



**Final Evaluation report**  
**Improving Energy Efficiency in Industry (IEEI) in Turkey**  
 UNDP – UNIDO and Ministry of Energy and Natural Resources  
 Turkey – October 3 2017



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## Foreword

The Improving Energy Efficiency in Industry in Turkey (Turkey IEE) project is a \$5.9 million GEF project, underway since February 2011. The project has four Turkish governmental partners, and is being implemented by UNDP and UNIDO. The Final Evaluation report covers Turkey IEE project activities undertaken from 2011 to the end of August 2017.

The evaluation team wish to mention the time and effort expended by all project participants and stakeholders during the site presence (July 2017) and after for efficiently and readily sharing the required information in the most transparent way.

Although the too short duration of the final evaluation mission (7 w-d), the evaluators met with key implementation partners in Ankara and Vienna, and a series of stakeholders in Istanbul: project beneficiaries and experts. In particular, we wish to thank Project Management Unit (PMU) in Ankara for arranging mission logistics, itinerary and stakeholder interviews.

The readiness to provide additional information and rescheduling meetings when needs be is a clear demonstration of their willingness to conclude with the project in the most relevant manner in accordance with the GEF requirements as managed by the UNDP and UNIDO. It is also important to mention the readiness of all national key implementation partners to support and provide on time the relevant inputs at the stage of final evaluation.

Finally and not the least, the project coordinator, UNDP and UNIDO provided their comments on the draft report with a reasonable delay. Majority of the comments were taken into consideration, especially with regards to recommendations.

The evaluation team hopes the final version of the FE report is in line with expectations and will contribute to the successful conclusion of the Project, and more importantly to go further toward the development of new EE project initiatives<sup>1</sup> based on lessons learnt over the last 6 years.

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October 3, 2017.

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<sup>1</sup> The GEF approved the UNDP project related to EE of Electric Motors. Most of the lessons learnt and recommendations could be useful to UNDP and the hosting institution (MoSTI) and KOSGEB in implementing the new project.

## List of Acronyms

APR-PIR	Annual Project Review / Project Implementation Report
BTOR	Back-to-Office Report
CC	Climate Change
CEO	Chief Executive Officer
CO	UNDP Country Office
CO <sub>2</sub>	Carbon Dioxide
CPAP	Country Program Action Plan
EA	Comprehensive detailed energy audit
DO	Development objectives
EE	Energy Efficiency
EECB	Energy Efficiency Coordination Board
EIE	General Directorate of Electrical Power Resources Survey and Development Administration
EMS	Environment Management Standard
EMU	Energy Management Unit
EnMS	Energy Management Standard
EOP	End-of-Project
ESCO	Energy Service Company
ES	Energy Savings
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FE	Final Evaluation
FS	Feasibility Study
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases
GoT	Government of Turkey
IEEI	Improving Energy Efficiency in Industry
IGA	Investments Grade Audit
ISO	International Organization for Standardization
ISP	Integrated Steel Plant
ITC	International Technical Consultant
KOSGEB	Small and Medium Enterprises Development Organization
kW	Kilowatt
kWh	Kilowatt-hour
LFA	Logical frame analysis
LGF	Logical
M&E	Monitoring and Evaluation
MENR	Ministry of Energy and Natural Resources
MIT	Ministry of Industry and Trade
MoEF	Ministry of Environment and Forestry
MoEU	Ministry of Environment and Urbanization
MoSIT	Ministry of Science Industry and Technology
MSE	Medium-size enterprises
MWh	Megawatt-hour (million watt-hours)
Mt	Mega Tons
MTE	Mid-Term Evaluation
MSE	Medium-sized enterprise(s)
NGO	Non-governmental Organization
NPD	National Project Director

OECD	Organization for Economic Cooperation and Development
OIZ	Organized Industrial Zone
PC	Project coordinator
PIF	Project implementation form
PIR	Project Implementation Review
PM	Project Manager
PMC	Project Management Cell
PMR	Partnership for Market Readiness – Project supported by the World Bank
PMU	Project Management Unit
PPG	Project preparation grant
PPM	Project Planning Matrix
ProDoc	Project document
QPR	Quarterly Project Review
R&D	Research and Development
RCU	UNDP/GEF Regional Coordination Unit
RTA	Regional technical advisor
SEC	Specific Energy Consumption
SM	Small and Medium
SMEs	small and medium-sized enterprises
SPO	State Planning Organization
TL	Team Leader
TOR	Terms of Reference
TUBITAK	Turkish Scientific and Technical Research Council
tCO <sub>2</sub>	tonne of carbon dioxide
TSE	Turkish Standards Institute
TUIK	Turkish Board of Statistics
TOE	Tons of Oil Equivalent
TRY	Turkish lira (= USD 1.95, October 2013)
TTGV	Technology Development Foundation of Turkey
VS	Very satisfactory
VSD	Variable speed drive controller
UNDAF	United Nations Development Assistance Framework
UNIDO	United Nations Industrial Development Organization
UNDP	United Nations Development Program
USD	US dollars
WP	Work plan
WTEA	Wall-through Energy Audit
YEGM	General Directorate of Renewable Energy (under MENR)

## Executive Summary

### Project Description

This report summarizes the findings of the Final Evaluation (FE) Mission conducted during July 2017 for the UNDP-UNIDO-GEF project entitled “Improving Energy Efficiency in Industry in Turkey”. For those who would like to focus on key findings, it is recommended to focus on Section 3 and 4 of the Draft report. Section 1 and 2 contains information on the project already known by all project partners.

The IEEI Project is a Project that assists the Government of Turkey (GoT) on its various efforts to reduce energy intensities and GHG emissions in the industrial sector through the demonstration of energy efficient practices and technologies to industrial stakeholders, and the subsequent adoption of these practices and technologies by industry.

Project activities include: a) strengthening of the institutional and regulatory framework for EE and energy management standards for industry; b) enhancing the capacity and awareness of the Turkish industry and its’ energy service providers; c) improving energy audit programmes for large industries and SMEs; and d) the demonstration of state-of-the-art energy management practices and EE measures as well as business and financial models.

While both UNDP and UNIDO are both GEF implementing partners on IEEI, UNDP assumes the overall management of the Project under the direction of the NPD from YEGM.

The ProDoc for IEEI was signed in April 2010; the Inception Phase of the Project, however, did not commence until May 2011.

### Evaluation Rating Table

The whole project performance is rated **Satisfactory** because of its achievements with only minor shortcomings. Only one project component (Outcome 3) got the rating **MS** because the Energy Audit Component did not perform in accordance with expectations in terms of impact and sustainability. The project proceeded with a series of significant improvements from Year 2014 to 2017 because of the quality support provided by the hosting ministry (YEGM) and more importantly because of the effort and dedication of the understaffed project team members.

Table 1: Summary Evaluation of Project

Outcomes	Relevance	Efficiency	Effective-ness	Overall Rating
<b>Outcome 1:</b> Strengthened institutional-regulatory framework and a national Energy Management Standard contributing to the implementation of the EE Law	65	5	5	5
<b>Outcome 2:</b> Enhanced capacity and awareness of Turkish industry and energy service providers	6	6	5	5,6
<b>Outcome 3:</b> Energy audit program for large industry and SMEs implemented	3	4	3	3,3
<b>Outcome 4:</b> State-of-the-art energy management	5	5	4	4.6

Outcomes	Relevance	Efficiency	Effective-ness	Overall Rating
practices and EE measures, business and financing models are demonstrated				
<b>Monitoring and Evaluation</b>	5	5	5	5
<b>Overall Rating</b>	<b>4.8</b>	<b>5</b>	<b>4.4</b>	<b>4.7</b>

Table 1 - Summary Evaluation of Project

The project overall evaluation of Sustainability is **ML** because of the low impact of the relevance of EA program and the absence of a financial mechanism to address the issue of loan guarantee to SMEs.

In term of replicability, the evaluator does not recommend the replication of a similar project framework for dealing with LSEs and SMEs within the same project initiative. The original project initiatives (2008) to implement two different projects were more appropriate. The replicability of a similar project is **Moderately unlikely (MU)**.

### Summary of conclusion, recommendations and lessons learned

The successful project implementation, despite the fact that the project has minor shortcomings in the achievement of its objectives, proven its sustainability especially in regard to the implementation of the EnMS in the industrial sector, especially in regard to LSEs, and potentially in medium-size enterprises.

The project formulation has been reviewed among others, in regard of the project beneficiaries (LSE vs SME) and the relevance of the EA or FS studies depending of the size of the enterprises.

Despite the fact that the project design did not encompass a significant budget provision for development and the implementation of a financial mechanism, the IEEI carried out a study related to the development of an integrated financial mechanism, sort of one-stop-shop, to be implemented by key players, that is to say, the KOSGEB, the TGGV and the YEGM. Within the current project timeframe, the evaluator has not been informed on the rollout of an integrated financial mechanism as proposed by the IEEI project through the related study.

#### Recommendations deal with:

- Further priority topic(s) and the extended scope to LSEs and MSEs
- Relevance of Feasibility Studies (FS) opposite to EA
- Integrated Financial Mechanism a basic need
- Scope of works, technologies and project beneficiaries
- Relevance of the Inception Stage - CTA's involvement
- Demonstration Component and organizational arrangement
- Verification of quantitative Impact of EE measures
- Let's come back to the right title of the head of the PMU

#### Lessons Learned deal with:

- Diversity of Project Beneficiaries: needs and capacities
- Promoting Energy Audit (EA) or Investment Grade Audit (IGA) or Wall-through EA (WTEA) or Feasibility studies (FS). What should be priority?
- Role and relevance of the CTA's involvement at the earliest stage
- Relevance and appropriateness of a tight and efficient M&E component
- UNIDO quality technical inputs and the UNDP support (management) were of the utmost importance toward the successful project implementation

- Replication: EnMS is the proven basic key tool for dealing with EE in LSE, and potentially with medium-scale enterprises (MSE).

## 1. Introduction

### 1.1 Purpose of the Final Evaluation

The overall purpose of the evaluation is to measure the effectiveness and efficiency of project activities in relation to the stated objectives endorsed by the GEF(2010), including any changes agreed upon with regards to outputs, timeframe, project implementation and any other results.

The terminal evaluation has the following complementary purposes:

- a) To promote accountability and transparency, and to assess and disclose the levels of success the project has achieved;
- b) To synthesize lessons learned that might help improve the selection, design and implementation of further similar GEF activities.
- c) To provide feedback on issues that could be recurrent across the portfolio and need attention. In addition to implement improvements with regards to previously identified issues.

It is not unusual to face the situation where for one facet or sub-component of the project did not perform as per expectations. Consequently the final evaluation (FE) is also required to assess how the project undertook an adaptive management methodology to improve the outcome of the project following its mid-term review (and the improved strategy), in addition to drawing lessons that can both be used to improve the sustainability of benefits from this project and, at the end of the day, to aid in the overall enhancement of the UNDP CO programming.

In essence, the Terminal Evaluation serves as an agent of change and plays a critical role in supporting accountability. The emphasis of the evaluation mainly focused on major issues and challenges the project has had to overcome over the last years:

Project Indicators The evaluation assessed the achievement towards indicators related to expected outcomes, planned duration budget and co-financing of the project.

Implementation The evaluation assessed the implementation of the project in terms of quality and timeliness of inputs and efficiency, the effectiveness of activities carried out and the responses to evaluation recommendations made during the mid-term evaluation in December 2013.

Project Outputs, Outcomes and Impact The evaluation assessed the outputs, outcomes and impacts achieved by the project as well as the likely sustainability of project results.

At the stage of the FE, the evaluation team mainly dealt with issues related to the sustainability of the major outcomes, likely replication of similar project initiatives, the project implementation scheme and lessons learnt.

### 1.2 Evaluation Team, Scope, Planning & Methodology

The final evaluation team encompasses two members:

- Louis-Philippe Lavoie, FE Team Leader (TL) and international energy efficiency (EE) expert in the industrial sector and financial mechanisms;
- Suleyman M. Bulut, national EE consultant.

In accordance with the contract duly signed in May 2017 (revised in August 2017), the FE team expects to carry out the FE tasks (desk review/field mission/reports draft and final) by the end of September 2017<sup>2</sup>.

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<sup>2</sup> Has been extended at the end of September because of the FE report presentation and the project closing workshop has been held on September 11 in Ankara. The FE team leader attended the closing WS.

The field mission achieved planning is in Appendix 1.

In term of methodology, the FE team complies with four phases as defined in the GEF Guidelines as follows:

- **Brief Pre-evaluation:** Learning on the UNDP/UNIDO and the National EE and CC policies. Information can be readily found on the UNDP CO website and others such as but not limited to Ministry of Energy and Natural resources (<http://www.enerji.gov.tr/en-US/Mainpage> ), General Directorate of Renewable Energy (<http://www.eie.gov.tr/>) and Energy Market Regulatory Authority (<http://www.emra.org.tr/en/home> ).
- **Preparatory:** In essence, the preparatory stage deals with the comprehensive desk review of key documents produce by the project from 2011 to 2017. In May 2017, the UNDP CO arranged and carried out two conference calls with the aim of sharing the same understanding of the FE and to secure full transparency of the FE procedures. The regional technical advisor (RTA) attended the second conference call.
- **FE Implementation:** Mainly related to the field mission (10 w-d in July). Because of the time constraint (short field mission) and because of the mandatory visit to UNIDO in Vienna, the FE team has not been in a position to return to Ankara for the final debriefing with the UNDP CO. From his home-office, the FE TL supported by the national evaluator prepared the draft report in August 2017. The draft report has been submitted to UNDP CO on August 28. The pre-final report has been submitted on September 25 and took into consideration comments provided by the UNIDO, UNDP and the project management unit(PMU).
- **Post-evaluation:** Taking into consideration the usefulness of the Terminal Evaluation Report, especially in terms of lessons learned and recommendations made towards the future development of similar projects and cooperation with relevant authorities and shareholders as a result of the IEEI, the RTA recommended that the UNDP CO to make an amendment to the FE Team contract so as to carry out an additional site visit in September.

### 1.3 Structure of the evaluation report

This evaluation report is presented as follows:

- Project description and development context, inclusive of the Track record of the project initiative and overview of project implementation from the commencement of operations in March 2010 until August 2017 and its expected results;
- Review of project results based on project design and execution;
- Conclusions and recommendations that can increase the performance of similar project in Turkey;
- Lessons learned from implementation of the project from 2011 to 2017.

This evaluation has taken into consideration the Guidance for conducting Terminal Evaluations of UNDP-Supported, GEF-Financed Project (2012):

<http://web.undp.org/evaluation/documents/guidance/GEF/UNDP-GEF-TE-Guide.pdf>

#### Key Issues Addressed:

The GEF Monitoring and Evaluation Policy specifies that the Terminal Evaluation shall assess, at a minimum:

- The achievement of outputs and outcomes and provide ratings for the targeted objectives and outcomes;
- The likelihood of sustaining the achieved outcomes at project termination, and provide ratings for the aforementioned outcomes.

Evaluations in the GEF explore five major criteria:

- I. **Relevance:** the extent to which the activity is suited to local and national development priorities and organizational policies, including changes over time.
- II. **Effectiveness:** the extent to which an objective has been achieved or how likely it is to be achieved.
- III. **Efficiency:** the extent to which results have been delivered with the least cost to resources as possible.
- IV. **Results:** the positive and negative, foreseen and unforeseen, changes to and effects produced by a development intervention. In GEF terms, results include direct project outputs, short- to medium-term outcomes, and longer-term impacts including global environmental benefits, replication effects and other local effects.
- V. **Sustainability:** the likely ability of an intervention to continue to deliver benefits for an extended period of time after completion. Projects need to be environmentally as well as financially and socially sustainable.

The Terminal Evaluation serves as an agent of change and plays a critical role in supporting accountability. The emphasis of the evaluation mainly focused on major issues and challenges the project had to deal with over the previous years:

Project indicators The evaluation assessed the Milestones toward indicators related to expected outcomes, planned duration and budget and co-financing of the project.

Implementation The evaluation assessed the implementation of the project in terms of quality and timeliness of inputs and efficiency, the effectiveness of activities carried out and the responses to evaluation recommendations made during the mid-term evaluation in December 2013.

Project outputs, outcomes and impact The evaluation assessed the outputs, outcomes and impacts achieved by the project as well as the likely sustainability of project results.

At the stage of the FE, the evaluation team mainly dealt with issues related to the sustainability of the major outcomes, the likely replication of similar project initiatives, the project implementation scheme and the lessons learnt.

## 2. Project description and Development context

### 2.1 Background of the UNIDO-UNDP Project Initiative and Rational

Turkey is a rapidly industrializing country with booming energy demand increase (rate of growth in primary energy demand between 1990 and 2012 was recorded as 3.8%) and ever-growing emissions while the energy intensity of its economy quite higher than other OECD countries. By the time of the project initiation, Turkey's energy intensity was calculated as 0.27 tons of oil equivalent (toe) in energy to generate US\$ 1,000 of GDP (in 2000 US\$) compared to the OECD average of 0.18 toe/US\$ 1,000 by the IEA<sup>3</sup>. Furthermore, Turkey must import three fourth of its energy needs which causes an additional burden on its foreign trade balance.

These facts necessitated addressing energy efficiency and since early 2000s a series of measures were undertaken supported with the activities of aligning the legislative framework with European Union and strengthening the institutional capacity of relevant institutions such as the General Directorate of Electrical Power Resources Survey and Development Administration (EIE)<sup>4</sup>. The activities include labelling of electrical

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<sup>3</sup> IEA, Key World Energy Statistics, 2009

<sup>4</sup> General Directorate of Electrical Power Resources Survey and Development Administration (EIE) was established in 1981 by the government to conduct renewable energy and energy efficiency related activities, research and their encouragement and later it was reorganised as the General Directorate of Renewable Energy

appliances, updating of building codes, series of energy saving measures and some projects in the building and industry sectors. Although these were important steps for adoption of energy efficiency as a main area of government activity and public awareness rising, they were insufficient to deliver meaningful savings and cutting down emissions.

Necessity of increasing energy efficiency is of utmost urgency in the industry as the manufacturing industry is one of the main drivers of Turkish economy, accounting for 24.2% of total GDP. The Turkish manufacturing industry has been growing over the past decade and increasing at a compound annual growth rate of 12% since 2003. Moreover, the manufacturing industry accounts for 35% of the total energy consumption. Additionally, there is great energy saving potentials in almost all of the industrial processes. According to the reports of World Energy Council – Turkish National Committee, estimated energy savings in major energy consuming industrial sectors are between 20 to 25%<sup>5</sup>.

In order to facilitate for addressing this huge potential for energy efficiency, addition to the nationally owned, funded and run projects, international donors such as UNIDO and UNDP also supported various projects. Among them, “Improving Energy Efficiency in Industry” was developed, which is subject to this evaluation.

## 2.2 Track record from PIF (2008) to CEO’s approval (2010)

In order to prepare a project for improving energy efficiency in industry in Turkey, a “Request for Project Preparation Grant (PPG)” has been submitted to the GEF dated 28<sup>th</sup> August 2008). At the project preparation stage, the following studies were to be completed under the PPG:

- A preliminary assessment of baseline scenario (oddly, a solid baseline study was not completed until the interim report prepared by national consultant Mehmet Guler, submitted 15.01.2015.)
- Needs assessment and demand for improving capacity upgrading of relevant policies, subsectors and various stakeholders.
- Initial criteria for selecting industrial subsectors and clients for preliminary walk through audits, more comprehensive audits and demonstration projects would be developed.

Timeframe for project preparation and implementation was envisaged to be between November 2008 and March 2010 and the total project preparation costs and financing to be a total of 270.000 USD, of which 120.000 USD to be GEF support and 150.000 USD to be co-financing.

The objective of the project is defined as “addressing barriers to energy efficiency in the Republic of Turkey by introducing energy efficiency measures in the industry” according to the Initiation Plan for a GEF Project Preparation Grant (PPG) document which has been agreed by UNDP Resident Representative on 22.06.2009.

The original PIF for the project titled “Improving Energy Efficiency in Turkey Project” (GEF ID: 3747 UNDP ID:4113) is based on UNDP/UNIDO’s project proposal which had been put forward in collaboration with EIE and Technology Development Foundation (TTGV) of Turkey and approved by GEF Council on January 27, 2009.

At the same time, a parallel UNIDO submission was also prepared in collaboration with the Small and Medium Enterprises Development Organization (KOSGEB) and the Turkish Standards Institute (TSE) with a similar objective (enhancing industrial energy efficiency), but with a stronger emphasis on small and medium enterprises (SMEs), introduction and implementation of the energy management standard, with more active role of the TSE, and introduction of and capacity building on energy system optimization approach.

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(YEGM) under the Ministry of Energy and Natural Resources (ETKB) in October 2011. Thus, prior to this date, as one of the beneficiary of the project, this institution is referred as EIE, but later as YEGM in related documents.

<sup>5</sup> DEKTMK, Türkiye Enerji Görünümü 2014.

The above UNIDO proposal was recommended by GEFSEC for merging with the approved UNDP/UNIDO concept into a single project, to ensure a harmonized impact and cost minimization from the management point of view, at no additional budget commitment from GEF. Building on that recommendation, the project design has been realigned to deal with both organisations' objectives. This crucial decision of merging two projects into one has resulted in some problems, which have created threats to the successful implementation and will be discussed later. It is important to mention that the approved Project Document did not define any particular priority in term of industrial sub-sectors excepted a sort of loose breakdown structure related to the size of industrial facilities. As approved by the GEF (2010), the "Improving Energy Efficiency in Industries (IEEI)" was expected to intervene, in a way or another, in 515 industrial facilities<sup>6</sup> more or less split up equally between large size and SM size enterprises.

The project was to be implemented by the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO) with financing support provided by the Global Environment Facility (GEF) with four implementing partners:

- YEGM (formerly EIE) or the General Directorate of Renewable Energy under the Ministry of Energy and Natural Resources (MENR);
- KOSGEB, an agency affiliated with Ministry of Industry and Trade or MIT that manages funds to support EE for SME industries;
- TTGV or the Technology Development Foundation of Turkey, an NGO under a PPP operating modality with funds to support EE in industry; and
- TSE or the Turkish Standards Institute (TSE), the agency responsible for certification of industrial and service provider entities to ISO and other standards adopted by the Government of Turkey GoT.

While both UNDP and UNIDO are GEF implementing partners on the project, UNDP assumes the overall management of the Project under the direction of the NPD from YEGM.

The ProDoc for IEEI was signed in April 2010 and the project inception phase was started on 14<sup>th</sup> February 2011 with the appointment of the Project Coordinator and the Project Associate. The Inception Report has been submitted in May 2011. During the inception phase a series of meetings was organized with the implementing partners to discuss the outline of the work plan and budget. Following these meetings, work plan and budget workshop has been held with the attendance of UN agencies UNDP and UNIDO and Implementing partners EIE, KOSGEB, TSE and TTGV.

The project staff (Project Coordinator and Project Associate) started work on 14<sup>th</sup> February 2011. The Inception Workshop and the kick-off meeting was organized on 2-3<sup>rd</sup> of May 2011.

### **Adaptive Management at Year 3 of the Project timeframe**

The first Project Implementation Report (PIR) was prepared for covering the term 2011-2012 and rated the project as moderately satisfactory. The project coordinator proved unable to provide the necessary ongoing project management requirements due to health and other issues and as a result, she left in December 2012. The project coordinator position was recast as an international CTA (Chief Technical Advisor) The CTA was recruited to start on 02 July 2012. The CTA, acting as project coordinator, provided relevant advice in regard to a major adjustment to the project strategy, especially with the aim of focussing on the rollout of the EnMS. On August 2013, his contract had not been renewed. A part-time CTA has been selected in 2014.

As general comment for adjustment, it was underlined<sup>7</sup> that "all project milestones will need to be deferred to reflect the nearly two-year delay in tangible project implementation

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<sup>6</sup> Ref. : ProDoc page 38, Box 4.

<sup>7</sup> Project MTR report, December 2013

activities over the dates envisaged in the ProDoc”. The need for a duration extension has been discussed with the Project Steering Committee and with UNDP and UNIDO. So by the time the first PIR was prepared the project was considered to be drastically behind schedule and additional time would be required. Total co-financing disbursed as of June 2013 was 17,288 USD.

According to the MTR (2013), which concluded the project performance as “Moderately Unsatisfactory”, it was stated that “no energy savings” were fulfilled by the Turkish industry because of the IEEI. The proposed OIZ activities (Establishment of Energy Management Units, Energy Management System - EnMS - trainings) had been authorised to take place in February 2014. It was conceded that “although it is valid to say that the project has not lived up to its potential in this reporting period (2011-2014), the MTR evaluator mentioned in his report: “in theory, the project could still be ultimately successful” and the remaining budget was still sufficient to achieve the adjusted WP. Up till 30<sup>th</sup> of June 2013, disbursements were 750,000 USD out of the total budget of \$6,020,000.

A new Project Coordinator (PC) was appointed in November 2013 as the previous one left in August 2013. The newly assigned PC was responsible for the project management until the full project completion in 2017. Among others the PC has been asked to recommend and proceed with a series of adjustments to the WP and adjust a few outputs accordingly. Based on the MTR recommendations, the following actions have been:

- Extend the Project for another 21 months to a new terminal date of August 30, 2017 to allow the Project to undertake all planned activities with the following rough order of priority.
- Enhance and provide a stronger coordination functions between the 4 implementing partners, 2 execution agencies and industrial stakeholders on the Project.
- UNDP and UNIDO were required to closely monitor Project progress and adaptively manage the Project according to realistic achievements in terms of outcomes and revised outputs.
- Promote a range of financing options to implement demo EE measures instead of an emphasis on ESCOs.
- Report on the linkages and collaboration with the World Bank’s PMR Project in Turkey as a means to improve the quality of industrial MRV and ultimately, enhance EE investment returns through proposed carbon pricing instruments.
- Simplify the Project Planning Matrix (PPM) and reset realistic EOP targets

Accordingly the Project Planning Matrix (PPM) was revised with a few revised outputs and indicators. The 2014 PIR was submitted on 8<sup>th</sup> November 2014, which rated overall risk substantial and both DO and IP as unsatisfactory toward priorities and action highlighted above.

An Interim Report<sup>8</sup> titled “Development and Running of a New Model for IEEI” has been submitted on January 2015. Initially anticipated energy savings numbers were reviewed as the analytical part of the baseline study that could not be completed before. To undertake this task, a consultant was hired. The consultant elaborated on the baseline energy consumption patterns of the industrial sub-sectors. By using both top down and bottom up approaches (both energy intensity and specific energy consumption data) he recalculated all the baseline data. Relying on this method and the revised past data, he also dealt with the energy consumption forecasts. The findings were shared with/appreciated by all project partners. The consultant was also tasked with developing alternative scenarios to calculate the possible energy and CO2 savings through the project activities.

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<sup>8</sup> By MEHMET GÜLER Consultant, final version 26.01.2015

Take-off: First tangible results took place in early 2015

2015 PIR on 24th of June 2016, which rated the project as Moderately Satisfactory, points out that certain progress has been achieved in 3 topics:

- I. The pilot audit program was initiated.
- II. The OIZs were selected and equipment tender is ongoing.
- III. The call for expert-level training was completed, and the dates were determined.

Nevertheless, it also stressed that despite all mentioned progress, a little more time was needed to see the actual investments. It also questions the consistency of many elements of the projects “as any delays early on can have a spiral effect throughout the process, causing unfortunate delays” and as a result implementation was complicated on several results for a long time. Yet in this PIR period the implementation was accelerated due to the performance indicators (conditionality) that had to be met in order to have a chance for a non-financial extension. The Project Strategy Document was revised and approved by the Steering Committee (June 2015) to reflect more realistic activities, while still maintaining the overall objectives. The report indicates that the new strategy was working and provided certain benefits in the remaining stage of the project implementation.

2016 PIR dated September 2016 rated the project as Satisfactory and indicated that there have been substantial improvements particularly in certain project activities, among others the EnMS training and implementation.

It also stresses that the end of project target<sup>9</sup> was determined as 'at least 190 GWh per year (energy and fuel)' saving, which equals to 16,340 toe (tonne of oil equivalent) was already achieved and exceeded. The cumulative<sup>10</sup> energy savings provided in the last three years are indicated as:

- The project has helped catalyze 264,950 USD investment which resulted in 617 toe energy saving annually by OIZ supports. The activities undertaken in 4 of the selected 6 OIZs (namely Gaziantep, Ankara, Bursa and Denizli) EMU (energy management unit) personnel helped factories in their own zones to develop and realize energy efficiency investments. In this regard, a total of 22 projects were invested in 9 industrial facilities.
- The project has also helped catalyze 4,938,400 USD investment which resulted in 13,988 toe energy saving annually by EnMS program. Totally 3 projects in 2 companies were developed in EnMS user-level program whereas totally 30 projects in 16 companies were developed in EnMS expert-level program.
- The project has helped catalyze an investment of 385,000 USD, which resulted in 169 toe energy savings annually due to the audit program.

Other positive developments were as follows:

- In this period, energy audits were undertaken in 9 companies of which 3 companies (namely Saint-Gobain, Termikel, ORS) actually developed 4 investment projects as a result of the audits.
- The total number of projects which enabled investments developed by the project activities is 59.
- The total value of the investments is 5,588,350 USD whereas the calculated annual energy saving is 14,774 toe. Between 2014 and 2015 totally 9 industrial companies were joined with 24 investment projects. Those savings were achieved through the investments taken place in these factories. The total amount of the investments is 4,229,000 USD.

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<sup>9</sup> As per the Project Planning Matrix ProDoc 2010

<sup>10</sup> Based on EE and Investment reports submitted by the industrial sector. The PMU developed and updated a xls spread sheet for that purpose.

The 2015 PIR also indicates that the end of project target which, was determined as “60,900 ton CO<sub>2</sub> direct emissions reduction” was also already achieved and exceeded with the following results:

- The calculated annual CO<sub>2</sub> emission reduction acquired by helping establish EMUs in 6 OIZs is 3,239 tonne.
- The calculated annual CO<sub>2</sub> emission reduction acquired by EnMS program is 85,805 tonne.
- The calculated annual CO<sub>2</sub> emission reduction acquired by audits is 1,087 tonne. Therefore, it is estimated that the activities of the project directly have led to 90,131 ton annual CO<sub>2</sub> saving.

### **2.3 Project start and duration**

On 5<sup>th</sup> May 2010 the projects was requested for CEO endorsement/approval and a resubmission was done on 29<sup>th</sup> of June 2010 and it was approved by the GEF Chief Executive Officer in August 2010. The Implementation of the start-up was endorsed as of September 2010, a mid-term evaluation was envisaged in March 2013 and the project closing date was planned for August 2015.

GEF support of \$5.9 million has been provided to support these activities, which will be co-financed by UNDP and UNIDO (\$60,000 and \$50,000 respectively), the Turkish Government partners and TTGV with a \$10.4 million contribution. An expected \$17.0 million investment by industry in audits, energy management and energy efficiency measures and technologies resulted in direct emissions reduction of around 61 kilotons of CO<sub>2</sub> annually and led to substantial indirect emission reductions.

### **2.4 Problems that the project sought to address and project beneficiaries**

According to the final PIF, the project aimed to remove the identified barriers through a comprehensive and integrated approach focusing on:

- 1) Contributing to the implementation of the EE Law by strengthening the institutional-regulatory framework and promoting a national Energy Management Standard;
- 2) Enhancing capacity and creating awareness in Turkish industrial companies as well as financial service and energy service providers;
- 3) Implementation of energy audits in large industry and SMEs;
- 4) Demonstration of state-of-the-art management practices, EE measures and technologies and appropriate business and financing models.

Industrial enterprises, both large scales and SMEs, were identified as beneficiaries, which were targeted to maximise the efficiency of their production process and manufacture energy efficient products. As beneficiaries, industrial companies were to go through audits, implement EE and rehabilitation measures and establish energy management systems. Again, as the project was the result of merging two projects, one targeting medium to big size companies on one hand, and targeting SMEs on the other hand, it was not foreseen that working with them and the financial and technical mechanisms of these two kinds of beneficiaries were totally different. Through interviews with beneficiaries and institutions like KOSGEB, it was observed that this sort of arrangement brought about many difficulties, especially in regard to coordination and approval process, that threatened the overall success of the projects.

### **2.5 Development objectives of the project and baseline**

The objective of the project has been defined as “to improve energy efficiency of the Turkish industry by enabling and encouraging companies in the industrial sector for efficient management of energy use by different energy conservation measures and energy efficient technologies”. In order to achieve this objective, the delivery of the following outcomes were envisaged:

- Outcome 1: Strengthening institutional-regulatory framework and a national Energy Management Standard contributing to the implementation of the EE Law
- Outcome 2: Enhanced capacity and awareness of Turkish industry and energy service providers.
- Outcome 3: Implementation of energy audit program for large industry and SMEs.
- Outcome 4: Demonstration of state-of-the-art energy management practices and EE measures, business and financing models.
- Outcome 5: Monitoring and evaluation; knowledge sharing and info dissemination.

As per the “Business-as-usual” scheme in Turkey, it was underlined that “most companies have not internalized the EE procedures by putting them as part of their daily activities proactively and creating a culture of EE management. It was also stressed that EE initiatives and EE technologies in Turkey remained quite limited, mostly to large industries (e.g. steel and cement) and in the absence of the project’s interventions, institutional capacity to implement innovative EE measures would also remain limited, participation of private investors and ESCOs<sup>11</sup> would be delayed without the introduction of new mechanisms to address performance risk in EE projects, while information dissemination on EE financing and practices would also remain limited.

## 2.6 Expected Original Results

According to the Project Document, the impact of GEF intervention and eventual replication during 10 years of GEF project influence period was estimated to enable the industry to realize 10% of savings by 2025, worth cumulatively 266,673 GWh. Thus, cumulative emissions reduction from the GEF alternative scenario are estimated at 32 MtCO<sub>2</sub> during 2016-2025, calculated over an average 10 years of investment lifetime, and assuming GEF causality factor of 40% (due to ongoing and future national efforts and donor-funded initiatives that will encourage uptake of EE technologies as well).

As solely for the impact of the project<sup>12</sup>, at least 190 GWh per year of energy savings (energy and fuel) and direct emissions reduction of 60.9 ktCO<sub>2</sub> and hence 609 ktCO<sub>2</sub> in 10 years were expected. In regard to cumulative indirect emission reductions due to the project’s capacity building activities the impact is estimated in-between 1.8 MtCO<sub>2</sub> (bottom-up approach) to 32.7 MtCO<sub>2</sub> (top-down), all according to the Project Document.

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<sup>11</sup> Again, it is important to mention that ESCO in Turkey has not the same meaning than in other countries. ESCO in Turkey do not deal with project financing (excepted only one Energy Service Provider the evaluation team met in Istanbul in July 2017).

<sup>12</sup> As per the original ProDoc 2010. Quantitative targets were scaled down in 2015 to fit with the approved new project strategy. The new targets are 15 ktCO<sub>2</sub> and 46.5GWh a year. In regard to indirect impact, the new target are: 0.45 MtCO<sub>2</sub> (bottom-up approach) to 8 MtCO<sub>2</sub> (top-down). Again, it is important mentioning that the GEF does allow the project to change targets. The FE is based on original targets, ref. Prodoc 2010.

### 3. Findings and Evaluation Rating

#### 3.1 Project Design / Formulation and Updating

The project design and formulation as well as the IEEI implementation “first stage 2011-2014” has been extensively reviewed at the stage of MTR and previous PIRs. The MTR report pointed out many inadequacies and weakness. The MTR report (end of 2013) mentioned: *‘For the Project to succeed, the effectiveness of the new Project Coordinator and CTA will be crucial. The new PC will need to utilize lessons learned from the execution of IEEI over the past 30 months and raise the level of confidence of implementing partners that the PMC can deliver the intended outputs and outcomes of the Project. This will be a challenging task notably the coordination and facilitating consensus amongst Project’s 4 implementing partners, 2 executing agencies and industrial stakeholders. The CTA will need to be effective in transferring EE knowledge to both public and private sector stakeholders, and leading industrial stakeholders towards EE investment commitments and reducing their energy intensities’*. In addition the MTR recommended revising the Project Planning Matrix (PPM) and setting up (and clarifying) new targets to make the whole project “achievable”.

Such as mentioned in the previous section (see Section 2.2 above) the GEF asked to merge the UNIDO and the UNDP project initiatives. The PPG budget (120kUSD/GEF + 150kUSD from Turkey side) should have been an appropriate amount of money for setting up the baseline and designing a dual implementation strategy for those two different categories of energy end-users. This is, in the evaluator’s understanding, the key weakness of the project formulation. Experts involved at the project design stage did not recommend such a differentiated approach. In addition, the PPG budget provisioned only 35 kUSD (30% of the PPG) for finalizing (in other words for formulating) the project design and presentation, including the M&E plans. About 70% of the PPG budget provision was granted to (i) baseline assessment (30%); (ii) communication, capacity building and training strategy, targets and specific activities (25%) and 15% for elaborating some selection criteria for EA and demo components. Such a “questionable” PPG budget breakdown structure is unfortunately not unusual within the GEF project design budgeting. How it can be possible to get the best project design while the PPG spends 35k\$ only for drafting the ProDoc and the GEF-CEO materials? The project has been designed as a sort of “open bar” with the aim of dealing with EE in the whole industrial sector mixing up large scale and SMEs into the same basket. The project formulation did not limit the scope of the project in term of priority industrial sub-sectors and did not promote a sectorial strategy based on the size of facilities<sup>13</sup>.

All this is easier to say some years after the project design stage (2008 to 2010); even at the Inception stage (2011), the issue related to priority industrial sub-sectors has not been appropriately addressed. Seemingly, the task related to the baseline assessment was quite weak, and maybe not very useful for defining the priority sub-sectors. The report entitled “ Interim Report: Development and running of a New Model” addressed the subsector-based issue in 2015 only, that is to say at Year 4 of the project timeframe.

#### The first weakness: Lack of adapted strategies for dealing with LSEs and SMEs

As formulated through 5 structured components the project formulation complied with the UNDP and GEF requirements although the scope of work was too extended and the implementation strategy was not clearly developed.

As designed and formulated, the IEEI made a merging of two different types of energy end-users in the industrial sector. It is well known that the practical way to support SMEs in accordance with their needs is quite different than it is in large-scale industrial facilities.

<sup>13</sup> The ProDoc mentioned that the IEEI should deal more or less, with a similar number of enterprises belonging to SMEs and large-scales industrial facilities whatever is the industrial sector.

Although the WTEA and EA methodologies look like similar in both industrial sectors, the required level of technical capacity and expert profiles are significantly different. Promoting EE in large-scale industrial facilities requires the involvement of the best and highly qualified experts, which is not the situation for dealing with EE in SMEs. Most of the times, large industrial facility managers get much more benefit from a subsectorial-based technical support. As a rule, the large-scale industrial sector is already involving very capable technical staff members, while the situation is not the same in SMEs. In addition, those industrial facilities are in a position to select the best and, in consequence, the most costly experts from Turkey or abroad. Again, the situation is not the same in SMEs. In addition the project provisioned a significant budget for dealing with EA, while such an approach does not fit appropriately with the large-scales industrial facilities. The operation and maintenance managers do not need a costly EA for implementing EE measures; they need a high quality feasibility study (FS) for implementing some selected EE improvements. Most of the time, the EA is useful to SME's managers for making an investment decision while large enterprises need a series of quality and accurate FS for making the decision because of the high capital-intensive requirement, which is not the same in SMEs. Even the way to finance investments is different.

Consequently, the major weakness of the project formulation is related to the lack of adapted implementation strategies for improving EE in both SME and large-scale enterprises.

#### The Second major Weakness: Lack of relevant Financial Mechanism

The investment financing issue is not the same for large-scale enterprises and SMEs. As a rule, large-scale enterprises are in a position to plan their investments on a yearly basis and do not need a particular financial mechanism to make the investment decision, especially those requiring moderate capital-intensive investments in EE. In addition, the TTGV is in position to provide soft loans to industrial facilities for investing in new equipment, production line extension, or new industrial buildings. In certain cases, the new asset can be used as collateral to back the soft loan. In other words, large-scale enterprises do not need a specific EE financial mechanism.

SMEs' financial needs are different. The EE investments deal with low capital-intensive projects, as a rule with a cap investment lower than 250,000\$, most of the time around 100,000\$. Investments are usually related to improvements of existing equipment already installed. As an instance, boiler retrofitting, air compressor improvements and electric motor drives, load control systems and lighting systems, etc...Most of the time, investments are not supported by the TTGV without providing a valuable asset as collateral because the "EE improvement" is not considered as a 'guarantee. The situation is different on a mature EE market, while the financial institutions have a long track record with the ESCO business model project-financing scheme.

The ProDoc provisioned a budget for dealing with the development of an integrated financial mechanism. The 2015 report "Improving Energy Efficiency Financial Mechanisms for Industry in Turkey" is a quality document. The document provided relevant information on the Turkish financial support/mechanisms in place and recommended the implementation of an Integrated EE Finance Support Mechanism with the aim of simplifying and offering a more efficient response to EE project financing needs, especially to SMEs. For example, the TTGV's program (among the most important financing program) has been assessed more or less efficient or useful to SME. As a result, only 14 EE projects were supported by the TTGV until 2015. The main reason for the limited disbursements is a heavy and bureaucratic project approval process with rigid technical requirements that can be met by only a limited number of larger firms with sufficient internal capacity for project preparation.

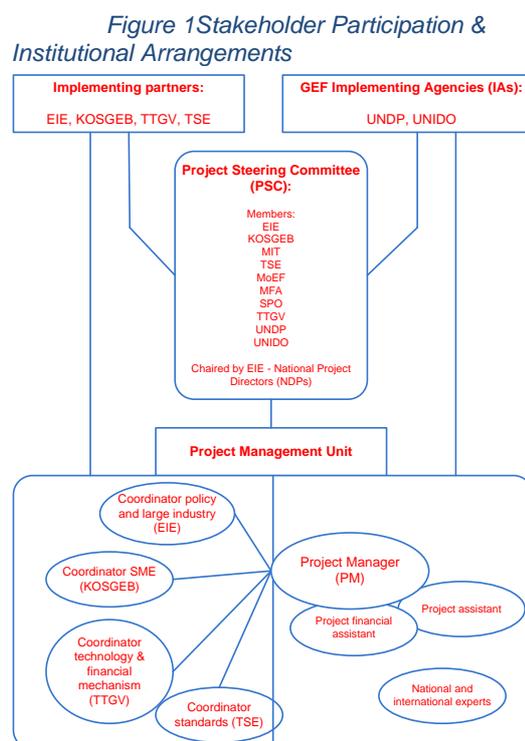
### 3.1.1 Stakeholders participation and Institutional arrangements

NOTE: EIE has been changed as YEGM

The project is implemented jointly by YEGM (General Directorate of Renewable Energy under MENR), TTVG, TSE and KOSGEB as **Implementing Partners** (Local Executing Agencies in GEF terminology) following UNDP guidelines for nationally implemented projects as well as UNIDO Guidelines on Technical Cooperation Programmes and Projects. The four agencies assume the overall responsibility for the achievement of the project results. YEGM will sign the budgeted Annual Work Plan (AWP) with UNDP on an annual basis, as per UNDP rules and regulations, while YEGM also made an agreement with UNIDO based on UNIDO rules and regulations. Part of the UNDP/YEGM budget is allocated for activities in which TTVG takes the lead, while part of the UNIDO/YEGM budget is for activities in which KOSGEB and TSE takes the lead as responsible party. YEGM designates a senior official as the **National Project Director (NPD)** for the project. The NPD is responsible for overall guidance to project management to (i) coordinate the project activities with other Government entities; (ii) certify the expenditures in line with approved budgets and work-plans; (iii) facilitate, monitor and report on the procurement of inputs and delivery of outputs; (iv) approve the Terms of Reference for consultants and tender documents for sub-contracted inputs; and (v) report to UNDP and UNIDO on project delivery and impact.

The **Project Steering Committee (PSC)** has been established at the inception stage of the project to monitor the project progress, to guide its implementation and to support the project otherwise in achieving its listed outputs and outcomes. The PSC is chaired by YEGM and be composed of the YEGM, KOSGEB<sup>14</sup>, Ministry of Energy and Natural Resources (MoENR), Ministry of Industry and Trade (MoIT), Ministry of Environment and Forestry (MoEF), State Planning Organization (SPO) and Ministry of Finance, TTVG and TSE<sup>15</sup> as well as UNDP and UNIDO<sup>16</sup>. Other members (e.g. industrial associations, research institutes)<sup>17</sup> can be invited by the decision of the PSC on as-needed basis, however, by taking care that the PSC remains operational by its size. Where needed, Working Groups can be formed of experts and stakeholders including representatives from industry and industrial associations who determine how the programme should be implemented per sector or group of industries.

The Project Manager (now called Project Coordinator: PC) participates as a non-voting member in the PSC meetings and is also responsible for compiling a summary



The Project Steering Committee has 3 distinct roles:

- <sup>14</sup> Executive: in this case the NPD of YEGM representing the project ownership and co-chair
- <sup>15</sup> Supplier: parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project
- <sup>16</sup> Assurance: supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions, in this case a representative from UNDP and UNIDO
- <sup>17</sup> Beneficiary: individual or group of individuals representing the interests of those who will ultimately benefit from the project.

report of the discussions and conclusions of each meeting. The NPD (YEGM) chairs the PSC. The Project Board plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the PC and any delegation of its 'project assurance'. Based on the approved Annual Work Plan, the Project Board can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

In accordance with the Prodoc, the Project Management Unit (PMU) set up by project partners was planned to ensure adequate organizational structure and systems for facilitating implementation. The Project Coordinator (PC) heads the PMU; he was expected to be supported by one Project Assistants, one project Administrator for Administration and Finance (MA&F) and one technical staff for Audits and Demonstration. In addition, adequate numbers of technical experts in different disciplines and project management experts/consultants with expertise in project, finance, energy, legal matters, etc. were associated on a longer-term or short-term basis depending upon the work load. Short job descriptions for the various positions/assignments were enclosed as an Annex to the CEO Endorsement Sheet. Requirement of additional support staff must be assessed and experts are engaged on contract/assignment basis as per requirement. In practice, the standing team member to be involved in activities related to EA and demonstration has not been hired. The Evaluator makes a recommendation with the aim of better organizing the project management unit in the future.

UNDP and UNIDO maintain the oversight on and manage the overall project budget. They are responsible for monitoring the project implementation, timely reporting of the progress to GEF as well as organizing mandatory and non-mandatory evaluations. It also supports the Implementing Partners (local executing agencies in GEF terminology) in the procurement of the required expert services and other project inputs and administers the required contracts. Furthermore, it can support the co-ordination and networking with other related initiatives and institutions in the country

### 3.1.2 Review of the planned costs and disbursements

Table 2 below highlights the disbursements current status opposite to the planned budget (2010).

In accordance with this date the project performed accordingly with expectation since the planned budget has been used at more that 98% at the EOP.

The MTR<sup>18</sup> report submitted at the end of 2013 highlighted the poor project performance in term of disbursements. At mid-term the IEEI project disbursed 20% only of the whole GEF grant. Such a situation was, among others, the result of the inefficient project management which is the consequence of a lack of adaptive management from 2011 to 2014. The situation changed in 2015 by the involvement of a new Project Coordinator and the approval of the new strategy.

<sup>18</sup> MTR report page 23: "There are sufficient project resources (USD 4.76 million) remaining that can be utilized "re-start" the Project (in addition to Project activities already initiated) to achieve its objectives, most important being the EE demonstration projects from Outcome 4. However, the current remaining time of IEEI (assuming the current Project terminal date of August 30, 2015) of 21 months is likely insufficient time to expend these funds and to achieve Project objectives. As such, an extension of the Project from its terminal date of August 2015 will be necessary".

Taking into consideration the new project strategy 2015, one can say that the budget line related to Outcome 4 and 5 were overestimated in 2010 and budgets for Outcome 1, 2 and 3 were underestimated by 8%, 17% and 45% respectively. Others were overestimated, for example the budget line Outcome 4 has been used at 44% only until July 2017 (EOP) when comparing with the budget planning 2010. This is the result of the “adaptive management” applied through the roll-out of the new project strategy in 2015. The new strategy 2015 intended focussing more on Outcome 1 (EnMS), Outcome 2 (Capacity Building) and Outcome 3 (Energy Audit component) and, at the same time, granting a lower priority to Outcome 4 (State-of-the-art energy management practices and EE measures, business and financing models are demonstrated)<sup>19</sup>. It is important to mention that the PC was not allowed to make appropriate changes to the budget breakdown structure as approved in the ProDoc 2010. This is a limitation of the “adaptive management” promoted by the UNDP.

Details related to costs breakdown are highlighted in Appendix 5

Table 2 - Planned Cost and Total Disbursements at the EOP (July 2017)

Project Component	Total Realised Expenditures			Total Expenditures to be Realised			Total Project Budget		
	UNDP	UNIDO	TOTAL	UNDP	UNIDO	TOTAL	UNDP	UNIDO	TOTAL
Outcome 1: Institutional and Regulatory Framework	\$450,085	\$872,291	<b>\$1,322,376</b>	-\$86,462	\$2,295	<b>-\$84,167</b>	\$363,623	\$874,586	\$1,238,209
Outcome 2: Enhanced Capacity and Awareness	\$1,056,138	\$550,651	<b>\$1,606,788</b>	- \$176,628	\$18,782	- <b>\$157,846</b>	\$879,510	\$569,432	\$1,448,942
Outcome 3: Energy Audit Program	\$748,367	\$535,828	<b>\$1,284,195</b>	-\$93,698	\$3,917	<b>-\$89,782</b>	\$654,669	\$539,744	\$1,194,413
Outcome 4: Demonstration of Energy Management Practices	\$12,335	\$552,929	<b>\$565,264</b>	\$565,380	\$1,721	<b>\$567,101</b>	\$577,715	\$554,650	\$1,132,365
Outcome 5: Monitoring and Evaluation	\$160,905	\$125,454	<b>\$286,359</b>	\$21,076	\$29,136	<b>\$50,212</b>	\$181,981	\$154,590	\$336,571
Project Management	\$500,724	\$0	<b>\$500,724</b>	\$48,776	\$0	<b>\$48,776</b>	\$549,500	\$0	\$549,500
TOTAL (Actual)	\$2,928,554	\$2,637,152	<b>\$5,565,706</b>	\$278,444	\$55,850	<b>\$334,294</b>	<b>\$3,206,998</b>	<b>\$2,693,002</b>	<b>\$5,900,000</b>

Table 2 - Planned Cost and Total Disbursements at the EOP (July 2017)

## 3.2 Project Implementation

### 3.2.1 Monitoring and evaluation activities and feedback loop

The Government provided the Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the programming and finance manuals. The audit conducted by the legally reputable

<sup>19</sup> The EnMS implementation (ISO 5001) was implemented under the Outcome 1.

commercial auditor engaged by the Government. The financial auditing has been done on target and in accordance with the usual procedure.

A series of 4 Progress Implementation Reports (2012 to 2015) were prepared by the PC. Shortcomings and problems were highlighted but from 2011 to 2015, the adaptive management has been very weak.

The turning point comes from the MTR carried out on schedule. In accordance with the UNDP/GEF's compulsory requirement, the mid-term evaluation process has been driven by an independent international evaluator. The MTR concluded that the IEEI needs drastic improvements in terms of management, adjustment to the PPM and, reset of certain outputs. One can say that the whole M&E activity forced the decision makers (UNDP/UNIDO, YEGM and the PSC) to take action for improving the project performance. The terminal evaluation was also carried out on schedule in July/August 2017.

Another valuable monitoring tool is the PSC meetings. The first PSC meeting was held in January 2013, that is to say 2 years after the project start-up (January 2011). Based on the minutes, a total of 19 persons attended the first PSC meeting. Such a situation results from the decision made to merge 2 GEF projects (UNIDO and UNDO project initiatives) into only one full-sized project. As a rule, to be more efficient, the joint PSC should involve a smaller number of participants, less than ten, most of the time even less. This situation has perhaps impeded the decision making process and the IEEI performance.

The other monitoring and management instrument was the Project Management Committee (PMC) Under the CTA's leadership (2013), ten Project Management Committee (PMC) meetings were held from October 2012 to May 2013. At the PMC meetings all project partner agencies (6) representatives worked together in a joint collaborative/consensus fashion on the project's ownership, governance and decision-making. Much of the information fed into the preparation of the PIRs comes from the PMC meetings (which are held on a monthly or more frequent basis), and "Annual Advisory Meetings" of which 4 meetings have been completed.

At the end of 2013 a new PC has been selected (Q4-2013) as well as a new CTA recruited in 2014. With the aim of re-starting the project activities in 2014 and ensuring that there is agreement on all work plan activities and their timely delivery, the first priority task of the new PC was to recommend a new strategy. The new strategy, the new WP, and the improved PPM were all approved by the PSC on March 2015. The project came back on the right way in terms of efficiency in 2015, that is to say 3 years after the project start-up.

All this shows that the project monitoring activity and the feedback loop were in place despite the poor performance of the project, at least during its first 4 years (2011-2015). During that phase, it was like the PMU was not in position to take action, maybe because of a certain lack of capacity, a misunderstanding of the outcomes, a lack of experience of the UNDP/GEF project framework, or a deficient communication link between parties involved.

### **3.2.2 Adaptive management connected to M&E activities and issues**

To be fair, for appropriately dealing with the evaluation of the adaptive management undertaken during the whole project timeframe, the evaluator must split the project in 2 phases: Phase 1 before the MTR (2011-2014); Phase 2 after the MTR (2015-2017).

Because of the questionable project performance in Phase 1, the MTR granted the IEEI overall rating as "Moderately Unsatisfactory" in terms of i) relevance; ii) Impacts; iii) Outcomes achievement; and iv) outputs effectiveness. Such a poor evaluation is clearly

highlighted in the MTR report submitted on December 2013. From 2011 to the end of 2014, the project faced a few problems, especially in term of management and planning. Even some project beneficiaries complained on the project performance and relevance.

The MTR report concluded as follows:

*“For the Project to succeed, the effectiveness of the new Project Coordinator and CTA will be crucial. The new PC will need to utilize lessons learned from the execution of IEEI over the past 30 months and raise the level of confidence of implementing partners that the PMC can deliver the intended outputs and outcomes of the Project. This will be a challenging task notably the coordination and facilitating consensus amongst Project’s 4 implementing partners, 2 executing agencies and industrial stakeholders. The CTA will need to be effective in transferring EE knowledge to both public and private sector stakeholders, and leading industrial stakeholders towards EE investment commitments and reducing their energy intensities.”*

*“The Project planning matrix (PPM) needs to be re-written and clarified with new targets that will improve management of the Project.”*

In other words, the IEEI was on the verge to fail if the required actions were not taken on the fast track in accordance with the MTR list of recommendations (6 recommendations).

During Phase 1 (2011-2014) one can say that the “Adaptive Management” approach has not been rolled out for dealing with highlighted issues, lack and other shortcomings pointed out by the PIR 2012 and PIR 2013 and the MTR 2013.

In the section related to the Outcome-based evaluation (see Section 3.4 below) and based on results achieved from early 2015 to July 2017, one can conclude that UNDP/UNIDO, the Project Steering Committee (PSC) and the YEGM, made the right decision toward the new strategy and scaling down several quantitative targets without modification to the approved Outcomes. The approval<sup>20</sup> of the new strategy and the duration extension (24 months), no additional budget, was a crucial decision initiated as a result of the bad rating of the project performance at the MTR stage (end of 2013).

Because of that decision the IEEI started out (restarted) on the right foot toward the expected and revised outputs in line with Outcomes. This has resulted in Project resources being used to update the old energy management systems and energy audit modules (and related trainings) to support the new regulations for a wider range of industries with the aim of implementing the ISO 50001 EnMS<sup>21</sup> and skills to carry out the WTEA and EA<sup>22</sup> in accordance with the international best practices.

By significantly improving the capacity of project beneficiaries (industrial facilities) and ESCOs<sup>23</sup>, the project played a major role toward the implementation of the Energy Management Standard (EnMS) and the practical implementation of the EE regulation improved in the year 2011<sup>24</sup>. Most of the quantitative project impacts, especially in terms of EE and GHG emissions reduction, resulted in the efficient implementation of the new strategy. Several quantitative outputs were scaled down with the aim of fulfilling Outcomes within the remaining timeframe. On the other hand, in accordance with UNDP/GEF strict requirements, Outcomes were not modified nor the approved budget. At Appendix 2 highlights changes to the PPM 2010.

<sup>20</sup> Project Steering Committee’s approval granted in March 2015.

<sup>21</sup> ISO 50001 is already specified in the YEGM initiated and administered Energy Efficiency Regulations of 2011 as a requirement for any industrial facility in Turkey to receive any government financial support from 01 January 2014.

<sup>22</sup> EA : Comprehensive Detailed Energy Audit / WTEA : Walk-through Energy Audit.

<sup>23</sup> Many reports prepared by the IEEI project used the wording “ESCO” rather than “Energy Efficiency Service Providers”. Such a situation could be confusing because as a rule, ESCOs call for a business model, which provides the energy end-users with the technical and financial support to EE measures implementation. In Turkey the ESCO business model is at its very nascent stage and the evaluator met with only one EESP having implemented a few projects in accordance with the ESCO business model. The other EESPs did not it.

<sup>24</sup> EE Law 5627 20017 amended in 2011): Regulation Regarding the Increase of Efficiency in the Use of Energy Resources and Energy” was published in the Turkish Government Gazette on 21 October 2011.

### 3.2.3 Partnership and Institutional arrangements

The project was to be implemented by the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO) with financing support provided by the Global Environment Facility (GEF) with four implementing partners:

- YEGM (formerly EIE) or the General Directorate of Renewable Energy under the Ministry of Energy and Natural Resources (MENR);
- KOSGEB, an agency affiliated with Ministry of Industry and Trade or MIT that manages funds to support EE for SME industries;
- TTGV or the Technology Development Foundation of Turkey, an NGO under a PPP operating modality with funds to support EE in industry; and
- TSE or the Turkish Standards Institute (TSE), the agency responsible for certification of industrial and service provider entities to ISO and other standards adopted by the Government of Turkey GoT.

### 3.3 Project Financing and co-financing

In term of national co-financing, the project performed better than expected. UNDP and UNIDO provided data related to the achieved co-financing. The UNDP was committed to providing a direct co-financing (out of GEF funding) of 60,000USD and UNIDO an amount of 50,000USD. Both achieved the direct co-financing of 50,000 and 48,700USD respectively. Other data on co-financing and its completion at EOP have been provided by the PMU.

Table 3 - Co-financing Scheme

	US\$)	At endorsement (Million US\$)	At completion, as of end July 2017 (Million US\$)
<b>GEF financing:</b>		6.020 (3.327 UNDP-2.693 UNIDO) <sup>25</sup>	5.566
<b>IA/EA own:</b>		0.110 (60k\$ UNDP and 50k\$ UNIDO)	0.108 700
<b>Government:</b>		6.444	8.629
<b>Other:</b>		22.640	144.192
<b>Total co-financing:</b>		29.234	158.4957

Table 3 - Co-financing Scheme

### 3.4 Project Results toward Outcomes achievement

Section 3.4 deals with the Outcome-based assessment of the IEEI Project achievements and shortcomings. In accordance with recommendations made by the MTR evaluation (end of 2013) most of quantitative outputs were scaled down. Appendix 2 highlights adjustments (2015) made to the outputs against the suggested edited version of the 2010 Project planning matrix.

It is important to mention that the evaluator rated the project performance against the new PPM approved in 2015.

Each outcome was evaluated against the following criteria as required by the GEF Guidelines as follows:

<sup>25</sup> In addition the UNDP was committed providing a co-financing of 60,000 USD and UNIDO a co-financing of 50,000USD. Co-financing were achieved accordingly to commitments, or nearly.

- *Relevance* – the extent to which the outcome is suited to local and national development priorities and organizational policies, including changes over time;
- *Effectiveness* – the extent to which an objective was achieved or how likely it is to be achieved;
- *Efficiency* – the extent to which results were delivered with the least costly resources possible.

The Project outcomes were rated based on the following scale:

- *6: Highly Satisfactory (HS)*: The project has no shortcomings in the achievement of its objectives;
- *5: Satisfactory (S)*: The project has minor shortcomings in the achievement of its objectives;
- *4: Moderately Satisfactory (MS)*: The project has moderate shortcomings in the achievement of its objectives;
- *3: Moderately Unsatisfactory (MU)*: The project has significant shortcomings in the achievement of its objectives;
- *2: Unsatisfactory (U)*: The project has major shortcomings in the achievement of its objectives;
- *1: Highly Unsatisfactory (HU)*: The project has severe shortcomings in the achievement of its objectives.

In the first step, the Evaluator proceeded with a comprehensive analysis and review of energy savings and GHG emissions reduction.

### 3.4.1 Energy Savings / GHG emissions reduction Breakdown and Abatement Cost

The Table of GEF Climate Change Mitigation Tracking Tool is at Appendix 3

#### **GHG emissions reduction and Energy Savings Overview and Results**

- The Implementation of EnMS Expert Level Training Programme First Phase, total implemented energy savings of 240,590 toe has been reached by 34 companies that participated in the programme. Furthermore, 90,712 toe of energy savings is planned and/or ongoing.
- With the Implementation of EnMS Expert Level Training Programme Second Phase, in 26 companies, 874,185 toe saving has been achieved and another 427,779 toe of energy savings is planned and/or ongoing.
- With the EnMS User Level Programme implemented in 2014, 2 in two companies (namely TatGıda and Pınar Et ve Un), 460 toe of energy savings has been achieved.
- Through audits<sup>26</sup> of 9 companies in 2014 and 2015, 3 companies have achieved a total of 1,690 toe savings.
- In addition, through governmental support schemes<sup>27</sup> from which 25 companies benefitted, a total of 273,449 toe of energy savings have been achieved during the term of the project.
- Thus, it is possible to conclude that a cumulative energy saving of 1,390,673 toe of has been obtained by the implemented projects throughout the project term. Additionally, another 518,492 toe were planned to be obtained through ongoing projects. It is necessary to underline that the cumulative savings were calculated

<sup>26</sup> In addition, at the end of July 2017 the energy service companies will audit a total of 14 selected additional plants, which were previously visited. The reports will be evaluated by the instructors of awarded companies which, developed the guides and checklists. All reports and findings will be shared with YEGM.

<sup>27</sup> The Evaluator and the PC consider result from the Government support as a component of the indirect impacts.

based on the principle that every project has a 10 years life-span. Therefore, the savings of a project commenced on 2014 ended in 2023; on 2015 it was ended in 2024, and so on. To sum up, a total of 1,909,165 toe of energy savings will have been achieved as a result of the project.

### As for the GHG emissions

- With the Implementation of ENMS Expert Level Training Programme First Phase, total implemented CO2 savings have been reached to 1,306,631 tonne in of 34 companies. Furthermore, 448,225 tonne of CO2 savings are planned and/or ongoing.
- With the Implementation of EnMS Expert Level Training Programme Second Phase, in 26 companies, 5,134,280 tonne CO2 savings have been implemented and another 2,281,752 tonne of CO2 savings are planned and/or ongoing.
- With the ENMS User Level Programme implemented in 2014, 2 in two companies (namely TatGıda and Pınar Et ve Un), 1,490 tonne CO2 saving has been implemented.
- Thorough audits of 3 companies (Saint Gobain, Termikel, ORS) in 2014 and 2015, 10.870 tonne CO2 saving has been implemented.
- In addition, through governmental support schemes from which 25 companies benefitted, a total of 881,121 tonne of CO2 savings have been implemented during the project term.
- Thus, it is possible to conclude that a cumulative of 7,334,392 tonne of CO2 saving has been obtained by the implemented projects throughout the project. Additionally, another 2,729,978 tonne of CO2 saving is planned to the obtained through ongoing projects. It is necessary to underline that the cumulative savings were calculated based on the principle that every project has a 10 years life-span. Therefore, the savings of a project commenced on 2014 was ended in 2023, on 2015 was ended in 2024, and so on. To sum up, a total of 10,064,369 tonnes of CO2 savings will have been achieved as a result of the project.

### The breakdown between SME and Large-Scale enterprises

According to the Turkish regulation, the definition of SME is any industrial company “with less than 250 employees and less than 50 Million Euro annual turnover”. Thus, we have carefully analysed all the beneficiary companies and identified them as SME or LSEs according to aforementioned criteria. As a result 15 companies are identified as SMEs and 45 as LSEs of a total of 60. Thus SME representation in the ENMS Program has been realised as 25%. The breakdown of energy savings and GHG reduction are shown above:

Table 4 - Breakdown of GHG emissions reduction

	Implemented CO2 Savings (tonne)	Percent	Planned/Ongoing CO2 Savings (tonne)	Total
EnMS P I LSE (23 Companies)	1,285,517	98.38	416,573	92.94
EnMS P I SME	21,113	1.62	31,094	6.94
EnMS P II LSE	5,114,703	99.62	2,267,795	99.39
EnMS P II SME	19,577	0.38	13,958	0.61
2014 EnMS LS	1490	100		
2014 EnMS SME	-	-	-	
Audited Companies 2014-2015 LSE	10,870	100	-	-
Audited Companies	-	-	-	-

2014-2015 SME				
Governmental Support Schemes LSE	881,121	100		-
Governmental Support Schemes SME	-	-	-	-
TOTAL LSE	7,293,701	99.45	2,684,368	98.35
TOTAL SME	40,069	0.55	45,051	1.65

Table 4 - Breakdown of GHG emissions reduction

As seen in the table, out of 7,334,392 tonne of implemented CO<sub>2</sub> savings, only 0.55% has been realized in SMEs. For the planned and ongoing savings, the SME share is just 1.65%.

Table 5 - Breakdown of energy savings

	Achieved Energy Savings (toe)	Percent	Planned/Ongoing Energy Savings (toe)	Total
EnMS P I LS (23 Companies)	237,075	98.42	84,604	93.27
EnMS P I SME	3,815	1.58	6,108	6.73
EnMS P II LSE	871,140	99.65	425,588	99.65
EnMS P II SME	3,045	0.35	2,191	0.51
2014 EnMS LSE	460	100	-	-
2014 EnMS SME	-	-	-	-
Audited Companies 2014-2015 LS	1,690	100	-	-
Audited Companies 2014-2015 SME	-	-	-	-
Governmental Support Schemes LSE	273,449	100	-	-
Governmental Support Schemes SME	-	-	-	-
TOTAL LSE	1,283,814	99.51	510,192	98.40
TOTAL SME	6,860	0.49	8,300	1.60

Table 5 - Breakdown of energy savings

As seen in the table, out of 1,390,673 toe of implemented energy savings, only 0.49% has been realized in SMEs. For the planned and ongoing savings, the SME share is just 1.60%.

Tables above demonstrate great gap in the benefits gained between two components of the project, namely SMEs and LSs. In it natural that in industrial sectors, the amount of energy and GHG saving potential is larger in the LSs, yet the difference should not be this big. This reveals that throughout the project, due to time and budget constraints, the implementers of the project had to focus on large-scale enterprises.

Most of the savings have been realized through EnMS in the project. Only 1,690 toe of energy savings and 10,870 tonnes of CO<sub>2</sub> savings can be attributed to detailed energy audits (see the table below). It is not possible to determine how much of the benefits are attained in the projects supported via governmental support schemes that can be attributed to EAs.

In 2014-2015 the EVD companies undertook 9 walk-through and 9 detailed audits in the pilot companies. However, just 3 of those industrial plants realized investments in line with the suggestions documented in the reports.

Table hereafter highlights the numbers pertaining to 4 investments of 3 companies (Saint

Gobain, Termikel, ORS).

Table 6 - Results from Energy Audits component

Name of the Project Activity	Company	Sector	Name of the Project	Investment Amount (USD)	Saved Energy (toe)	Saved CO <sub>2</sub> (tonne)
Audits	Saint-Gobain (Bala)	Stone & soil based (plaster)	Frequency convertor implementation	154,000	125	804
	Termikel	Fabricated metal products (white goods)	Replacement of lightings with LEDs	6,000	1	6
	ORS	Metal processing (bearing rolls)	Implementation of inventor to fans	30,000	16	103
	ORS	Metal processing (bearing rolls)	Compressor replacement	195,000	27	174
			<b>TOTAL</b>	<b>385,000</b>	<b>169</b>	<b>1,087</b>

Table 6 - Results from Energy Audits component

In July 2017, the IEEI developed sector-based energy audit guides and 14 additional industrial companies were selected for other EA<sup>28</sup>. All audits were completed (August 2017) and were under evaluation at the time of the final evaluation. However, because of the short delay (end of August 2017) between the project closing date and the submission of 14 EA reports, the PMU did not get information how much savings are in progress as the IEEI has no chance to monitor the progress within the industrial companies. It is easy to make the assumption that those 14 industrial facilities did not yet undertake or implement any EE measure at the end of September 2017.

### Direct and indirect impacts a Year and on 10 years

As an impact of the project, that a cumulative of 1.390.673 toe of energy saving and 7.334.392 tonne of CO<sub>2</sub> saving has been obtained by the implemented projects. Additionally, 518.492 toe of energy is planned to be obtained through ongoing projects and 2.729.978 tonne of CO<sub>2</sub> saving is planned to be obtained through ongoing projects in ten coming years.

### The abatement cost based on the GEF grant:

The abatement cost results of the cumulative project direct impacts. The abatement cost is based on the total GHG reduction (cumulative direct impact) on the GEF grant.

A total of 6 million USD (GEF funding) has been spent and 10.064.369 tonnes of CO<sub>2</sub> emissions were avoided. As a result, the abatement cost has been 0.60\$ per ton CO<sub>2</sub>. It is necessary to keep in mind that the timeframe of the project extends to 10 years of each component started/concluded, thus running up to 2026. It can be concluded that the project has been quite efficient in impact if compared to the price of 1 tonne of CO<sub>2</sub> as 5.80 Euros (as of August 2017) in the secondary market of EU Emission Allowances. Such a result is than the expectation. In accordance with Project Document<sup>29</sup>, the estimated abatement cost was estimated at about 9.80\$. In essence, the huge difference comes from the impact of the implementation of the EnMS ISO5001, which has a great leverage impact on energy savings.

### 3.4.2 Overall project results and rating toward expected Outcomes

**Project Objective:** To improve energy efficiency of Turkish industry by enabling and encouraging companies in the industrial sector for efficient management of energy use by different energy conservation measures and energy efficient technologies.

The whole project performance is rated **Satisfactory** because of its achievements with minor shortcomings only. Only one project component (Outcome 3) got a less favourable rating (MS) because the Energy Audit Component did not perform in

<sup>28</sup> At the EOP a total of 23 detailed EA were carried out.

<sup>29</sup> The ProDoc 2010 had a target of 609,000 tons CO<sub>2</sub> cumulative.

accordance with expectations in terms of impact and sustainability<sup>30</sup>. In addition the Evaluator rated the replicability of EA component as “Moderately Likely” because the impact of quality EA reports drafted (23) prepared under this component and at the time of the FE, only 4 investment projects result of the EA component 3.

On the other hand, although the IEEI provided a quality report related to financial mechanisms, authorities (KOSGEG, TTGV and YEGM) responsible for rolling out financial mechanisms did not apply recommendations until now. It is important to mention that the IEEI was not responsible of the implementation of recommendations because the IEEI was not involved in a way or another in regard to financial mechanism(s) management. On a short term, the Financial Mechanism report prepared by the IEEI will be useful because of the new full-sized UNDP/GEF EE project (Electric Motors). Indeed, the upcoming EE project (Inception stage planned by the end of the year 2017) targets SMEs; the KOSGEB will be required to adjust its financial mechanism to fulfill its commitment within the new project framework. This is a positive and likely sustainable result of the study related to Integrated Financial Mechanism submitted in 2015 by the IEEI project.

For more details related to Outcomes-based review and evaluation look at table 9 to 13 below. Table 7 below summarizes the FE rating matrix.

Table 7 – Summary Evaluation of Outcomes-based Matrix

Outcomes	Relevance	Efficiency	Effectiveness	Overall Rating
<b>Outcome 1:</b> Strengthened institutional-regulatory framework and a national Energy Management Standard contributing to the implementation of the EE Law	5	5	5	5
<b>Outcome 2:</b> Enhanced capacity and awareness of Turkish industry and energy service providers	6	6	5	5,6
<b>Outcome 3:</b> Energy audit program for large industry and SMEs implemented	3	4	3	3,3
<b>Outcome 4:</b> State-of-the-art energy management practices and EE measures, business and financing models are demonstrated	5	5	4	4.6
<b>Monitoring and Evaluation</b>	5	5	5	5
<b>Overall Rating</b>	<b>4.8</b>	<b>5</b>	<b>4.4</b>	<b>4.7</b>

Table 7 – Summary Evaluation of Outcomes-based Matrix

Table 8 – Overall Project Results at EOP

Overall Project Results at EOP	Achieved
<b>Intended EOP Outputs:</b>	Quantitative expected outputs reached more than intended a year (data from Table 3.4.1.1 and 3.4.1.2 above)
Energy savings from EE investments of at least 190 GWh per year (various fuels: electr. + thermal)	2,886 GWh
Direct emissions reduction (associated with demo projects and EnMS) at least 60.9 ktons CO <sub>2</sub> per year	733 ktCO <sub>2</sub>
Cumulative indirect emissions reduction due to project's capacity building activities ranging from 0.45 MtCO <sub>2</sub>	81 ktCO <sub>2</sub> (NOTE 2)

<sup>30</sup> The Project outputs were rated based on the following scale: 6: Highly satisfactory (no shortcomings), 5: Satisfactory (minor shortcomings), 4: Moderately satisfactory, 3: Moderately unsatisfactory (significant shortcoming), 2: Unsatisfactory (major problems); and 1: Highly unsatisfactory (severe shortcomings)

(bottom-up approach) to 8 MtCO<sub>2</sub> (top-down)

### Ratings

The EOP targets were drastically scaled down<sup>31</sup> in 2015 from 60.9 ktCO<sub>2</sub> a year to 15 ktons. Such a target was not approved by the UNDP.

At EOP the revised (2015) targets have been significantly overpassed. Even more than the original target defined in the ProDoc.

A series of 91 enterprises were directly impacted

By introducing EE technologies/measures and EnMS the SEC has been reduced by nearly 10% (on target) and the energy savings over expectations.

✓ relevance: 5	The project has no shortcomings in the achievement. The delay (phase 1: 2011-2014) for getting results has been recovered from 2015 to 2017.
✓ efficiency: 4	It is not unusual in EE projects to get tangible results (savings and GHG) after 1 or 2 years after the start-up. The efficiency is rated MS because of the weakness of the project implementation from 2011 to 2014. On the other hand, the evaluator could not avoid highlighting the outstanding performance of the project team from 2014 to the end of the project timeframe to reach the target despite the significant delay that occurred during the first 3 years.
✓ effectiveness: 5	Data provided to evaluators encompass a list of 34 industrial facilities having contributed to the result. Because of the usefulness of components 1-2 and 4, and despite the questionable usefulness of the EA component 3, the evaluator rated the effectiveness Satisfactory.
✓ <b>Key Outcome overall rating: 5</b>	In regard to CO <sub>2</sub> and energy saving the project performed over expectations. Because it overcame the target to reach the initial target despite the initial delay (2011-2014) the project is a successful project rated Satisfactory as a whole.

*Table 8 – Overall Project Results at EOP*

NOTE 1: The Evaluator did not get this data related to Government Support in large-scale enterprises because it is not a direct project output and this information was not available.

NOTE 2: In essence, the estimated indirect impact results of the Government Support activities (see Table 3.4.1.1 above).

*As revised in March 2015:* Evaluation Achievement Overall Target 1: At least 46.5 GWh per year (energy and fuel) and direct emissions reduction (associated with demo projects) of 15MtCO<sub>2</sub> p.a. and (assuming an average 10-year lifetime, and Target 2: Cumulative indirect emission reductions due to project's capacity building activities ranging from 0.45 MtCO<sub>2</sub> (bottom-up approach) to 8 MtCO<sub>2</sub> (top-down).

In practice, the overall project result in term of energy savings and GHG emissions reduction is better than the expected results.

<sup>31</sup> The project steering committee was not allowed to revise the targets

### 3.4.3 Outcome 1 and Outputs-based Relevance/Effectiveness and Efficiency

Outcome 1: Strengthened institutional-regulatory framework and a national Energy Management Standard contributing to the implementation of the EE Law.

Because of a few questions asked<sup>32</sup> on the achievement of outputs under Component 1, it is seemingly important to provide the readers with a summary of activities carried out for dealing with the EE regulation.

#### **Support to national EE Regulation and Policy strengthening**

In accordance with the MTR recommendation, the PSC agreed to delete this output of its deliverable highlighted in PPM. The EE Law 2011 was already approved at the earliest stage of the project implementation. In such a situation, the IEEI could not pretend having been involved in the EE Law revision 2011. The work was already done.

#### Progress related to EE Law development:

- The EE Law was issued 2007.
- The secondary legislation (by-law) was issued in 2008.
- The by-law was amended and renewed in 2011.
- The EE Strategy Paper was finalized by a team (including the project coordinator (which was not involved within the IEEI project framework at that time), the YEGM GD, and some key persons from Treasury) and issued in 2012 by High Planning Council.
- In line with the project's contribution the by-law was amended again in 2014 from the viewpoint of several aspects including ISO 50001 certification, the training of energy managers, etc.

The latest version 2011 of the EE Law was outlined without the support of the IEEP. Based on information gathered in the field to PMU, the project has not been involved at the drafting stage of EE Law 2011 not only because at that time (2011), the project was just stating up and was facing a difficult situation in term of project management, but most importantly, because the work was already done by the YEGM. It is the result of the project design, planning and approval by the GEF Secretariat, which was initiated in 2008 (PIF), drafted in 2009, for finally approved in 2010 to start in January 2011. The YEGM was active to support and draft the revised EE Law.

Nevertheless, with the aim of supporting the national EE policy framework the IEEI all produced reports (mainly related to EE financial mechanism, EnMS and benchmarking systems design, database and related tools) were delivered to YEGM to provide a baseline for the studies for developing National Energy Efficiency Action Plan (NEEAP). The outputs produced through the IEEI Project were so useful that the foreseen mechanism of NEEAP was dramatically changed. The NEEAP should be issued in Autumn 2017 by the YEGM.

On the other hand, other expected key outputs Component 1 were the implementation of 1) the EnMS and, 2) the Benchmarking systems. For that purpose the IEEI provided OIZ, industrial stakeholders and practitioners with the needed tools, training and guidelines to implement the EnMS and Benchmarking systems. These outputs are directly linked to the EE Law implementation. Work has been done.

#### Benchmarking and database

Creating a new data collection, processing and reporting system is one of the important pillars for strengthening the capacity of the implementing agency (YEGM) under the whole IEEI project framework. Within this activity the IEEI developed a state-of-the art technology portal system, which should be used for web based energy efficiency (EE) data collection, efficiency improvement projects applications, producing benchmarking reports, monitoring and online trainings. It also aims to integrate the databases of partner

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<sup>32</sup> After the Evaluator submitted the FE draft report on August 28

organizations so that they could monitor the developments in different industrial sub-sectors simultaneously. Third party users (such as industrial entities, energy service companies, even the big building complexes consuming a significant amount of energy, etc.) will also be allowed to use the system for different purposes. The portal system is used for testing on September 2017. YEGM experts have done the final acceptance of the system.

The project also supports the procurement of supplementary software and hardware for portal system. The hardware items are virtualization servers with related server switches and the software includes related security firewalls, load balancer with necessary subscriptions. This hardware and software procurement will improve the capacity of YEGM to manage the EE portal effectively and efficiently. The evaluation of the revised RFQ has been finalized in July 2017 and the delivery was planned to be realized in the in August 2017. The national experts made a very comprehensive presentation of the related tools (software and database) at the IEEI project closing workshop on September 11. The result is impressive.

### Energy Management Standard (EnMS)

The first phase (phase-1) of Energy Management System (EnMS) Expert Level Program was completed in August 2016 with the delivery of EnMS reports prepared by 34 factories with the support of local consultants and improved by the international consultants. During the program, selected industrial companies were matched with 2 or 3 local consultants who were assigned with respect to factors such as plant size, geographical proximity, and the field of expertise of the consultants. In addition to 3 training modules were rolled out in 3 different areas (Ankara, Istanbul, Izmir), 6 online meetings (webinars) for each of 34 plants (in total 204 meetings) were led by international consultants with the participation of factory representatives, local consultants and project management unit (PMU). The aim of the mentioned webinars was to monitor and check the improvement in factories.

Table 9 – Results Outcome 1

Results at EOP- Intended Outputs	Achievements
New provisions available related to EnMS and Institutions strengthened and cooperation increased between EIE, KOSGEB, TTGV and OIZs	Qualitative output: Based on comments gathered, meetings with KOSGEB, YEGM, OIZ and TSI, and reporting (PIRs) the output is achieved.
Information on energy use of about 1,500 industries is updated and expanded and put in the databases	The target is not fully achieved. IEEI dealt with information sharing, training and data gathering to 1,350 industrial facilities.
Benchmark data for all sectors and size of industry are available	<p>The industrial sectors covered up to now are (July 2017) are the following:</p> <ul style="list-style-type: none"> <li>• Textile</li> <li>• Cement</li> <li>• Ceramics</li> <li>• Iron and Steel</li> </ul> <p>The Project recruited national experts for developing a portal system and now developing benchmarking forms in following sectors (work still in progress):</p> <ul style="list-style-type: none"> <li>• Sugar</li> <li>• Glass</li> <li>• Pulp and Paper</li> </ul> <p>For benchmarking sectors (glass, paper, cement, etc.) are represented by the sector-based associations. The extended rolling out of its implementation in the industrial sector will take a few years.</p>

<p>Widely promote EnMS approach throughout the country and Guidelines issued for implementation of EnMS</p>	<p>The EnMS is the most impacting achievements. The EnMS, based on ISO50001, is implemented: Comprehensive training has been delivered to energy managers, OIZ (11) and consulting firms and Guidelines issued</p>
<p>12 Energy Management Units in OIZs with sufficient operating budgets</p>	<p>Rather than 12 OIZ, the project supported with EnMS with 11 OIZ in the whole country. Data logging systems and metering equipment have been provided to IOZs.</p>
<p>The three existing mechanism are improved and new mechanism are proposed</p>	<p>The international consultant drafted (2015) the key report entitled: "Improving Energy Efficiency Financial Mechanisms for Industry in Turkey - CONCEPT PAPER". The report is comprehensive enough and provides the basic analysis tools for dealing with project financing and the issue related to the integrated financial mechanism. It is important to mention that the project was not required by the IEEI to implement the recommended financial mechanism. The project provided the quality guidelines to help, especially KOSGEB, TTGV and YEGM to improve their financial mechanism. In practice the KOSGEB is moving on the right way in to this end. Indeed, the KOSGEB agreed to embark on the new EE EE Electric Motors project (UNDP/MoSTI: not yet started up) and will be required to adjust its financial mechanism dedicated to SMEs.</p>
<p><b>Ratings</b></p>	
<p>✓ relevance: 5</p>	<p>This project Component 1 is the one having had the most significant impact in terms of EE and GHG emissions reduction, and further developments. The IEEI provided studies, training, and financial support in line with expectations. The project has no shortcomings in the achievement. The EnMS system is implemented on a large scale as well that the reporting. The Financial Mechanism – Concept Note provided key institutional players (KOGEB, TTGV and YEGM) with guidelines and recommendations for improving and integrating their financial mechanisms and facilitating the access to EE financing, especially to SMEs. In regard to financial mechanism, the IEEI promoted to KOSGEB, TTGV and YEGM the implementation of an integrated financial mechanism, but key financial players were moving on slow motion and at the end of the project, decision and action were not taken to this end.</p>

<p>✓ efficiency: 5</p>	<p>The Financial Mechanism Concept Note started up in 2013 and was completed in 2015. It should have been achieved faster in 2013 or early 2014. Although the Integrated Financial Mechanism has been designed and procedures clearly outlined, KOSGEB and TTGV did not take action to this end.</p>
<p>✓ effectiveness: 5</p>	<p>Based on results reached within the project timeframe, it is not difficult to assess the degree to which EnMS system is useful to manage the energy in industrial facilities. The impact is already tangible. On the other hand, the Financing Concept Note should be useful in producing in the future, if actions are undertaken by key financial partners toward the desired long-term impacts in terms of integration toward a one-stop-shop for EE projects financing and energy saving. Equipment provided to IOZs is already useful to industrial facilities. The RETScreen<sup>33</sup> training related to EA and energy management has been delivered to IOZs and energy managers.</p>
<p>✓ Outcome 1 overall rating: 5</p>	<p>The EnMS is now fully operating in about 1,350 enterprises and the regulation related to ISO50001 has been promulgated. The table is set for improving and integrating the available financial mechanisms. On the other hand, nothing has been done in practice for the implementation, even not a decision to this end by key players. The rating is VS although the project targeted a few less enterprises that expected. On the other hand, the impact is much more important than expected.</p>

Table 9 – Results Outcome 1

<sup>33</sup> RETScreen is a series of software developed for improving energy management and energy savings.

### 3.4.4 Outcome 2 and Outputs-based Relevance/Effectiveness and Efficiency

Outcome 2: Enhanced capacity and awareness of Turkish industry and energy service providers.

Table 10– Results Outcome 2

Results at EOP-Intended Outputs	Achievements
<p>About 100 EE investment projects were directly (demos) or indirectly (outcome 2; capacity building) realized</p> <ul style="list-style-type: none"> <li>Upgraded and linked websites to provide integrated info on EE</li> <li>Number of case studies, lessons learned from (inter-) national sources and number of brochures and booklets on EE Project newsletter; Documentaries</li> </ul>	<p>About 260 enterprises carried out EE improvements as a direct or indirect impact of the IEEI. The project performed over expectations.</p> <p>The sub-activity was still in progress in July 2017.</p> <p>The Project produced a series of reference documents and technical guidelines:</p> <ul style="list-style-type: none"> <li>A series (7) of Energy Auditing Guide and a comprehensive Checklist were designed as a major outcome in energy auditing activities.</li> <li>1 WTEA Guidelines book</li> <li>1 EnMS practical guidelines book</li> <li>A series of EE Technical guidelines, sort of Hand Book related to Air Compressor, Boilers,</li> <li>The book prepared by UNIDO Energy Management Systems-Practical Guide was translated into Turkish, printed out and distributed to 2,500 stakeholders involved in the industrial sector.</li> <li>The website provided updated information on the IEEI purposes, activities and achievements.</li> <li>At the end of July 2017 the IEEI did not draft any Case Studies or News Letters.</li> </ul>
<p>At least 900 decision makers are aware of EE options</p> <p>Energy managers, energy service providers and other technical staff are trained at 40 events (workshops, seminars, courses) attended by 1,200 people at various places in Turkey on systems optimization, energy engineering and EE technologies and processes, business planning and EE investments</p>	<p>Reliable Data not available. On the other hand because of the significant number of participants in training sessions and other events, one can suspect that decision makers are now well-aware of EE options.</p> <ul style="list-style-type: none"> <li>A total of 114 training-day was delivered through 43 events in all major cities.</li> <li>31 events were related to EnMS ISO50001 from April 2014 to July 2017 to 1,164 participants.</li> <li>Other training were related to ESCO-Detailed Energy Audit; Benchmarking; OIZ Measuring Devices;</li> <li>Measurement technics, ES evaluation, financial analysis;</li> <li>ESCO Business model;</li> <li>Outline and recommendations on the integrated financial mechanism;</li> <li>A total of 2.104 people attended these events.</li> <li>Translation of technical training package for system optimization was completed. Up to now more than 3,000</li> </ul>

<p>Engineers and energy managers of ESCO/EVD companies are trained in terms of EnMS undertaking audits and reporting.</p>	<p>pages of Word and PP documents were translated and edited in pump, fan, and compressed air and steam packages. The hard cover brief versions of those documents have been printed.</p> <ul style="list-style-type: none"> <li>- A total of 2104 participants attended the above mentioned events.</li> <li>- Approximately 1,164 participants were trained within the scope of ISO 50001 and Energy Management Systems in the programs (User-Level) performed in 9 different cities of the country.</li> <li>- About 73 participants training to ESCO Business model</li> <li>- About 47 participants training to WTEA and EA methodology</li> <li>- About 27 training to Benchmarking and related reporting</li> <li>- Web-based communication (webinar) by the participation of international consultants, national consultants and company representatives. Up to now 9 trainings and 18 webinars were performed.</li> </ul>
<p><b>Ratings</b></p>	
<p>✓ relevance: 6</p>	<ul style="list-style-type: none"> <li>- Training sessions delivered by international and national experts allowed the successful implementation and operation of the EnMS and as a result of the major ES and GHG emissions reduction.</li> <li>- Training related to EA and WTEA allowed harmonizing the methodology with the aim of fulfilling the EE Law 2011 requirements.</li> </ul>
<p>✓ efficiency: 6</p>	<p>The PMU efficiently rolled out the training program by implementing the approach of training of trainers in the first step. In a second step, the series to training sessions were efficiently delivers to about 1,164 technical staff, consultants and energy managers.</p>
<p>✓ effectiveness: 5</p>	<p>The impact of the EnMS training deliveries to 1,164 participants is the basis of the successful implementation of the EnMS systems.</p> <p>Training sessions on EA and WTEA is the basis on the timely and efficient roll-out of the EE Law and the reporting methodology.</p> <p>Benchmarking session could be maybe useful in the future if the SEC<sup>34</sup> but the YEGM will be required to improve the statistical analysis methodology to deal with the impact of the production level (facility's output) on the SEC</p> <p>The ESCO business model training were</p>

<sup>34</sup> SEC : Specific Energy Consumption

	moderately useful because the EPC scheme is not easily implementable in the absence of an appropriate financial mechanism for that purpose. The issue of collateral financial institutions' requirement is still a major barrier.
✓ <b>Outcome 2 overall rating: 5.6</b>	<p>The EnMS is now fully operating in about 1,350 enterprises and the regulation related to ISO 50001 has been promulgated.</p> <p>The table is set for improving and integrating the available financial mechanisms. On the other hand, nothing has been done in practice for the implementation, even not a decision to this end by key players. The rating is VS although the project targeted a few less enterprises than expected. On the other hand, the impact is much more important than expected.</p>

Table 10 – Results Outcome 2

### 3.4.5 Outcome 3 and Outputs-based Relevance/Effectiveness and Efficiency

**Outcome 3:** Energy audit program for large industry and SMEs implemented.

Table 11 – Results Outcome 3

Results at EOP/Intended Outputs	Achievements
50 % of energy audits are leading to actual investments in EE in industry	<p>At the end of August 2017, a total of 23 EA were carried out. As a result, 3 EE investment projects resulted (ref. table 5 section 3.4.1). Result under expectations.</p> <p>NOTE: The PMU advertised a RFP to carry out an additional series of 14 EA (inclusive of 23 EA mentioned above). Work in progress up to the end of September 2017.</p>
At least 190 GWh/year in new EE investments identified	The result is much better than expected but not as a result of EA carried out. Most of the energy savings results of the EnMS systems: 190 GWh. Data related to EE investments (385,000 USD) is highlighted at Table 6.
<ul style="list-style-type: none"> <li>Standardized audit procedures in line with EnMS ISO 50001</li> <li>5 training on audit techniques supported by the project</li> </ul>	<p>The EA procedure is now standardized with the EnMS ISO 50001. A EA Booklet has been produced to this end.</p> <p>7 training sessions were delivered to ESCO/EVD AND IOZs. 68 people were trained.</p>
Implementation of EnMS in selected enterprises. At least 20 companies certified	A total of 62 enterprises were certified. Result is over expectations.
50 Walk-through energy audits carried out. Info dissemination on 'walk-through' audits at 2 events (supported by the project)	<p>23 WTEA<sup>35</sup> carried out by the IEEI's support. Result under expectations.</p> <p>The project did not carry out any special event related to information dissemination on WTEA excepted 7</p>

<sup>35</sup> 14 selected additional plants were previously visited and audited in July and August 2017.

	training sessions mentioned above. Result over expectations in regard to this sub-output.
50 Detailed energy audits Info dissemination on ‘walk-through’ audits at 2 events (supported by the project) attended by 70 people	At the end of August 2017 a total of 23 EA were carried out. Result under expectations. The project did not carry out any special event related to information dissemination on EA excepted 7 training sessions mentioned above.
<b>Ratings</b>	The EA program did not performed in accordance with expectations.
✓ relevance: 3	In large-scale enterprises the EA approach is not the most appropriate. At his time the previous CTA mentioned that point. On the other hand, EA is useful to SME because, as a rule they do not the qualified technical staff to point out the required EE measures to be implemented.
✓ efficiency: 4	The output is quite far of expectations. But on the other hand the final impact has been reached through the EnMS implementation strategy. As previously mentioned in the Conclusion (second paragraph), this is the result of the new strategy implementation toward the fulfilling of the whole IEEI objectives in regard to energy savings and GHG emissions reduction. If the project had going on with the original work plan as described in the Prodoc, it is obvious that the IEEI would have missed its whole target. The way the PMU managed the situation was, at the end of the day, quite efficient in this regard.
✓ effectiveness: 3	At the end of August 2017 only 23 EA were carried out and only 3 enterprises proceeded with 4 investments (ref. Table 6 above).
✓ <b>Outcome 3 overall rating: 3.3</b>	

Table 11 – Results Outcome 3

### 3.4.6 Outcome 4 and Outputs-based Relevance/Effectiveness and Efficiency

**Outcome 4:** State-of-the-art energy management practices and EE measures, business and financing models are demonstrated.

Table 12 - Results Outcome 4

Results at the end of project (EOP)	Achievement
<b>Intended Outputs</b>	
SEC in demonstration projects improved on average by at least 10%	Based on data available the average SEC improvement is about 9%. Somewhat slightly under the target. The indicators issue is disputable and sometimes SEC may not be the appropriate indicator to accurately measure the improvement because the various production level has a direct

	impact on the SEC. As a result, it is not reliable to assess the impact of the EE measures implementations based on the SEC. The factor affecting the SEC is not limited to volume of production. Heating and cooling degree days, number of stops in the production, changes in the batch sizes and/or product types may also directly affect the SEC in a negative day.
Demo activities designed and implemented, targeting at 65 enterprises	A total of 65 demo projects were implemented: - 3 projects results of the EA program - 62 projects are related to EnMS implementation.
Information exchanges for presenting the actual implementation results	The evaluator has not been informed on any results dissemination events (with the exception the project closing workshop) but on the other hand, the IEEP prepared and circulated a series of 8 case studies.
<b>Ratings</b>	With the exception of the Information dissemination, sub-task under Outcome 4 performed appropriately
✓ relevance: 5	Key relevance mainly result of demo projects related to EnMS. The improvement and implementation of EnMS is the masterpiece of the whole IEEI.
✓ efficiency: 5	Good result on target.
✓ effectiveness: 4	The impact of the State-of-the-art energy management practices is demonstrated. The project prepared and circulated (August 2017) a series of 8 quality Case Studies.
✓ <b>Outcome 4 overall rating: 4.6</b>	

Table 12 - Results Outcome 4

### 3.4.7 Outcome 5 and Outputs-based Relevance/Effectiveness and Efficiency

#### Outcome 5: Monitoring and evaluation; knowledge sharing and info dissemination

Results at EOP – Intended Outputs	Achievement
Monitoring (quarterly and annually) Mid-term and final evaluation	PIRs were only submitted on target MTR carried out on target as well than the FE. In addition the RTA made a tight and efficient monitoring effort to restart the project on the right track after 2014. His involvement has been crucial for the whole success of the IEEI.
Baseline study and end-of-project impact assessment Project reports and publications for promotion of EE in industry in Turkey	At the project design stage (PPG), the IEEI was required to proceed with the Baseline study. Although a significant budget granted for this activity, the baseline study has not been achieved. In 2015 the project carried out the baseline study, which is obviously the fundamental requirement for proceeding with the project monitoring.



Table 14 - Assessment of Sustainability for Objectives

Planned Outcomes (a few Outputs revised in 2015) <sup>37</sup>	Assessment of Sustainability at EOP	Dimensions of Sustainability at EOP
<ul style="list-style-type: none"> <li>• updated and expanded energy use information on a harmonized database</li> <li>• dissemination of energy consumption benchmarks</li> <li>• adoption of a National Energy Management System</li> <li>• functional regional energy management units within OIZs</li> <li>• strengthened and integrated financial systems for EE investments</li> </ul>	<ul style="list-style-type: none"> <li>• <b><u>Socio-Political Risks:</u></b> The Government issued the 2004 Energy Efficiency Strategy, promulgated the 2007 Energy Efficiency Law, and set a target of 20% reduction in energy intensities for all sectors by 2023 of which the industrial sector in Turkey was a priority. These are indicators of the high importance of industrial energy efficiency for the Government of Turkey;</li> <li>• <b><u>Institutional Framework and Governance:</u></b> YEGM has a mandate to research and promote EE in Turkey as well as providing advice on EE-related secondary legislation and regulations (2011); The latest secondary regulation (2011) were drafted out of the IEEI framework. The table is set in term of key EE regulations.</li> <li>• <b><u>Environmental Factors:</u></b> Reduced energy consumption and GHG emissions is a consequence of strengthened institutional-regulatory framework activities of the Project, especially in regard to secondary regulation on the EnMS ISO5001 implemented by the IEEI.</li> </ul> <p style="text-align: right;"><b><u>Overall Rating</u></b></p>	<p style="text-align: center;">L</p> <p style="text-align: center;">L</p> <p style="text-align: center;">L</p> <p style="text-align: center;">L</p> <p style="text-align: center;"><b>L(4)</b></p>
<p><b>Outcome 2: Enhanced capacity and awareness of Turkish industry and energy service providers.</b> This includes:</p> <ul style="list-style-type: none"> <li>• Improved information services Awareness and capacity amongst owners and managers from industry and financial institutions is enhanced</li> <li>• Capacity enhancement on sectorial and energy systems optimization for energy managers and others technical staff on EE in industrial companies.</li> <li>• Capacity of energy service providers enhanced</li> </ul>	<ul style="list-style-type: none"> <li>• <b><u>Financial Resources:</u></b> Financial resources were available with government agencies and the industrial entities for the technical support, training and implementing of EE measures. More significantly, the EE measures will reduce industrial costs of operations and the SEC;</li> <li>• <b><u>Socio-Political Risks:</u></b> Industrial entities in general wish to learn more about implementing EE measures as this improved the competitiveness of their businesses; 43 training and information dissemination were carried out for that purpose.</li> <li>• <b><u>Institutional Framework and Governance:</u></b> The 2007 EE Law requires industrial entities that use more than 1,000 toe annually of energy to report their energy consumption to YEGM. The Project assisted YEGM to monitoring and improving compliance by SMEs to this requirement; Both sizes were trained to implement ISO5001 on EnMS.</li> <li>• <b><u>Environmental Factors:</u></b> Reduced energy consumption and GHG emissions are a consequence of enhanced capacity and awareness activities of the Project to Turkish industry and energy service providers.</li> </ul> <p style="text-align: right;"><b><u>Overall Rating</u></b></p>	<p style="text-align: center;">L</p> <p style="text-align: center;"><b>L(4)</b></p>
<p><b>Outcome 3: Energy audit program for large industry and SMEs implemented.</b> This includes:</p> <ul style="list-style-type: none"> <li>• Additional energy saving investment opportunities identified as part of energy audits</li> <li>• Share of energy audits in Turkey leading to actual investments in EE in industry</li> <li>• Strengthened energy audit</li> </ul>	<ul style="list-style-type: none"> <li>• <b><u>Financial Resources:</u></b> Financial resources were available from various government agency funds to facilitate the completion of energy audits for industrial entities especially LSEs;</li> <li>• <b><u>Socio-Political Risks:</u></b> Industrial entities that consume more than 1,000 toe of energy annually need to report their energy consumption to YEGM. The Project's assistance to implement a ISO 50001-based energy audit program improved compliance of industrial entities, notably SMEs sector, to this requirement;</li> <li>• <b><u>Institutional Framework and Governance:</u></b> The Government has adopted ISO 50001, the standard for energy management systems and modernized energy.</li> </ul>	<p style="text-align: center;">L</p> <p style="text-align: center;">L</p> <p style="text-align: center;">L</p>

Table 14 - Assessment of Sustainability for Objectives

Planned Outcomes (a few Outputs revised in 2015) <sup>37</sup>	Assessment of Sustainability at EOP	Dimensions of Sustainability at EOP
<ul style="list-style-type: none"> <li>capacity upgraded</li> <li>Implementation of EnMS in selected enterprises</li> </ul>	<p>This enforced by YEGM who benefited from the Project's activities to upgrade their capacities for oversight of WTEAs, detailed energy audits and investment-grade energy audits for industrial entities;</p> <ul style="list-style-type: none"> <li><b>Environmental Factors:</b> Reduction of energy consumption and GHG emissions were not significantly achieved as consequence of implementing energy audit program activities of the Project for Turkish industry and energy service providers.</li> </ul> <p style="text-align: right;"><b>Overall Rating</b></p>	<p>L</p> <p>MU</p> <p><b>ML(3.6)</b></p>
<p><b>Outcome 4: State-of-the-art energy management practices and EE measures, business and financing models are demonstrated.</b> This includes:</p> <ul style="list-style-type: none"> <li>Demonstration projects designed and developed</li> </ul>	<ul style="list-style-type: none"> <li><b>Financial Resources:</b> Large industrial entities generally have sufficient funds to implement EE measures. SMEs likely do not have fiscal resources to implement EE measures; however, they do have access to a number of EE financing mechanisms from YEGM, KOSGEB and TTGV which the Project will assist to improve SME access to financing for EE measures; the issue of loan guarantee or collateral requirement by FI was lightly addressed by the project.</li> <li><b>Socio-Political Risks:</b> Industrial entities need to see EE measure demonstrations to boost their confidence to implement EE measures; such a risk, especially for SMEs, was lightly addressed by the project.</li> <li><b>Institutional Framework and Governance:</b> YEGM, TSE, TTGV and KOSGEB are available for support of EE investments by industrial entities in Turkey;</li> <li><b>Environmental Factors:</b> Reduced energy consumption and GHG emissions are a consequence of EE demonstration activities of the Project. This impact is the result of the implementation of the EnMS rather than EA. 3 industrial facilities implemented EE measure because of the EA.</li> </ul> <p style="text-align: right;"><b>Overall Rating</b></p>	<p>L</p> <p>ML</p> <p>L</p> <p>ML</p> <p>L</p> <p>ML</p> <p><b>ML(3.5)</b></p>

Table 14 - Assessment of Sustainability for Objectives

### 3.5.2 Replicability

The YEGM should avoid promoting the EA in LSE because large enterprises are, as a rule, in position to assess their own lack of energy performance on the production line and other auxiliary services. The ministry should promote the roll-out of the feasibility study in LSEs. On the other hand, the WTEA and EA should be promoted by the KOSGEB to SMEs because small and medium enterprises, as a rule, have not the needed technical capacity to deal with these studies. Again, the impact of the replication of the EA component to SMEs will result in a significant impact if the KOSGEB is in a position to support SMEs with a financial mechanism to overpass the issue of loan guarantee for implementing EE measures.

For further development, the priority in term of replicability must be given to the extension of the EnMS ISO50001 to all LSEs because of the proven potential of energy savings that can be achieved because of the EnMS. In addition, a follow-up programme could also target energy intensive MSEs.

The replication of an EE full-ledged GEF project to deal with EE improvement in LSE and SMEs at the same time should be avoided in the future. As designed and formulated, the IEEI made a merging of two different types of energy end-users in the industrial sector. It is well known that the practical way to support SMEs in accordance with their needs is quite different than it is in large-scale industrial facilities in terms of technologies, technical capacity of staff members and more importantly in term of EE project financing needs. The evaluator pointed out the weakness of such an approach at Section 3.1. In addition the performance of the EA component toward ES expectations proven that the EA approach is not the most appropriate for LSE. On the other hand, the EA and WTEA are appropriate for SMEs because of the lack of capable energy managers, which can benefit of the EE measures analyzed and recommended through the EA procedure. For reasons highlighted above, the project replication is rated **Moderately unlikely (MU)**.

## 4. Conclusion, Recommendations and Lessons learned

### 4.1 Conclusion

The final evaluation carried out in July 2017 has been carried out in accordance with the GEF FE Guidelines. In Year 2014 the IEEI was on the verge to be terminated because of its low performance in terms of impact and expenditures. From 2015 to 2017 the IEEI significantly improved its performance in term of capacity building to industrial enterprises and service providers, as well as the technical support provided to IOZ, especially in regard to metering equipment provided to 11 IOZ in Turkey.

After Year 2014, the new PC got the approval of a new implementation strategy, which was more related to the scale-down of a few outputs, especially towards energy savings, GHG emissions reduction and, the number of EA to be carried out. The PC was not in a position to revise the outcomes because it is not allowed by the GEF due to regulation. At the end of the day, the despite the adjustment to a few outputs, the project overcame the revised targets and nearly reached the initial target set in the ProDoc; excepted the EA component which was too ambitious in the Podoc. The EA component, as implemented in accordance with the revised lower target (number of EA), was appropriate because the EA component impacted ES and GHG emissions very lightly. Because of the adaptive management and the tight M&E activity implemented by the PMU, with the support of the UNDP and UNIDO, the project recovered, nearly from scratch and reached its whole revised target.

The evaluator rated the whole project performance **Satisfactory**. The YEGM and the project team members rolled out the needed efforts, and the adaptive management approach (2015 and after) to achieve the project in accordance with the revised expectations. The weaker project sub-component is related to the EA activities, which did not provide a significant impact on the whole project results. The other lack is related to the absence of a particular financial mechanism to support the implementation of EE measures in SMEs. The Project reviewed the series of financial support already made available by the YEGM, TTGV, and KOSGEB with the aim of recommending an integrated financial mechanism for simplifying the procedure and shorten delays for getting access to financial support through the existing financial mechanisms. At the EOP, recommendations toward the rollout of the integrated financial mechanism (one-stop-shop approach) did not take off.

The evaluator assessed the sustainability and replication potential of the IEEI at the EOP. Because of the comprehensive capacity building activities carried out, and the successful implementation of ISO50001 EnMS component, the sustainability of most of project result is somewhat secured. The project overall evaluation of Sustainability is **Moderately Likely (ML)** because of the low impact of the EA program and the absence of a financial mechanism to address the issue of loan guarantee to SMEs.

In term of replicability the evaluator does not recommend the replication of a similar project framework for dealing with LSCs and SMSEs within the same project initiative. The original project initiatives (2008) to implement two different projects was more appropriate. The replicability is **Moderately unlikely (MU)**.

As a rule, the successful project implementation, despite the fact that the project had minor shortcomings in the achievement of its objectives, it has proven its sustainability especially in regard to the implementation of the EnMS in the industrial sector, especially in regard to LSEs.

The project formulation has been reviewed, especially in regard of the incompatible project beneficiaries (LSE vs SME) and the relevance of the EA or FS studies depending on the size of the enterprises.

Despite the fact that the project design did not encompass a significant budget provision for development and the implementation of a financial mechanism, the IEEI carried out a study related to the development of an integrated financial mechanism, sort of one-stop-shop, to be implemented by key players, that is to say, the KOSGEB, the TTGV and the YEGM. The evaluator has not been informed of any tangible decision or action undertaken by key players to roll out the “one-stop-shop” and simplifying the access to the financial support.

The IEEP set the table for the efficient extension of the EnMS in LSEs and MSEs and the development of new EE project initiatives in the industrial sector.

## 4.2 Lessons Learned

### Key Team Members Involvement and Readiness

Among others, the project shortcoming was the result of a lack of capacity of the first Project Coordinator, and the absence of an appropriate technical support within the Project Management Unit (PMU). Although the ProDoc clearly mentioned the need for involving at least four full-time national team members: 1) Project Coordinator (PC); 2) Project Administrator; 3) Project Assistant, and 4) A technical coordinator to deal with the Energy Audit (EA) program and other technical issues. The PMU did not involve any full-time technical specialists. For such a full-sized GEF project the involvement of only 3 team members proved to be insufficient to appropriately start up and implement a full-sized project. The project would have had a better performance with the involvement of 2 additional technical specialists: 1) EA-Walk-through EA and technologies; 2) a coordinator for the Energy Management Standard (EnMS) implementation. Such a team of 5 members is, in the opinion of the evaluator, the basic requirement to successfully and efficiently implement the project. Because of the limitation of the “project management” budget provision, these 2 technical specialists should have been paid through the project technical components from Year 1 to the EOP. In the situation where the PMU is understaffed the project become like an impossible mission. That is the lesson learned. The first PC resigned, maybe because of such a situation, and also a certain lack of capacity. The IEEI finally succeeded because of the capacity and dedication of only 3 team members and a part-time CTA. Several UNDP-GEF projects face a lack of capable team members or are understaffed. The involvement of a full-time Chief Technical Advisor (CTA) during the first year of implementation, and part-time after for a certain time horizon is another prerequisite that should not be avoided for the implementation of a full-sized GEF project.

### Diversity of Project Beneficiaries: Various needs and capacities

The evaluator explained in Section 2 the project background while the UNDO and UNDP merged two project initiatives related to SMEs and LSEs respectively. The project baseline was nearly non-existent although the PPG requirement, and there was no limitation in terms of industrial sub-sectors to be prioritized. Small and Medium enterprises (SMEs) and Large-size enterprises (LSEs) are the basis of the manufacturing activities in all countries, but each of them is different and observes to different investment decision-making procedures, financial needs are totally different, and technical and technological capacities are not the same. In other words the decision to merge into the same project framework LSEs and SMEs was a questionable decision, especially in regard to the Energy Audit component. The project results confirm the questionable relevance of such an approach: 99% of energy savings were achieved in the LSEs. However, there is a significant EE potential to achieve in medium-scale enterprises and LSEs through additional efforts or project initiatives in a near future.

In the UNIDO's view, the fact that in the Turkey IEEI project, the bulk of the partner companies are LSE was more the result of prioritized larger impact (i.e. energy savings per company, ability to invest without external help) and participation of leading national companies in the project could provide an exemplary role and exert an influence on peers within their respective sectors. The evaluator agrees with such an assumption but at the end of the day, the project got a very marginal impact in SMEs.

### **Promoting Energy Audit (EA) or Investment Grade Audit (IGA) or Wall-through EA (WTEA) or Feasibility studies (FS). What should be priority?**

The way to promote EE in the industrial sector depends of the facility size. It has been mentioned by the first CTA in his final report (2013): "Comprehensive and detailed energy audits (EA) are helpful to SMEs because of their lack of EE technical staff members". EA is much more costly to carry out in a LSE than in a SME. The technical capacity and skill requirements of EE auditors are not the same in both sectors, and the EA cost in a LSE is can be many times bigger than the same task in a SME. On the other hand, the LSE would take more advantages of the Feasibility Study or an IGA focussing on a limited number of EE measures rather than an EA program.

The lesson learned is to focus on a few energy-intensive industrial sectors, within similar industrial facilities size because the approach for promoting, implementing, financing and monitoring result are vastly different although the IEEI reached its target by implementing the EnMS, medium and large-scale enterprises even if the project design did not grant a priority to EnMS. At the end of the project timeframe, most of energy saving impacts are the result of the EnMS.

### **Role and significant relevance of the CTA's involvement**

Nowadays, it is not unusual that the UNDP and the project hosting institution(s) do not promote the full-time involvement of a CTA<sup>38</sup>. Such an approach is counterproductive. If the CTA is appropriately selected at the earliest stage of the project timeframe, his (her) involvement should be crucial for the successful implementation of a full-sized project. In many GEF project frameworks, the hosting institution however is often too reluctant to use the GEF's grant for such a cost-intensive budget provision. Most of the time, the hosting institution intends focussing the priority on the input from national technical advisor, which is good but not sufficient. The evaluator will never sufficiently emphasize that point: the CTA should have been involved at the earliest stage of the project implementation, even at the inception stage. This is the lesson learned in Turkey, but also in many other countries.

### **Relevance and appropriateness of a tight and efficient M&E component and Adaptive Management**

This is a positive lesson learned from the IEEI in Turkey. One can say that the project recovered in its phase 2 (2015-2017) because of the strong alarms sent by the M&E activity. The UNDP played a crucial role in that matter, especially the RTA and the MTR experts (2013). However, the evaluator regrets the time lost from 2011 to the end of 2014. A few activities were carried out but the project did not take off and at the end of Year 2013, the project was on the verge to be terminated. Because of the outstanding dedication of the project administrator in 2013, the project survived by achieving a few "soft" outputs. Again, thanks to the M&E all decision makers were aware of the poor project performance and finally the new PC submitted in early 2015 a new project strategy, which was mainly related to an adjustment to few deliverables by scaling down

<sup>38</sup> IEEI: The full-time CTA was involved from July 2012 to August 2013 ; in late, about 1 ½ year after the project strat-up.

the quantitative outputs<sup>39</sup>. The UNDP and the PSC approved the “new strategy” on the fast track because key stakeholders and PSV members were already concerned and aware of the bad project performance. Though the basic M&E activities (PIR, MTR and FE) proven their usefulness for revising and improving the project implementation through the adaptive management, the first adaptive management actions (key adjustments in terms of implementation strategy and work plan) should be the result of the inception phase, report and workshop.

**UNIDO quality technical inputs and the UNDP support (management) were of the utmost importance toward the successful project implementation.**

This is another positive lesson learnt: By nature the UNIDO used to work in the industrial sector and EE technologies. UNDP used to support GEF project implementation and design through its country offices and the regional technical support provided by the RTA. Such a joint venture approach should be replicated in other countries because both institutions can have a synergic impact in line with their respective capacities to secure the successful implementation of EE projects in the industrial sector. The Turkish IEEI project clearly demonstrated the appropriateness of that strategy.

**EnMS is the basic key tool for dealing with EE in LSE**

We all know that energy management is a basic requirement to go further with energy savings and reporting in the industrial sector. The evaluator is quite amazed by the tangible impact of the implementation of the Energy Management Standard in line with ISO50001. About 98% of savings came from the implementation of the EnMS in LSE while the EA components were insignificant to the project results in terms of energy savings and GHG emissions reduction. This is a major lesson learned that should be replicated in other countries.

### 4.3 Recommendations

Section 4.3 is a major deliverable of the FE report because recommendations should be likely useful for improving the upcoming new project designs and implementation toward the best efficiency and effectiveness. This is particularly the situation in Turkey at this point in time. The GEF Secretariat has recently approved a new EE project in the industrial sector. The UNDP will support the Ministry of Science Industry and Technology (MoSIT) through a full-sized project<sup>40</sup> mainly aiming to improve the energy efficiency of electric motors. Most of lessons learnt and recommendations could be taken into consideration at the earliest stage of the upcoming project (PIM 5285) implementation as well than at the inception stage.

**Recommendation 1: Further priority topic and extended scope to all Large-scale Enterprises (LSEs) and Medium-scale Enterprises (MSEs)**

Support and extend the EnMS systems to all LSEs by the YEGM. The ministry should roll out a full-sized EnMS implementation strategy in LSEs.

EnMS is probably the main asset of the project implementation. Because of the proven results of the EnMS in LSEs, the YEGM should, as a priority, support its extension to all LSE achieved through the methodology demonstrated and the professional workforce built by the project. EnMS is probably the main asset of the project implementation. Because of the proven results of the EnMS in LSEs achieved through the most relevant

<sup>39</sup> Scaling down outputs is not allowed by the GEF regulation.

<sup>40</sup> PIM5285: Promoting Energy-Efficient Motors in Small and Medium Sized Enterprises (PEEMS)

methodology and the professional workforce built by the project<sup>41</sup>, the YEGM should, as a priority, should support its extension to all LSE, and the in energy intensive medium-sized enterprises (MSE).

### **Recommendation 2: Relevance of Feasibility Studies (FS) opposite to EA**

Rather than providing subsidies to carry out EA in LSEs, it should more useful to subsidize (or support) FS to support the implementation of EE measures highlighted by the mandatory EA (by Law).

That point has been raised by the first CTA (2012-2013) but the PSC did not take action to provide LSEs with FS because it was not included under any defined outcome. For further development the YGEM should consider such an approach, which is more attractive and useful to LSEs. The same recommendation is addressed to the MoSIT for implementing the new EE project in the industrial sector. In essence, the new project targets electric motors and a few peripheral equipment e.g. variable speed drive controllers, etc... For this reason, there is not any clear needs in regard EA. The FS approach should be the basic tool to implement EE measures in SMEs. Such a sort-cut should be considered because the project deals with only one technology.

### **Recommendation 3: Integrated Financial Mechanism - a basic need**

Development of a financial mechanism that will provide funding for SMEs with the aim of accelerating the EE measures implementation in SMEs and ESCO business model development.

Based on his experience of more than 600 EE projects implemented in SMEs in South East Asia, the evaluation team leader knows that among others, the issue of loan guarantee or collateral is as a rule, a barrier to EE investments by SMEs or through the ESCO/EPC business model. To this end, the KOSGEB should be the initiator and the manager of such a one-stop shop for providing the needed integrated financial mechanism to SMEs.

### **Recommendation 4: Scope of works, technologies and project beneficiaries**

UNDP as well than UNIDO should not promote the implementation of EE projects in the industrial sector in LSEs and SMEs within the same project initiative.

The evaluator highlighted this point as a major weakness of the IEEI project formulation (section 3.1). The title of the project was not appropriate as it is too in large scope and no special focus in terms of EE technologies and industrial sub-sectors.

The upcoming project related to EE Motors should pay a special attention to this recommendation. The basic focus of the new EE project is solely electric motors and some peripheral equipment. The project should avoid dealing with other EE measures, especially the ones related to the production line, other than the electric motors and controllers (VSD).

### **Recommendation 5: Relevance of the Inception Stage - CTA's involvement**

At mid-term the IEEI was nearly seen as failure for many reasons. Fortunately the IEEI recovered and reached the target because of a new implementation strategy, the

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<sup>41</sup> These are the two key factors for getting results from EnMS/ISO 50001. On the other hand, the standard alone does not guarantee results, and the evidence we found in Turkey and in all other countries where UNIDO has projects is that ISO 50001 implementation is done pretty poorly. Again the outstanding result in Turkey comes from the intensive efforts rolled out by the YEGM and the PMU (IEEI) in terms of training, TA and support to enterprises in measuring energy consumption of some components of the selected industrial plans in LSE.

influence of the RTA and the high capacity of the new project coordinator. Among others the situation faced by the project over its first 3 years is mainly the result of a lack of capacity on the PMU side. The project administrator did a very good job during this period of time, but one cannot ask the “administrator” to deal with the project design improvement and technical management.

The recommendation aims at involving the Chief Technical Advisor (CTA) at the earliest stage. The TA and inputs provided by the CTA should be crucial, especially at the earliest stage of the project implementation that is to say, at the Inception stage. The CTA and the project manager should jointly manage the Inception stage (reporting and workshop). In addition, the CTA must deal mainly with technical and implementation issues, especially in regard to some demonstration components, hands-on training and coaching. Based on a long experience in the UNDP/GEF project framework and taking into consideration the limited budget provision of GEF project framework, the CTA should be full-time involved, or almost, during the first year and part-time for two additional years, that is to say until the MTR stage.

### **Recommendation 6: Demonstration Component and organizational arrangement**

Most of the EE/CC GEF projects encompass a “demonstration component”. Most of the time the final objective of demo component is not clearly defined. It is well known that EE measures in the industrial sector, but also in the building sector, are not using any edge-technologies or innovative equipment. As a result, the objective of the demonstration component is not related to technology but mainly focus on the cost-effectiveness, sustainability and replication of EE measures. In the field of EE, money is the driver. As long the EE measures did not demonstrate their cost-effectiveness, decision-makers in the industrial sector are not so quick to make the investing decision. In addition the demo component should be seen as a sort of “showcase” for promoting these EE measures and their replication. Based on a long experience in the GEF/UNDP project implementation framework, it is proven that the demo component is always (or almost) in late and its final objective is not clearly understood or defined. In the worst situation, the demo component is implemented after the MTR, nearly at the end of the project timeframe.

The recommendation aims at speeding up the implementation of the demo component within the first year of the project timeframe. It would be possible to do it if some basic conditions are met.

At the earliest stage of the project timeframe, the project manager is, as usual, totally overwhelmed by too many unavoidable administrative and reporting tasks in addition to the selection of team members and daily project management. In such a situation the PM cannot appropriately deal with the demo component although the PM is as a rule, aware of the importance and usefulness of the demo component. For this reason, the CTA should be involved at the earliest stage of the project with the aim of selecting and implementing the demo component within the first year. For a matter of knowledge transfer and result ownership, a national technical advisor should support the CTA in his(her) task.

The upcoming UNDP GEF project related to EE Electric Motors should pay attention to this recommendation; otherwise the likely risk to face a significant and damageable delay is predictable.

### **Recommendation 7: Verification of quantitative Impact of EE measures.**

Tough the EE measures are as a rule, not using any edge-technologies, the impact (energy saving and load profile) must be monitored in the most accurate and reliable was

by using the required modern data logging systems and the 3G or 4G communication support to data gathering.

At the site selection stage (industrial facilities) the PMU must use portable accurate metering and data logger systems but, from the moment the site is selected for the purpose of demonstration, the project should install (and pay for) a smart meter with the 3G or 4 G communication link to monitor the energy consumption and the load profile of the targeted equipment to be improved or replaced. This is the basic requirement for establishing the baseline of an EE project and later on, to measure the actual impact of the EE improvement. In the best situation, all equipment improved or replaced must be monitored through a standing metering systems installed for that purpose and should be transferred to the industrial facility for improving the energy management systems on a long run. Most of the time such a simple methodology is not implemented and the baseline data and the impact in term of EE are still not a simple estimate and not quite accurate or reliable.

**Recommendation 8: Let's come back to the right title of the head of the PMU**

This not a matter of detail; over the last five years (more or less) the UNDP and UNIDO use the name of “coordinator” to qualify the position title at the head of the PMU. The evaluator recommends coming back to the previous position title, that is to say “Project Manager”.

Mostly all full-sized projects encompass 4 or 5 components linked with specific outcomes. Some components are much more important and effort-intensive than others. For these components the PMU should involve one or two full-time national team members acting as experts and component coordinators. As an instance, the upcoming EE Electric Motors should take this recommendation into consideration, especially in regard to demo component to be implemented on the fast track and other technical component later on. In such a situation the head of the PMU cannot have a position of “coordinator” because the PMU needs one or two component coordinators to be achieved the whole project in the wished efficient way. Let's come back to the position title “Project Manager” to highlight the consistency of his (her) crucial responsibility and the decision line.

## Appendix 1: The field mission planning and persons/institutions interviewed

Mission Agenda July 2017.

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### Monday, July 3

Meeting with the PMU:

- Mr. Kubilay Kavak, Coordinator
- Mr. Seracettin Yuzgulen, Administrator
- Miss. Pinar Engin: PMU Project Assistant

Activities and progress review tasks-based.

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### Tuesday, July 4.

Miss N. Pinar Isin  
Manager Kosgeb

Discussion and review of results to SMEs  
Especially in regard to benchmarking and EnMs.  
Result were estimated valuable.

**Mr. Yuksel Malkoc**  
Deputy General Director  
MENR (YEGM)

Discussion and progress review.  
Discussion on the role and tasks of the NPD.  
Need to be clarified in the FE report.

**Mr. Gursel Eratak**  
Expert Standard and Labeling (TSE, Turkish Standard Institution)

Discussion and evaluation of the training related to EnMs. Mr. Eratak is certifies as Energy Manager because of the EnMs training.

Positive comments.

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### Wednesday, July 5

am:

**Mrs. Pelin Rodoplu**  
UNDP Portfolio Manager. Ankara.

Evaluation of the project performance and  
efficiency of communication link.

All comments were good. No issue.

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**Pm:**

Travel from Ankara to Vienna

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**Thursday, July 6**

*UNIDO meeting, non-stop from 10 am to 14:30*

**Mr. Javier Guarnizo**

Chief of Independent Evaluation Office UNIDO

Discussion on the “independent “ evaluation procedures and compliance with the GEF guidelines.

The FE Evaluator mentioned the relevance of the GEF methodology.

**Mr. Marco Matteini**

UNIDO Indus. Dev. Officer

Project Progress review.

Mr. Matteini mentioned the outstanding progress from 2014,

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**Friday, July 7**

Continuation of desk review in Vienna

And FE team meeting, with Seracettin and Skype meeting with the RTA (John Obrien + Kubilay + Suleyman)

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**Saturday, July 8**

Flight back to Istanbul

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**Sunday , July 9**

Rest and Relax in Istanbul

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**Monday , July 10**

**Mr. Cihan Karamik**

Schneider Electric – Istanbul

Review of the training (EnMs) program in terms of usefulness and efficiency.

Mr. Karamik expressed his outstanding evaluation of the training program. Mr. Karamik was also “trainer” as a result of his training.

**Mr. Onur Unlu**

Escon Co

Equipment supplier and Energy Management

Escon is also an ESCO having carried out 20 EPC projects in Turkey over the last 3 years.

Good comments on training delivery related to EnMs. Engineering Universities should be more involved by including a training module related to EnMs in training curriculum.

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## Tuesday, July 11

### Meeting with Baymak

Electric Appliances Supplier  
(major equipment manufacturer in Turkey)

The purpose of the meeting with such a major appliance manufacturer was to get their feedback on energy saving resulting of the implementation of EnMs.

The total energy consumption of the industrial facility (huge) is 1,400 TOE/yr.

Saving from the EnMs is estimated to 3%.

In addition key energy managers are now certified in accordance with the EnMs training delivered by the IEEI.

- Mr. Oktay Okyay  
Production Engineer
  
- Mr. Kerem Gargili  
Quality Assurance Engineer
  
- **Mr. Murat Kurnaz**  
Quality Assurance Manager

### GOSB

#### Meeting with OIZ Istanbul

The purpose of the meeting was mainly related to the relevance and usefulness of metering equipment provided by the IEEI project.

Testing and metering equipment are useful, especially some thermal metering equipment.

Other Energy Service Providers can use this equipment, but the GOSB's technical staff member must use the equipment with the ESP.

#### **Yunus Emre Zengin**

Technical staff

#### **Hulya Kaynak**

Deputy Regional Director

#### **Mrs. Z. Nil Sonmez**

Regional Director

### Meeting with Endustriyel Enerji Consulting Group

The purpose of the meeting was related to training delivered by the IEEI.

Endustriyel Enerji is a major Consulting company in Turkey. The Group carried out only 1 EA for the IEEI project. On the other hand Endustriyel Enerji carried out 3 EPC out of the IEEI project. All staff members are very senior experts.

Comments were related to the significant relevance of the EnMs program and training.

## July 11, cont'd

### Meeting with ENVE Enerji

The main purpose of the meeting was to evaluate the impact of the IEEI on EE investments in industrial facilities.

ENVE Enerji carried out about 100 EA in industrial facilities. ENVE is a key player (as well as Endustriyel Enerji) in the field of EE in the industrial sector.

ENVE mentioned the Financial requirement as a key barrier to EE full implementation in line with the ESCO business model or other. Based on ENVE extended experience and achievements, large scale industrial facilities should be a priority target. Such a comment is in line with ENVE's key clients.

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## Wednesday, July 12

Early morning (06 :20) flight back to Canada.

Thank Seracettin and Suleyman for having taken me to Airport so early in the morning.

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## Saturday, July 22

### Skype-call Frank Pool

Review of the former CTA final report (2013) and discussion on his recommendations. In his view, the IEEI did not appropriately perform from 2011 to the end of 2013 because the project has not been in a position to adjust the scope and some project outcomes.

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## Monday, July 27

### Skype-call Roland Wong

Review of the MTE (2013) and discussion on recommendations (rational and usefulness). In his view the major issue having justified the bad rating (MTR) is related to a lack of management capacity and the whole vision of the IEEI.

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## Tuesday, September 12

### Meeting at UNDP CO - Ankara

Meeting with Numi Ozbagdatly (the newly assignment UNDP program officer) and John Obrien, RTA.

The purpose of the meeting was to review recommendation of the FE evaluation report.

Short meeting with the UNIDO representative in Turkey Mr.

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## Thursday, Sept 28

### Skype call with Rod Jensen

Former part-time CTA 2014-2015.

Review and discussion on EE Law and regulations

Financial mechanism

And role and impact of Franc Pool (2012-2013) on the project achievement.

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## Monday, July 27

### Joint-Skype call with Frank Pool and John Obrien

In essence for listening Frank Pool's comments on the draft FE report.



## Appendix 2: Changes to the PPM 2010

Appendix 2 PPM Revised 215: New Strategy 2015-2017 Logical framework of outcomes, outputs and indicators

**NOTE: Changes of targets are not allowed by the GEF.**

<p><b>This project will contribute to achieving the following Country Program Outcome (as defined in the CP)</b>  <i>Outcome:</i> Strengthened management and protection of ecosystems for environmental sustainability (CP, Outcome 3)  <i>Output:</i> Increased productivity and competitiveness through improved energy efficiency and conservation (CP, output 1.3.5)  <i>Output indicators:</i> Level of energy utilized in different sectors; assessment of clean development technology implemented in production; level of renewable energy applied to fulfil the energy demand of the nation; level of greenhouse gas emission; cost of implementing cleaner technology and its effect on the overall GDP</p>					
<p><b>CPAP Outcomes and indicators:</b>  <i>Outcome:</i> Access to sustainable energy services is increased  <i>Indicator:</i> Number of new technologies for energy efficiency introduced</p>					
<p><b>Primary applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one):</b>          Mainstreaming environment and energy</p>					
<p>The project falls under the Environment and Energy Thematic Priority of UNIDO, and its RBM code C13, Industrial Energy Efficiency. It will contribute to the successful implementation of the cooperation programme between UNIDO and Turkey as agreed by the last bilateral consultation.</p>					
<p><b>Applicable GEF Strategic Objective and Program:</b> To promote energy-efficient technologies and practices in industrial production and manufacturing processes</p>					
<p><b>Applicable GEF Expected Outcomes:</b> Improved energy efficiency of industrial production</p>					
<p><b>Applicable GEF Outcome Indicators:</b> Efficiency of industrial energy use (energy use / \$ GDP); GHG emissions from industry (tons CO<sub>2</sub> eq/ \$ GDP); and \$/ t CO<sub>2</sub>eq</p>					
	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
<p><b>Project Objective</b> To improve energy efficiency of the Turkish industry by enabling and encouraging companies in the industrial sector for efficient management of energy use by different energy</p>	A) Energy savings from EE investments in industrial sector compared to baseline	<ul style="list-style-type: none"> <li>Technical energy savings potential in industry estimated at around 20%</li> </ul>	<ul style="list-style-type: none"> <li>At least <del>190</del> <b>46.5</b> GWh per year (energy and fuel)</li> </ul>	<ul style="list-style-type: none"> <li>As given under the various Outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Willingness of industry to invest</li> </ul>
	B) Direct and indirect emission reductions	<ul style="list-style-type: none"> <li>GHG emissions from industry were around <del>66.5</del> <b>118</b> MtC O<sub>2</sub> in <del>2009</del> <b>2012</b> and</li> </ul>	<ul style="list-style-type: none"> <li>Direct emission reduction (associated with demo projects) of <del>60.9</del> <b>15</b> ktCO<sub>2</sub> p.a. and (assuming an average</li> </ul>	<ul style="list-style-type: none"> <li>As given under the various outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Willingness of industry during and after the project</li> </ul>

<p>conservation measures and energy efficient technologies</p>		<p>are projected to grow to <del>115.3</del> <b>221</b> MtCO<sub>2</sub> by 2025</p>	<p>10-year lifetime of energy investment) <del>609</del> <b>150</b> ktCO<sub>2</sub> cumulatively</p> <ul style="list-style-type: none"> <li>• Cumulative indirect emission reduction due to project's capacity building activities ranging from <del>1.8</del> <b>0.45</b> MtCO<sub>2</sub> (bottom-up approach) to <del>32.7</del> <b>8</b> MtCO<sub>2</sub> (top-down)</li> </ul>		
<p><b>Outcome 1</b> Strengthened institutional-regulatory framework and a national Energy Management Standard contributing to the implementation of the EE Law</p>	<p>C) The content and status of new policies and programs supporting their implementation</p>	<ul style="list-style-type: none"> <li>• Insufficient implementation of policies and programs</li> </ul>	<ul style="list-style-type: none"> <li>• New provisions available (EnMS)</li> <li>• Institutions strengthened and cooperation increased between EIE, KOSGEB, TTGV and OIZs</li> </ul>	<ul style="list-style-type: none"> <li>• Government statements</li> <li>• Other verifiers as given below</li> </ul>	<ul style="list-style-type: none"> <li>• See below</li> </ul>
<p><i>Output indicators:</i></p>	<p>1) Comprehensive ness of energy-related databases in EIE and KOSGEB (<i>output 1.1</i>)</p> <p>2) Availability of benchmark data for industrial sectors (<i>output 1.2</i>)</p>	<ul style="list-style-type: none"> <li>• Basic energy consumption data gathering by Statistics and EIE</li> <li>• Benchmark data are available for some</li> </ul>	<ul style="list-style-type: none"> <li>• Information on energy use of about 1,500 industries is updated and expanded and put in the databases</li> <li>• Benchmark data for all sectors and size of industry are</li> </ul>	<ul style="list-style-type: none"> <li>• Data input format</li> <li>• Database output and statistical reports</li> <li>• Progress report</li> <li>• Web portal</li> <li>• Progress report</li> <li>• Seminar</li> </ul>	<ul style="list-style-type: none"> <li>• Willingness of industries to provide such data (which sometimes can be considered confidential)</li> <li>• Sufficient sectoral and technology data can be</li> </ul>

		sectors	available	presentations	gathered to be able to define benchmarks
	3) Status of adoption of National Energy Management Standard (EnMS) (output 1.3)	<ul style="list-style-type: none"> <li>No EnMS defined</li> </ul>	<ul style="list-style-type: none"> <li>EnMS adopted and promulgation of EnMS</li> <li>Widely promote EnMS approach throughout the country</li> <li>Guidelines issued for implementation of EnMS</li> </ul>	<ul style="list-style-type: none"> <li>Official publication</li> <li>EnMS user guide</li> <li>Progress report</li> </ul>	<ul style="list-style-type: none"> <li>Government-level support to define and promulgate EnMS</li> </ul>
	4) Functioning regional energy support centers (output 1.4)	<ul style="list-style-type: none"> <li>No energy-dedicated regional support centers</li> </ul>	<ul style="list-style-type: none"> <li>10 Energy Management Units in OIZs with sufficient operating budgets</li> </ul>	<ul style="list-style-type: none"> <li>Business plan</li> <li>Annual reports</li> <li>Project progress report</li> </ul>	<ul style="list-style-type: none"> <li>EIE top management approves the establishment</li> </ul>
	5) Strengthened and integrated financial mechanisms (output 1.5)	<ul style="list-style-type: none"> <li>Existing mechanisms (EIE, KOSGEB, TTGV) leave gaps and do not reach all potential beneficiaries</li> </ul>	<ul style="list-style-type: none"> <li>The three existing mechanisms are integrated to target both large companies (EIE, TTGV) and SMEs (KOSGEB)</li> <li>The three existing mechanism are improved and a new mechanism is proposed</li> </ul>	<ul style="list-style-type: none"> <li>Official publications on financial mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>Top management of the institutions involved approve proposed changes in the existing mechanisms</li> </ul>
<b>Outcome 2</b> Enhanced capacity and awareness of Turkish industry and energy service	D) Additional number of EE projects investment made by industrial companies per year	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>About 200 100 EE investment directly (demos) or indirectly (outcome 2; capacity building)</li> </ul>	<ul style="list-style-type: none"> <li>Reports by industry associations; publications</li> <li>Other verifiers</li> </ul>	<ul style="list-style-type: none"> <li>See below</li> </ul>

providers	<del>E) Expanded business opportunities for ESCOs</del>	<del>• No performance contracts concluded by ESCOs to-date</del>	<del>• At least 10 new performance contracts concluded by ESCOs per year</del>	as given below	
<i>Output indicators:</i>	6) Improved information services ( <i>output 2.1</i> )	<ul style="list-style-type: none"> <li>• Websites of EIE, KOSGEB, TTGV, TSE</li> </ul>	<ul style="list-style-type: none"> <li>• Upgraded and linked websites to provide integrated info on EE</li> <li>• Number of case studies, lessons learned from (inter-) national sources and number of brochures and booklets on EE</li> <li>• Project newsletter; Documentaries</li> </ul>	<ul style="list-style-type: none"> <li>• Web sites</li> <li>• Reports, booklets, brochures on EE</li> <li>• Project newsletter</li> <li>• Progress report</li> </ul>	<ul style="list-style-type: none"> <li>• Implementing agencies coordinate the content of their websites on EE aspects</li> </ul>
	<del>7) Enhanced awareness in industry on EE options, energy management and systems optimization (<i>output 2.2</i>)</del> Awareness and capacity amongst owners and managers from industry and financial institutions is enhanced	<ul style="list-style-type: none"> <li>• Limited number of decision makers are aware of EE options</li> </ul>	<ul style="list-style-type: none"> <li>• At least 900 decision makers are aware of EE options</li> </ul>	<ul style="list-style-type: none"> <li>• Presentation at events</li> <li>• Project progress report</li> <li>• Project website</li> </ul>	<ul style="list-style-type: none"> <li>• Willingness of the targeted public to benefit from the training and supporting materials</li> </ul>
	<del>8) Enhanced technical capacity in ESCOs and industry (<i>outputs 2.3 and 2.4</i>)</del> <b>Capacity</b>	<ul style="list-style-type: none"> <li>• Insufficient technical capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Energy managers, energy service providers and other technical staff are</li> </ul>	<ul style="list-style-type: none"> <li>• Training needs assessment and action plan</li> <li>• Presentation at</li> </ul>	<ul style="list-style-type: none"> <li>• Willingness of the targeted public to benefit from the training and</li> </ul>

	enhancement on sectorial and energy systems optimization for energy managers and others technical staff on EE in industrial companies.		trained at 40 events (workshops, seminars, courses) attended by 1,200 people at various places in Turkey on systems optimization, energy engineering and EE technologies and processes, business planning and EE investments	<ul style="list-style-type: none"> <li>• Project progress report</li> <li>• Project website</li> </ul>	supporting materials
	9) Capacity of energy service providers enhanced Output 2.4	<ul style="list-style-type: none"> <li>• Insufficient technical capacity</li> </ul>	<ul style="list-style-type: none"> <li>• Engineers and energy managers of ESCO/EVD companies are trained in terms of EnMS undertaking audits and reporting.</li> </ul>	<ul style="list-style-type: none"> <li>• Guide, checklists reports on EE</li> </ul>	<ul style="list-style-type: none"> <li>• Slowly growing the EE market in private enterprises</li> </ul>
<b>Outcome 3</b> Energy audit program for large industry and SMEs implemented	F) Share of energy audits in Turkey leading to actual investments in EE in industry	<ul style="list-style-type: none"> <li>• Less than 10% (to be verified and adjusted within 1<sup>st</sup> project year)</li> </ul>	<ul style="list-style-type: none"> <li>• At least 50%</li> </ul>	<ul style="list-style-type: none"> <li>• See below</li> </ul>	<ul style="list-style-type: none"> <li>• See below</li> </ul>
	G) Additional energy saving investment opportunities identified as part of energy audits	<ul style="list-style-type: none"> <li>• Zero</li> </ul>	<ul style="list-style-type: none"> <li>• At least 490 € 46.5 GWh/year in new EE investments identified</li> </ul>		
	10) Strengthened energy audit capacity upgraded (output 3.1)	<ul style="list-style-type: none"> <li>• Basic audit capacity exists in consulting firms</li> </ul>	<ul style="list-style-type: none"> <li>• Standardized audit procedures in line with EnMS 15001</li> </ul>	<ul style="list-style-type: none"> <li>• Audit assessment report</li> <li>• Training reports and</li> </ul>	Willingness of the targeted public to benefit from the training and supporting

			<ul style="list-style-type: none"> <li>• 10-5 training on audit techniques supported by the project</li> </ul>	<p>presentations</p> <ul style="list-style-type: none"> <li>• Project progress report</li> <li>• Project website</li> </ul>	materials
	<p>11) <b>Implementation of EnMS in selected enterprises</b> Number of companies internationally certified under EnMS (output 3.2)</p>	<ul style="list-style-type: none"> <li>• Zero company certified</li> </ul>	<ul style="list-style-type: none"> <li>• At least 20 companies certified</li> </ul>	<ul style="list-style-type: none"> <li>• Presentations at training events</li> <li>• Project progress report</li> <li>• Project website</li> </ul>	<ul style="list-style-type: none"> <li>• Selected companies are willing to have EnMS implemented</li> </ul>
	<p>12) <b>'Walk-through' energy audits conducted</b> (output 3.3) Selected companies have been audited through pre-audit (WTEA)</p>	<ul style="list-style-type: none"> <li>• <b>YEGM</b> EIE has conducted 100 energy audits in energy-intensive subsectors</li> </ul>	<ul style="list-style-type: none"> <li>• <b>50</b> Walk-through energy audits in 170 MEs and 130 medium-large industry Info dissemination on 'walk-through' audits at 2 events (supported by the project)</li> </ul>	<ul style="list-style-type: none"> <li>• Case studies</li> <li>• Audit reports</li> <li>• Project progress report</li> </ul>	<ul style="list-style-type: none"> <li>• Selected companies are willing to have a walk-through audit</li> </ul>
	<p>13) Detailed energy audits conducted (output 3.4)</p>		<ul style="list-style-type: none"> <li>• <b>50</b> Detailed energy audits in 200 MEs and 20 medium-large industry</li> <li>• Info dissemination on 'walk-through' audits at 2 events (supported by the project) attended by</li> </ul>	<ul style="list-style-type: none"> <li>• Case studies</li> <li>• Audit reports and feasibility studies</li> <li>• Project progress report</li> <li>• Project website</li> </ul>	<ul style="list-style-type: none"> <li>• Selected companies are willing to have a detailed audit</li> </ul>

			70 people		
<b>Outcome 4</b> State-of-the-art energy management practices and EE measures, business and financing models are demonstrated	H) Improved specific energy consumption by demonstration projects	<ul style="list-style-type: none"> <li>• SEC in demonstration projects is at country-average level</li> </ul>	<ul style="list-style-type: none"> <li>• SEC in demonstration projects improved on average by at least 10%</li> </ul>	<ul style="list-style-type: none"> <li>• As given below</li> </ul>	<ul style="list-style-type: none"> <li>• As given below</li> </ul>
<i>Output indicators:</i>	<p>14) Demonstration projects are designed and developed (outputs 4.1 and 4.2)</p> <p>Demonstrated energy systems optimized and EE processes and technologies.</p>	<ul style="list-style-type: none"> <li>• EE technologies are implemented in some sectors, but needs to be expanded and extended to more subsectors</li> </ul>	<ul style="list-style-type: none"> <li>• Demo activities designed and implemented, targeting at 65 enterprises (40 SMEs and 25 medium-large enterprises)</li> </ul>	<ul style="list-style-type: none"> <li>• Case studies</li> <li>• Design and financial plans</li> <li>• Monitoring reports</li> <li>• Project progress report</li> <li>• Project website</li> </ul>	<ul style="list-style-type: none"> <li>• Selected companies are willing to invest in EE improvements, based on the feasibility analysis</li> <li>• Macro-economic environment is conducive for investments by private sector</li> </ul>
	15)	Information exchanges (output 4.2)	At least 3 formal meetings for presenting the actual implementation results	Case Studies	<ul style="list-style-type: none"> <li>•</li> </ul>
<b>Outcome 5</b> Monitoring and evaluation; knowledge sharing and information dissemination (output indicators)	16) Monitoring and evaluation; baseline study and impact assessment carried out (output 5.1)	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring (quarterly and annually)</li> <li>• Mid-term and final evaluation</li> </ul>	<ul style="list-style-type: none"> <li>• Project progress reports</li> <li>• APR-PIR</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate documentation, reporting and filing of documents</li> </ul>
	17) Information on project activities disseminated (output 5.2)	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	<ul style="list-style-type: none"> <li>• Baseline study and end-of-project impact assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Baseline and end-of-project study with impacts, lessons</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate info and knowledge capture, data gathering,</li> </ul>

			<ul style="list-style-type: none"> <li>• Project reports and publications for promotion of EE in industry in Turkey</li> </ul>	<ul style="list-style-type: none"> <li>• Project reports and publications</li> <li>• Progress reports</li> </ul>	<ul style="list-style-type: none"> <li>• reporting and filing of documents</li> </ul>
	<p>18) Knowledge sharing and post-project recommendation plan                  Status of final report and exit strategy                  (output 5.2)</p>	<ul style="list-style-type: none"> <li>• N/A</li> <li>• No consolidation of the results and lessons learnt</li> </ul>	<ul style="list-style-type: none"> <li>• Baseline study and end-of-project impact assessment</li> <li>• Project reports and publications for promoting EE in industry in Turkey</li> <li>• Final project report consolidating the results and lesson learnt from the implementation of the project, as well as project exit strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Action plan</li> <li>• Project report</li> </ul>	<ul style="list-style-type: none"> <li>• Willingness of implementing agencies and partners to work together in future</li> </ul>

## Appendix 3: GHG Emissions reduction Calculation and Conversion Factor

### Appendix 3 GHG Emissions reduction Calculation and Conversion Factor A COMPARISON AND EVALUATION OF THE CONVERSION AND CO2 EMISSION FACTORS USED IN THE PROJECT

1. In the Project document dated August 2010, in Annex C titled “Energy Savings and Emission Reduction Calculation”, it is emphasized that the calculations of the expected energy savings (and thus GHG emission reductions) were to be based on the following formula and assumption:

$CO_2 \text{ direct} = E * L * C$ ; where

- C – CO<sub>2</sub> emission factor: emission factors of 0.58 tCO<sub>2</sub>/MWh for grid (1) and 0.06 tCO<sub>2</sub>/GJ for heat have been used(2).
- L – average useful lifetime of equipment: considering the fact that a range of technologies will be demonstrated, which may have varying lifetimes, an average of 10 years has been assumed for the calculation; and
- E – annual energy saved, MWh and GJ: 49,600 MWh in electrical energy and 535,680 GJ in thermal energy is estimated to be saved annually through the project demonstrations.

Thus, applying the above formula separately to electricity and thermal energy savings, cumulative direct CO<sub>2</sub> emission reductions over 10-year investment lifetime are estimate at:

$$((49,600 \text{ MWh} * 0.58 \text{ tCO}_2/\text{MWh}) + (535,680 \text{ GJ} * 0.06 \text{ tCO}_2/\text{GJ})) * 10 \text{ years} = \mathbf{609.1 \text{ ktCO}_2}.$$

(1) Confusingly, various emission factors are quoted in literature. TUBITAK Marmara Research gives 0.42 tCO<sub>2</sub>/MWh, while, for example, [www.eia.doe.gov/oiaf/1605/pdf/Appendix%20F\\_r071023.pdf](http://www.eia.doe.gov/oiaf/1605/pdf/Appendix%20F_r071023.pdf) gives 0.584. Further, recently validated Gold Standard voluntary projects (wind) in Turkey use even higher grid factor of 0.617 (which is based on combined margin calculation). We have used a grid emission factor of 0.58 tCO<sub>2</sub>/MWh

(2) Mostly natural gas is used as fuel, with some sectors using fuel oil. IPCC default emission factors are used for natural gas and fuel oil, yielding a combined emission factor for fuels of 0.06 tCO<sub>2</sub>/GJ.

In short, two emission factors were determined:

- a. A generic grid emission factor of 0.58 tCO<sub>2</sub>/MWh and
- b. A combined emission factor for fuels of 0.06 tCO<sub>2</sub>/GJ.

It is necessary to underline that even these amalgamated figures are based on IPCC 96 Guidelines. Yet, it is not possible to reach any further explanation of the rationality of using such generic figures or by whom they are produced and if they are used elsewhere such as in other similar projects run by the UNIDO.

2. In the Interim Report dated 15.01.2015 prepared by Mehmet GULER, as outlined in chapter 5 titled “Methodology” (pages 16 and 17), the following methodology for calculations of emissions are used:

The methodologies used in the calculation of emissions are based on the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC Guidelines).

The other assumptions having been considered can be summarized as following:

- The baseline year is selected as 2012, the latest available year, but in order to reflect the behaviour of the sector, last year’s averages are also used.

- Projected time period is between 2013 and 2023.
- The industry sector as a whole and its subsectors will form the boundaries of the study in line with the scope of the project.
- Default emission factors are from the latest CRF Tables submitted to UNFCCC.

Furthermore, the emission formula was given as follows:

$$\text{Emissions} = \Sigma(\text{EF}_a \times \text{Activity}_b)$$

Where EF=Emission Factor (kg/TJ);

Activity=Energy Input (TJ);

a = Fuel type; and

b = Sector-activity

It is noteworthy that the emission factors, although based on REVISED 1996 IPCC Guidelines, are the latest CFR tables submitted to UNFCCC by Turkey. Upon more research on the methodology used in the Interim report, it is discovered that the following table for emission factors were used by the author:

#### Default IPCC Carbon and CO<sub>2</sub> Emission Factors

Fuel Type	Default Carbon Content <sup>1</sup> (kg/GJ)	Default Carbon CO <sub>2</sub> <sup>1</sup> (kg/GJ)	Oxidation Factor <sup>1</sup>	Default Carbon CO <sub>2</sub> (kg/GJ)
Antrachite	26.8	98.3	0.98	96.3
Coking Coal	25.8	94.6	0.98	92.7
Other Bituminous Coal	25.8	94.6	0.98	92.7
Lignite	27.6	101.2	0.98	99.2
Sub-Bituminous Coal	26.2	96.1	0.98	94.1
Coke Oven/Gas Coke	29.5	108.2	0.98	106.0
Petroleum Coke	27.5	100.8	0.98	98.8
Crude Oil	20.0	73.3	0.99	72.6
Residual Fuel Oil	21.1	77.4	0.99	76.6
Motor Gasoline	18.9	69.3	0.99	68.6
Other Petroleum Products	20.0	73.3	0.99	72.6
Natural Gas	15.3	56.1	0.995	55.8

CO<sub>2</sub> Intensity<sup>2</sup> for Electricity and Heat Production

**153.5625**

Mg CO<sub>2</sub>/TJ

=kg CO<sub>2</sub>/GJ

<sup>1</sup> IPCC Good Practice Guidance 1996

It is rather interesting to see that although the factors such as default carbon content and oxidation factors are based on IPCC 1996 Guidelines, a generic “CO<sub>2</sub> Intensity for Electricity and Heat Production” of 153.5625 Mg CO<sub>2</sub>/TJ has been used. It is understood

that this figure has been produced by the Ministry of Energy and Natural Resources (MENR) and is used in the official CFR tables submitted to UNFCCC.

Based on the explanation above, it is possible to summarize that the methodology and emission factors used in the Interim Report for emission reductions and savings were more robust and reflects the Turkey's case healthier than the calculations used initially in the original project document.

3. Upon summarizing and evaluating the methodologies and emission factors used in both documents, it is possible to come to the conclusion that for the evaluation of the project it is necessary to update the guidelines used, namely instead of using 1996 GL's we should use IPCC 2006 GL's or for more accurate calculations amalgamated figures based on them.

For this purpose, initial contact has been established with the MENR and most recent and updated figures expected from them soon.

Nevertheless, the following table shows the comparison of default carbon content values of 1996 and 2006 GLs:

Fuel Type	1996 Guidelines	2006 Guidelines**	Percent Change
Anthracite	26.8	26.8	0.0%
Coking Coal	25.8	25.8	0.0%
Other Bituminous Coal	25.8	25.8	0.0%
Sub-Bituminous Coal	26.2	26.2	0.0%
Lignite	27.6	27.6	0.0%
Patent Fuel	25.8	26.6	+3.1%
Coke oven coke	29.5	29.2	-1.0%
Gas Coke	29.5	29.2	-1.0%
Coal Tar		22.0	x
BKB	25.8	26.6	+3.1%
Gas Works Gas		12.1	x
Coke Oven Gas	13.0	12.1	-6.9%
Blast Furnace Gas	66.0	70.8	+7.3%
Other recovered gases		49.6	x
Peat	28.9	28.9	0.0%
Oil shale	29.1	29.1	0.0%
Natural Gas	15.3	15.3	0.0%
Crude Oil	20.0	20.0	0.0%
Natural Gas Liquids	17.2	17.5	+ 1.7%
Refinery Feedstocks	20.0	20.0	0.0%
Orimulsion	22.0	21.0	-4.5%
Refinery Gas	18.2	15.7	-13.7%
Ethane	16.8	16.8	0.0%
Liquefied petroleum gases (LPG)	17.2	17.2	0.0%
Motor Gasoline excl. bio		18.9	0.0%
Aviation Gasoline	18.9	19.1	+ 1.1%
Gasoline type jet fuel		19.1	+1.1%
Kerosene type jet fuel excl.	19.5	19.5	0.0%
Other Kerosene	19.6	19.6	0.0%
Gas/Diesel Oil excl. bio	20.2	20.2	0.0%

Fuel Oil	21.1	21.1	0.0%
Naphtha	20.0	20.0	0.0%
Lubricants	20.0	20.0	0.0%
Bitumen	22.0	22.0	0.0%
Petroleum Coke	27.5	26.6	-3.3%
Non-specified oil products	20.0	20.0	0.0%
Other hydrocarbons		20.0	0.0%
White Spirit & SBP		20.0	0.0%
Paraffin Waxes		20.0	0.0%
Industrial Waste		39.0	x
Municipal Waste (non-renewable)		25.0	x

The following table shows the comparison of default carbon oxidation factors for 1996 and 2006 GLs:

Fuel Type	1996 Guidelines	2006 Guidelines	Percent Change
Coal	0.980	1.00	+2.0%
Oil and oil products	0.990	1.00	+ 1.0%
Natural gas	0.995	1.00	+0.5%
Peat	0.990	1.00	+ 1.0%

4. A report launched by the IEA titled “CO<sub>2</sub> Emissions from Fuel Combustion” dated 2016 shows a comparison of Turkey’s 20014 emissions using both GLs:

Country	1996 GLs CO <sub>2</sub> Sectoral Approach	2006GLs CO <sub>2</sub> Fuel Combustion	Percent Change	Country	1996 GLs CO <sub>2</sub> Sectoral Approach	2006GLs CO <sub>2</sub> Fuel Combustion	Percent Change
World	32903.3	32381.0	-1.6%	Non-OECD Europe and Eurasia			
Annex I Parties	12852.2	12628.4	-2%	Albania	4.3	4.1	-4.7%
Non-Annex I	18932.1	18622.2	-2%	Armenia	5.2	5.2	0.0%
				Azerbaijan	31.3	30.8	-1.6%
				Belarus	64.3	57.4	-10.7%
OECD				Bosnia and	21.2	21.6	1.9%
Australia	375.2	373.8	-0.4%	Albania	42.2	42.1	-0.2%
Austria	60.8	60.8	0.0%	Croatia	15.8	15.1	-4.4%
Belgium	95.0	87.4	-8.0%	Cyprus <sup>42</sup>	5.7	5.8	1.8%
Canada	574.6	554.8	-3.4%	Georgia	8.0	7.7	-3.8%
Chile	76.4	75.8	-0.8%	Gibraltar	0.6	0.5	-16.7%
Czech Republic	98.4	96.6	-1.8%	Kazakhstan	220.3	223.7	1.5%
Denmark	34.7	34.5	-0.6%	Kosovo	7.3	7.4	1.4%
Estonia	17.5	17.5	0.0%	Kyrgyzstan	8.3	8.4	1.2%
Finland	46.4	45.3	-2.4%	Latvia	6.7	6.7	0.0%
France	295.8	285.7	-3.4%	Lithuania	12.0	10.3	-14.2%
Germany	734.6	723.3	-1.5%	FYR of Macedonia	7.3	7.4	1.4%
Greece	66.4	65.9	-0.8%	Malta	2.3	2.3	0.0%
Hungary	41.3	40.3	-2.4%	Republic of Moldova	7.2	7.2	0.0%
Iceland	2.0	2.0	0.0%	Montenegro	2.2	2.2	0.0%
Ireland	33.7	33.9	0.6%	Romania	69.0	68.2	-1.2%
Israel	66.3	64.7	-2.4%	Russian Federation	1525.3	1467.6	-3.8%
Italy	325.7	319.7	-1.8%	Serbia	37.9	38.1	0.5%
Japan	1193.3	1188.6	-0.4%	Tajikistan	4.6	4.7	2.2%
Korea	589.5	567.8	-3.7%	Turkmenistan	66.6	67.0	0.6%
Luxembourg	9.2	9.2	0.0%	Ukraine	239.6	236.5	-1.3%
Mexico	432.1	430.9	-0.3%	Uzbekistan	101.0	97.9	-3.1%

Netherlands	166.6	148.3	-11.0%	Non-OECD Europe and Eurasia	2516.4	2446.1	-2.8%
New Zealand	33.2	31.2	-6.0%				
Norway	36.9	35.3	-4.3%				
Poland	281.3	279.0	-0.8%				
Portugal	43.2	42.8	-0.9%				
Slovak Republic	29.9	29.3	-2.0%				
Slovenia	12.6	12.8	1.6%				
Spain	234.8	232.0	-1.2%				
Sweden	38.7	37.4	-3.4%				
Switzerland	37.7	37.7	0.0%				
<b>Turkey</b>	<b>304.8</b>	<b>307.1</b>	<b>0.8%</b>				
United Kingdom	409.0	407.8	-0.3%				
United States	5235.9	5176.2	-1.1%				
OECD Total	12033.5	11855.6	-1.5%				

5. As a result, 2006 GLs result in a 0.8% increase in the emission calculation. Although the difference could be regarded as miniscule, for the accuracy of such calculations and for the sake of benefiting more up to date methodology, it can be established that for healthier evaluation of the project figures based on 2006 IPPC GLs should be adopted.

## Appendix 4: List of documents reviewed and analysed

	4113 (IEEI Turkey)-2016 PIR Report-Draft5-14.09.16.docx
	Amendment no1 No Cost Extension-1.pdf
	EEI-TURKEY PRO DOC-1.pdf
	FM Workshop Invitation Letter-28.10.15-ENG..doc
	Frank Pool TUR-IEE 20131003 Final Assignment Report for UNIDO - Updated - Clean
	Inception Report of EE Industry-1.docx
	Integrated Mechanism Report-Final Draft-06.11.15.pdf
	Interium Report-FINAL-26.01.15-1.doc
	Interium Report-FINAL-26.01.15.doc
	KOSGEB Final Report-FINAL-22.01.15.docx
	Meeting Minues of FM Workshop-(FINAL)-19.11.2015.doc
	Meeting Minutes-PSC-003-v3-11.03.15.doc
	Meeting Minutes-PSC-004-v3-SON-19.04.16.doc
	Meeting Minutes-PSC-005-v4-CLEAN-27.03.17.doc
	NATE_Suleyman Mumin Bulut_PHF-1.DOC
	PE_IEEI_Revision of Project Strategy_01-06-2015-1.docx
	PIMS 4113-IEEI MTE Final-16.12.2013-1
	PIMS 4113-IEEI MTE Final-16.12.2013-1.2
	PIMS 4113-IEEI MTE Final-16.12.2013-1.3
	PIMS 4113-IEEI MTE Final-16.12.2013-1.4
	PIMS 4113-IEEI MTE Final-16.12.2013-1.5
	PIMS 4113-IEEI MTE Final-16.12.2013-1.6
	PIMS 4113-IEEI MTE Final-16.12.2013-1.7
	PIMS 4113-IEEI MTE Final-16.12.2013-1.8
	<b>PIMS 4113-IEEI MTE Final-16.12.2013-1.doc</b>
	PIMS-4113 Budget Revisions 2011-2016.pdf
	PIR-2013-GEFID3747-PIMS4113.docx
	PIR-2014-PIMS4113-FINAL-GEF-08.11.14.docx
	PIR-2015-Report-II-12.08.15.docx
	PROJECT DOCs of IEEI in Turkey Project
	PSC-001 Minutes of Meeting.doc
	RE_ FE Documents Request.
	Report-1-International Experience with ESPs in Indust.EE-v.2-27.01.16 (With Exec.Sum.).pdf
	Report-1-International Experience with ESPs in Indust.EE-v.2-27.01.16.pdf
	Report-2-International Best Practice Case Studies-18.01.16.pdf
	Report-3-ESPs in Turkey?s Industri al EE Market-v8-Final-17.08.16.pdf
	Report-4-Turkey's Potential Industrial ESP Market-v9-Final-19.08.16.pdf
	Report-5-Gap Analysis-Turkey's Industrial ESPs-v4-Final-01.10.16.pdf

 Report-5-Gap Analysis-Turkey's Industrial ESPs-v4-Final-01.10.16.pdf

 Revised Issues Paper-EN-14.11.15.docx

 Table REV 25 May Request LIST OF DOCUMENTS (002).docx

 TTGV Financial Mechanism-03.06.14.docx

 TUR-IEE 20120831 PIR for 2011-2012 for PIMS 4113.xlsx

 WTEA Guide and Checklist-v5-REVISED-V-FINAL-08.10.14.pdf

 YEGM-FINAL-Report-CLEAN-15.12.15.DOCX

 BASELINE STUDY FINAL REPORT-Final-06.10.15.doc

 ECEEE Paper-Printed-2016.pdf

 Integrated Mechanism Report-Final Draft-06.11.15.pdf

 Integrated Mechanism Structure-05.08.15.pdf

 KOSGEB fin\_model\_v1.xlsx

 KOSGEB Final Report-FINAL-22.01.15.docx

 Meeting Minutes-PSC-003-v3-11.03.15.doc

 NEW PROJECT STRATEGY-28.02.15 (AMENDED).docx

 OIZ 27 jul Combined Activity Report (English)-26.07.17

 Project Activity Note (for JOB)-06.07.17

 Project Extension Letter-3-v7-son-EKLİ-09.03.05.pdf

 PROJECT RESULTS FRAMEWORK-28.02.15 (AMENDED).docx

 PROJECT STRATEGY REVISION-v6-28.02.15 (CLEAN).docx

 PSC-2015 Toplantı? Tutanag? Yaz ısı (Çıkan)(EKLİ)-30.03.15.pdf

 TTGV Financial Mechanism-03.06.14.docx

 TTGV Financial Model-05.08.14.xlsx

 YEGM-FINAL-Report-Appendix-II-15.12.15.XLSX

 YEGM-FINAL-Report-CLEAN-15.12.15.DOCX

 Cumulative Energy and CO2 Saving-v3-28.07.17.xlsx

 ENMS First Phase-Energy and CO2 Saving-v5-28.07.17.xlsx

 EnMS Second Phase-Energy and CO2 Saving-v2-28.07.17.xlsx

 Development Objectives Progress-Final-v4-28.07.17by kubilay

## Appendix 5: Project Cost Breakdown Analysis

### Appendix 6 Project Cost Breakdown Analysis

The total Project budget was foreseen as 35,058,400 USD. Out of it, 5,900,000 USD was GEF support and the remaining 29,158,400 USD was expected from co-financing.

Project Budget (USD)	
<b>GEF Support</b>	5,900,000
<b>CO-financing</b>	29,158,400
<b>Total</b>	<b>35,058,400</b>

Of the 5,900,000 USD actual budget (GEF support) of the project, an amount of 3,206,998 USD is provided through UNDP and 2,693,002 USD is provided through UNIDO. All the expenses related to technical services, equipment and personnel fees for realisation of the expected goals have been met with this budget.

GEF Agency	Focal Area	Country Name/ Global	(in \$)
			Project
<b>UNDP</b>	Climate change	Turkey	<b>3,206,998</b>
<b>UNIDO</b>	Climate change	Turkey	<b>2,693,002</b>
<b>Total GEF Support</b>			<b>5,900,000</b>

National co-financing provided is in two categories, namely in kind and in cash. In kind co-financing has been provided as personnel support, providing area/office and all the expenses related to them such as communication, transportation costs. In cash co-financing involves the investment and support budgets related to the execution of the project of the concerned governmental institutions. This tranche of the budget also encompasses the related investment budgets of the industrial enterprises, similar governmental investment support schemes and when available grant/credit amounts

## REALISED EXPENDITURES

### a. Expenditures by UN Institutions

Project Component	Total Realised Expenditures			Total Expenditures to be Realised			Total Project Budget		
	UNDP	UNIDO	TOTAL	UNDP	UNIDO	TOTAL	UNDP	UNIDO	TOTAL
<b>Outcome 1: Institutional and Regulatory Framework</b>	\$450,085	\$872,291	<b>\$1,322,376</b>	-\$86,462	\$2,295	<b>-\$84,167</b>	\$363,623	\$874,586	\$1,238,209
<b>Outcome 2: Enhanced Capacity and Awareness</b>	\$1,056,138	\$550,651	<b>\$1,606,788</b>	\$176,628	\$18,782	<b>\$157,846</b>	\$879,510	\$569,432	\$1,448,942
<b>Outcome 3: Energy Audit</b>	\$748,367	\$535,828	<b>\$1,284,195</b>	-\$93,698	\$3,917	<b>-\$89,782</b>	\$654,669	\$539,744	\$1,194,413

Program									
Outcome 4: Demonstration of Energy Management Practices	\$12,335	\$552,929	<b>\$565,264</b>	\$565,380	\$1,721	<b>\$567,101</b>	\$577,715	\$554,650	\$1,132,365
Outcome 5: Monitoring and Evaluation	\$160,905	\$125,454	<b>\$286,359</b>	\$21,076	\$29,136	<b>\$50,212</b>	\$181,981	\$154,590	\$336,571
Project Management	\$500,724	\$0	<b>\$500,724</b>	\$48,776	\$0	<b>\$48,776</b>	\$549,500	\$0	\$549,500
TOTAL (Actual)	\$2,928,554	\$2,637,152	<b>\$5,565,706</b>	\$278,444	\$55,850	<b>\$334,294</b>	<b>\$3,206,998</b>	<b>\$2,693,002</b>	<b>\$5,900,000</b>

**b. Approximate expenditures of the activities defined in the projects document:**

<b>1.</b>	<b>EnMS</b>	<b>872.000 USD</b>
<b>2.</b>	Internet Portal (Software and Hardware)	804.000 USD
<b>3.</b>	OIZ Energy Management Units	457.000 USD
<b>4.</b>	Development of Energy Audit Methodology	598.000 USD
<b>5.</b>	Energy Audits	438.000 USD
<b>6.</b>	Procurement of Training Equipment	282.000 USD
<b>7.</b>	Training and Advancing Awareness	966.000 USD
<b>8.</b>	Monitoring and Evaluation	286.000 USD
<b>9.</b>	Project Management	500.000 USD
<b>10.</b>	Other Services and Consultancy Expenditures	697.000 USD

**c. Sources of Completed Co-Financing**

Name of Co-financier (source)	Classification	Type	Project (USD)	%
<b>YEGM</b>	Nat'l Gov't	Cash	7,845,225.00	5.13
<b>KOSGEB</b>	Nat'l Gov't	Cash		0.00
<b>TTGV</b>	Foundation	Soft loan and cash	0	0.00
<b>UNDP</b>	Impl. Agency	Cash	60,000.00	0.04
<b>UNIDO</b>	Impl. Agency	In-kind	50,000.00	0.03
<b>Industry</b>	Private sector	Cash	144,082,444.00	94.28
<b>YEGM</b>	Nat'l Gov't	In-kind	658,250	0.43
<b>KOSGEB</b>	Nat'l Gov't	In-kind		0.00
<b>TTGV</b>	Foundation	In-kind	0	0.00
<b>TSE</b>	Nat'l Gov't	In-kind	126,000	0.08
<b>Industry</b>	Private sector	In-kind		0.00
			<b>152,821,919</b>	<b>100</b>

**d. Investment Budgets of Projects/Programs and Energy Saved**

Project/Program	Number of Projects	Energy Saved (GWh)	Investment (USD)
<b>EnMS Beginner Level Trainings</b>	3	0.53	65,000
<b>EnMS Expert Level</b>	258	280	35,833,740

<b>Trainings Phase I</b>			
<b>EnMS Expert Level</b>	220		107,797,704
<b>Trainings Phase II</b>		1,017	
<b>Energy Audits</b>	4	1965.47	386,000
<b>Governmental Support Schemes</b>	48	312.07	7,845,225
<b>TOTAL</b>	<b>533</b>	<b>3574.91</b>	<b>151,927,669</b>

To sum up, with the project finance of 5,900,000 USD as foreseen in the project document, a total of 151,927,669 USD worth of projects have been initiated. This figure is about five times the more than what was expected in the project document (29,158,400 USD). In this regard, it is possible to conclude that with the budget spent, the impact has been more successful than anticipated at the beginning of the projects.

## Appendix 6: GEF Climate Change Mitigation Tracking Tool

TABLE CC Mitigation

<h3 style="margin: 0;">GEF Climate Change Mitigation Tracking Tool</h3> <p style="margin: 0; color: #A52A2A;">Please complete the cells with white background colour only.</p>	
Is this the mid-term APR/PIR or the FINAL APR/PIR? Please refer to CCM tracking tool instruction tab for details	
<b>Special Notes: reporting on lifetime emissions avoided</b>	
Lifetime direct GHG emissions avoided: Lifetime direct GHG emissions avoided are the emissions reductions attributable to the investments made during the project's supervised implementation period, totaled over the respective lifetime of the investments. Lifetime direct post-project emissions avoided: Lifetime direct post-project emissions avoided are the emissions reductions attributable to the investments made outside the project's supervised implementation period, but supported by financial facilities put in place by the GEF project, totaled over the respective lifetime of the investments. These financial facilities will still be operational after the project ends, such as partial credit guarantee facilities, risk mitigation facilities, or revolving funds. Lifetime indirect GHG emissions avoided (top-down and bottom-up): indirect emissions reductions are those attributable to the long-term outcomes of the GEF activities that remove barriers, such as capacity building, innovation, catalytic action for replication. Please refer to the previous CCM instruction tab for special notes. Please use the following GEF manual and calculator for EE and RE projects: <a href="#">Manual for Energy Efficiency and Renewable Energy Projects</a> Please use the following GEF manual and calculator for transport projects: <a href="#">Manual for Transportation Projects</a>  For LULUCF projects, the definitions of "lifetime direct and indirect" apply. Lifetime length is defined to be 20 years, unless a different number of years are deemed appropriate. For emission or removal factors (tones of CO <sub>2</sub> eq per hectare per year), use IPCC defaults or country specific factors.	
<b>General Data</b>	<b>Results at mid-point, or result at project closing depending at whether this is the mid-term APR/PIR or final APR/PIR</b>
Project Title	

GEF ID	
Agency Project ID	
Country	
Region	
GEF Agency	
Date of Council/CEO Approval	
GEF Grant (US\$)	
Date of submission of the tracking tool	
Is the project consistent with the priorities identified in National Communications, Technology Needs Assessment, or other Enabling Activities under the UNFCCC?	
Is the project linked to carbon finance?	
Co-financing expected (US\$)	
<b>Objective 1: Transfer of Innovative Technologies (Please refer to the CCM instruction tab for important guidance)</b>	
<b>Please specify the type of enabling environment created for technology transfer through this project</b>	
	Yes =1, No =0
National innovation and technology transfer policy	0
Innovation and technology center and network	0
Applied R&D support	0
South-South technology cooperation	0
North-South technology cooperation	0
Intellectual property rights (IPR)	0
Information dissemination	1
Institutional and technical capacity building	1
Other (please specify)	Delivery of state of the art technology measuring devices to OIZs and providing necessary on the job trainings for conducting basic energy audits.
Number of innovative technologies demonstrated or deployed	9 measuring devices have been both demonstrated and deployed: 1. Energy Analyzer 2. Thermal Camera

	<ol style="list-style-type: none"> <li>3. Infrared Temperature Meter</li> <li>4. Ultrasonic Liquid Meter</li> <li>5. Flue Gas Analyzer</li> <li>6. Ultrasonic Leak Detector</li> <li>7. Tachometer</li> <li>8. Water Conductivity Meter</li> <li>9. Multifunction HVAC and Indoor Air Quality Meter</li> </ol>
<p><b>Please specify three key technologies for demonstration or deployment</b></p>	
<p>Area of technology 1</p>	<p>Steam systems,</p>
<p>Type of technology 1</p>	
<p>Area of technology 2</p>	
<p>Type of technology 2</p>	
<p>Area of technology 3</p>	
<p>Type of technology 3</p>	
<p>Status of technology demonstration/deployment</p>	
<p>Lifetime direct GHG emissions avoided (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab</p>	<ul style="list-style-type: none"> <li>• With the Implementation of ENMS Expert Level Training Programme First Phase, total implemented CO2 savings have been reached to 1,306,631 tonne in of 34 companies. Furthermore, 448,225 tonne of CO2 savings are planned and/or ongoing.</li> <li>• With the Implementation of ENMS Expert Level Training Programme Second Phase, in 26 companies, 4,134,280 tonne CO2 savings have been implemented and another 2,281,752 tonne of CO2 savings are planned and/or ongoing.</li> <li>• With the ENMS User Level Programme implemented in 2014, 2 in two companies (namely TatGıda and Pınar Et ve Un), 1,490 tonne CO2 saving has been implemented.</li> <li>• Thorough audits of 3 companies (Sain Gobain, Termikel, ORS) in 2014 and 2015, 10.870 tonne CO2 saving has been implemented.</li> <li>• In addition, through governmental support schemes from which 25 companies benefitted, a total of 881,121 tonne of</li> </ul>

	CO2 savings have been implemented during the project term.
Lifetime direct post-project GHG emissions avoided (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	It is possible to conclude that a cumulative of 7,334,392 tonne of CO2 saving has been obtained by the implemented projects throughout the project. Additionally, another 2,729,978 tonne of CO2 saving is planned to be obtained through ongoing projects. It is necessary to underline that the cumulative savings were calculated based on the principle that every project has a 10 years life-span. Therefore, the savings of a project commenced on 2014 was ended in 2023, on 2015 was ended in 2024, and so on. To sum up, a total of 10,064,369 tonnes of CO2 saving will have been achieved as a result of the project.
Lifetime indirect GHG emissions avoided (bottom-up) (Tonnes of CO2 eq). Please see special in the CCM instruction tab	N/A
Lifetime indirect GHG emissions avoided (top-down) ) (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	N/A
<b>Objective 2: Energy Efficiency</b>	
<b>Please specify if the project targets any of the following areas</b>	
Lighting	1
Appliances (white goods)	0
Equipment	1
Cook stoves	0
Existing building	0
New building	0
Industrial processes	1
Synergy with phase-out of ozone depleting substances	0
Other (please specify)	Industrial processes

Policy and regulatory framework	0
Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)	1 (new financial facilities were created for funding EE investments, yet none was applied by the government as of end of the project)
Capacity building	1
Lifetime energy saved (to be reported in MJ, Million Joule). Please use IEA unit converter (Link below). Please see special notes on calculating energy saved in the CCM instruction tab	58,224,697,164 MJ has been saved cumulatively between 2014 and 2026. For each project, a total of 10 years was determined as the project lifetime. However, as some projects began in 2017, the saving will not be limited to the aforementioned timeframe (2023). Additionally 21,708,223,056 MJ of savings will be achieved due to ongoing projects. Thus a total of 79,932,920,220 MJ of energy will be saved in total.
<a href="http://www.iea.org/stats/unit.asp">http://www.iea.org/stats/unit.asp</a>	
Lifetime direct GHG emissions avoided (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	
Lifetime direct post-project GHG emissions avoided (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	
Lifetime indirect GHG emissions avoided (bottom-up) (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	N/A
Lifetime indirect GHG emissions avoided (top-down) (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	N/A
<b>Objective 3: Renewable Energy</b>	
<b>Please specify if the project includes any of the following areas</b>	N/A
Heat/thermal energy production	N/A
On-grid electricity production	N/A
Off-grid electricity production	N/A
Policy and regulatory framework	N/A
Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)	N/A
Capacity building	N/A
<b>Installed capacity per technology directly resulting from the project</b>	

Wind	N/A
Biomass	N/A
Biomass	N/A
Geothermal	N/A
Geothermal	N/A
Hydro	N/A
Photovoltaic (solar lighting included)	N/A
Solar thermal heat (heating, water, cooling, process)	N/A
Solar thermal power	N/A
Marine power (wave, tidal, marine current, osmotic, ocean thermal)	N/A
<b>Lifetime energy production per technology directly resulting from the project (IEA unit converter: <a href="http://www.iea.org/stats/unit.asp">http://www.iea.org/stats/unit.asp</a>)</b>	
Wind	N/A
Biomass	N/A
Biomass	N/A
Geothermal	N/A
Geothermal	N/A
Hydro	N/A
Photovoltaic (solar lighting included)	N/A
Solar thermal heat (heating, water, cooling, process)	N/A
Solar thermal power	N/A
Marine energy (wave, tidal, marine current, osmotic, ocean thermal)	N/A
Lifetime direct GHG emissions avoided (Tonnes of CO2)	
Lifetime direct post-project GHG emissions avoided (Tonnes of CO2)	
Lifetime indirect GHG emissions avoided (bottom-up) (Tonnes of CO2)	
Lifetime indirect GHG emissions avoided (top-down) (Tonnes of CO2)	
<b>Objective 4: Transport and Urban Systems</b>	
<b>Please specify if the project targets any of the following areas</b>	
Bus rapid transit	N/A

Other mass transit (e.g., light rail, heavy rail, water or other mass transit; excluding regular bus or minibus)	N/A
Logistics management	N/A
Transport efficiency (e.g., vehicle, fuel, network efficiency)	N/A
Non-motorized transport (NMT)	N/A
Travel demand management	N/A
Comprehensive transport initiatives (Involving the coordination of multiple strategies from different transportation sub-sectors)	N/A
Sustainable urban initiatives	N/A
Policy and regulatory framework	N/A
Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)	N/A
Capacity building	N/A
Length of public rapid transit (PRT)	N/A
Length of non-motorized transport (NMT)	N/A
Number of lower GHG emission vehicles	N/A
Number of people benefiting from the improved transport and urban systems	N/A
Lifetime direct GHG emissions avoided (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	N/A
Lifetime direct post-project GHG emissions avoided (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	N/A
Lifetime indirect GHG emissions avoided (bottom-up) (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	N/A
Lifetime indirect GHG emissions avoided (top-down) (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	N/A
<b>Objective 5: LULUCF</b>	
<b>Area of activity directly resulting from the project</b>	
Conservation and enhancement of carbon in forests, including agroforestry	N/A
Conservation and enhancement of carbon in nonforest lands, including peat land	N/A
Avoided deforestation and forest degradation	N/A

Afforestation/reforestation	N/A
Good management practices developed and adopted	N/A
Carbon stock monitoring system established	N/A
Lifetime direct GHG emission avoided (Tonnes of CO2)	N/A
Lifetime indirect GHG emission avoided (Tonnes of CO2)	N/A
Lifetime direct carbon sequestered (Tonnes of CO2 eq). Please see special notes in the CCM instruction tab	N/A
Lifetime indirect carbon sequestered (Tonnes of CO2 eq). Please see special notes in CCM instruction tab	N/A
<b>Objective 6: Enabling Activities</b>	
<b>Please specify the number of Enabling Activities for the project (for a multiple country project, please put the number of countries/assessments)</b>	
National Communication	
Technology Needs Assessment	
Nationally Appropriate Mitigation Actions	
Other	
Does the project include Measurement, Reporting and Verification (MRV) activities?	