

## **INDEPENDENT TERMINAL EVALUATION**

## **INDUSTRIAL ENERGY EFFICIENCY IN ECUADOR**

**UNIDO Project No.: GF/ECU/11/004;  
SAP ID: 103017; GEF ID: 4147**



**UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION**



**UNIDO INDEPENDENT EVALUATION DIVISION**

**Independent terminal evaluation**

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## Abbreviations and acronyms

<b>Boe</b>	barrels of oil equivalent
<b>CAF</b>	Andean Development Corporation
<b>CEO</b>	Chief Executive Officer
<b>EE</b>	Energy Efficiency
<b>Egranconel</b>	Large Energy Consumer Association
<b>EnMS</b>	National Energy Management Standard
<b>ESCO</b>	Energy Service Company
<b>ESO</b>	Energy System Optimization
<b>FIDE</b>	Mexican National Trust Fund for Energy Savings
<b>GDP</b>	Gross domestic product
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	Green House Gas
<b>HQ</b>	Head Quarter
<b>IEE</b>	Industrial Energy Efficiency
<b>IEE</b>	Industrial Energy Efficiency
<b>INEN</b>	Ecuadorian Standardization Institute
<b>ISO</b>	International Standards Organization
<b>ITT</b>	Ishpingo Tambococha Tiputini
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MAE</b>	Ministry of Environment
<b>MEER</b>	Ministry of Electricity and Renewable Energy
<b>MIPRO</b>	Ministry of Industries and Productivity
<b>MSO</b>	Motors Systems Optimization
<b>MSP</b>	Medium-sized project
<b>MTE</b>	Mid-Term Evaluation
<b>OAE</b>	Ecuadorian Accreditation Organism
<b>ODG/EVA</b>	UNIDO Office for Independent Evaluation
<b>PIR</b>	Project Implementation Review
<b>PROMEC</b>	Power and Communications Sectors Modernization and Rural Services
<b>PSC</b>	Project Steering Committee
<b>SME</b>	Small and Medium Size Enterprises
<b>TE</b>	Terminal evaluation
<b>TOR</b>	Term of Reference
<b>UN</b>	United Nations
<b>UNIDO</b>	United Nations Industrial Development Organization
<b>WB</b>	World Bank

## GLOSSARY OF EVALUATION RELATE TERMS

<b>Activity</b>	Actions taken or work performed through which inputs, such as funds, technical assistance and other types of resources are mobilized to produce specific outputs.
<b>Assumptions</b>	Hypotheses about factor or risks which could affect the progress or success of a development intervention.
<b>Beneficiaries</b>	The individuals, groups, or organizations, whether targeted or not, that benefit, directly or indirectly, from the development intervention.
<b>Conclusions</b>	Conclusions point out the factor of success and failure of the evaluated intervention, with special attention paid to the intended and unintended results and impacts, and more generally to any other strength or weakness. A conclusion draws on data collection and analyses undertaken, through a transparent chain of arguments.
<b>Data collection tools</b>	Methodologies used to identify information sources and collect information during an evaluation.
<b>Effect</b>	Intended or unintended change due directly or indirectly to an intervention.
<b>Effectiveness</b>	The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance.
<b>Efficiency</b>	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
<b>Evaluation</b>	The systematic and objective assessment of an ongoing or completed project, programme or policy, its design, implementation and results. The aim is to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact and sustainability.
<b>External evaluation</b>	The evaluation of a development intervention conducted by entities and/or individuals outside the donor and implementing organizations.
<b>Finding</b>	A finding uses evidence from one or more evaluations to allow for a factual statement.
<b>Goal</b>	The higher-order objective to which a development intervention is intended to contribute.
<b>Impacts</b>	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.
<b>Independent</b>	An evaluation carried out by entities and persons free of the control of



<b>evaluation</b>	those responsible for the design and implementation of the development intervention.
<b>Indicator</b>	Quantitative or qualitative factor or variable that provides a simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor.
<b>Inputs</b>	The financial, human, and material resources used for the development intervention.
<b>Lessons learned</b>	Generalizations based on evaluation experiences with projects, programs, or policies that abstract from the specific circumstances to broader situations. Frequently, lessons highlight strengths or weaknesses in preparation, design, and implementation that affect performance, outcome, and impact
<b>Logical framework (Log frame)</b>	Management tool used to improve the design of interventions, most often at the project level.
<b>Mid-term evaluation</b>	Evaluation performed towards the middle of the period of implementation of the intervention.
<b>Monitoring</b>	A continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds.
<b>Outcome</b>	The likely or achieved short-term and medium-term effects of an intervention's outputs.
<b>Outputs</b>	The products, capital goods and services which result from a development intervention; may also include changes resulting from the intervention which are relevant to the achievement of outcomes.
<b>Project or program objective</b>	The intended physical, financial, institutional, social, environmental, or other development results to which a project or program is expected to contribute.
<b>Quality assurance</b>	Quality assurance encompasses any activity that is concerned with assessing and improving the merit or the worth of a development intervention or its compliance with given standards.
<b>Recommendations</b>	Proposals aimed at enhancing the effectiveness, quality, or efficiency of a development intervention; at redesigning the objectives; and/or at their allocation of resources. Recommendations should be linked to conclusions.

<b>Relevance</b>	The extent to which the objectives of a development intervention are consistent with beneficiaries' requirements, country needs global priorities and partners' and donors' policies.
<b>Reliability</b>	Consistency or dependability of data and evaluation judgments, with reference to the quality of the instruments, procedures and analyses used to collect and interpret evaluation data.
<b>Results</b>	The output, outcome or impact (intended or unintended, positive and/or negative) of a development intervention.
<b>Results chain</b>	The causal sequence for a development intervention that stipulates the necessary sequence to achieve desired objectives-beginning with inputs, moving through activities and outputs, and culminating in outcomes, impacts, and feedback.
<b>Results framework</b>	The program logic that explains how the development objective is to be achieved, including causal relationships and underlying assumptions.
<b>Review</b>	An assessment of the performance of an intervention, periodically or on an ad hoc basis.
<b>Risk analysis</b>	<p>An analysis or an assessment of factor (called assumptions in the log frame) affect or are likely to affect the successful achievement of an intervention's objectives.</p> <p>A detailed examination of the potential unwanted and negative consequences to human life, health, property, or the environment posed by development interventions;</p> <p>A systematic process to provide information regarding such undesirable consequences; the process of quantification of the probabilities and expected impacts for identified risks.</p>
<b>Stakeholders</b>	Agencies, organizations, groups or individuals who have a direct or indirect interest in the development intervention or its evaluation.
<b>Sustainability</b>	<p>The continuation of benefits from a development intervention after major development assistance has-been completed.</p> <p>The probability of continued long-term benefits. The resilience to risk of the net benefit flows over time.</p>
<b>Target group</b>	The specific individuals or organizations for whose benefit the development intervention is undertaken
<b>Terms of</b>	Written document presenting the purpose and scope of the evaluation, the

<b>reference</b>	methods to be used, the standard against which performance is to be assessed or analyses are to be conducted, the resources and time allocated, and reporting requirements.
<b>Triangulation</b>	The use of three or more theories, sources or types of information, or types of analysis to verify and substantiate an assessment.
<b>Validity</b>	The extent to which the data collection strategies and instruments measure what they purport to measure.

## **Executive summary**

### **Overview of the evaluation object**

The purpose of the project “Industrial Energy Efficiency in Ecuador” was to promote energy efficiency improvements in the Ecuadorian industry through the development of national energy management standards and application of system optimization. At the planning stage, the project was structured in five components, to address the lack of awareness towards energy efficiency benefits held by industrial stakeholders in the country, which identified as the main barrier to adoption.

The project “Industrial Energy Efficiency in Ecuador” was a medium size project executed under GEF IV replenishment having UNIDO as the implementation agency and the Ministry of Electricity and Renewable Energy (MEER) acting as the domestic counterpart. The project budget consisted of the following contributions: 1) 915 000 US\$ from GEF, 2) 60 000 US\$ from UNIDO and 3) 1 700 000 US\$ from national counterpart. Planned implementation start date was July 2011 and closing date was May 2014 that was later moved to September 2015.

Once the project entered its closure phase, it was required to perform the project evaluation to verify to what extent outcomes and expected results were achieved, what could be improved for future projects of this kind and the reasons why results cannot be achieved, The project evaluation was performed to measures the projects impacts in terms of relevance, effectiveness, efficiency, sustainability and impact of project results.

### **Evaluation objectives and intended audience**

The objectives of the project evaluation are to:

- Assess project performance against the evaluation criteria: relevance, effectiveness, efficiency, sustainability and impact.
- Draw lessons and developing recommendations for UNIDO and the GEF that may help for improving the selection, enhancing the design and implementation of similar future projects and activities in the country and on a global scale upon project completion.
- Include examples of good practices for other projects in a focal area, country, or region.
- Provide an analysis of the attainment of the main objective and the five technical components.
- Enable Government, counterparts, GEF, UNIDO and other stakeholders and donors to verify prospects for development impact and sustainability, providing an analysis of the attainment of global environmental objectives, project objectives, delivery and completion of project outputs/activities, and outcomes/impacts based on indicators.

In line with the last evaluation objective, the intended audience for the present report include project stakeholders and beneficiaries; and in addition decision makers in the public and private sector seeking for previous experiences in industrial energy efficiency initiatives financed by the Global Environmental Facility (GEF) with the participation of the UNIDO in developing countries, especially in the Andean region of Latin America.

## **Evaluation methodology**

The evidence for the evaluation process was systematically collected through interviews, surveys, technical visits and expert opinions. The Evaluation process started with a review of project documents which provided the general context of the project activities to be evaluated as well as their expected results.

The evaluation process was the field mission carried out from August 11 to August 17, 2015. During this period, the evaluation team collected primary information through surveys, technical visits and meetings with national authorities, allowing the team leader to draft a preliminary evaluation report. Two survey formats were prepared in order to gather significant information for the evaluation process: a) one directed to managers and corporate members in companies, and b) one directed to technicians and workers directly involved with capacity building activities. The field visit enabled the team not only to interview relevant project stakeholders and stakeholders, but also, to verify project results of companies participating in demonstration activities.

This final evaluation covers the complete project execution.

## **Key findings of the evaluation**

The most important findings after the evaluation are:

- There was inconsistency in outcomes formulation at project design stage, which included vague outputs formulation, and inappropriate selection of outcomes achievement indicators;
- The project relevance has grown as the implementation stage developed;
- The delay of legal agreements directly impacted on project effectiveness; and
- The lack of policy tools, promotion mechanisms, awareness among a wider range of industrial subsectors, and training capacity could impact negatively on project sustainability,

The project evaluation ratings are:

- Overall project rating is moderately satisfactory,
- Outcome 1 was partially achieved,
- Outcome 2 present high level of achievement,
- Outcome 3 was partially achieved,
- Outcome 4 also had a positive achievement rating,

The following conclusions can be drawn from the evaluation process:

- The project has demonstrated considerable relevance for the promotion of the energy efficiency in the industrial sector,
- Increased interest by industrial companies in further improve energy efficiency revealed awareness raising and motivation attributable to the project,
- The fact that some project outputs were not achieved reduces opportunities to increase the sustainability of the project outcomes.

## **Main recommendations**

Finally, recommendations stated in the report are the following:

- Strengthening institutional capacity for experts training and certification on implementation of energy management systems and energy optimization.
- Developing synergies among institutions and improve communication with business sector on energy efficiency.
- Implementing mechanisms that provide access to information and technical advice to private companies.
- Avoiding future inaccuracies following project design by carefully formulating outcomes, outputs and indicators.
- Promoting networking and experience sharing among specialists that participated in project activities.
- Formulating a closing strategy in order to assure that pending activities will be completed.
- Considering a second phase project given the momentum created by the first implementation phase.

## 1 Introduction

This project “Industrial Energy Efficiency in Ecuador” addresses the problem of high energy consumption in the Ecuadorian industrial sector, which had been on the Government agenda for over ten years. Different actions focused on industrial energy efficiency have been executed by governmental bodies, companies and in cooperation with international organizations in the period 2001 – 2011, previous to project starting.

Project objective is to “To promote energy efficiency improvements in the Ecuadorian industry through the development of national energy management standards and application of optimization systems”. The lack of in-depth knowledge of methodologies for energy system’s optimization and energy management standards, in addition to the low awareness of the industrial energy efficiency benefits in enterprises, enabled the project to focus on specific barriers which had not been faced during the previous experiences. These barriers are described in section 3 of this report. Outcomes of the project are four and they are related to: the enhancement of the institutional framework, the deployment of policy tools, , for example the implementation of the ISO 50001 Energy Management Standard; the preparation of a cadre of highly specialized energy management and system optimization experts as a long-term technical resource available to industry and the country; and raising key actor awareness as consequence of the diffusion of information, including results of practical demonstration of actions aims to the improvement of energy efficiency. (see annex 3)

It is a Medium Size Project implemented by UNIDO with MEER and MIPRO acting as executing partners. Project started on July 6<sup>th</sup>, 2011 and ended on September 30<sup>th</sup>, 2015. While GEF contribution was 915,000 US\$, total project budget was 4,34 US\$ Million (see table 1, 2 and 3).

Project Title	Industrial Energy Efficiency in Ecuador
GEF ID	4147
UNIDO project No. (SAP ID)	103017
Region	Latin America and Caribbean
Country	Ecuador
GEF focal area(s) and operational programme	Climate Change CC-2
GEF Agency (implementing agency)	UNIDO
Project executing partners	Ministry of Electricity and Renewable Energy (MEER), Ministry of Industries and Productivity (MIPRO)
Project size	MSP

Milestone	Expected date	Actual date
CEO endorsement/approval date		May 20, 2011
Implementation start date (PAD issuance date)		July 6, 2011
Implementation end date	7 May 2014	Sept 30, 2015
Midterm evaluation		July 2013
Terminal evaluation completion	May-July 2015	March 2016
Project closing		Sept 30, 2015

Table 3 Project Financing	
Component	Amount (US\$)
GEF Grant (USD)	915,000
GEF PPG (USD) (if any)	75,000
UNIDO inputs (USD)	60,000 (cash)
Co-financing (USD) at CEO Endorsement	4,434,703 (cash + in-kind)
Total project cost (USD) (GEF Grant + Co-financing at CEO Endorsement)	5,424,703
Mid-term review date	July 2013
Planned terminal evaluation date	May-July 2015

### Key findings

The evaluation of the project design identified the following difficulties that affected project performance during implementation.

- Inconsistency in outcomes formulation:

Outcome formulation	Interpretation	Actual meaning
Outcome 1: Enhanced institutional framework and EE awareness raising for financing mechanisms, and facilitating the implementation of EE in the industrial sector.	“Enhancement of <b>institutional</b> framework”.	It focused on improving <b>legal</b> and <b>regulatory</b> frameworks.
Outcome 2: Supportive policies in place, compatible with ISO energy management standard (EnMS), for delivering sustainable improvements in energy efficiency in industry and contributing to improved international competitiveness.	Gives the impression that a <b>set of policies</b> related to the ISO standard will be in place as result of the outcome.	It only considers only <b>one</b> policy intervention; the implementation of the energy management standard.
Outcome 3: A cadre of highly specialized energy management and system optimization experts from the public and private sectors are available as a long-term technical resource to industry and the country.	Focused on <b>capacity building</b> .	It also includes a relevant output, according to theory of change (annex 1) related to <b>dissemination of information</b> and <b>awareness rising</b> at national level.
In-depth energy system assessments are completed in manufacturing facilities, out of which system optimization projects are identified.	Outcome 4: focused on the implementation of <b>energy system assessment</b> .	This outcome also focused on the <b>technical demonstration</b> and <b>dissemination of information</b> and <b>awareness raising</b> .



- Vague outputs' formulation

Output formulation	Full meaning
1.1 Policy measures that assist in the effective development and improvement of the legal-regulatory improvement under the Energy Efficiency Law are identified and analyzed.	Refers to <b>supporting</b> an energy efficiency law that was just a draft proposal at the moment of project approval. It never was <b>introduced to the legislative</b> .
1.3 Guidelines for financial evaluation of industrial energy efficiency projects.	Is open to interpretation because it does not include a verb.
1.4 National recognition programme for facilities that implement an energy management plan created.	Achievements depended of the creation by governmental authorities of a national recognition programme.
2.1 National Energy Management Standard (EnMS) adopted (compatible with ISO EnMS) and structure and capacity in place for the promotion of implementation of EnMS.	Required that national governmental agencies put in structure and capacity for the promotion of implementation of EnMS.

- The theory of change of the project, reconstructed by the evaluation team, revealed that some project outcomes should have been focused on changing awareness of relevant stakeholders involved in the achievement of the project objective. This aspect was only included in outcomes 3 and 4 through capacity building and assessment of energy system activities where this issue was deemed as not relevant.

A more effective design of outcomes has been elaborated in Annex 1. It contributes to the improvement of the policy framework, merging outcomes 1 and 2 and including a new outcome addressing awareness issues.

- Indicators of outcome`s achievement, included in the project result framework, were not appropriated, as most of them focused on the achievement of outputs but not of outcomes. In general, they are not considered SMART indicators (specific, measurable, attainable, relevant and time-bound).

The final evaluation showed that the relevance of the project has grown during the implementation period. This is linked to the national circumstances such as the approval of a national organic act on electrical public service in 2015 that highlights the issue of energy efficiency and its increasing need in the industrial sector to continuously improve competitiveness within the market.

The effectiveness of the project, achieving project objective and outcomes, was affected not only by the above mentioned design problems but also by fstakeholders like: 1) the delay of legal approval

of specific agreements necessary for the project implementation and 2) the late definition of the scope of some project outputs, in both cases depended on the national counterpart.

On one hand the project execution was cost effective. Here it is important to mention that some companies involved in the project made additional financial contributions amounting to 884,460 US\$ for the implementation of demonstration actions. On the other hand, the delay with the project start and the missing in cash contribution by the national counterpart reduced the project efficiency. In addition, the synergies between the project activities and other clean production activities in Ecuador lead by UNIDO, Ministry of Environment of Ecuador and Ministry of Industry and Productivity were also weak. A better performance in this area would represent a greater achievement of the project outputs and a reduction of the risks affecting the sustainability of project outcomes.

Project management and coordination was effective. The project steering committee (PSC) played a positive role dealing with the stakeholders that affected the implementation of the work plan. The project team was understaffed during the initial implementation phase and the necessary resources from national counterpart were not in place. However, the schedule and expenses were adjusted annually by the PSC. Therefore, it can be concluded UNIDO project coordination has been effective and timely, it contributed to a flexible and adaptive project management style.

The assessment of sustainability was provided analyzing possible permanency of some relevant changes (effects) after project closure. A description of selected changes and stakeholders affecting their permanency is shown in table 4.

Table 4 Sustainability of project effects	
Change	Affecting stakeholders
An effective training system of specialists for the implementation of energy management systems and energy optimization of industrial systems is available at national level.	This system was developed by UNIDO and implemented by foreign specialist. Its sustainable use will depend on the existence of qualified national institutions. However, the effort of the national counterpart in involving institutions did not succeed.
A cadre of trained experts, with practical experience in implementing industrial energy efficiency measures exists in the country.	Its preservation and enlargement will depend on the demand of their services in market.
A group of companies changed their attitude of disbelief at the benefits of industrial energy efficiency through awareness raising and practical experience and are now ready to extend their good practices.	In order to expand the number of companies ready to invest in energy efficiency, it is necessary to disseminate the enabling framework by sharing, for instance, successful experiences.

Evaluation team has identified the following stakeholders which could affect sustainability of project outcomes:

- Lack of policy tools supporting energy efficiency in industry.
- Lack of a certification mechanism for experts implementing EnMS and energy system optimization

- Lack of efficient mechanisms for encouraging companies to implement an EnMS and energy efficiency measures in industry.
- Lack of awareness among a wider range of industry sectors. This project has limited its focus on the stakeholders who were directly involved in the project implementation without considering other national stakeholders also involved in energy efficiency.
- Lack of accessible training information for companies to take energy efficiency actions.
- Lack of training capacity of national trained experts for implementing EnMS and energy optimization systems.

It is challenging to make an accurate assessment of the achievement of project outcomes due to the above mentioned design problems. The following conclusions are based on an interpretation of possible outcomes to be achieved as result of attainment of project outputs. The lack of consonance between outcomes and outputs is considered a project design failure in this regard.

- Outcome 1 was partially achieved.  
The project conducted and validated a study to analyze the “Energy Efficiency Law” and policy measures. However, the law was never introduced to the legislative and output 1.1 was not modified accordingly. Consequently, output 1.2 focused on awareness rising of the new law was cancelled. Furthermore, experts drafted a manual on the guidelines for financial evaluation of industrial energy efficiency projects and conducted trainings (output 1.3). Additionally, one of the companies was recognized for its achievement during the Vienna Energy Forum 2015 (output 1.4). Nevertheless, these two outputs were not totally achieved due to various delays in the approval processes by the governmental bodies.
- Outcome 2 has a rather high level of achievement. Among outcome’s achievements should be mentioned the early approval of the national energy management standard, the successful awareness raising campaign among relevant actor and the implementation of this standard by a significant group of companies. Only an output, focused on capacity building of relevant institutions involved in EnMS implementation, presents a low level of achievement.
- Outcome 3 was partially achieved. Outputs focused on training activities (3.1 and 3.2) showed a high quality achievement level. Even if some of these did not achieve the exact targeted amount, this did not affect the outcome’s achievement. However, the project only initiated but did not complete the national certification scheme for the trained experts (3.1). Output 3.3 aimed to develop a national information campaign, was no achieved as result of the low priority given to it.
- Outcome 4 also had a positive achievement rating. Pilot activities for demonstration of energy system optimization were successfully initiated. However, the targeted numbers was not reached, as they were overestimated in the project document. The project proved success of the training activities and awareness creation. The main difficulty, achieving this outcome, was output 4.3 which aimed at developing and disseminating selected case studies; they are still being elaborated.

The assessment of evaluators is that the overall project rating is moderately satisfactory.

The project exceeded its global targets; the planned annual emission reduction by 37% and the annual energy saving target by 99%.

## **Conclusions**

In terms of project relevance, the evaluation demonstrated the continuing relevance of this project to the main stakeholders.





However, it is important to mention that there were two main drawbacks in terms of project design and effectiveness: 1) the formulation of the outcomes, outputs and indicators and 2) the delays from the side of the national counterpart. Moreover, the incomplete outputs lead to a reduce sustainability of project.

The evaluation team has highlighted the following considerations:

- The project has demonstrated a considerable relevance for the promotion of the energy efficiency in the industrial sector as described below.
  - An effective and efficient training system for EnMS and ESO, which offers new opportunities for further improvement.
  - The trained experts have successfully implemented EnMS and ESO projects in a relevant number of enterprises.
  - The implemented actions provided fact-based results and solid information for the energy efficiency promotion in the Ecuadorian industry.
- The increased interest of participating companies in the further improvement of energy efficiency has shown the awareness and motivation created by the project.
- The fact that some project outputs were not achieved reduced the opportunities to increase the sustainability of the project outcomes as follows.
  - The achievement of some project outputs would have contributed to the successful implementation of the Energy Efficiency Law of the Organic Act of the Public Electrical Service.
  - While the project improved the motivation of industrial companies to implement EnMS, it was not able to fully achieve the output focused on the deployment of encouraging mechanisms.
  - The creation of a certification mechanism is required to satisfy the demand of the increasing number of EnMS and ESO experts. However, this has not yet been established.
- Taking the above mentioned issues into consideration it can be concluded that the following aspects contributed to the lack of achievement of the project outputs:
  - Absence of a proposal of specific regulations on energy efficiency.
  - Limited progress in the creation of mechanism for recognition of companies implementing EnMS and for certification of experts.
  - Late implementation of the national information dissemination and awareness creation campaign.

## Recommendations

The following recommendations have been identified for the respective partners.

Table 5 Recommendations to most relevant project partners	
Partners	Recommendations
<p><b>National counterpart:</b> Ministry of Electricity and Renewable Energy (MEER)</p> 	<ul style="list-style-type: none"> <li>✓ Strengthen national institutional capacity for training and certification of experts for implementing energy management systems and energy optimization.</li> <li>✓ Interviews during field visit and answer to surveys (annex 2) allowed the evaluation team to identify the following issues that could contribute to improvement of energy efficiency in the industrial sector. <ul style="list-style-type: none"> <li>– Encourage energy efficiency investments by introducing specific financial tools to reduce the economic uncertainty.</li> <li>– Reduce the costs and simplify the mechanisms for the import of goods and technologies for improving energy efficiency.</li> <li>– Increase the local availability of industrial equipment with high energy efficiency standards.</li> <li>– Take advantage from effective implementation of Energy Efficiency content of the Electricity Act.</li> </ul> </li> <li>✓ Develop synergies among institutional stakeholders contributing to the enhancement of energy efficiency.</li> <li>✓ Improve the institutional communication with the business sector on energy efficiency. For example, by facilitating the creation of an entrepreneur's networks in this field.</li> <li>✓ Identify, recognize and promote leading companies improving energy efficiency.</li> <li>✓ Implement mechanisms that guarantee the systematic access to information and technical advice to companies requesting such services.</li> </ul>
<p><b>Implementing agency: UNIDO</b></p> 	<ul style="list-style-type: none"> <li>✓ Promote synergies among activities of the organization at country level.</li> <li>✓ Avoid future inaccuracies in project design by carefully formulating the outcomes, outputs and indicators.</li> </ul>
<p>MEER and UNIDO</p>  	<ul style="list-style-type: none"> <li>✓ Facilitate and promote networking and exchange of experiences among leader entrepreneurs and specialists that participated in project activities, before project ending.</li> <li>✓ Formulate an exit strategy to assure that pending project activities will be completed.</li> <li>✓ Consider the option of a second phase project, taking advantage of the created momentum in the awareness of industrial energy efficiency in Ecuador. It is recommended, that project should be focused on: <ul style="list-style-type: none"> <li>– Design and proposal of policy tools.</li> <li>– Development of institutional capacities for training of experts.</li> <li>– Provision of an information and technical advice platform supporting development of energy efficiency.</li> </ul> </li> </ul>

## Lessons learned

- Lack of synergies between energy efficiency projects and Clean Production activities developed by UNIDO at local level reduce opportunities for a more efficient achievement of shared goals.
- Allocate funds for gender mainstreaming actions in order to achieve gender related results.
- Imperfections of project design misguide the implementation of the project by management team and steering committee. And also significantly reduces the efficiency of monitoring and evaluation project activities.

## 2 Evaluation scope, objectives, methodology and approach

This terminal evaluation (TE) covers the whole project duration from its implementation starting date in July 2011 to the revised estimated completion date in April 2015. The Evaluation was initiated on 6 June 2015 with the following assignments:

- Assess project performance against evaluation criteria: relevance, effectiveness, efficiency, sustainability and impact.
- Draw lessons learnt and develop recommendations for the counterpart, UNIDO and the GEF that may help in improving the selection, enhancing the design and implementation of similar future projects and activities in the country and on a global scale upon project completion.
- Include examples of good practices for other projects in a focal area, country or region.
- Provide an analysis of the attainment of the main objective and the five technical components.
- Enable the Government, counterparts, the GEF, UNIDO and other stakeholders and donors to verify prospects of developing impact and sustainability and analyzing the attainment of global environmental objectives, project objectives, delivery and completion of project outputs/activities, and outcomes/impacts based on indicators.

The assessment includes the reexamination of the relevance of the objectives and other elements of the project design.

The key question of the TE is whether the project has achieved or is likely to achieve its main objective of promoting energy efficiency (EE) improvements in the industry sector of Ecuador through the development and implementation of national energy management standards and the application of system optimization.

The evaluation team was integrated by Dr. Alfredo Curbelo as international consultant and team leader and by MSc. Augusto D. Sanchez as national consultant.

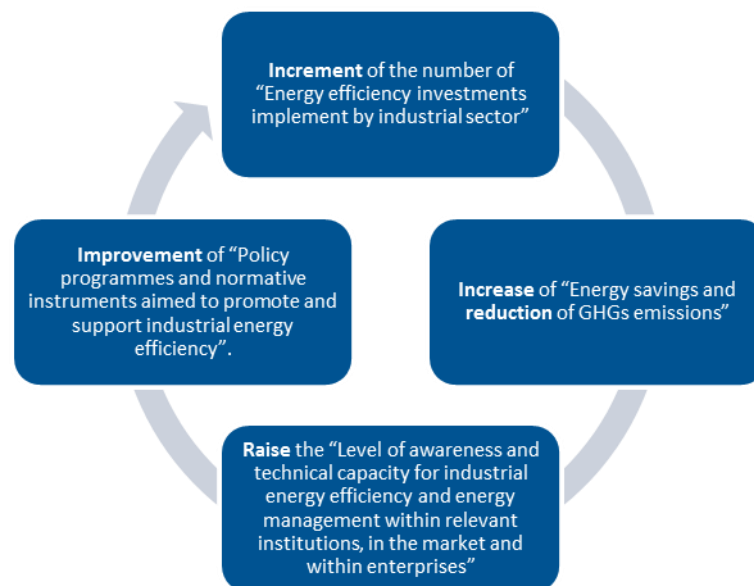
The evaluation methodology used by the evaluation team is based on:

- 1) A desk review of project documents, including, but not limited to:
  - a) The original project document, monitoring reports (such as progress and financial reports to UNIDO and GEF annual Project Implementation Review (PIR) reports), mid-term evaluation/review report, expert's reports and relevant communications.
  - b) Notes of meetings of project steering committee and project advisory committee.
  - c) Other project-related documents produced by the project.

- 2) Reconstructed theory of changes of the project (annex 1).
- 3) Interviews with:
  - a) Project management and technical support at UNIDO HQ and in the field and – if necessary - staff associated with the project’s financial administration and procurement.
  - b) Project partners including Government counterparts: MEER and MIPRO, GEF focal point: Ministry of Environment (MAE), regulatory agencies: Ecuadorian Accreditation Organism (OAE) and Ecuadorian Standardization Institute (INEN).
  - c) Participants in awareness creation and training activities via online surveys annex 2.
- 4) On-site observation of results achieved in demonstration projects: Visit to 6 beneficiary companies of the project.
- 5) Other interviews, surveys or document reviews as deemed necessary by the evaluation team and/or UNIDO ODG/EVA.

The evaluation team reconstructed a theory of change of the project that was used as a reference tool during project evaluation. It is described in details by Annex 1, but next are explained main findings of this theory.

The achievement of project objective, which is formulated in terms of “To promote energy efficiency improvements in the Ecuadorian industry through the development of national energy management standards and application of systems optimization”, should lead to a group of changes expressed by the indicators of impacts. The evaluation team formulated the following basic assumption to analyze impact level changes: the rise on awareness and technical capacity levels among relevant project stakeholders will contribute to the improvement of the legal and regulatory framework. At the same time, these changes will lead to an increment of the number of EE investments and consequently to an increase in energy saving and a reduction of GHG emissions (Figure 1).







**Figure 1 Changes at impact level**



This analysis leads to the conclusion that the impact related to rising awareness and technical capacity level is fundamental for the achievement of the project objective. In this case, the

assumption is that a portion of project activities would contribute to change attitudes and aptitudes of relevant stakeholders involved in processes focused on reaching project objective. These activities refer to those related to awareness creation and training, including the implementation of EnMS and the demonstration of technical measures. Additionally, the activity focused on the national information dissemination and awareness creation campaign, is relevant to the achievement of the targeted behavioral change of relevant stakeholders. The evaluation team developed a summary of the expected changes at actor level (Table 6).

**Table 6 Changes at stakeholders' level**

Policy actor	Relevant actor
<p>Improved capacity for adequate decisions making on EE policy and policy tools based on:</p> <ul style="list-style-type: none"> <li>• Results of a detailed analysis of EE policy and measures at regional and international level as well as the promotion of financial mechanisms and incentives to promote EE.</li> <li>• Policy paper with proposed measures on how to effectively promote EE in industry.</li> </ul> <p> Indicator: Quality of the process for improving EE policy framework considering at least:</p> <ul style="list-style-type: none"> <li>– Duration and timely completion.</li> <li>– Relevant stakeholders actively contributing to project implementation</li> <li>– Relevance of decisions and choices.</li> </ul>	<p>Improved capacity for implementation of EnMS has been obtained as result of the implemented capacity building plan designed under this project.</p> <p> Indicator: Efficiency and effectiveness of intervention of selected actor in the process of EnMS implementation based on:</p> <ul style="list-style-type: none"> <li>– Number of performed actions.</li> <li>– Quantity and quality of answers to requests for assistance.</li> <li>– Delay in reaction to satisfy identified demands</li> </ul>
Supply chain actor	
Company management	Technical personnel at factory level
<p>Increased motivation to support implementation of EnMS due to:</p> <ul style="list-style-type: none"> <li>• Participation in 0.5 day awareness workshops.</li> <li>• Information received through the national information campaign.</li> </ul> <p> Indicator: Commitment of company management staff to implement EnMS.</p> <ul style="list-style-type: none"> <li>– Number of new actions related to the implementation of EnMS.</li> <li>– Amount of resources that are committed.</li> </ul>	<p>Improved capacity for proposing implementation of EnMS and system optimization actions as result of attending:</p> <ul style="list-style-type: none"> <li>• 1 day or 2 days EnMS User Training,</li> <li>• 1 day or 2 days System optimization User Training.</li> </ul> <p> Indicator: Number of new proposed interventions.</p>
Technical service providers	Vendors
<p>Increased capacity for offering technical services for the implementation of EnMS and system optimization actions as result of attending:</p>	<p>Improved capacity to actively participate in the implementation of system optimization actions as result of attending:</p>



<ul style="list-style-type: none"> <li>• 160 hours expert training workshops on EnMS,</li> <li>• 30 days training workshop on system optimization for users.</li> </ul> <p> Indicator:</p> <ul style="list-style-type: none"> <li>– Number of technical services that are offered.</li> </ul>	<ul style="list-style-type: none"> <li>• 1 day or 2 days user training workshops on System optimization</li> </ul> <p> Indicator:</p> <ul style="list-style-type: none"> <li>– Number of actions for improving energy efficiency that are initiate for vendors.</li> </ul>
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### 3 Country and project background

#### 3.1 Energy Efficiency in Ecuador

According to figures of the National Energy Balance, the national energy intensity reached 1.45 barrels of oil equivalent per USD 1,000 in 2014, being lower than the industrial energy intensity that contributed with around 2 BOE/USD 1000. According to the same source, the energy consumption in Ecuador in 2014 was of 101 Million barrels of oil equivalent (Mboe) and the annual electricity consumption was of 21,495 GWh .

Electricity demand in industry was of 9,242 GWh (43% of national consumption) and the average power price for the industrial sector was USD 0.0716 per kWh in 2014. The total diesel consumption by the industry sector in 2014 was of about 281 million gallons (25% of total diesel demand)..

In reality, energy efficiency has always been a low priority of the industry due to relative low energy prices (supported by subsidies) and preference for second-hand equipment. A local analysis concluded that the avoided electricity costs derived from the investment in energy efficiency and renewable energy technologies account for 1% of the country GDP, amounting to over USD 5 billion by 2025, could contribute significantly to poverty alleviation, job creation and to the improvement of social services (Bassi A and Baer A, 2008).

The project seeks to address some of the existing barriers to industrial energy efficiency in the Ecuadorian industrial sector, to deliver measurable results and to make an impact on how Ecuadorian industries manage energy through an integrated approach that combines capacity building and technical assistance interventions at the policy and energy efficiency project level.

#### Previous initiatives

The Government of Ecuador is committed to increase energy efficiency (EE) in the country. A National Plan for Energy Efficiency was developed in 2004. A new Ministry of Electricity and Renewable Energy (MEER) was created in July 2007 to, inter-alia, coordinate and implement this National Plan. Promoting efficient and rational use of energy is one of the Ministry’s 6 long-term objectives.

A summary of initiatives that were in place or planned to be implemented at the time of project approval is presented in table 7.

**Table 7 Energy Efficiency Initiatives in Ecuador**

<b>Title: Power and Communications Sectors Modernization and Rural Services Project (PROMECC)</b>	
<b>Basic data</b>	<b>Results</b>
Period: 2001 – 2006	<ul style="list-style-type: none"> <li>✓ 24 energy audits carried out.</li> <li>✓ Low cost, high returns (quick wins) actions were undertaken in the first few months after the audits were undertaken, more significant investments were delayed due to lack of financing mechanisms.</li> <li>– Dissemination of these activities was quite limited due to the following issues: <ul style="list-style-type: none"> <li>▪ limited number of ESCOs available in the country to undertake the studies,</li> <li>▪ the beneficiary enterprises were reluctant to sign the ESCO agreements, and</li> <li>▪ the timeframe for implementation did not contemplate the ESCOs learning curve.</li> </ul> </li> </ul>
Financing/Implementing agency: GEF/ WB	
National counterpart: Ministry of Industries and Productivity (MIPRO)	
Goals (EE): Energy efficiency promotion by stimulating the creation of local Energy Service Companies (ESCO)	
<b>Title: Large Energy Consumer Association (Egranconel) initiative</b>	
<b>Basic data</b>	<b>Results</b>
Period: 2005-2006	<ul style="list-style-type: none"> <li>✓ The study was undertaken in 37 facilities.</li> <li>– Less than 20% of the identified measures were undertaken and follow up of savings has been limited.</li> <li>– No replication could be undertaken since the studies were made using international experts from the Mexican National Trust Fund for Energy Savings (FIDE) who did not transfer their knowledge.</li> </ul>
Financer/ Implementing agency: Andean Development Corporation	
National counterpart: Ministry of Commerce	
Goals (EE): To identify energy saving in large energy consuming industries	
<b>Title: Renova Refrigeradoras</b>	
<b>Basic data</b>	<b>Results</b>
Period: 2011 - 2016	<ul style="list-style-type: none"> <li>▪ A subsidy that cover between 41% to 52% of the initial cost of the equipment is issued to beneficiaries.</li> <li>▪ A soft loan is lent to cover the rest of cost of new refrigerator.</li> <li>▪ More than 53000 old refrigerators had been</li> </ul>
Financer/ Implementing agency: National Budget/ MEER	
National counterpart: It is a national Programme implemented by Executive Order issued on April 2011	
Goals (EE): Replacement of 330 000 inefficient refrigerators (10-year-old or	

more)	replaced at April 2015.
<b>Title: Renova Transporte</b>	
<b>Basic data</b>	<b>Results</b>
2008 - 2016	✓ More than 20 000 old inefficient transport units had been replaced at July 2015.
Financer/ Implementing agency: Corporación Financiera Nacional (National Financial Corporation) / Ministerio de Obras Publicas.	✓ This replacement required a governmental investment close to 119 millions of US\$.
National counterpart: It is a national programme	✓ Fuel saving associated to this program are estimated in 36,5 million of gallons of fuels.
Goals (EE): To promote the replacement of inefficient transport equipment implementing fiscal and financial incentives.	✓ This savings saved 60000 million US\$ from subsidies to fuels.
<b>Title: Action Plan for Sustainable Energy</b>	
<b>Basic data</b>	<b>Results</b>
Period: 2009 -2011	– The PAES project has 4 main components of them:
Financer/ Implementing agency: Inter American Development Bank.	<ul style="list-style-type: none"> <li>▪ Energy Efficiency Programme (Component I),</li> <li>▪ Institutional Strengthening Programme, promoting renewable energy, energy efficiency and bioenergy and dissemination of results (Component IV),</li> </ul>
National counterpart: MEER	– Planned activities related to Energy efficiency included:
Goals (EE):	<ul style="list-style-type: none"> <li>▪ updating the inventory of electricity demand by sector,</li> <li>▪ designing a national plan for energy saving in public lighting, SMEs, commercial and residential sector,</li> <li>▪ identifying measures for the electricity transmission chain and distribution and</li> <li>▪ Preparing energy audits for the 4 sectors identified.</li> </ul>
<ul style="list-style-type: none"> <li>• To diversify the national energy matrix through distributed power generation and fossil fuels switching for renewable energy.</li> <li>• Increased energy efficiency practices in the demand side.</li> </ul>	– Under this project framework MEER coordinated the development of an Energy Efficiency law, which was drafted and should have been sent for

	legislative approval in 2011.
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### Barriers to energy efficiency initiatives

The above mentioned initiatives' results corroborate that numerous barriers prevent energy efficiency initiatives from being fully implemented and financed. An overview of these barriers is shown in Table 8 Identified Barriers.

**Table 8 Identified Barriers**

<b>Policy and institutional</b>
<ul style="list-style-type: none"> <li>• Lack of adequate data on energy consumption, benchmarks and best practices.</li> <li>• Efforts on energy efficiency have been initiated by the Government, but have focused more on standards and labeling of household equipment than on industrial energy efficiency.</li> <li>• There are limited governmental incentives to encourage energy efficient behavior, in particular specific incentives to advise and provide comprehensive services to SMEs.</li> <li>• There is lack of information about available options, best practice, benchmarks and related financing mechanisms and options.</li> </ul>
<b>Industrial energy management</b>
<ul style="list-style-type: none"> <li>• Energy efficiency is not a core interest for most industries and company strategies, as they tend to focus on output growth rather than cost management. Most industries have a budgetary disconnect between capital projects (equipment purchases) and operating expenses (energy and maintenance), therefore, purchasing decisions are normally based on initial capital investment consideration, rather than on operating costs.</li> <li>• Technology aims to support production, and production practices can have a significant impact on operational efficiency. These practices, however, are usually outside the control of the facility engineers.</li> <li>• Industries lack a culture of energy and resource management.</li> </ul>
<b>Technical knowledge and dissemination</b>
<ul style="list-style-type: none"> <li>• Facility engineers tend to focus on components, not on systems. When processes and equipment change over time, inefficiencies in term of energy use compound and reoccur. Even were systems optimizations is available, knowledge resides with the individual who has been trained and is often not institutionalized.</li> <li>• SMEs are not familiar with system optimization and energy efficient technologies.</li> </ul>
<b>Products and services (supply chain)</b>
<ul style="list-style-type: none"> <li>• Expertise – most of the consulting services on energy efficiency available in Ecuador focus on</li> </ul>

specific technologies and not on processes and systems. The overall knowledge of EnMS is also limited. There is a need to build up capacities in monitoring, reporting, and analyzing of energy management systems and systems optimization data.

- Marketing – local suppliers of EE related to finance, equipment and expertise have limited experience and skills in promoting their products among industrial decision-makers.

The evaluated project has the goal to contribute to remove the selected barriers dealing with issues which were not addressed by the prior projects:

- Lack of familiarity with diverse energy efficiency technologies and processes, and best practices in energy conservation investment.
- Lack of awareness of financial benefits deriving from energy conservation investments. This is the primary reason for the high risk perception among industrial enterprises.
- Energy efficiency is not part of the core business of most of the companies. Company strategies tend to focus on output growth rather than cost management. Most enterprises have a budgetary disconnect between capital projects (equipment purchases) and operating expenses.

### 3.2 Project Objectives, framework and justification.

The project focuses on building national capacities in two technical fields:

- **Systems optimization:** Even though presence of energy-efficient components in industrial systems is important, it does not assure that energy savings will be attained if the system of which the components are part is not properly designed and operated.
- **Energy management systems (EnMS):** the adoption and promotion of national energy management standards, besides capacity building of enterprises and institutions, will be effective in transforming the national industrial energy efficiency market condition.

It is a Medium Size Project financed by GEF and implemented by UNIDO in Ecuador (table 9)

**Table 9 Project General Information**

Project Title	Industrial Energy Efficiency in Ecuador
GEF ID	4147
UNIDO project No. (SAP ID)	103017
Region	Latin America and Caribbean
Country(ies)	Ecuador
GEF Focal area(s) and operational program	Climate Change CC-2
GEF Agencies (implementing agency)	UNIDO
Project executing partners	Ministry of Electricity and Renewable Energy (MEER), Ministry of Industries and Productivity (MIPRO)
Project size (FSP, MSP, EA)	MSP
Milestone	Date
Project CEO endorsement/Approval date	20 May 2011
Project implementation start date	6 July 2011

Original expected implementation end date	7 May 2014
Actual implementation end date	30 April 2015

The objective of the project is formulated in term of promotion of energy efficiency of the industrial sector. Energy management systems and application of system optimization are selected tools to achieve such proposal.

**Objective:**

To promote Energy Efficiency (EE) improvements in the industry sector of Ecuador through the development and implementation of national energy management standards and application of system optimization

The project defines four outcomes to achieve project objective:

Outcome 1: Enhanced institutional framework and EE awareness rising for financing mechanisms, and facilitating the implementation of EE in the industrial sector.

Outcome 2: Supportive policies in place, compatible with ISO energy management standard (EnMS), for delivering sustainable improvements in energy efficiency in industry and contributing to improved international competitiveness

Outcome 3: A cadre of highly specialized energy management and system optimization experts from the public and private sectors are available as a long-term technical resource to industry and the country.

Outcome 4: In-depth energy system assessments are completed in manufacturing facilities, out of which system optimization projects are identified.

Justification of project outcomes is described in the project document (see table 10). But only in the case of outcome 1, provided explanations actually justify the formulation of the outcome in the project, as a contribution for achieving project goals. In the other cases the justification is more a description of expected benefits or activities.

Component 1	Outcome 1	Justification Outcome 1
Analysis of industrial EE institutional and regulatory arrangements and development of tools to facilitate EE measures adoption.	Enhanced institutional framework and EE awareness raising for financing mechanisms, and facilitating the implementation of EE in the industrial sector. Numbers of outputs: 4	While the current framework law is being drafted, the effective implementation of measures in the industrial sector shall be achieved once regulatory decrees and technical regulations are put in place. The project shall facilitate the task of policymakers in the formulation of such instruments by providing an analysis of international and regional EE policies, programmes and institutional arrangements for effective implementation.

<b>Component 2</b>	<b>Outcome 2</b>	<b>Justification Outcome 2</b>
National program to implement ISO-compatible energy management standard.	Supportive policies in place, compatible with ISO energy management standard (EnMS), for delivering sustainable improvements in energy efficiency in industry and contributing to improved international competitiveness. Numbers of outputs: 3	<ul style="list-style-type: none"> <li>• Adopt the ISO 50001, EnMS, as the Ecuadorian national energy management standard; institutional capacity building for the implementation of the standard.</li> <li>• Build capacity for the implementation of the EnMS and energy system optimization; raise awareness about benefits in the implementation of the standard and system optimization measures.</li> </ul>
<b>Component 3</b>	<b>Outcome 3</b>	<b>Justification Outcome 3</b>
Capacity building for personnel involved in EE from the public and private sectors in the areas of energy management and system optimization and energy efficiency promotion	A cadre of highly specialized energy management and system optimization experts from the public and private sectors are available as a long-term technical resource to industry and the country. Numbers of outputs: 3	<ul style="list-style-type: none"> <li>• The adoption of standardized management systems will not only ensure sustainable improvements in industrial energy efficiency, but also contribute to enhancing the international competitiveness of Ecuadorian products.</li> <li>• Involve the private sector in the implementation of all the components of the Project and their commitments as contributions in-kind and in cash to the project. The active participation and contribution of industrial firms and Chambers of Industry are decisive for the success of the project and the sustainability of the project.</li> </ul>
<b>Component 4</b>	<b>Outcome 4</b>	<b>Justification Outcome 4</b>
Demonstrated and measured energy savings in industrial entities through application of system assessment techniques by trained experts, leveraging additional energy savings as more industrial facilities will seek the implementation of systems optimization.	In-depth energy system assessments are completed in manufacturing facilities, out of which system optimization projects are identified. Numbers of outputs: 3	<ul style="list-style-type: none"> <li>• In-depth energy system assessments are completed in manufacturing facilities, out of which system optimization projects are identified.</li> <li>• Demonstrate energy savings in industry through application of system optimization.</li> <li>• Disseminate case studies with concrete results from the demonstration projects.</li> </ul>

Achievement of those outcomes is expected that would produce the following impacts:

- 1) Energy savings and GHGs emission reductions directly and in-directly generated by the project.
- 2) Development of policy programmes and normative instruments aimed to promote and support industrial energy efficiency.
- 3) Level of awareness and technical capacity for industrial energy efficiency and energy management within relevant institutions, in the market and within enterprises.
- 4) Energy efficiency investments generated by the project, directly and indirectly.

The evaluation team identified specific impact indicators for every output in order to facilitate the assessment of the project result framework (annex 3) and how it assists to the impact

This analysis shows that there is a good correlation between project impacts and their indicators of impact except in the case of impact I. The reason is that indicators of impacts are not formulated in an adequate form.

**Table 11 Impacts and their indicators**

<b>IMPACT 1: Energy savings and GHGs emission reductions directly and indirectly generated by the project</b>	
Related OUTCOME: Global of the project	
Indicators of impact	Planned targets
A. Incremental direct CO <sub>2</sub> eq emission reductions (tons of CO <sub>2</sub> eq)	<ul style="list-style-type: none"> <li>✓ Cumulative direct emission reduction of 321,6 ktCO<sub>2</sub></li> <li>✓ Cumulative post project direct emission reduction of 965 ktCO<sub>2</sub></li> </ul>
B. Incremental indirect CO <sub>2</sub> eq emission reductions (tons of CO <sub>2</sub> eq)	<ul style="list-style-type: none"> <li>✓ Indirect emission reduction of up to 3,091 ktCO<sub>2</sub> (assuming a growth of 10% in the period 2009-2023)</li> </ul>
C. Specific energy consumption of selected enterprises	<ul style="list-style-type: none"> <li>✓ Implementation of energy management plans, systems optimization and operational improvements in 25 enterprises lead to annual fuel savings of 96,000 GJ and power savings of 25,975 MWh</li> </ul>
<b>IMPACT 2: Development of policy programmes and normative instruments aimed to promote and support industrial energy efficiency (IEE)</b>	
Related OUTCOMES: OUTCOME 1 AND OUTCOME 2	
Indicators of impact	Planned targets
Status of policy paper on how to implement industrial policy ( <i>output 1.1</i> )	<ul style="list-style-type: none"> <li>✓ Detailed analysis of EE policy and measures at regional and international level as well as the promotion of financial mechanisms and incentives to promote EE (that will feed into the formulation of the final proposal for the EE Law)</li> </ul>
Status of the national technical regulations on IEE ( <i>output 1.2</i> )	<ul style="list-style-type: none"> <li>✓ Establishment of appropriate regulations by central government as well as lower-level authorities</li> </ul>
Status of manual and guidelines for financial evaluation of IEE	<ul style="list-style-type: none"> <li>✓ Manual for financial evaluation of EE projects disseminated in the financial sector</li> </ul>



projects (output 1.3)	
Status of the national recognition programme for facilities that implement an energy management plan (output 1.4)	✓ Recognition and award scheme formulated and implemented for facilities that implement an energy management plan
Status of the adoption of national EnMS (output 2.1)	<ul style="list-style-type: none"> <li>✓ EnMS adopted after stakeholder consultations (compatible with ISO 50001) and promulgated as a national standard.</li> <li>✓ Capacity of relevant institutions analyzed (MEER, MIPRO, INEN, OAE) and capacity plan formulated and implemented for the implementation of EnMS (which will improve EE as well as international competitiveness)</li> </ul>
<b>IMPACT 3: Level of awareness and technical capacity for industrial energy efficiency and energy management (EM) within relevant institutions, in the market and within enterprises</b>	
Related OUTCOMES: OUTCOME 2, OUTCOME 3 AND OUTCOME 4	
Indicators of impact	Planned targets
Status of energy management and EnMS training (output 2.2)	<ul style="list-style-type: none"> <li>✓ Awareness raised in four 0.5 day workshops among general and/or financial managers</li> <li>✓ Energy managers, energy service providers and other technical staff are trained at five 2-day events (workshops, seminars, courses) attended by 200 people at various places in Ecuador (e.g. Quito, Guayaquil, Cuenca, etc.) on energy management (half from large enterprises; half from SMEs)</li> </ul>
Status of the implementation of energy management plans in industry	✓ Energy management plans fully implemented in 50 companies
Status of EM training of trainers (output 3.1)	<ul style="list-style-type: none"> <li>✓ 25 EE experts trained as trainers on energy management (20 days)</li> <li>✓ 50 EE experts trained as trainers on systems optimization (motor driven and steam systems; 30-day training)</li> <li>✓ Trained experts receive their certification</li> </ul>
Status of system optimization training (output 3.2)	<ul style="list-style-type: none"> <li>✓ 200 staff trained (half from large, half from SMEs) in 1-day workshop (approx. 8 training sessions)</li> <li>✓ 100 staff receives a more comprehensive 2-day training workshop (approx. 4 training sessions).</li> </ul>
Status of the information dissemination and awareness creation campaign (output 3.3)	<ul style="list-style-type: none"> <li>✓ 400 industry representatives workshops, including supply-chain partners and the 200 entities from Component 2, have awareness raised on energy management and systems optimization and EE for industry in general (approx. ten 1-day events)</li> <li>✓ Design and implement national information campaign</li> </ul>

	(seminars, road shows, multimedia, and promotional material/brochures)
Status of info gathering and dissemination (output 4.3)	✓ 5 case studies presented and equipment/processes identified for improvement in 2 most important sectors; information disseminated to a wide audience
<b>IMPACT 4: Energy efficiency investments generated by the project, directly and indirectly</b>	
Related OUTCOMES: OUTCOME 4	
Indicators of impact	Planned targets
Status of in-depth energy assessments (output 4.1)	✓ 25 in-depth energy system assessments in manufacturing facilities (with the assistance of experts trained in output 3.2)
Status of system optimization projects (output 4.2)	✓ 10 factories improve their energy consumption by means of pilot system optimization activities

Primary target groups of the project are industrial decision makers (managers), engineers, vendors and other professionals and industrial energy efficiency (IEE) policymaking and/or implementing institutions.

More than 400 professionals were planned to enhance their knowledge about energy efficiency in industry and 75 engineers received an expert training (25 in energy management and 50 in system optimization).



**Figure 2 Project target groups**

In addition, relevant institutions like INEN and OAE, were expected to enhance their capacity thanks to project support. Also industrial SMEs should be also benefited by the project. In depth energy audits would be provided to 25 industries and 10 of them would improve their energy consumption by means of pilot system optimization activities.

Planned total cost of the project is 5,424,703 US\$ of which 915,000 US\$ correspond to the GEF grant (table 12)

**Table 12 Project financing structure and cost**

Item	Value (USD)
GEF Grant	915,000
GEF PPG	75,000
UNIDO inputs (cash)	60,000
Co-financing at CEO Endorsement (cash + in-kind)	4,434,703
<b>Total project cost</b>	<b>5,424,703</b>

## 4 Project assessment

### 4.1 Design

The project design considered previous experiences developed in the field of Industrial Energy Efficiency in the country. This allowed involvement of relevant stakeholders already during the project preparation phase. Additionally, a project framework was created in this phase of project cycle. However, the evaluation team identified formulation issues which caused some difficulties during the implementation phase.

Some barriers to improvement of energy efficiency in industrial sector were selected during this phase to be addressed by project activities. Selection of these barriers envisaged experiences from previous IEE initiatives and some stakeholders limiting IEE development that were identified during project preparation phase.

Furthermore, the following relevant stakeholders were selected and involved in the participatory activities during the design phase:

- Relevant ministries:
  - Ministry of Electricity and Renewable Energy (MEER)
  - Ministry of Industries and Productivity (MIPRO)
  - Ministry of Environment
- Standardization and accreditation Institutions:
  - Ecuadorian Standardization Institute (INEN)
  - Ecuadorian Accreditation Organism (OAE)
- Representatives of the industry sector:
  - Industrial companies
  - Chambers of Industry

Moreover, the project document describes an adequate set of outcomes, outputs and activities designed to achieve project objectives and produce expected impacts. The project results framework (annex 3) includes standard elements for each project outcomes: indicator, baseline, and targets at end of project, source of verification and risks and assumptions.

Nevertheless, the design of the project presented some problems that are described below:

1) Inconsistency in the outcomes formulation.

- a) **Writing of outcome 1** is about institutional framework: “Enhanced institutional framework and EE awareness rising ... “. But outputs of this outcome are actually focused on enhancing legal and regulatory frameworks but not on enhancing the institutional framework.

#### Outputs of Outcome 1:

- 1.1 Policy measures that assist in the effective development and improvement of the legal regulatory improvement under the **Energy Efficiency Law** are identified and analyzed.
- 1.2 The development of **national technical regulations** on industrial energy efficiency is supported.
- 1.3 Guidelines for financial evaluation of industrial energy efficiency projects.
- 1.4 National recognition programme for facilities that implement an energy management plan created.

- a) **Formulation of outcome 2** uses the plural form: “Supportive policies in place, compatible with ISO energy management standard (EnMS)...”. It gives the impression that a set of policies related to the ISO standard will be in place as result of the outcome. However, it only refers to one policy intervention which is the implementation of the energy management standard.
- b) **Outcome 3** is focused on capacity building: “A cadre of highly specialized energy management and system optimization experts from the public and private sectors are available as a long-term technical resource to industry and the country”. However, output 3.3 “National information dissemination and awareness creation campaign developed and implemented” is not relevant for achieving this outcome. The outcome was obtained without the implementation of that national campaign.
- c) **The scope of outcome 4** is formulated in terms of energy assessment: “In-depth energy system assessments are completed in manufacturing facilities”. Nevertheless, outputs go beyond system assessments and project identification: it is a technical demonstration outcome. Furthermore, this outcome also includes a relevant output on information diffusion and awareness raising that does not correspond with the outcome formulation.

#### Outputs of Outcome 4:

- 4.1 25 in-depth energy system assessments are completed in manufacturing facilities.
- 4.2 10 system optimization projects identified through assessments are implemented.
- 4.3 Results obtained from the demonstration projects, including proposed and adopted EE technologies, are **disseminated**.

- 2) Some outputs cannot be achieved directly by the project or their formulation is not specific.
  - a) Output 1.1: “Policy measures that assist in the effective development and improvement of the legal regulatory improvement under the **Energy Efficiency Law** are identified and analyzed”. It is formulated in terms of supporting a law that was just a proposal at the moment of project approval, but never was introduced to the legislative.
  - b) Output 1.4: “National recognition programme for facilities that implement an energy management plan **created**”. Creation of a national recognition programme means that it is not only designed, proposed and discussed with right authorities. It means that it is

approved and implemented. But these last two actions depend of national procedures and priorities. Efforts of project team could not avoid a late approval and implementation.

- c) Output 2.1: “National Energy Management Standard adopted (compatible with ISO and EnMS) and **structure and capacity in place** for the promotion of implementation of EnMS”. Although authorities would commit with the development of a standard during project preparation phase, this is completely different from set up the required structure and capacity for promotion and implementation of EnMS. Due to its complexity, these set of activities cannot be driven by the project team.
  - d) Formulation of output 1.3 is open to interpretation because it does not include a verb: “Guidelines for financial evaluation of industrial energy efficiency projects”.
- 3) The understanding of Output 1.2 varies in different parts of the document:
- a) Formulations of this output are different in the section “project framework”<sup>1</sup> and in the section that provides outcome justification and describes project activities.
  - b) In the first case it is described as: “The development of national technical regulations on industrial energy efficiency is supported” while in the second it is: “Raising public awareness and promotion of the new Energy Efficiency law”.
- 4) Project outcomes could, in a better way, respond to the reconstructed theory of change for achieving project goals.

The theory of change of the project, which was reconstructed by the evaluation team, shows that project outcomes should be focused on changing awareness of relevant stakeholders involved in the achievement of the project objective. However, the few outputs pursuing this goal are included in outcomes where they are not relevant.

Also both, outcome 1 and outcome 2, are aimed to contribute to the improvement of the policy frameworks.

The evaluation team proposed a more effective design of outcomes which considers 1) the formulation of a unique outcome by merging outcomes 1 and 2 and 2) the inclusion of a new outcome addressing awareness issues.

- 5) Indicators of outcome’s achievement in the project result framework are not appropriated.
- a) Most of the indicators are focused on the achievement of outputs but not of outcomes.
  - b) Most of the indicators are not relevant for the assessment of outcome achievement.
  - c) In general, they are not SMART indicators (specific, measurable, attainable, relevant and, where possible, time-bound).

## 4.2 Relevance

The goal of the project: “promote energy efficiency improvements in the Ecuadorian industry” was proved to be relevant at the moment when project was approved. Market failures like subsidies to fuels and electricity tariffs lead to a high energy consumption in the industrial sector. The high energy consumption in the industrial sector was partly driven by government actions such as high

<sup>1</sup> REQUEST FOR CEO ENDORSEMENT/APPROVAL. Re-submitted on 21 April 2011.

subsidies to fuels and electricity. Some actions taken by government in order to overcome this barrier to energy efficiency practices are:

- National Plan for Energy Efficiency developed in 2004;
- the strengthening of the institutional capacity by creating an Energy Efficiency Direction at MEER and
- the various projects and programmes aiming to improve energy efficiency measures implemented by governmental bodies and international organizations described in a previous section of this report (see table 7).

The evaluation team recognized that relevance of the project goals and outcomes has grown during project implementation phase:

- A national organic act on electrical public service has been approved in 2015. Title number 4 of the law is dedicated to energy efficiency.
- Governmental bodies like MIPRO and MAE have kept and increased the interest and support to activities in line with project’s goals such as the Clean Production and the RENOVA programme. Representatives of these ministries, who were interviewed by the evaluation team, confirmed this relevance for their institutions.
- Private sector representatives also confirmed this point of view during the meetings. Additionally, the evaluation team sent a survey to the companies’ executives and technical staff involved in project implementation which also confirmed the project relevance. A large share (>89%) of management staff, that answered the survey, consider that actions taken by the project bring medium to high impact benefits and that they are cost effective and can be sustained by companies.

### 4.3 Effectiveness

The project proved to be effective by achieving its global targets which focused on the achieved energy savings and the annual emission reduction. The annual energy savings target was achieved by 199% while the emission reduction by 139% in relation to planned amount. The fact that both targets were surpassed reveals the project success in the implementation of energy efficiency actions as well as the appropriate estimation of the values (Figure 3 and 2).

Energy savings and emission reductions were calculated based on the reports from 30 industrial plants who participated in the project activities. Those plants reported on savings of electricity, diesel oil, fuel oil and LPG during a period of two years.

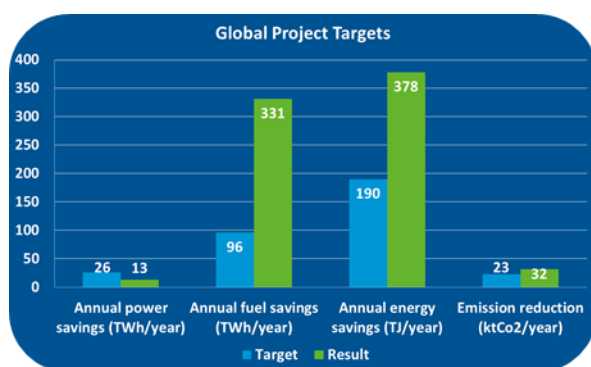


Figure 3 Target achievement %

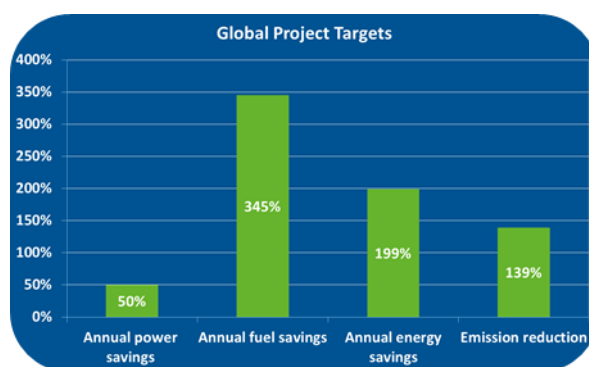


Figure 4 Planned and achieved global project targets

## Outcome 1

False assumptions reveal some of the project's inefficiencies. outcome 1 assume that a drafted Act for the Energy Efficiency Promotion was going to be approved before project inception. As this never happened, the targets of outcome 1 linked to this act needed to be modified. However the national counterpart was not able to define the needed modifications on time. So those targets were not achieved. Furthermore, this outcome also included other targets which depended on promptness of the approval processes by governmental bodies. Those targets only reached the stage of proposal for approval.

Following the analysis of the design of the project, achievement of this outcome cannot be strictly evaluated based on its formulation.

This outcome was partially achieved. The following problems affected the achievement of the project objective, reduced the probability that some project output will be replicated and prevented more favorable conditions for supporting the implementation of the recently approved power act. See details in table 13.

- Lack of promotion of financial mechanism and incentives to promote EE
- No implementation of a recognition and award scheme for facilities applying EnMS
- Absence of new EE regulations.

**Table 13 Targets of outcome 1**

Planned targets	Achieved target	Achievement level
<b>Detailed analysis of energy efficiency policy and measures at regional and international level as well as the promotion of financial mechanisms and incentives to promote EE</b>	<ul style="list-style-type: none"> <li>✓ Detailed analysis of energy efficiency policy and measures is completed.</li> <li>✓ The promotion of financial mechanisms and incentives to promote EE was not executed.</li> </ul>	Partially with minus
<b>Establishment of appropriate regulations by central government as well as lower level authorities.</b>	No progress.	No results
<b>Manual for financial evaluation of EE projects disseminated in the financial sector</b>	The manual is in progress to be approved.	Partially with minus
<b>Recognition and award scheme formulated and implemented for facilities that implement an energy management plan.</b>	✓ Recognition and award scheme is proposed.	Partially with minus

## Outcome 2

Outcome 2 was dedicated to the implementation of the ISO 50001 energy management standard in Ecuador. Positive achievements include the early approval of the national standard that follows ISO

50001 by respective authorities, the successful awareness raising campaign among relevant stakeholders and the implementation of this standard by a significant group of companies. In this regard, answers to the evaluation survey (annex 2) show a high motivation on EE improving practices and a positive impression of participants about effectiveness of these activities. The fact that the target of 50 companies fully implement an EnMS was not totally achieved, did not affect the achievement of project outcome. This shows that the target figures were overestimated. The achieved result of 34 companies is a notable success in comparison with other international project outputs.

However, the output focused on capacity building of relevant institutions involved in EnMS implementation present the lower level of achievement. This limited the opportunities for a broader implementation of EnMS. A review of the achieved targets is shown in table 14.

**Table 14 Targets of outcome 2**

Planned targets	Achieved target	Achievement level
<b>EnMS adopted after stakeholder consultations and promulgated as a national standard</b>	✓ Done	Totally
<b>Capacity analyzed of relevant institutions (MEER, MIPRO, INEN, and OAE) and capacity plan formulated and implemented for the implementation of EnMS.</b>	<ul style="list-style-type: none"> <li>✓ Capacity of relevant institutions was analyzed.</li> <li>✓ Capacity plan was not formulated neither implemented</li> </ul>	Partially with minus
<b>Awareness raised in four 0.5 day workshops amongst general and/or financial managers ; Energy managers, energy service providers and other technical staff are trained at five 2Noday events attended by 200 people on energy management</b>	<ul style="list-style-type: none"> <li>✓ 187 people attended 0.5 day workshops;</li> <li>✓ 207 people were trained at eight 2 – day events.</li> </ul>	Totally
<b>Energy management plans fully implemented in 50 companies</b>	✓ 42 companies were initially committed to implement EM plans, of them 34 companies implemented, with different completions, these plans	Partially with plus

### Outcome 3

Outcome 3 was focused on capacity building for the implementation of EnMS and energy system optimization interventions.

Most of the outputs were focused on training activities. There were two types of training activities: 1) training of experts for implementation of EnMs and 2) system optimization. The evaluation survey and the interviews during the field visits revealed the good quality and positive response to the training activities performed.



The following design and methodology elements should be highlighted as they were relevant to the achievement of this outcome.

- Selection process of participants.
  - The selection process was initiated with a public call for participation in two day workshops.
  - The trainers evaluated the participants who attended the basic training course.
  - Based on the participants' performance the trainers selected those who could attend the advance training course.
- Formal commitment of participants.
  - An agreement between MEER and trainees was intended to be signed.
- Methodology of training courses.
  - The course was a combination of theory and practice.
  - Practical activities included a field visit guided by the trainer and a practical exercise in a selected company.
  - The practical exercise included the implementation of EnMS or the proposal of an energy optimization intervention.
  - The evaluation of the course analyzed the theoretical knowledge through a written examination and the practical knowledge through a report on practical activity.
- The issuance of an official certificate of the acquired expertise.
  - This was not possible to implement because of a delay in the approval of accreditation norm.

The following recommendations came out from interviews during field visit and answers to evaluation survey.

- Include more of the national context in the training programmes.
- Improve the effectiveness of the programme via:
  - Assuring the availability of required measurement instruments.
  - Increasing the duration of practical and training activities on the use of specialized software.
  - Including other equipment of energy system optimization besides motors and steam generator.
  - Improving the availability of technical supporting materials.
- Create a continuous training system, including the certification of skills and capacities.
- Facilitate access for experts to updated knowledge about equipment, practices and experiences in the international market.

This outcome faced the following problems during the implementation of foreseen activities.

- Late receipt of the signed agreement between trainees and MEER delayed the start of the first course.
- Accreditation norm for acquired expertise was proposed by project team, but do not approved by authorities before project ending.
- Low priority to implement national information campaign. Due to the above mentioned design problems, this result does not influence the attainment of the outcome, but it affects the achievement of the overall project objective. See table 15.

**Table 15 Targets outcome 3**

Planned targets	Achieved target	Achievement level
<b>25 EE experts trained as trainers on energy management</b>	✓ 25 experts initiated the training while 17 completed it.	Partially with plus
<b>50 EE experts trained as trainers on systems optimization</b>	✓ 55 experts initiated the training while 37 completed it.	Partially with plus
<b>Trained experts receive their certification</b>	✓ A norm for expert certification is pending to be approved.	Partially with plus
<b>200 staff trained in 1-day workshop.</b>	✓ 83 people were trained in 1-day workshop.	Partially with minus
<b>100 staff receive a more comprehensive 2-day training workshop</b>	✓ 324 staff received a more comprehensive 2-day training workshop .	Totally
<b>400 industry representatives have awareness raised.</b>	✓ 464 industry representatives have awareness raised on system optimization and 481 on energy management.	Totally
<b>Design and implement national information campaign</b>	✓ National campaign was designed but not implemented	Partially with minus

Outcome 4 focused on the practical demonstration, beyond training activities scope, of the IEE solutions promoted by the project. The successful provision of 25 in depth energy audits by trained experts without external advice is also a project achievement. The evaluation revealed the good level of skills acquired by trainees due to the independent professional performance but also the strong motivation of company executive staff for introducing energy efficiency solutions.

The target that 10 of the industries that applied an energy audit would decide to implement the obtained recommendations was only partially achieved. In order to encourage the company executive staff to make this decision the project team, with the approval of the PSC, set up a financial support tool. The MEER agreed on covering up to 20,000 USD, but no more than 33% of the equipment cost with the project resources.

A Technical Committee selected the 10 industries from the group of the 25 that completed the in-deep energy audits. 7 of them showed interest and finally only 4 implemented the pilots.

This was also a case of over estimation as the targeted value would mean that almost 50% of audited companies implement the obtained recommendations. This is too high according to international practice.

The main difficulty to achieve this outcome's targets, is that the output that pursued the information dissemination of selected case studies was not attained. Nevertheless, this only partially affects the achievement of outcome goals. See table 16.

**Table 16 Targets outcome 4**

Planned targets	Achieved target	Achievement level
<b>In depth energy audits and reports in 25 industries (with assistance of experts trained in output 3.2)</b>	✓ 25 industries were provided with in depth energy audits and reports	Totally
<b>10 factories improved their energy consumption by means of pilot system optimization activities</b>	✓ 4 factories improved EE by means of pilot systems.	Partially with plus
<b>5 case studies presented and equipment/processes identified for improvement in 2 most important sectors; information disseminated to a wide audience.</b>	In progress	Partially with minus

A summary of above described outcome accomplishment is provided in table 17. Most of the outcomes are partially achieved with positive remarks and one of them is evaluated with a note of partially with negative remarks.

**Table 17 Summary of outcomes review**

Outcome	Achievement level
<b>Outcome 1: Enhanced institutional framework and EE awareness raising...</b>	Partially with minus
<b>Outcome 2: Supportive policies in place, compatible with ISO energy management standard (EnMS)...</b>	Partially with plus
<b>Outcome 3: A cadre of highly specialized energy management and system optimization experts is available...</b>	Partially with plus
<b>Outcome 4: In-depth energy system assessments are completed in manufacturing facilities...</b>	Partially with plus.

The most relevant outputs which were not achieved and affected the achievement of project outcomes and expected impacts are:

- No formulation of proposals of specific regulations on energy efficiency.
- Limited progress in the approval of recognition mechanisms for companies implementing EnMS and for certification of experts.
- No implementation of the national information dissemination and awareness creation campaign.

Some stakeholders that contributed to these shortcomings are:

- A long approval process by MEER of some institutional or legal arrangements that delayed the implementation of some activities.
- The definition by the national counterpart of the scope of activities, focused on policy regulations and on dissemination of information, was made too late to be effective

Finally, the project management elaborated a project exit strategy (annex 4) for overcoming those failures after the end of the project.

#### **4.4 Efficiency**

The project budget was properly distributed by components. It concentrated on outputs pursuing a major contribution achieving project goals; those related to expert training and demonstration/implementation activities.

Total GEF/UNIDO contribution was in place on time and 99% was used according to plan.

However, the national counterpart only disbursed 50.8% of the total planned in cash contribution. The ratio was planned to be of 1.85:1 (MEER: GEF/UNIDO), but the actual ratio was 1: 0.39.

It is important to highlight that these budget restrictions were partially overcome and the key project outputs were achieved thanks to an adequate and cost effective management.

A further positive point was the additional mobilization of 884,460 USD from private sector during the project implementation.

The project finished a year later than planned due to the following stakeholders.

- Delay of legal approval of agreements:
  - MEER requested, after project approval by GEF secretariat, to sign with UNIDO an additional legal document that would allow releasing national counterpart contribution. The effective in-cash contribution by national counterpart took place 18 months after the estimated initial date.
  - Agreement between participants in courses for expert training and MEER for fixing duties and rights from both sides.
- Late definition by MEER of the scope of some project outputs.
- Design aspects: Underestimation of extension and simultaneous planning of training activities.

The project steering committee (PSC) played a positive role in dealing with the stakeholders that affected the implementation of the work plan. The project schedule and expenses were adjusted annually by the PSC. In this regard, it can be concluded that project coordination by UNIDO has been effective and timely. It contributed to a flexible and adaptive project management style.

Interviews and meetings with different project stakeholders revealed that actions developed by the Clean Production Project and led by UNIDO and MIPRO are well known. This is relevant for the project evaluation because clean production is a concept focused on sustainable industrial production that UNIDO has been developing for more than 25 years. One of the core ideas of clean

production strategies is the efficient use of resources, including energy. For this reason, improving energy efficiency and promoting energy savings are tools used by this kind of strategy.

In the case of Ecuador, UNIDO has been collaborating with the Ecuadorian government in the field of clean production strategies during last years. The main governmental counterparts have been MIPRO and MAE. In the scope of this collaboration, UNIDO has supported MIPRO actions such as the former Ecuadorian Clean Production Center and creation of the new Ecuadorian Center for Efficiency Use of Resources and Clean Production. Additionally, UNIDO and the MAE have collaborated in the implementation of the “Green Point Certification” mechanism. In this regard, UNIDO jointly with governmental bodies has carried out awareness rising activities, workshops, seminars and training programmes focused on increasing energy efficiency, EnMS and the ISO 50001 standard. Furthermore, the evaluators appreciate that the Green Certificate is considered by companies a distinguished recognition.

All this allowed UNIDO Field Office to accumulate experiences, obtain lessons learned, and build a network that was not incorporated to the practice of the evaluated project.

The synergy between project activities and clean production activities was weak. A better performance in this area would help to get farther achieving project outputs and to reduce risks affecting sustainability of project outcomes.

#### **4.5 Sustainability of project outcomes**

Specific outcomes that should be sustainable after project end are:

- The successful training of specialists for implementing an energy management systems and energy optimization of industrial systems.
- The knowledge, skills and know-how accumulated about the implementation of actions for improving energy efficiency in industry.
- The momentum created for energy efficiency development in a number of representative companies of the industrial sector.

The sustainability of project outcomes benefited from the approval of the National Law for the Public Service of Electric Energy (*Ley Orgánica del servicio público de energía eléctrica*) in January 2015. Article 12 of the law mandates the development of the National Plan of Energy Efficiency.; and this article jointly with an adequate regulation would enhance the sustainability of the projects outcomes.

In addition to the regulatory framework all relevant interviewed stakeholders have ratified that the project goals are fully in accordance with the current priorities at national, sectorial and entrepreneurial level.

Furthermore, the following stakeholders also affect the sustainability of project outcomes:

- Policy tools supporting energy efficiency in industry are not designed.
- A scheme for training and certification of experts implementing EMS and energy optimization systems is not in place.

- Lack of efficient mechanisms for encouraging companies to implement EMS and implement actions for increasing energy efficiency in industry.
- Awareness on energy efficiency has only been partially developed. It was increased only among stakeholders that were directly involved in project implementation.
- Information for companies willing to implement energy efficiency actions is dispersed or not accessible.

#### **4.6 Assessment of monitoring and evaluation systems**

Project monitoring and evaluation (M&E) was conducted in accordance with UNIDO and GEF rules and regulations. Both UNIDO and National Project Team were responsible for implementing the M&E system.

The main M&E outputs were the quarterly progress report, annual reviews, midterm evaluation and the independent final evaluation. All these activities were developed following planned scheduled and allocated budget that was provided as co-financing by UNIDO.

Execution of the M&E plan allow project team and project steering committee to timely identify deviations from original plan, alert about difficulties to achieve outcome targets and formulate corrective actions and made its follow up. The annual work plan and its budget were systematically updated based on information produced by M&E system.

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

Evaluated project does not include activities aimed to monitoring and evaluation of long term changes and it is right decision. Expected long term changes are multifactor and very difficult to determine specific contribution of project outcomes to their achievement.

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

Issues affecting the project implementation and attainment of project results that were not integrated in other parts of the reports are exposed here.

#### **Preparation and readiness / Quality at entry**

Outputs in outcome 3, aim to training of experts, were a critical activity of the project. The reason is that they successful and in time completion was close linked to other outputs that should be implemented by trainees. Training activities are three different courses: Implementation of energy management systems, energy optimization of steam systems and energy optimization of motor systems.

All three training activities were planned to be performed at the same time during a period of three months. But accomplish such plan was not feasible because capacity of the project team was not enough and intended duration of training activities was too short to achieve course objective.

Another minus at project entry was that counterpart resources and project team were not in place. In previous sections in was described with more detail.

## Stakeholder involvement

Project stakeholders are a combination of ministries, national agencies, and representatives of private industrial sector.

Ministries involved in the project like stakeholders are:

- Ministry of Electricity and Renewable Energy as national counterpart leading project implementation,
- Ministry for Productivity and Industry is the national counterpart that takes care of the harmonization of project activities with national industrial policies, but also coordinating participation in project activities of national agencies under its control: INEN and OAE; and
- Ministry of Environment in the role of national GEF focal point.

National agencies acting as project stakeholders are the Ecuadorian Standardization Institute (INEN) and Ecuadorian Accreditation Organism (OAE). They were called to play a leading role supporting implementation of project activities.

The role of representative of the industrial private sector was played by chambers of commerce. In particular, the National Federation of Chambers of Commerce and Industry and regional chambers of Industry, namely the Chamber of Industry of Guayaquil, the Chamber of Industry of Cuenca, the Chamber of Small Industries of Pichincha (CAPEIPI), and the Chamber of Industry and Production.

MEER contribution to project implementation was essential. Performance of this ministry as project stakeholder demonstrated its commitment with achievement of project goals. MEER's understanding of project contribution to national energy development was centered on practical demonstration of energy efficiency tools, but not on improvement of policy framework and national campaign for disseminations of information. MEER chaired project steering committee in a responsible way. The PSC meet regularly, examined critical issues, made decision on their solutions, and approved needed reports. However, effective assumption of the role for supporting PMU and project activities took almost two years. Approval of procedures and documents produced by the project was delayed in some cases.

MIPRO contribution to project implementation was under expectation. This assertion is supported by next facts: this ministry was represented in most of PSC meetings but its representative's changes time to time; national agencies under its control had a limited participation in project activities and it was notable to made a more effective contribution based on own experiences promoting energy efficiency. One example of this last fact is the lack of synergies between evaluated project and Clean Production project. Actually, MIPRO and MEER are responsible for this lack of synergy.

Ministry of Environment played his role of project stakeholder in accordance with expectations.

The role of INEN and OAE as national stakeholder was limited. They effectively contributed with inputs leading to observance by project activities of national regulations in the field of normalization and accreditation procedures. However, effective support to reinforce promotion of implementation of 50 001 ISO by national companies and completion of effective process for expert accreditation of energy efficiency experts was lacking.

Chambers of commerce played adequately the role of project stakeholders. Main actions were in the field of information diffusion and representation of industrial private sector interest. They attended project activities where used the occasion for expressing private sector recognition of importance of improving energy efficiency, explaining visualized barriers and advancing possible actions for overcoming these barriers.

### Project coordination and management

The project steering committee was integrated according to the approved project document. PSC meet regularly and play an active role for guidance of the project. Effective engagement of some key members like MIPRO and MAE was not as strong as it was expected.

The Project Management Unit was understaffed during initial project execution period:

- Project Manager (PM) – This position was stable covered after 7 months of the initial date of the project.
- Industry and energy experts – This position was occupied under contract after 2 ½ years the project was initiated.
- Administrative - financial officer. - was nominated 14 months after project beginning.

During this period support to PMU activities from the technical divisions within the MEER was below expectations. This situation was overcome during the last 2 years of project execution.

### Gender mainstreaming

Project objectives do not consider the gender mainstreaming. No matter it, gender composition of participants in project activities has been tracked by PMU during project implementation. Based on this data, it is possible to analyze three groups of activities: training activities, seminars, meetings, and project coordination. Available data shows an average gender composition of 12% of women participants. (table 18 and table 19).

**Table 18 Participants by gender in project activities**

Theme	Training activities			Seminars and workshops		
	Women	Total	% of women	Women	Total	% of women
EnMS	5	46	11	96	724	13
Motors	0	10	0	24	207	12
Steam	2	30	7	9	118	8
<b>Total</b>	<b>7</b>	<b>86</b>	<b>8</b>	<b>129</b>	<b>1,049</b>	<b>12</b>

**Table 19 Participants involved in project implementation**

Area	Women	Total	% of women
Trainees	7	86	8%
Participants in seminars and workshops	129	1049	12%



<b>Coordination of project activities</b>	4	8	50%
<b>Total</b>	140	1143	12%

Development of possible actions focused on gender mainstream was prevented due absence of specific budget.

### Procurement issues

This project is based on a technical assistance grant. It was not foreseen equipment acquisition or direct participation for financing pilot projects.

Pilot projects were financed by project's owner companies while all procurement activities were provided directly by them. Project steering committee approved a mechanism for promoting participation of companies for financing these projects. Based on this mechanism UNIDO issued subcontracts for partial reimbursement to enterprises of expenses for pilot projects after demonstration of successful implementation.

**Table 20 Overall rating**

Criterion and sub-criteria	Evaluator's Summary Comments	Evaluator's Rating
Attainment of project objectives and results <sup>2</sup>	Project objective aim to promotion of energy efficiency in the industrial sector of Ecuador was partially achieved. While training of experts, practical demonstration of acquired skills and benefits from implementation of actions directed to improve energy efficiency in industry achieved positive results, project implementation failed in dissemination of information and improving policy and institutional frameworks.	MS
<b>Main criteria</b>		
Design	Formulation of project outcomes, outputs and outcome's indicators exhibit some problems. Those problems affected identification of priority actions by management team and limited effective of monitoring and evaluation activities. Ultimately affected a better accomplishment of project goals.	MU
Effectiveness	None of four project outcomes was fully achieved, while some outputs were even not accomplished.	MS
Relevance	The project is fully in line with country and project stakeholders needs.	S
Efficiency	Delays during project implementation and partial provision of committed funds by national counterpart affected achievement of project outputs.	MS

2

Moderately Satisfactory (MS):	The project had moderate shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
Moderately Unsatisfactory (MU):	The project had significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Criterion and sub-criteria	Evaluator's Summary Comments	Evaluator's Rating
Sustainability of Project outcomes	Major risks affecting sustainability of project outputs were not identified.	<b>ML</b>
<b>Risks</b>		
Financial risks	In the case of the industry sector in Ecuador, financial risks are more related to market instabilities that are linked to the international environment.	L
Sociopolitical risks	The sociopolitical environment is favorable for further development of project's outcomes.	L
Institutional framework and governance risks	An appropriate legal, regulatory and institutional framework is just to be developed after project ends.	ML
Environmental risks	There is not.	L
<b>Monitoring and Evaluation (M&amp;E)</b>		
Monitoring and Evaluation	Only minor shortcomings were established.	HS
M&E Design	There were no shortcomings	HS
M&E Plan Implementation	There were no shortcomings	HS
<b>Others</b>		
Budgeting and Funding for M&E activities	There were no shortcomings	HS
Project management	Understaffing of the project management team during a long period of time affected it's capacity for pursuing projects outputs.	MS
UNIDO specific ratings	Beside problems at entry, that relay on national counterpart, no other major problems were identified.	MS
Quality at entry/ Preparation and readiness.	Due lack of preparation of national counterpart at entry the project execution was affected	MU
Implementation approach	No major problems were identified.	S
UNIDO Supervision and backstopping	No major problems were identified.	S
<b>Overall rating</b>		<b>MS</b>

## 5 Conclusions, recommendations and lessons learned

### 5.1 Conclusions

Relevance of this project for main stakeholders has been confirmed during evaluation. Project design has some problems related to formulation of outcomes, outputs and indicators. These problems and delays from the side of the national counterpart affected the effectiveness of project outcomes. Non-achieved outputs lead to reduce sustainability of project.

Next considerations should be highlighted:

- Achievements of the project have a significant relevance for the promotion of the energy efficiency in the industrial sector. They are mentioned below:
  - A training system of experts on EMS implementation and System Optimization, no matter it could be improved, has been demonstrated. It has proved to be effective and efficient.
  - EMS and System Optimization projects have been successfully implemented in a relevant number of enterprises by experts trained by the project.
  - Fact-based results from implemented actions provide solid information for EE promotion in Ecuadorian industry.
  - Many participant companies are looking for further improvement of EE. It shows the awareness and motivation created by the project.
- The fact, that some outputs of the project were not achieved, made that some opportunities to increase project outcome sustainability were lost. It is the case of the following ones:
- The fact, that some outputs of the project were not achieved, made that some opportunities to increase project outcome sustainability were lost. It is the case of the following ones:
  - Some project outputs that were not achieved would have been a very pertinent contribution to the successful implementation of the Energy Efficiency title of the Organic Act of Public Electrical Service.
  - While the project was able to develop motivation of industrial companies to implement Energy Management Systems, it was not able to achieve fully outputs supporting the deployment of mechanisms for encouraging it.
  - It is expected a growing demand of experts on EMS and System Optimization, but certification mechanism of expert professionals in this field, suggested by the project, was not established
- The most relevant aspects limiting achievement of project outputs and expected impacts are:
  - Absence of proposal of specific regulations on energy efficiency.
  - Limited progress in the design and proposal of mechanism for recognition of companies implementing EMS and for certification of experts.
  - No implementation of the national information dissemination and awareness creation campaign

### 5.2 Recommendations

- To national counterpart:

- Strengthen of national institutional capacity for training and certification of experts on implementation of energy management systems and energy optimization.
- Interviews during field visit and answers to evaluation survey (annex 2) allowed evaluator team to identify some aspects that need to be handled as a contribution for enhancing conditions for improving energy efficiency in the industrial sector. For example:
  - Encourage energy efficiency investments in conditions of economic uncertainty as result of introduction of specific financial tools.
  - Reduction of cost and simplification of mechanisms for import of goods and technologies for improving EE.
  - Facilitation of local availability of industrial equipment with high standards of energy efficiency.

Process of implementation of the title on Energy Efficiency of the Electricity Act, could be a good opportunity for doing that.

- Development of synergies among institutional actor contributing to enhance energy efficiency.
- Improve the institutional communication with business sector on energy efficiency. For example, facilitating creation of entrepreneur’s networks in this field.
- Identify, recognize and promote champion companies improving EE.
- Implement mechanisms that guarantee systematic access to information and technical advice to companies requesting such services.

- To UNIDO

- Promote synergies among activities of the organization at country level.
- Avoid inaccuracies in project design.

It means assuring that troubles of project design, like those highlighted by project evaluators, (for example inadequate formulation of outcomes, outputs and indicators) would be avoided elaborating project documents by the organization.

- To MEER and UNIDO.

- Promotion of networking and interchange of experiences among relevant entrepreneurs and specialists that participated in project activities should be facilitated before project ending.
- Formulate an exit strategy assuring that pending project activities will be finished.
- Consider to formulate a new project, for taking advantage of the created momentum in the promotion of energy efficiency in the industry, that based on strategic approach would focus at least on:
  - Design and proposal of policy tools.
  - Development of institutional capacities for training of experts.
  - Provision of an information and technical advice platform supporting development of energy efficiency.

### **5.3 Lessons learned**

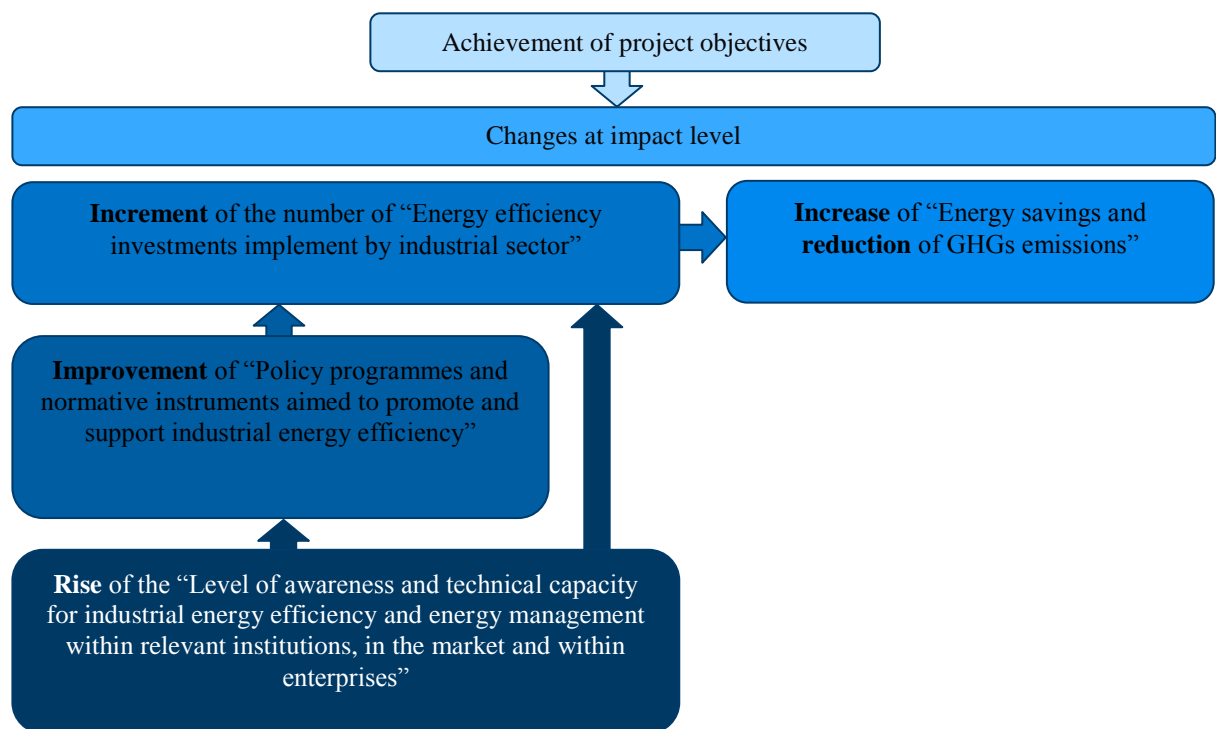
- Lack of synergies between energy efficiency projects and Clean Production activities developed by UNIDO at local level drives to lose opportunities for a more efficient achievement of shared goals.
- Provision in project budget of financial resources for gender mainstreaming actions is a precondition for achieving results on these issues by project team.
- Imperfections of project design misguide the implementation of the project by management team and steering committee. But also significantly reduces the efficiency of monitoring and evaluation project activities.

## ANNEXES

### Annex 1. Theory of Change of the project

The evaluation team has reconstructed a theory of change of the project to be used as a reference tool during project evaluation.

The achievement of project objective “To PROMOTE Energy Efficiency (EE) improvements in the industry sector of Ecuador”, should lead to a group of changes associated to project impacts. Identified impacts are: increment of the number of investments and energy savings, improvement of policy framework and the rising level of awareness and technical capacity. The interrelation between these impacts reveals the fundamental assumption for achieving project goals. This assumption shows that a rise of the level of awareness and technical capacity among the relevant project actor will contribute to the improvement of the legal and regulatory framework. These changes will consequently lead to an increase in the number of EE investments and consequently to an increase in the energy savings and a reduction of the GHG emissions (Fig 1).



**Figure 5 Chain of changes at impact level**

This analysis leads to the conclusion that the impact related to “the rise of the level of awareness and technical capacity” is essential for the achievement of the project objective and impacts. The assumption, in this case, is that some project activities would change the attitudes and aptitudes of relevant actor for reaching project objective. These relevant stakeholders are: policy actor, company management, technical personnel at factory level, providers of technical services and vendors. Those changes are pursued by activities related to awareness creation, training, information dissemination and to implementation of EnMS and technical measures. The analysis of project design allowed the evaluation team to identify the project activities which led to changes in relevant actor’s attitude and aptitudes (Table 1).

**Table 21 Changes of actor's attitude and aptitudes**

<b>Relevant actor</b>	<b>Changes</b>	<b>Activity (according to the project document)</b>
<b>National policy actor (MEER, MIPRO)</b>	Improved capacity to make adequate decisions and choices on EE policy and policy tools.	1.1.1 Carry out international and regional policy analysis including: improved data collection and analysis, data dissemination in terms of industrial energy use and intensity, benchmarking, tax and other fiscal incentives, and analysis of institutional structure.
		1.1.2 Formulate policy paper with proposed measures on how to effectively promote EE in industry in Ecuador.
<b>Key institutions for implementation of Energy Management Standards (INEN, OAE)</b>	Improved capacity for promotion of implementation of EnMS.	2.1.2 Analysis of institutional setup and capacity needs and recommendations for structure.  2.1.3 Enhance capacity of relevant institutions (INEN, OAE).
<b>Vendors</b>	Improved capacity to actively participate in implementation of system optimization actions.	3.3.1 Awareness level training offered by trained local experts to 400 industry representatives, including supply-chain partners.
<b>Technical personnel at factory level</b>	Improved capacity for proposing implementation of EnMS and system optimization.	2.2.2 Training of 200 factory personnel, of which at least half are from SMEs (2 days).
<b>Technical service providers</b>	Incremented capacity for offering technical services for implementation of EnMS and system optimization actions.	3.1.3 Training of the selected experts by UNIDO team in Energy Management Systems.  3.2.3. Training of 50 systems optimization experts by UNIDO team for motor driven systems and steam systems.
<b>Company management</b>	Incremented motivation to support the implementation of EnMS as a result of their workshops' participation and the information received from the national dissemination campaign.	2.2.1 Awareness and promotion workshop for managers – 200 industries (0.5 days).  3.3.2 Design and implement national dissemination campaign (seminars, road shows, multimedia, and promotional material/brochures) on the benefits of energy management, system optimization and various incentive programs on EE, as well as EE equipment and EE services.
<b>Financial institutions</b>	Incremented awareness on financial viability of energy efficiency projects.	1.3.2 Experts and industry personnel trained on the evaluation of EE projects financing and access to finance resources.

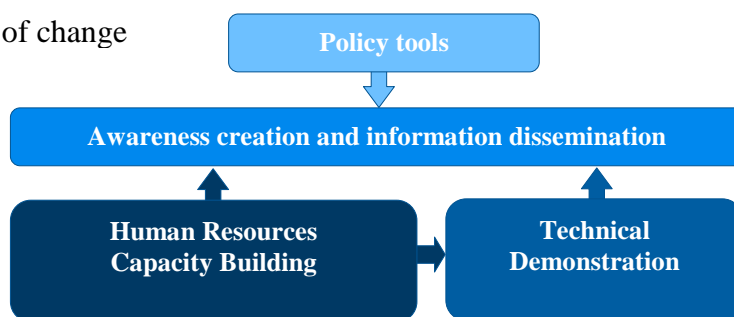
However, the probability that these project activities lead to the changes depends on various factors of project design. In particular, it depends on the formulation and interconnection between the project outcomes, outputs and activities.

Based on the described connections among project impacts, it is possible to identify four areas (figure 1) where changes are produced:

- Policy tools and institutional capacity building.
- Awareness creation and information dissemination.
- Human resource capacity building.
- Technical demonstration.

Based on this Theory of Change, the evaluation team has envisaged an alternative project component composition. This alternative composition defines a project outcome for every area of changes and redistributes original project outputs among new components (fig. 2).

Figure 1. Areas of change





### Component 1: POLICY TOOLS AND INSTITUTIONAL STRENGTHENING

1.1 Policy measures that assist in the effective development and improvement of the legal regulatory framework under the Energy Efficiency Law are identified and analysed.

2.1 National Energy Management Standard (EnMS) adopted (compatible with ISO EnMS) and structure and capacity in place for the promotion of implementation of EnMS.

1.2 The development of national technical regulations on industrial energy efficiency is supported.

1.4 National recognition programme to facilitate the implementation of an energy management plan created.

### Component 2: AWARENESS CREATION AND INFORMATION DISSEMINATION

3.3 National information dissemination and awareness creation campaign developed and implemented.

4.3 Results obtained from the demonstration projects, including proposed and adopted EE technologies, are disseminated.

2.2 At least 200 industrial entities participate in an awareness training and develop Energy Management plans and

### Component 3: CAPACITY BUILDING HUMAN RESOURCES

3.1 25 EE professionals received expert training in energy management, including the use of the UNIDO's practical guide for implementing an EnMS

3.2 System optimization training and web-based tools developed. 50 EE professionals received expert training in system optimization.

50 entities implement these Energy Management plans.

1.3 Guidelines for financial evaluation of industrial energy efficiency projects.

4.1 25 in-depth energy system assessments are completed in manufacturing facilities.

### Component 4: TECHNICAL DEMONSTRATION

4.2 10 system optimization projects (identified through assessments) are implemented.

## **Annex 2. Description of Survey Tool**

The Theory of Change of the Project shows that activities focused on raising awareness level and technical capacity of relevant actor are fundamental for achieving project goals. A survey tool was used for collecting criteria about the impact of those activities required to achieve the project goals.

This tool was designed jointly by the project and evaluation teams. The key issues about design, application and results of the survey tool are described below.

### **A. Target groups**

The following two target groups were defined for the application of the survey tool, based on their role in the implementation of the actions needed to achieve project goals.

- Group 1: Executive company staff that received energy audits or implemented energy management system.
- Group 2: Participants in awareness raising or training activities.

### **B. Criteria and Indicators**

The survey is based on the selection of a group of criteria and indicators. It seeks to obtain a comprehensive idea about the point of view of respondents on project activities. The selected criteria were: design, relevance, effectiveness and sustainability. Each criterion was assigned appropriated indicators.

### **C. Design of the survey form**

A specific survey form was chosen for every target group ([table 1](#) and [table 2](#)).

The survey form has a header section to identify the respondent which should allow creating a link between, the role and professional experience of the respondent towards the project activities.

For every indicator, it was elaborated a questions and options to select the answer.

### **D. Survey application**

The survey was applied using the free Google forms tool.

Form included questions and multiple choice answers. The project team emailed the invitation to potential respondents to participate in the survey.

The mentioned tool automatically processed the answers and presented the results.

### **E. Results of the survey**

Based on the compilation of answers produced by Google form it was possible to produce a resume of results of survey application. Quantitative results for Group 1 ([table 3](#)) and Group 2 ([table 4](#)) is included in this report.

## **Answers of Group 1**

The analysis of the survey answers of the executive company staff shows that the general assessment is very positive.

Participants	Nine survey participants represented 24% of the companies where energy management plans were implemented. They are experienced managers who are mostly directly involved in production activities.
Criteria	
1. Design	This criterion is not including in the survey for this group
2. Relevance	<p>The relevance of implementing energy management systems and energy system optimization in companies was perceived as high. In the case of system optimization, the respondents show a greater appreciation of its benefits and even though they have some reservations about chances for its application.</p> <p>Relevant comments on this criterion are; 1) the compatibility of ISO50001 with current standards that are applied by companies (9001, 14001, 18001), 2) the positive effects of the interaction between the expert and company staff and 3) the large potential opportunities for energy saving that was revealed by the studies.</p>
3. Effectiveness	<p>Effectiveness of implemented activities was perceived high Most respondents considered that the technical rigor was high and they are satisfied with the obtained results. The prioritization of the implementation of project activities by company management is satisfactory considering the novelty of energy efficiency measures.</p> <p>Comments reveal the fact that the implementation of energy management systems, even without obtaining the ISO 50001 certification brings evident benefits to the company.</p>
4. Sustainability	<p>All respondents consider that the continuous implementation of energy efficiency measures is a sustainable option for the company.</p> <p>Comments on the project's sustainability put emphasis on the negative impact of the lack of measuring instruments and the low availability of resources for the implementation of action plans. Among actions to be implemented they Respondents recommend to 1) integrate specialized companies of certification and training of experts in the national market, 2) facilitate access to low cost measurement equipment and 3) that companies should introduce a data collection system.</p>

## Answers of group 2

Participants	The survey was answered by 82 respondents, most of them with long experience in industrial sector, including 85% of participants that finalized their training. Almost two thirds of respondents are directly involved in the practice of energy efficiency improvement and work as technician in companies or independent consultants.
Criteria	
1. Design	<p>Design of project activities dedicated to raising awareness or technical capacity received a high rating from respondents.</p> <p>The comments provided by the respondents about the design of the training course emphasize:</p> <ul style="list-style-type: none"> <li>• The effectiveness of the applied methodology. The participants go through the following phases: 1) awareness raising, 2) technical learning and 3) practical application.</li> <li>• The fact that training activities were a mix of technical explanations and practical applications of knowledge.</li> <li>• Quality of supporting materials and of software used during training activities.</li> <li>• High level of technical preparation, experience and communication abilities of the trainers.</li> <li>• Support from the project management team and company staff for assuring the success of training activities.</li> <li>• The positive atmosphere that was created facilitated the exchange of experiences and knowledge among trainees, trainers and company staff.</li> </ul> <p>The following recommendation to improve the quality of training activities are based on the respondents' comments:</p> <ul style="list-style-type: none"> <li>• Increase the presence of the national context in the training programme. For example:             <ol style="list-style-type: none"> <li>i. Considering the prevalent organizational culture in the industry sector, legal and regulatory environment, local prices of fuels and electricity, available technology</li> <li>ii. Using national real case studies.</li> </ol> </li> <li>• Improve the effectiveness of the programme by:             <ol style="list-style-type: none"> <li>i. Assuring the availability of required measurement instruments.</li> <li>ii. Increasing the duration of practical activities and training using</li> </ol> </li> </ul>

	<p>specialized software.</p> <p>iii. Expanding the list of equipment for energy system optimization. Example of equipment to be included are water pumps, compressors and internal combustion engines.</p> <p>iv. Rising participation of trainers in direct technical assistance to trainees during field activities</p> <p>v. Increasing the availability of technical supporting materials.</p> <ul style="list-style-type: none"> <li>• Establish a continuous training system, including the certification of skills and capacities.</li> </ul>
2. Relevance	The relevance of the training and awareness raising activities was perceived as very high, however half of the respondents consider that the received knowledge had a medium level of applicability.
3. Effectiveness	The effectiveness of the activities has been evaluated as elevated. More than 90% of the answers rate the level of technical rigor, relevance and applicability of received knowledge and abilities as medium-high.
4. Sustainability	<p>Sustainability of benefits received a positive assessment.</p> <p>Survey questions were based on the practical applicability and the difficulties and possible actions to overcome them. A summary of the answers obtained is provided below.</p>

## **General conclusions on the received knowledge**

The following conclusions are extracted from the answers to the questions about the practical application of the received knowledge, which demonstrate that the participants are able to sustain its use after the training.

A significant number of respondents explained that after receiving the training they have been actively involved in the application of received knowledge not only in their own company but also in others.

Answers show that capacity of trainees for implementation of energy management systems and energy system optimization has been developed.

Capacity of trainees for obtaining positive outputs, applying received knowledge on energy systems in different industrial sectors, demonstrates that training was successful.

- **Specific knowledge**

### **System optimization**

The optimization of steam systems has been developed not only for fuel oil boilers but also for boilers fueled with agro-residues. It has been applied in naval facilities, in the cattle sector and food processing industry.

Knowledge on optimization of motor systems has been also actively utilized. Optimization of light systems and compressed air systems, variable speed motors in pumping stations, automation of systems, improving of energy efficiency in cooling systems: cooling towers, chillers, refrigeration compressors, etc.

### **Energy management systems**

In relation to energy management system many actions have been implemented by trainees. The participants have implemented many actions on energy management systems, including the definition of energy performance indicators, development of baseline and energy management plans. This action has been implemented in hospitals, cooling units, buildings, etc.

In addition, it is important to mention that trainees have been able to deal with situations that were not explicitly explained during training process.

- **Barriers in applying the received knowledge**

The description of difficulties for utilization of received knowledge was detailed and diverse. The most recurrent ones are described below.

- **Low capacity for provision of energy audits** related to:
  - i. Lack of measurement equipment.
  - ii. Low availability of data about energy consumption.
  - iii. Insufficient data interpretation by companies.
- **Low motivation** of companies for improving energy efficiency due to various causes:
  - i. Lack of incentives for companies.

- ii. Insufficient legislation on efficient energy use.
- iii. Low awareness of executive company staff on the benefits from implementing energy efficiency programs.
  - **Low priority for energy saving investments.** The following specific characteristics of the Ecuadorian economic situation contribute to this barrier:
    - i. Low price of fuels and electricity because of price subsidies.
    - ii. Budget of most companies operate with restrictions.
    - iii. Economic uncertainties determine that investment recovery expectations are in short term.
  - **Limited access** to high energy efficiency **equipment** due to:
    - i. High prices of equipment.
    - ii. Long, complex and time consuming process for import of equipment due some national regulations in this sector.
    - iii. Scarcity of high efficiency equipment in the local market.
    - iv. Local suppliers are not familiar with the high energy efficiency assortment.
  - **Low confidence in local experts** on energy efficiency improvement
 

Apart from the fact that this is a normal reaction during the initial phase of market penetrations, there are some issues that reinforce the lack of confidence:

    - i. A certification mechanism of experts by an accredited institution is not in place.
    - ii. Lack of an institutional training system.
    - iii. Few opportunities for experts to update their knowledge about equipment, practices and experiences in the international market.

- **Mitigation measures**

Most relevant actions proposed by respondents for overcoming some of above mentioned difficulties are aimed to:

- Increase the knowledge and training of relevant actor in fields related to energy efficiency by considering the following:
  - i. Implementation of institutional continuous training programs which shall be attended by staff from all company levels: top management, middle management and operations personnel (technicians and workers).
  - ii. Provide companies with access to training activities.
- Facilitate acquisition of high energy efficiency equipment by:
  - i. Providing financial support to suppliers.
  - ii. Simplifying the process of importing efficient equipment.

- iii. Implementing governmental programs for reducing prices of high efficiency equipment.
- Improve the access to information.

It is the issue that received more attention from respondents. A resume of exposed ideas is next:

- i. Information availability  
relevant information on energy efficiency should be available not only to relevant actor like entrepreneurs and company management staff but also to the general public. Examples of this kind of information are:
  - Energy efficiency solutions available in the market.
  - Attractive cost benefit rate of energy efficiency investments.
  - Benefits from the implementation of EnMS.
  - Results of national and international experiences.
- ii. Information diffusion and exchange:
  - Web Portal / Forum.
  - Chambers of commerce and other industrial associations.
  - Governmental bodies and public servant's activities.
- Legal and regulatory framework  
Develop an appropriate legal and regulatory framework for the development of energy efficiency. The respondents recommended the formulation of an energy efficiency law but also to:
  - i. Create an energy legal framework similar to the environmental one.
  - ii. Develop policy tools that:
    - Create incentives to industry for implementing energy efficiency actions.
    - Recognize companies improving energy efficiency.
  - iii. Introduce regulations focused on:
    - Energy efficiency standards for equipment and processes.
    - Binding regulations for using EnMS and implementing optimization of energy systems.
  - iv. Improve the capacity for data collection on energy variables by:
    - Introducing a mechanism for the provision of financial support for the acquisition of measurement equipment by experts and companies.
    - Facilitate that some public institution could lease or lend this equipment.



**Table 1. Design of the survey for Group 1.**

SURVEY FOR EXECUTIVE STAFF OF COMPANIES THAT RECEIVED ENERGY AUDITS OR IMPLEMENTED ENERGY MANAGEMENT SYSTEM (EnMS)		
Identification of respondent		
In your company	An EnMS was implemented	
	An energy audit was conducted	
	The results of the EnMS and energy audit outputs are implemented	
Company Sector	Textile	
	Plastic	
	Steel	
	Food	
	Assemblage	
	Ceramics	
Occupation within the company	Board member	
	Board president	
	General Manager	
	Area Manager / Head of department	
Years of experience in industrial activity (directly or indirectly)	Less than 5 years	
	Between 5 and 10 years	
	More than 10 years	

SURVEY FOR EXECUTIVE STAFF OF COMPANIES THAT RECEIVED ENERGY AUDITS OR IMPLEMENTED ENERGY MANAGEMENT SYSTEM (EnMS).			
Criterion	Indicator	Question	Indicator Value
<b>Relevance</b> of Energy Management Systems to the company.	Novelty of received information	The information on EnMS that was available to you before the project actions was:	High Middle Low Null
	Benefits from the acquired knowledge	The company benefits from the implementation of energy management system are:	High Middle Low
	Practical applicability	The implementation and maintenance of EnMS is viable under the current conditions of your company?	Yes No
	Other comments		text
<b>Relevance</b> of energy optimization of systems to the company	Novelty of received information	The information on energy system optimization that was available to you before the project actions was:	High Middle Low
	Benefits from the knowledge acquired	The importance that your staff acquired such knowledge is:	High Middle Low
	Practical applicability	The potential for practical application of energy steam and motors system optimization for the company is:	High Middle Low
	Other comments		Text
<b>Effectiveness</b> to what extent the objectives were achieved	Technical rigor of work done at the factory.	The technical and organizational level of the executed work is:	High Middle Low
	Prioritization of resources to execute the work	How do you rate the level of effort that your company provided for implementing EnMS and optimizing energy systems?	High Middle Low
	Satisfaction with the	To which extent do the achieved	High

SURVEY FOR EXECUTIVE STAFF OF COMPANIES THAT RECEIVED ENERGY AUDITS OR IMPLEMENTED ENERGY MANAGEMENT SYSTEM (EnMS).			
Criterion	Indicator	Question	Indicator Value
	results.	benefits justify the effort made?	Middle Low
	Access to results of studies.	Has the key management personnel of the company been informed about the carried out work and its results?	Yes No
		If yes, please clarify the means of information.	Informal Way. Written report. Oral presentation.
	Awareness level within the company	The level of understanding of the board of the company about the work done may be considered:	High Middle Low
	Other comments		text
<b>Sustainability</b> of actions benefits in the short / middle term	Willingness to continue implementing this kind of studies	The priority that company gives to allocate resources to sustain and develop studies is:	High Middle Low
	Difficulties in applying outputs of developed studies.	What have been the major internal / external difficulties for applying gained knowledge? Please describe them.	Text
	Possible actions that would facilitate further implementation of finished studies	In your opinion, what actions could help to overcome these difficulties?	Text
	Potential for replication	Would you recommend performing this type of exercise in other companies?	Yes No
	Other comments		text

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**Table 2. Design of the survey for Group 2.**

SURVEY FOR PARTICIPANT IN AWARENESS RAISING OR TRAINING ACTIVITIES		
Identification of respondent		
Participates in a project activity dedicated to:	Awareness training	
	Expert-level training.	
	Conducted a study of energy optimization	
Activity was related to	Energy Management System	
	Optimization of engine systems	
	Steam system optimization	
Occupation	Managerial position in company / organization.	
	Technician position in a company / organization.	
	Consultant / independent expert	
	Researcher / university lecturer	
	Vendor / supplier	
	Public server	
Years of experience in industrial activity, directly or indirectly	Less than 5 years	
	Between 5 and 10 years	
	More than 10 years	

SURVEY FOR PARTICIPANTS IN AWARENESS RAISING OR TRAINING ACTIVITIES			
Criterion	Indicator	Question	Indicator Value
Design	Duration of Activity	In your view, the duration of the training activities was:	<ul style="list-style-type: none"> <li>• Short</li> <li>• Adequate</li> <li>• Too long</li> </ul>
	Planning the content	How does the content of the received training fit your needs?	<ul style="list-style-type: none"> <li>• Excellent</li> <li>• Good</li> <li>• Regular</li> <li>• Poor</li> </ul>
	Positive aspects to be replicated in new experiences.	Which training program pleased you the most?	Text
	New aspects to be improved.	What aspects of the training program would you improve?	Text
	Other comments		Text
Relevance for participants	Novelty of received information.	To what extent was the received information new for you?	<ul style="list-style-type: none"> <li>• High</li> <li>• Middle</li> <li>• Low</li> </ul>
	Benefits from the knowledge acquired	To what extent did you benefit from the acquired knowledge?	<ul style="list-style-type: none"> <li>• High</li> <li>• Middle</li> <li>• Low</li> </ul>
	Practical applicability	To what extent do you apply the acquired knowledge in daily work?	<ul style="list-style-type: none"> <li>• High</li> <li>• Middle</li> <li>• Low</li> </ul>
	Other comments		
Effectiveness: To what extent were the objectives of the activities reached	Technical rigor of activities.	How would you rate the technical content of received training?	<ul style="list-style-type: none"> <li>• High</li> <li>• Middle</li> <li>• Low</li> </ul>
	Level of acquired knowledge on the key issues addressed during the training	How would you rate your level of knowledge about the issues addressed in the training?	<ul style="list-style-type: none"> <li>• High</li> <li>• Middle</li> <li>• Low</li> </ul>

SURVEY FOR PARTICIPANTS IN AWARENESS RAISING OR TRAINING ACTIVITIES			
	Ability to apply the acquired knowledge	Your capacity for independently applying the knowledge acquired is:	<ul style="list-style-type: none"> <li>• High</li> <li>• Middle</li> <li>• Low</li> </ul>
Sustainability of the benefits in the short / middle term	Practical application of acquired knowledge.	In what kind of processes have you applied acquired knowledge? Please describe them.	Text
	Difficulties in applying acquired knowledge.	What have been the main difficulties when applying acquired knowledge? Please describe them.	Text
	Possible actions to facilitate the implementation of acquired knowledge	In your opinion, what actions would allow to overcome these difficulties?	Text
	Other comments		Text

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**Table 3. Result of the survey for Group 1.**

SURVEY FOR EXECUTIVE STAFF OF COMPANIES THAT RECEIVED ENERGY AUDITS OR IMPLEMENTED ENERGY MANAGEMENT SYSTEM (EnMS)		
<b>Identification of respondent</b>	<b>Number of respondents</b>	<b>9</b>
In your company	An EnMS was implemented	88,9%
	An energy audit was conducted	33,3%
	EnMS and energy audit outputs are implemented	11,1%
Company Sector	Textile	25%
	Plastic	12,5%
	Steel	12,5%
	Food	12,5%
	Assemblage	25%
	ceramics	12,5%
Occupation	Board member	0
	Board president	0
	General Manager	1
	Area Manager / Head of department	8
Years of experience in industrial activity	Less than 5 years	11,1%

(directly or indirectly)	Between 5 and 10 years	22,2%
	More than 10 years	66,7%

Criterion	Indicator	Indicator Value	Answer (%)
Relevance of Energy Management Systems to the company.	Novelty of received information	High	77,8
		Middle	11,1
		Low	11,1
		Null	0
	Benefits from the knowledge acquired	High	22,2
		Middle	66,7
		Low	11,1
	Practical applicability	Yes	100
		No	0
	Other comments	text	
Relevance of energy optimization of systems to the company	Novelty of received information	High	33,3
		Middle	55,6
		Low	11,1
	Benefits from the knowledge acquired	High	66,7
		Middle	33,3
		Low	0
	Practical applicability	High	66,7
		Middle	33,3
		Low	0
	Other comments	Text	
Effectiveness to what extent the objectives were achieved	Technical rigor of work done.	High	66,7
		Middle	33,3
		Low	0
	Prioritization of resources to execute the work	High	33,3
		Middle	66,7
		Low	0
	Satisfaction with the results.	High	44,4
		Middle	44,4
		Low	11,1

Criterion	Indicator	Indicator Value	Answer (%)
	Access to results of studies. Opportunity.	Yes	88,9
		No	11,1
	Access to results of studies. Via.	Informal Way	12,5
		Written report.	75
		Oral presentation.	62,5
	Awareness level within the company	High	55,6
		Middle	33,3
		Low	11,1
	Other comments	text	
	Sustainability of actions benefits in the short / middle term	Willingness to continue implementing this kind of studies	High
Middle			33,3
Low			
Difficulties in applying outputs of developed studies.		Text	
Possible actions that would facilitate further implementation of finished studies		Text	
Potential for replication		Yes	100
		No	
Other comments		text	

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**Table 4. Result of the survey for Group 2.**

Survey for participant in awareness raising or training activities		
<b>Identification of respondent</b>	Number of respondents	82
<b>Participates in a project activity dedicated to:</b>	Awareness training	62,3%
	Expert-level training.	55,8%
	Conducted a study of energy optimization	64,9%
<b>Activity was related to</b>	Energy Management System	42,9%
	Motor system optimization	33,8%
	Steam system optimization	49,4%
<b>Occupation</b>	Managerial position in company / organization.	7,8%
	Technician position in a company / organization.	42,9%
	Consultant / independent expert	23,4%
	Researcher / university lecturer	13%
	Vendor / supplier	3,9%
	Public server	9,1%
<b>Years of experience in industrial activity, directly or indirectly</b>	Less than 5 years	18,2%
	Between 5 and 10 years	26%
	More than 10 years	55,8%

Results of survey for participants in awareness raising or training activities			
Criterion	Indicator	Indicator Value	Answers (%)
<b>Design</b>	Duration of activities	Short	38
		Adequate	53,5
		Too long	8,5
	Planning of the content.	Excellent	46,6
		Good	47,9
		Regular	5,5
		Poor	
	Positive aspects to be replicated in new experiences.	Text	
	New aspects to be improved.	Text	
Other comments	Text		
<b>Relevance for participants</b>	Novelty of received information.	High	80,3
		Middle	19,7
		Low	0
	Benefits from the knowledge acquired	High	73,6
		Middle	25
		Low	1,4
	Practical applicability	High	38
		Middle	52,1
		Low	9,9
Other comments	Text		

<b>Effectiveness: To what extent the objectives of activity are reached</b>	Technical rigor of activities.	High	69,9
		Middle	30,1
		Low	0
	Level of acquired knowledge on key issues addressed during the training	High	42,5
		Middle	53,4
		Low	4,1
	Ability to apply the acquired knowledge	High	43,8
		Middle	53,4
		Low	2,7
<b>Sustainability of the benefits in the short / middle term</b>	Practical application of acquired knowledge.	Text	
	Difficulties in applying acquired knowledge.	Text	
	Possible actions to facilitate the implementation of acquired knowledge	Text	
	Other comments	Text	

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### Annex 3. Project Results Framework

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
<b>Project Objective</b> <b>Improved Energy Efficiency of Ecuadorian Industrial Sector leading to reduced global environmental impact and enhanced competitiveness through the development of national energy management standards and application of systems optimization</b>	A. Incremental direct CO <sub>2</sub> eq emission reductions (tons of CO <sub>2</sub> eq)	annual industrial growth of 4.3%	Cumulative Direct emission reduction of 321,6 ktCO <sub>2</sub>  Cumulative post project direct emission reduction of 965 ktCO <sub>2</sub>	As given under the various Outcomes, including surveys, monitoring, and tracking	A1. Sustained and solid Government support to the project.  A2. Industry drive for energy costs reduction and enhanced energy efficiency grows progressively stronger and widens.
	Incremental indirect CO <sub>2</sub> eq emission reductions (tons of CO <sub>2</sub> eq)	In BaU scenario industrial emissions will grow at 0.7% annually	Indirect emission reduction of up to 3,091 ktCO <sub>2</sub> (assuming a growth of 10% in the period 2009-2023) (details are given in Annex G)	End of project	A3. Various international IEE technical cooperation programmes achieve good synergy and leverage of respective complementarities
	Specific energy consumption of selected enterprises.	Based on UNIDO experience and the surveys undertaken, typical consumptions are identified in Annex G	Implementation of energy management plans, systems optimization and operational improvements in 25 enterprises lead to annual fuel savings of 96,000 GJ and power savings of 25,975 MWh (details are given in Annex G)	Final evaluation	
<b>Outcome 1</b> <b>Enhanced institutional framework and EE awareness raising in financing mechanisms facilitating increased</b>	1) Status of policy paper on how to implement industrial policy (output 1.1)	National Plan for EE (2004), EE Law in preparation	Detailed analysis of energy efficiency policy and measures and regional and international level as well as the promotion of financial mechanisms and incentives to promote EE (that	Report containing analysis and recommendations  Progress reports	Government-level support for incentives and other supporting measures for industrial EE

### Annex 3. Project Results Framework

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
implementation of EE in the industrial sector			will feed into the formulation of the final proposal for the EE Law)	Official publications	
	2) Status of development of industrial EE (output 1.2)	EE Law formulation is in progress, but promulgation not expected before end of 2011	Establishment of appropriate regulations by central government as well as lower-level authorities	Official reports Progress reports	Government-level support for incentives and other supporting measures for industrial EE
	3) Status of manual and guidelines for financial evaluation of industrial energy efficiency projects (output 1.3)	Credit lines and financial support are offered by national development and some commercial banks, but not particularly geared towards EE	Manual for financial evaluation of EE projects disseminated in the financial sector	Project technical report Progress reports	Willingness of Government agencies and commercial banks to support industrial EE measures
	4) National recognition programme for facilities that implement an energy management plan created (output 1.4)	N/A	Recognition and award scheme formulated and implemented for facilities that implement an energy management plan	Publications; chambers of industry websites Project progress reports	Willingness of private sector organizations to be engaged in recognition scheme

### Annex 3. Project Results Framework

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
<b>Outcome 2</b> <b>Supportive policies in place, compatible with ISO energy management standard (EnMS), for delivering sustainable improvements in energy efficiency in industry and contributing to improved international competitiveness</b>	5) Status of national EnMS (output 2.1)	No EnMS has been defined	<p>EnMS adopted after stakeholder consultations (compatible with ISO 50001) and promulgated as a national standard.</p> <p>Capacity analyzed of relevant institutions (MEER, MIPRO, INEN, OAE) and capacity plan formulated and implemented for the implementation of EnMS (which will improve energy efficiency as well as international competitiveness)</p>	<p>Official publications</p> <p>Progress reports</p>	<p>The institution can develop their capacity in time to provide services</p> <p>INEN and OAE are willing to contribute to EnMS adoption and implementation</p>
	6) Status of energy management and EnMS training (output 2.2)	No EnMS has been defined	<p>Awareness raised in four 0.5 day workshops amongst general and/or financial managers</p> <p>Energy managers, energy service providers and other technical staff are trained at five 2-day events (workshops, seminars, courses) attended by 200 people at various places in Ecuador (e.g. Quito, Guayaquil, Cuenca, etc.) on energy management (half from large enterprises; half from</p>	<p>Presentations and training materials</p> <p>Progress reports</p> <p>Project and other websites</p>	<p>Willingness of the targeted companies to benefit from the training and supporting materials</p> <p>Willingness of chambers of industry and professional associations in various towns to support training courses</p>

### Annex 3. Project Results Framework

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
			SMEs)		
	7) Status of energy management plans in industry	Only a few large industries have energy management personnel; Limited awareness on energy management planning	Energy management plans fully implemented in 50 companies	Progress reports Project and other websites	Willingness of companies to implement EM plans

### Annex 3. Project Results Framework

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
<b>Outcome 3</b> <b>Capacity building for personnel involved in EE from the public and private sectors in the areas of energy management and system optimization and energy efficiency promotion</b>	8) Status of EM training of trainers (output 3.1)	Technical awareness and knowledge on energy management, systems optimization and energy auditing needs improved	25 EE experts trained as trainers on energy management (20 days)  50 EE experts trained as trainers on systems optimization (motor driven and steam systems; 30-day training)  Trained experts receive their certification	Presentations and training materials  Progress reports	Availability and willingness of experts to receive training.  Commitment of trained experts to impart training
	9) Status of system optimization training (output 3.2)		200 staff trained (half from large, half from SMEs) in 1-day workshop (approx. 8 training sessions)  100 staff receive a more comprehensive 2-day training workshop (approx. 4 training sessions).	Presentations and training materials  Progress reports	Willingness of experts to benefit from the training and supporting materials

### Annex 3. Project Results Framework

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
	10) information dissemination and awareness creation campaign developed and implemented (output 3.3)		400 industrial representative’s workshops, including supply-chain partners and the 200 entities from Component 2, have awareness raised on energy management and systems optimization and EE for industry in general (approx. ten 1-day events)  Design and implement national information campaign (seminars, road shows, multimedia, and promotional material/brochures)	Presentations and raining materials  Project progress report  Project website.	Willingness of the targeted public to benefit from the training and supporting materials
<b>Outcome 4 Demonstrated and measured energy savings in industrial entities through application of system assessment techniques by trained experts, leveraging additional energy savings</b>	11) Status of in-depth energy assessments (output 4.1)	8 detailed audits out as part of the World Bank supported PROMEC and 37 assessments by the CAF supported projects	in-depth energy audits in 25 Audits and reports industries (with assistance of experts trained in output 3.2)	Audits and reports on EE improvements  Progress reports	Willingness of companies to implement system optimization and EE measures



### Annex 3. Project Results Framework

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
as more industrial facilities will seek implementation of systems optimization	12) Status of system optimization projects (output 4.2)	Limited adoption of recommended measures due to lack of financing and awareness	10 factories improve their energy consumption by means of pilot system optimization activities	Audits and reports on EE improvements  Progress reports	Willingness of companies to implement system optimization and EE measures
	13) Status of info gathering and dissemination <i>output 4.3</i>	Some exposure to audits and EE measures, but no systematic knowledge on systems optimization	5 case studies presented and equipment/processes identified for improvement in 2 most important sectors; information disseminated to a wide audience	Case study documentation  Progress reports  Project website	Willingness of companies to share info

## **Annex 4. Exit Strategy**

### **1 Introduction**

The objective of project has been to promote Energy Efficiency (EE) improvements in the industry sector of Ecuador through the development and implementation of national energy management standards and application of system optimization. The Ministry of Electricity and Renewable Energy (MEER) has been the executing agency and UNIDO was the GEF Agency of this project.

The project implementation started in late 2011. The project original duration was of three years, and the final completion date was planned for April 2014. However, as described in the midterm appraisal report, there have been significant administrative delays which had repercussion in the overall duration of the project. An extension of 18 months was granted, which resulted in a final project completion date in September 2015. The 30 September 2015 is considered the date of financial close of the project.

While the support from the technical cooperation agency will be completed in September 2015, certain project activities will be continuing its execution beyond this period. It has been agreed that the MEER will continue executing the pending activities, particularly since 46% of the national funds allocated for cofinancing is yet to be disbursed.

The aims of this report it to present the exit strategy and handover to the MEER of the final activities, to guarantee continuity and complete planned project execution. The goal of the exit strategy is to provide MEER staff with guidance to monitor and evaluate the outstanding activities

The report is structured in 3 sections:

- Activities which are pending for execution after financial close
- Recommendations from the final evaluation
- Actions that may increase sustainability of EE in Ecuador

The activities outline in this strategy were presented to MEER and validated in September 2015.

### **2 Activities which are pending for execution after financial close**

While the project financial close and evaluation were completed in September 2015, the following project activities remain under execution. Contracts have been awarded to selected contractors, and the supervision role of their execution will be completed by MEER.

#### **2.1 Pending activities by output**

Activity	Tasks for MEER	Timeframe	Means of verification
<b>Outcome 1</b>			
<b>Enhanced institutional framework and EE awareness raising in financing mechanisms facilitating increased implementation of EE in the industrial sector</b>			
1.4.1 Set up a recognition program and acknowledgement for facilities that implement an energy management plan (compliant with ISO 50001)	As part of the dissemination campaign, conduct dissemination events in selected cities in which enterprises that	October-December 2015	Event reports from dissemination campaign (contractor)
Activity	Tasks for MEER	Timeframe	Means of verification
	participated in the programme and achieve energy savings will receive an award		
<b>Outcome 3*</b>			
<b>Capacity building for personnel involved in EE from the public and private sectors in the areas of energy management and system optimization and energy efficiency promotion</b>			
3.1.4 Certification of trained experts by a competent authority (OAE)	Complete the submission of the draft standard to the National Standards Body (SENOR)	December 2015	Official communication from SENOR
3.3.2 Design and implement national information campaign (seminars, road shows, multimedia, and promotional material/brochures) on the benefits of energy management, system optimization and various incentive programs on EE, as well as EE equipment and EE services	Supervise and verify the deliverables of the dissemination campaign	October-December 2015	Reports from dissemination campaign
<b>Outcome 4</b>			
<b>Demonstrated and measured energy savings in industrial entities through application of system assessment techniques by trained experts, leveraging additional energy savings as more industrial facilities will seek implementation of systems optimization</b>			
4.2.1 Systems optimization experts work with 10 industrial facilities to implement the systems optimization projects identified during the in-depth energy assessments	Conduct the ex-post evaluation of the measures adopted by the 4 enterprises	October 2015	ex-post evaluation reports
4.3.3 Prepare 5 case studies based on the 10 implemented projects	Conclude the drafting and validation of case studies	October 2015	Case studies are published electronically

4.3.4 Dissemination of cases studies and new EE technologies through national awareness campaign via workshops, publications, and website (complementary to output 4.3.4)	Case studies are published in hard copies and distributed as part of campaign	October-December 2015	Reports from dissemination campaign
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\* there are no pending activities under outcome 2

## 2.2 Reporting to UNIDO on pending activities

MEER will submit the report listed under the means of verification column.

## 2.3 Transfer of assets

The following assets will be officially transferred to MEER, through a transfer title letter:

Asset	Serial number
Projector Epson Brightlink 485Wi 3LCD PO20304	QTUK100074
Ink Ling Digital Sketch Pen WACOM	2GAD001515
Thermographic Camera FLIR E5 PO21206	T198547

In addition, the following low valued added assets are to be kept by MEER

- Rechargeable batteries
- Computer software
- Wireless connectors

## 3 Recommendations from the Final Evaluation

The project final evaluation process begun in June of 2015 and as a key recommendation suggested the elaboration of the exit strategy to ensure a smooth continuation of the execution. In addition, it provides recommendations of actions to be taken by each stakeholder

### 3.1 For MEER, the main recommendations are to:

1. Strengthen of institutional capacity to continue training of national practitioners experts in the field of Energy Efficiency. It is recommended that a national academic or skills development organization continue offering training on EE practices such as energy management systems, energy systems optimization, and financial evaluation of EE projects.
2. Consider the following project findings during the reglamentation of the 2015 Electricity Act:
  - The design of financial mechanisms to promote EE investments
  - Revising the mechanisms for importing consumer goods and industrial equipment required in EE projects.
  - Development of synergies among institutional stakeholders.
3. Improve the institutional communication with business sector on energy efficiency facilitating creation of entrepreneur's networks in this field.
4. Identify, recognize and promote champion companies improving EE.
5. Implement mechanisms that guarantee systematic access to information and technical advice to companies requesting such services.

### **3.2 For UNIDO, the main recommendations are to:**

1. Avoid inaccuracies in project designs
2. Promote synergies among activities of the organization at country level.

## **4 Actions that may increase sustainability of EE in Ecuador**

In addition to the specified activities which are presented in section 2, a set of no cost actions are proposed that may facilitate the promotion of IEE and contribute to the sustainability of project results

### **4.1 Integration of the IEE measures in other national programmes**

In 2015, the Ministry of Industries and Productivity (MIPRO) has launched a programme to establish a new National Cleaner Production Center, with the technical assistance from UNIDO. The new structure

is based on a private sector model that will be structured around organizations which represent the interest of industrial enterprises, namely:

- Chamber of Industries and Production (CIP)
- Chamber of Small Industry of Pichincha (CAPEIPI)
- Chamber of Industries of Guayaquil (CIG)
- Association of Textile Industrialists of Ecuador (AITE)
- Chemical Producers Association of Ecuador (APROQUE)
- National Association of Manufacturers of Food and Beverage (ANFAB)
- National Poultry Farmers Corporation of Ecuador (CONAVE)
- Central University of Ecuador

MEER has been invited to join the Advisory Committee of the NCPC. The role of this Committee is to engage government organization in the activities of the NCPC. The proposed role for MEER is to both advise the NCPC in its function supporting enterprises, or to use the services provided by the NCPC.

### **4.2 Ensuring continuity of capacity building activities**

It is strongly recommended that the MEER continues supporting the technical capacity building for national enterprises. The key measures that are recommended included

- 1) undertaking post-implementation evaluations of EnMS effectiveness: it is recommended that monitoring of enterprises who have adopted an EnMS is done periodically
- 2) Assessing the continuous support of the enterprises who have adopted an EnMS.
- 3) Continue raising awareness of IEE measures, through workshops and seminar
- 4) Disseminate training materials, such as the "Practical Guide to adopt and EnMS" which was translated to Spanish and published by MEER in early 2015

### **4.3 Collaboration and participation in existing and planned international activities**

MEER is encouraged to engage regional and international working groups in the field of EE, including

- Latin-American Network for EE (Red-LAC-EE) currently hosted by the Latin American Energy Organization (OLADE)
- Technical Committees from standards bodies, such as the ISO TC 242 (responsible for energy management)

UNIDO will strive to engage MEER in all regional activities, including workshops from national programmes, such as the “Promotion of Industrial Energy Efficiency in Colombian Industries”.

**Annex 5. Evaluation ToRs (see independent document)**

**TERMS OF REFERENCE**

**Independent terminal evaluation of UNIDO project: Industrial Energy Efficiency in Ecuador**

**UNIDO Project numbers: GF/ECU/11/004**

**UNIDO SAP ID: 103017**

**GEF Project number: 4147**

**MARCH 2015**

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## Project background and overview

### 1. Project factsheet

Project Title	Industrial Energy Efficiency in Ecuador
GEF ID	4147
UNIDO project No. (SAP ID)	103017
Region	Latin America and Caribbean
Country(ies)	Ecuador
GEF Focal area(s) and operational program	Climate Change CC-2
GEF Agencies (implementing agency)	UNIDO
Project executing partners	Ministry of Electricity and Renewable Energy (MEER), Ministry of Industries and Productivity (MIPRO)
Project size (FSP, MSP, EA)	MSP
Project CEO endorsement/Approval date	20 May 2011
Project implementation start date (PAD issuance date)	6 July 2011
Original expected implementation end date (indicated in CEO endorsement/Approval document)	7 May 2014
Revised expected implementation end date (if any)	7 May 2014
Actual implementation end date	30 April 2015
GEF Grant (USD)	915,000
GEF PPG (USD) (if any)	75,000
UNIDO inputs (USD)	60,000 (cash)
Co-financing (USD) at CEO Endorsement	4,434,703 (cash + in-kind)
Total project cost (USD) (GEF Grant + Co-financing at CEO Endorsement)	5,424,703
Mid-term review date	July 2013
Planned terminal evaluation date	May-July 2015

## 2. Project summary

Ecuador is situated in Western South America, bordering the Pacific Ocean at the Equator, between Colombia and Peru. It has natural resources in petroleum, fish, timber and hydropower. It is party to various international agreements (relating to environment), such as Antarctic-Environmental Protocol, Antarctic Treaty, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands. It has a population of 16.65 million, with around 86% of the people being below the age of 55 (14% above 55 years), and a population growth rate of 1.37%. Youth unemployment is at 11.1%. Overall unemployment rate is estimated to be at 4.2%. About 25.6% of the population lives below the poverty line.

Ecuador has a GDP of USD 91.41 billion (official exchange rate, 2013), and a GDP real growth rate of 4% (2013). Services constitute the largest share of GDP with 59%, followed by industry with 35.1% and agriculture with 5.9%. Ecuadorian industries are active in the following sectors: petroleum, food processing, textiles, wood products, chemicals. Industrial production growth rate is expected to be at 3.1%. Ecuador exports petroleum, bananas, cut flowers, shrimp, cacao, coffee, wood and fish. It is significantly dependent on its petroleum resources, as they have accounted for more than 50% of Ecuadorian export earnings and approximately two-fifths of public sector revenues in recent years.

Current environmental issues are deforestation, soil erosion, desertification, water pollution, pollution from oil production and waste in ecologically sensitive areas of the Amazon Basin and Galapagos Islands.

Energy consumption in Ecuador is very inefficient compared to the peer developing countries, mainly due to the low energy price set up by the Government. In order to increase energy efficiency (EE) in the country, the government has developed a National Plan for Energy Efficiency in 2004, created the new Ministry of Electricity and Renewable Energy (MEER) in July 2007 inter-alia, which is responsible for the coordination and implementation.

Promoting the efficient and rational use of energy is one of six long-term goals of the Ministry. However, recognizing the enormous potential of energy savings to the entire economy, and particularly in the industrial sector, as well as increasing pressure to improve competitiveness and reduce emissions CO<sub>2</sub>, the government requested the United Nations Industrial Development Organization (UNIDO) to develop the project on Energy Efficiency for Industry in Ecuador.

The main objective of the project is to promote Energy Efficiency (EE) improvements in the industry sector of Ecuador through the development and implementation of national energy management standards and application of system optimization.

The project is funded through a GEF grant, amounting to USD 915,000 (and PPG Grant of USD 75,000), a UNIDO contribution of USD 60,000 (cash); and the counterparts' co-financing of USD 4,374,703 (cash and in kind), which amount to total project budget of USD 5,424,703.

The project implementation started in July 2011 and the initial project end date was in May 2014. The same was revised to April 2015.

The M&E procedure will consist of a) project inception, b) quarterly progress reporting, c) annual reviews, d) independent mid-term and final evaluation. The allocated budget is USD 60,000 and will be provided as co-financing by UNIDO. A detailed monitoring plan for tracking and reporting on project time-bound milestones and accomplishments will be prepared by UNIDO in collaboration with the PMU and project partners at the beginning of project implementation and then periodically updated.

### 3. Project objective

The main objective of the project is to promote Energy Efficiency (EE) improvements in the industry sector of Ecuador through the development and implementation of national energy management standards and application of system optimization. It focuses on improving energy management and looking at how systems in the facilities processes can be optimized from an energy point of view. Its main goal is to tackle the policy, management, technical knowledge and supply chain related barriers. The project focuses on building national capacities in two technical fields:

- **Systems Optimization.** The presence of energy-efficient components in industrial systems, while important, provides no assurance that energy savings will be attained if the system of which the components are part is not properly designed and operated.
- **Energy Management Systems (EnMS):** the adoption and promotion of national energy management standards, along with capacity building of enterprises and institutions will be effective in transforming the national industrial energy efficiency market condition.

Following are the **4 main components** of the project, besides project management: **Component 1:** Analysis of industrial EE institutional and regulatory arrangements and development of tools to facilitate EE measures adoption

**Component 2:** National program to implement ISO-compatible energy management standard

**Component 3:** Capacity building for personnel involved in EE from the public and private sectors in the areas of energy management and system optimization and energy efficiency promotion

**Component 4:** Demonstrated and measured energy savings in industrial entities through application of system assessment techniques by trained experts, leveraging additional energy savings as more industrial facilities will seek the implementation of systems optimization

### 4. Mid-term review (MTR)

The MTE analyses activities and results from implementation start till May 2013. The report has been prepared by the project management team, led by the project manager (PM). Following are some of the documented results; further details can be referred to in the MTR report (July 2013):

**Outcome 1:** No activities were carried out till the MTR

**Outcome 2:** Various activities had already taken place and were ongoing at the time of the MTE. Some of the achieved results are as follows:

- ISO 50001 was officially approved as National Technical Standard
- INEN and OAE staff received dedicated training on best global practices on EnMS and ISO 50001
- Five half day awareness raising seminars conducted with altogether around 140 participants
- 28 enterprises are engaged in adopting EnMS but only 16 Enterprises complete implementation by August 2013

**Outcome 3:** Various activities have commenced/are ongoing. Some of the achieved results are as follows:

- Training packages have been translated to Spanish
- A web based platform for EnMS and Motors Systems Optimization (MSO) trainings are established and are operational
- Expert training for 25 EnMS national trainees conducted with two face-to-face learning modules undertaken
- MSO expert training began in November 2012 with the selection of applicants for the expert training

**Outcome 4:** Activities are planned for 2013 and 2014.

## 5. Project implementation arrangements

**UNIDO:** The project will be directly executed by UNIDO in collaboration with Ministry of Electricity and Renewable Energy (MEER) and Ministry of Industries and Productivity (MIPRO). It will maintain the oversight on the project implementation, manage the overall project budget, procure all services required, monitor the project implementation, timely prepare financial and progress report and submit them to the GEF and the National Steering Committee, as well as organize mandatory and non-mandatory evaluations.

**MEER:** Overall national responsibility for project implementation will lie with Ministry of Electricity and Renewable Energy, (MEER). The Secretariat for Renewable Energy and Energy Efficiency of MEER will have specific responsibility for overseeing the current UNIDO/GEF project

An **Advisory Committee** will be formed to serve as a forum to discuss broader policy and project implementation issues and also to seek inputs from other organizations, besides the institutions officially responsible for project implementation.

The **Project Management Unit (PMU)** will be the project secretariat and will provide guidance/advice on the implementation of each project component. The Project Management Unit will comprise of:

- Project Manager (PM) - fulltime, paid partly from the GEF budget and partly from the cash co-financing
- Industry and energy experts (co-financing)
- Administrative-financial officer (co-financing)

## 6. Budget information

The project is funded through a GEF grant, amounting to USD 915,000 (and PPG Grant of USD 75,000), a UNIDO contribution of USD 60,000 (cash); and the counterparts' co-financing of USD 4,374,703 (cash and in kind), which amount to total project budget of USD 5,424,703.

\* The figures received as sum in the above tables are not the same as the figures mentioned in the project document. The evaluation team can check updated figures from the PM.

### Financing Plan Summary For The Project (\$)

	<i>Project Preparation</i>	<i>Project</i>	<i>Total</i>	<i>Agency Fee</i>	<i>For comparison: GEF and Co-financing at PIF</i>
GEF financing	75,000	915,000	990,000	99,000	915,000
Co-financing (Cash and In-kind)	15,000	4,434,703	4,449,703		3,835,000
<b>Total</b>	<b>90,000</b>	<b>5,349,703</b>	<b>5,439,703*</b>	<b>99,000</b>	<b>4,750,000</b>

Source: CEO EF IEE

<b>Project outcomes</b>	<b>GEF (\$)</b>	<b>Co- Financing (\$)</b>	<b>Total (\$)</b>
1. Analysis of industrial EE institutional and regulatory arrangements and development of tools to facilitate EE measures adoption	79,175	295,000	<b>374,175</b>
2. National program to implement ISO - compatible energy management standard	148,200	1,368,500	<b>1,516,700</b>
3. Capacity building for personnel involved in EE from the public and private sectors in the areas of energy management and system optimization and energy efficiency promotion	213,138	615,000	<b>828,138</b>
4. Demonstrated and measured energy savings in industrial entities through application of system assessment techniques by trained experts, leveraging additional energy savings as more industrial facilities will seek the implementation of systems optimization	396,488	1,795,178	<b>2,191,666</b>
Project management	78,000	498,075	<b>576,075</b>
<b>Total</b>	<b>915,001</b>	<b>4,571,753*</b>	<b>5,486,754*</b>

Source: CEO EF IEE

Co-financing Source Breakdown is as follows:

<b>Name of Co-financier (source)</b>	<b>Classification</b>	<b>Type</b>	<b>Project</b>
<b>MEER</b>	Government	Cash	1,700,000
		In-kind	400,000
<b>MIPRO</b>	Government	In-kind	96,525
<b>INEN</b>	Government	In-kind	50,000
<b>OAE</b>	Government	In-kind	50,000
<b>National Banks providing loans for industries</b>	Private	Cash	2,000,000
<b>Chambers of Industry (representing industries and committing to capacity building activities)</b>	Private	In-kind	78,178
<b>UNIDO</b>	IA	Cash	60,000
<b>Total Co-Financing</b>			<b>4,434,703</b>

**UNIDO budget execution:**

Item	EXECUTED BUDGET in 2012	EXECUTED BUDGET in 2013	EXECUTED BUDGET in 2014	EXECUTED BUDGET in 2015	Total Expenditure (2012-present)
					(23 Mar.)
Contingencies					<b>0.00</b>
Contractual Services	7,500.00	6,513.39	41,181.50		<b>55,194.89</b>
Equipment		1,063.79	7,787.22		<b>8,851.01</b>
International.. Consultant/Staff	126,835.40	99,791.63	95,239.94	9,330.86	<b>331,197.83</b>
Local Travel	1,133.46	3,598.01	1,875.31		<b>6,606.78</b>
National Consultant/Staff	33,760.38	48,870.28	99,916.28	18,788.00	<b>201,334.94</b>
Other Direct Costs	12,053.84	15,317.70	6,191.72	0.00	<b>33,563.26</b>
Premises			1,185.00	8,699.20	<b>9,884.20</b>
Staff Travel	15,162.97	13,835.98	6,735.94		<b>35,734.89</b>
Training/Fellowship/Study	8,942.69	187.75			<b>9,130.44</b>
<b>Total</b>	<b>205,388.74</b>	<b>189,178.53</b>	<b>260,112.91</b>	<b>36,818.06</b>	<b>691,498.24</b>

## I. Scope and purpose of the evaluation

The terminal evaluation (TE) will cover the whole duration of the project from its starting date in July 2011 to the estimated completion date in April 2015. It will assess project performance against the evaluation criteria: relevance, effectiveness, efficiency, sustainability and impact.

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

The evaluation team should provide an analysis of the attainment of the main objective and the five technical components. Through its assessments, the evaluation team should enable the Government, counterparts, the GEF, UNIDO and other stakeholders and donors to verify prospects for development impact and sustainability, providing an analysis of the attainment of global environmental objectives, project objectives, delivery and completion of project outputs/activities, and outcomes/impacts based on indicators. The assessment includes re-examination of the relevance of the objectives and other elements of project design according to the project evaluation parameters defined in chapter VI.

The key question of the TE is whether the project has achieved or is likely to achieve its main objective of promoting Energy Efficiency (EE) improvements in the industry sector of Ecuador through the development and implementation of national energy management standards and application of system optimization.

## II. Evaluation approach and methodology

The TE will be conducted in accordance with the UNIDO Evaluation Policy, the UNIDO Guidelines for the Technical Cooperation Programs and Projects, the GEF's 2008 Guidelines for Implementing and Executing Agencies to Conduct Terminal Evaluations, the GEF Monitoring and Evaluation Policy from 2010 and the Recommended Minimum Fiduciary Standards for GEF Implementing and Executing Agencies.

It will be carried out as an independent in-depth evaluation using a participatory approach whereby all key parties associated with the project are kept informed and regularly consulted throughout the evaluation. The evaluation team leader will liaise with the UNIDO Office for Independent Evaluation (ODG/EVA) in the conduct of the evaluation and methodological issues.

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

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

The methodology will be based on the following:

1. A desk review of project documents, including, but not limited to:
  - (a) The original project document, monitoring reports (such as progress and financial reports to UNIDO and GEF annual Project Implementation Review (PIR) reports), mid-term evaluation/review report, output reports (case studies, action plans,

sub-regional strategies, etc.), BTOMR, end-of-contract report and relevant correspondence.

- (b) Notes from the meetings of committees involved in the project (e.g. approval and steering committees).
  - (c) Other project-related material produced by the project.
2. The evaluation team will use (or reconstruct if necessary) available models of theory of change for the different types of intervention (enabling, capacity, investment, demonstration). The validity of the theory of change will be examined through specific questions in interviews and possibly through a survey of stakeholders.
  3. Counterfactual information: In those cases where baseline information for relevant indicators is not available, the evaluation team will aim at establishing a proxy-baseline through recall and secondary information.
  4. Interviews with project management and technical support including staff and management at UNIDO HQ and in the field and – if necessary - staff associated with the project's financial administration and procurement.
  5. Interviews with project partners including Government counterparts, GEF focal points and partners that have been selected for co-financing as shown in the corresponding sections of the project documents.
  6. On-site observation of results achieved in demonstration projects, including interviews of actual and potential beneficiaries of improved technologies.
  7. Interviews and telephone interviews with intended users for the project outputs and other stakeholders involved with this project. The evaluator shall determine whether to seek additional information and opinions from representatives of any donor agencies or other organizations.
  8. Interviews with the head of operations in Ecuador, as well as UNIDO Field Office in Colombia, which covers Ecuador, and the project's management members and the various national and sub-regional authorities dealing with project activities as necessary. If deemed necessary, the evaluation team shall also gain broader perspectives from discussions with relevant GEF Secretariat staff.
  9. Other interviews, surveys or document reviews as deemed necessary by the evaluation team and/or UNIDO ODG/EVA.
  10. The inception report will provide details on the methodology used by the evaluation team and include an evaluation matrix.

### **III. Evaluation team composition**

The evaluation team will be composed of one international evaluation consultant acting as a team leader and one national evaluation consultant.

The evaluation team should be able to provide relevant information for follow-up studies, including evaluation verification on request to the GEF partnership up to two years after completion of the evaluation.

Both consultants will be contracted by UNIDO. The tasks of each team member are specified in the job descriptions attached to these terms of reference.

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



The Project Manager at UNIDO and the Project Team in Ecuador will support the evaluation team. The UNIDO GEF Coordinator will be briefed on the evaluation and equally provide support to its conduct.

#### **IV. Time schedule and deliverables**

The evaluation is scheduled to take place in the period from **1 June 2015 to 31 August 2015**. The field mission is planned for **end June or early July**. At the end of the field mission, there will be a presentation of the preliminary findings for all stakeholders involved in this project in Ecuador.

After the field mission, the evaluation team leader will come to UNIDO HQ for debriefing and presentation of the preliminary findings of the Terminal Evaluation (TE). The draft TE report will be submitted 4-6 weeks after the end of the mission.

#### **V. Project evaluation parameters**

The evaluation team will rate the projects. The ratings for the parameters described in the following sub-chapters A to J will be presented in form of a table with each of the categories rated separately and with brief justifications for the rating based on the findings of the main analysis. An overall rating for the project should also be given.

##### **A. Project design**

The evaluation will examine the extent to which:

- the project's design is adequate to address the problems at hand;
- a participatory project identification process was instrumental in selecting problem areas and national counterparts;
- the project has a clear thematically focused development objective, the attainment of which can be determined by a set of verifiable indicators;
- the project was formulated based on the logical framework (project results framework) approach;
- the project was formulated with the participation of national counterpart and/or target beneficiaries; and
- relevant country representatives (from government, industries and civil society) have been appropriately involved and were participating in the identification of critical problem areas and the development of technical cooperation strategies.

##### **B. Project relevance**

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

- National development and environmental priorities and strategies of the Government and population of Ecuador, and regional and international agreements. See possible evaluation questions under "Country ownership/drivenness" below.
- Target groups: relevance of the project's objectives, outcomes and outputs to the different target groups of the interventions (e.g. companies, civil society, beneficiaries of capacity building and training, etc.).
- GEF's focal areas/operational program strategies: In retrospect, were the project's outcomes consistent with the focal areas/operational program strategies of GEF? Ascertain the likely nature and significance of the contribution of the project outcomes to the wider portfolio of GEF's Focal area and Operational Program of Climate Change (CC-2).

- UNIDO's thematic priorities: Were they in line with UNIDO's mandate, objectives and outcomes defined in the Program & Budget and core competencies?
- Does the project remain relevant taking into account the changing environment? Is there a need to reformulate the project design and the project results framework given changes in the country and operational context?

### C. Effectiveness: objectives and planned final results at the end of the project

- The evaluation will assess to what extent results at various levels, including outcomes, have been achieved. In detail, the following issues will be assessed: To what extent have the expected outputs, outcomes and **long-term objectives** been achieved or are likely to be achieved? Has the project generated any results that could lead to changes of the assisted institutions? Have there been any unplanned effects?
- Are the project outcomes commensurate with the original or modified project objectives? If the original or modified expected results are merely outputs/inputs, the evaluators should assess if there were any real outcomes of the project and, if there were, determine whether these are commensurate with realistic expectations from the project.
- How do the stakeholders perceive the quality of outputs? **Were the targeted beneficiary groups actually reached?**
- What outputs and outcomes has the project achieved so far (both qualitative and quantitative results)? Has the project generated any results that could lead to changes of the assisted institutions? Have there been any **unplanned effects?**
- **Identify actual and/or potential longer-term impacts or at least indicate** the steps taken to assess these (see also below "monitoring of long term changes"). Wherever possible, evaluators should indicate how findings on impacts will be reported in future.
- Describe any **catalytic or replication effects**: the evaluation will describe any catalytic or replication effect both within and outside the project. If no effects are identified, the evaluation will describe the catalytic or replication actions that the project carried out. No ratings are requested for the project's catalytic role.

### D. Efficiency

The evaluation will examine the extent to which:

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

### E. Assessment of sustainability of project outcomes

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

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

## **F. Assessment of monitoring and evaluation (M&E) systems**

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

impacts? Are there any annual work plans? Was any steering or advisory mechanism put in place? Did reporting and performance reviews take place regularly?

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

### **G. Monitoring of long-term changes**

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

- Did this project contribute to the establishment of a long-term monitoring system?

If it did not, should the project have included such a component?

- What were the accomplishments and shortcomings in the establishment of this system?
- Is the system sustainable; is it embedded in a proper institutional structure and does it have financing? How likely is it that this system continues operating upon project completion?
- Is the information generated by this system being used as originally intended?

### **H. Assessment of processes affecting achievement of project results**

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

#### **a. Preparation and readiness / Quality at entry**

- Were the project's objectives and components clear, practicable, and feasible within its time frame?
- Were counterpart resources (funding, staff, and facilities), and adequate project management arrangements in place at project entry?
- Were the capacities of executing institution and counterparts properly considered when the project was designed?
- Were lessons from other relevant projects properly incorporated in the project design?
- Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to the project approval?

#### **b. Country ownership/drivenness**

- Was the project concept in line with the sectoral and development priorities and plans of the country—or of participating countries, in the case of multi-country projects?
- Are project outcomes contributing to national development priorities and plans? Were the relevant country representatives from government and civil society involved in the project?
- Did the recipient government maintain its financial commitment to the project?
- Has the government—or governments in the case of multi-country projects—approved policies or regulatory frameworks in line with the project's objectives?

- c. **Stakeholder involvement**
- Did the project involve the relevant stakeholders in information sharing and consultation?
  - Did the project implement appropriate outreach and public awareness campaigns?
  - Were the relevant vulnerable groups and powerful supporters and opponents of the processes properly involved?
  - Which stakeholders were involved in the project (i.e. NGOs, private sector, other UN Agencies, etc.) and what were their immediate tasks?
  - Did the project consult with and make use of the skills, experience, and knowledge of the appropriate government entities, nongovernmental organizations, community groups, private sector entities, local governments, and academic institutions in the design, implementation, and evaluation of project activities?
  - Were perspectives of those who would be affected by project decisions, those who could affect the outcomes, and those who could contribute information or other resources to the process taken into account while taking decisions?
  - Were the relevant vulnerable groups and the powerful, the supporters and the opponents, of the processes properly involved?
- d. **Financial planning**
- Did the project have appropriate financial controls, including reporting and planning, that allowed management to make informed decisions regarding the budget and allowed for timely flow of funds?
  - Was there due diligence in the management of funds and financial audits?
  - Did promised co-financing materialize?
  - Specifically, the evaluation should also include a breakdown of final actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co-financing.
- e. **UNIDO's supervision and backstopping**
- Did UNIDO staff identify problems in a timely fashion and accurately estimate their seriousness?
  - Did UNIDO staff provide quality support and advice to the project, approve modifications in time, and restructure the project when needed?
  - Did UNIDO provide the right staffing levels, continuity, skill mix, and frequency of field visits for the project?
- f. **Co-financing and project outcomes and sustainability**
- If there was a difference in the level of expected co-financing and the co-financing actually realized, what were the reasons for the variance?
  - Did the extent of materialization of co-financing affect project outcomes and/or sustainability, and, if so, in what ways and through what causal linkages?
- g. **Delays and project outcomes and sustainability**
- If there were delays in project implementation and completion, what were the reasons?
  - Did the delays affect project outcomes and/or sustainability, and, if so, in what ways and through what causal linkages?
- h. **Implementation approach**
- Is the implementation approach chosen different from other implementation approaches applied by UNIDO and other agencies?
  - Does the approach comply with the principles of the Paris Declaration?
  - Does the approach promote local ownership and capacity building?
  - Does the approach involve significant risks?

The evaluation team will rate the project performance as required by the GEF. The ratings will be given to four criteria: Project Results, Sustainability, Monitoring and Evaluation, and UNIDO related issues as specified in Annex 2. The ratings will be presented in a table with each of the

categories rated separately and with brief justifications for the rating based on the findings of the main analysis. An overall rating for the project should also be given. The rating system to be applied is specified in the same annex. As per the GEF's requirements, the report should also provide information on project identification, time frame, actual expenditures, and co-financing in the format in Annex 5, which is modeled after the GEF's project identification form (PIF).

### **I. Project coordination and management**

The extent to which:

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

### **J. Assessment of gender mainstreaming**

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

- To which extent were socioeconomic benefits delivered by the project at the national and local levels, including consideration of gender dimensions?

### **K. Procurement issues**

The following evaluation questions that will feed in the Thematic Evaluation on Procurement have been developed and would be included as applicable in all projects (for reference, please see Annex 9 of the ToR: UNIDO Procurement Process):

- To what extent does the process provide adequate treatment to different types of procurement (e.g. by value, by category, by exception...)
- Was the procurement timely? How long does the procurement process take (e.g. by value, by category, by exception...)
- Did the good/item(s) arrive as planned or scheduled? If not, how long were the delays? If delay, what was the reason(s)?
- Were the procured good(s) acquired at a reasonable price?
- To what extent were the procured goods of the expected/needed quality and quantity?
- Were the transportation costs reasonable and within budget. If no, please elaborate.
- Was the freight forwarding timely and within budget? If no, please elaborate.
- Who was responsible for the customs clearance? UNIDO? UNDP? Government? Other?
- Was the customs clearance handled professionally and in a timely manner? How many days did it take?
- How long time did it take to get approval from the government on import duty exemption?
- Which were the main bottlenecks / issues in the procurement process?
- Which good practices have been identified?
- To what extent roles and responsibilities of the different stakeholders in the different procurement stages are established, adequate and clear?
- To what extent there is an adequate segregation of duties across the procurement process and between the different roles and stakeholders?

## VI. Reporting

### Inception report

This Terms of Reference (ToR) provide some information on the evaluation methodology but this should not be regarded as exhaustive. After reviewing the project documentation and initial interviews with the project manager, the International Evaluation Consultant will prepare, in collaboration with the national consultant, a short inception report that will operationalize the ToR relating to the evaluation questions and provide information on what type of and how the evidence will be collected (methodology). It will be discussed with and approved by the responsible UNIDO Evaluation Officer. The **Inception Report will focus on the following elements:** preliminary project theory model(s); elaboration of evaluation methodology including quantitative and qualitative approaches through an evaluation framework (“evaluation matrix”); division of work between the International Evaluation Consultant and National Consultant; mission plan, including places to be visited, people to be interviewed and possible surveys to be conducted and a debriefing and reporting timetable<sup>1</sup>.

### Evaluation report format and review procedures

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

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

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

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

### Evaluation work plan

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

1. Desk review, briefing by project manager and development of methodology: Following the receipt of all relevant documents, and consultation with the Project Manager about

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<sup>1</sup> The evaluator will be provided with a Guide on how to prepare an evaluation inception report prepared by the UNIDO Office for Independent Evaluation.

the documentation, including reaching an agreement on the Methodology, the desk review could be completed.

2. **Inception report:** At the time for departure to the field mission, the complete gamete of received materials have been reviewed and consolidated into the Inception report.
3. **Field mission:** The principal responsibility for managing this evaluation lies with UNIDO. It will be responsible for liaising with the project team to set up the stakeholder interviews, arrange the field missions, coordinate with the Government. At the end of the field mission, there will be a presentation of preliminary findings to the key stakeholders in the country where the project was implemented.
4. **Preliminary findings from the field mission:** Following the field mission, the main findings, conclusions and recommendations would be prepared and presented in the field and at UNIDO Headquarters.
5. **A draft terminal evaluation report** will be forwarded electronically to the UNIDO Office for Independent Evaluation and circulated to main stakeholders.
6. **Final terminal evaluation report will incorporate comments received.**

<b>Evaluation phases</b>	<b>Deliverables</b>
Desk review	Development of methodology approach and evaluation tools
Briefing with UNIDO Office for Independent Evaluation, Project Managers and other key stakeholder at HQ	Interview notes, detailed evaluation schedule and list of stakeholders to interview during field mission
Data analysis	Inception Evaluation Report
Conduct of Field mission. Present preliminary findings and recommendations to key stakeholders in the field	Presentation of main findings to key stakeholders in the field.
Present preliminary findings and recommendations to the stakeholders at UNIDO HQ	Presentation slides
Analysis of the data collected	Draft Terminal Evaluation Report
Circulation of the draft report to UNIDO/relevant stakeholders and revision	Final Terminal Evaluation Report

## **VII. Quality assurance**

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



## Annex 1 - Outline of an in-depth project evaluation report

### Executive summary

- Must provide a synopsis of the storyline which includes the main evaluation findings and recommendations
- Must present strengths and weaknesses of the project
- Must be self-explanatory and should be 3-4 pages in length

### Evaluation objectives, methodology and process

- Information on the evaluation: why, when, by whom, etc.
- Scope and objectives of the evaluation, main questions to be addressed
- Information sources and availability of information
- Methodological remarks, limitations encountered and validity of the findings

### Countries and project background

- Brief countries context: an overview of the economy, the environment, institutional development, demographic and other data of relevance to the project
- Sector-specific issues of concern to the project<sup>2</sup> and important developments during the project implementation period
- Project summary:
  - Fact sheet of the project: including project objectives and structure, donors and counterparts, project timing and duration, project costs and co-financing
  - Brief description including history and previous cooperation
  - Project implementation arrangements and implementation modalities, institutions involved, major changes to project implementation
  - Positioning of the UNIDO project (other initiatives of government, other donors, private sector, etc.)
  - Counterpart organization(s)

### Project assessment

This is the key chapter of the report and should address all evaluation criteria and questions outlined in the TOR (see section VI Project Evaluation Parameters). Assessment must be based on factual evidence collected and analyzed from different sources. The evaluators' assessment can be broken into the following sections:

- A. Design
- B. Relevance (Report on the relevance of project towards countries and beneficiaries)
- C. Effectiveness (The extent to which the development intervention's objectives and deliverables were achieved, or are expected to be achieved, taking into account their relative importance)
- D. Efficiency (Report on the overall cost-benefit of the project and partner Countries contribution to the achievement of project objectives)
- E. Sustainability of Project Outcomes (Report on the risks and vulnerability of the project, considering the likely effects of sociopolitical and institutional changes in partner countries, and its impact on continuation of benefits after the GEF project ends, specifically the financial, sociopolitical, institutional framework and governance, and environmental risks)
- F. Assessment of monitoring and evaluation systems (Report on M&E design, M&E plan implementation, and Budgeting and funding for M&E activities)
- G. Monitoring of long-term changes

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<sup>2</sup> Explicit and implicit assumptions in the logical framework of the project can provide insights into

key-issues of concern (e.g. relevant legislation, enforcement capacities, government initiatives, etc.)

- H. Assessment of processes affecting achievement of project results (Report on preparation and readiness / quality at entry, country ownership, stakeholder involvement, financial planning, UNIDO support, co-financing and project outcomes and sustainability, delays of project outcomes and sustainability, and implementation approach)
- I. Project coordination and management (Report project management conditions and achievements, and partner countries commitment)
- J. Gender mainstreaming
- K. Procurement issues

At the end of this chapter, an overall project achievement rating should be developed as required in Annex 2. The overall rating table required by the GEF should be presented here.

#### **IV. Conclusions, recommendations and lessons learned**

This chapter can be divided into three sections:

##### **A. Conclusions**

This section should include a storyline of the main evaluation conclusions related to the project's achievements and shortfalls. It is important to avoid providing a summary based on each and every evaluation criterion. The main conclusions should be cross-referenced to relevant sections of the evaluation report.

##### **B. Recommendations**

This section should be succinct and contain few key recommendations. They should:

- be based on evaluation findings
- realistic and feasible within a project context
- indicate institution(s) responsible for implementation (addressed to a specific officer, group or entity who can act on it) and have a proposed timeline for implementation if possible
- be commensurate with the available capacities of project team and partners
- take resource requirements into account.

Recommendations should be structured by addressees:

- UNIDO
- Government and/or Counterpart Organizations
- Donor

##### **C. Lessons learned**

- Lessons learned must be of wider applicability beyond the evaluated project but must be based on findings and conclusions of the evaluation
- For each lesson the context from which they are derived should be briefly stated

**Annexes** should include the evaluation TOR, list of interviewees, documents reviewed, a summary of project identification and financial data, and other detailed quantitative information. Dissident views or management responses to the evaluation findings may later be appended in an annex.

## Annex 2 - Overall ratings table

Criterion (Overall rating and sub criteria)	Evaluator's Summary Comments	Evaluator's Rating
<b>Attainment of project objectives and results</b>		
Design		
Effectiveness		
Relevance		
Efficiency		
<b>Sustainability of Project outcomes</b>		
Financial risks		
Sociopolitical risks		
Institutional framework and governance risks		
Environmental risks		
<b>Monitoring and Evaluation</b>		
M&E Design		
M&E Plan Implementation (use for adaptive management)		
Budgeting and Funding for M&E activities		
Project management		
<b>UNIDO specific ratings</b>		
Quality at entry / Preparation and readiness		
Implementation approach		
UNIDO Supervision and backstopping		
<b>Overall rating</b>		

### RATING OF PROJECT OBJECTIVES AND RESULTS

- Highly Satisfactory (HS): The project had no shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Satisfactory (S): The project had minor shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Moderately Satisfactory (MS): The project had moderate shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Moderately Unsatisfactory (MU): The project had significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Unsatisfactory (U) The project had major shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.
- Highly Unsatisfactory (HU): The project had severe shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

**Please note:** Relevance and effectiveness will be considered as critical criteria. The overall rating of the project for achievement of objectives and results **may not be higher** than the lowest rating on either of these two criteria. Thus, to have an overall satisfactory rating for outcomes a project must have at least satisfactory ratings on both relevance and effectiveness.

## **RATINGS ON SUSTAINABILITY**

Sustainability will be understood as the probability of continued long-term outcomes and impacts after the GEF project funding ends. The evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits beyond project completion. Some of these factors might be outcomes of the project, i.e. stronger institutional capacities, legal frameworks, socio-economic incentives /or public awareness. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes.

### Rating system for sustainability sub-criteria

On each of the dimensions of sustainability of the project outcomes will be rated as follows.

- Likely (L): There are no risks affecting this dimension of sustainability.
- Moderately Likely (ML). There are moderate risks that affect this dimension of sustainability.
- Moderately Unlikely (MU): There are significant risks that affect this dimension of sustainability.
- Unlikely (U): There are severe risks that affect this dimension of sustainability.

All the risk dimensions of sustainability are critical. Therefore, overall rating for sustainability will not be higher than the rating of the dimension with lowest ratings. For example, if a project has an Unlikely rating in either of the dimensions then its overall rating cannot be higher than Unlikely, regardless of whether higher ratings in other dimensions of sustainability produce a higher average.

## **RATINGS OF PROJECT M&E**

Monitoring is a continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing project with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds. Evaluation is the systematic and objective assessment of an on-going or completed project, its design, implementation and results. Project evaluation may involve the definition of appropriate standards, the examination of performance against those standards, and an assessment of actual and expected results.

The Project M&E system will be rated on 'M&E Design', 'M&E Plan Implementation' and 'Budgeting and Funding for M&E activities' as follows:

- Highly Satisfactory (HS): There were no shortcomings in the project M&E system.
- Satisfactory(S): There were minor shortcomings in the project M&E system.
- Moderately Satisfactory (MS): There were moderate shortcomings in the project M&E system.
- Moderately Unsatisfactory (MU): There were significant shortcomings in the project M&E system.
- Unsatisfactory (U): There were major shortcomings in the project M&E system.
- Highly Unsatisfactory (HU): The Project had no M&E system.

"M&E plan implementation" will be considered a critical parameter for the overall assessment of the M&E system. The overall rating for the M&E systems will not be higher than the rating on "M&E plan implementation."

All other ratings will be on the GEF six point scale:

HS = Highly Satisfactory	Excellent
S = Satisfactory	Well above average
MS = Moderately Satisfactory	Average
MU = Moderately Unsatisfactory	Below Average
U = Unsatisfactory	Poor
HU = Highly Unsatisfactory	Very poor (Appalling)

### **Annex 3 - GEF Minimum requirements for M&E<sup>3</sup>**

#### **Minimum Requirement 1: Project Design of M&E**

All projects will include a concrete and fully budgeted M&E plan by the time of work program entry for full-sized projects and CEO approval for medium-sized projects. This M&E plan will contain as a minimum:

- SMART indicators for project implementation, or, if no indicators are identified, an alternative plan for monitoring that will deliver reliable and valid information to management;
- SMART indicators for results (outcomes and, if applicable, impacts), and, where appropriate, indicators identified at the corporate level;
- Baseline for the project, with a description of the problem to be addressed, with indicator data, or, if major baseline indicators are not identified, an alternative plan for addressing this within one year of implementation;
- Identification of reviews and evaluations that will be undertaken, such as mid-term reviews or evaluations of activities; and
- Organizational set-up and budgets for monitoring and evaluation.

#### **Minimum requirement 2: Application of Project M&E**

Project monitoring and supervision will include implementation of the M&E plan, comprising:

- SMART indicators for implementation are actively used, or if not, a reasonable explanation is provided;
- SMART indicators for results are actively used, or if not, a reasonable explanation is provided;
- The baseline for the project is fully established and data compiled to review progress reviews, and evaluations are undertaken as planned; and
- The organizational set-up for M&E is operational and budgets are spent as planned.

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<sup>3</sup> [http://www.thegef.org/gef/sites/thegef.org/files/documents/ME\\_Policy\\_2010.pdf](http://www.thegef.org/gef/sites/thegef.org/files/documents/ME_Policy_2010.pdf)

#### Annex 4 - Checklist on evaluation report quality

Independent terminal evaluation of UNIDO-GEF project:

PROJECT TITLE: PROJECT NUMBER:

#### CHECKLIST ON EVALUATION REPORT QUALITY

Report Quality Criteria	UNIDO Office for Independent Evaluation Assessment notes	Rating
A. The terminal evaluation report presented an assessment of all relevant outcomes and achievement of project objectives in the context of the focal area program indicators if applicable.		
B. The terminal evaluation report was consistent, the evidence presented was complete and convincing, and the ratings were well substantiated.		
C. The terminal evaluation report presented a sound assessment of sustainability of outcomes.		
D. The lessons and recommendations listed in the terminal evaluation report are supported by the evidence presented and are relevant to the GEF portfolio and future projects.		
E. The terminal evaluation report included the actual project costs (totals, per activity, and per source) and actual cofinancing used.		
F. The terminal evaluation report included an assessment of the quality of the M&E plan at entry, the operation of the M&E system used during implementation, and the extent M&E was sufficiently budgeted for during preparation and properly funded during implementation.		

#### Rating system for quality of evaluation reports

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

## Annex 5 – Required project identification and financial data

The evaluation report should provide information on project identification, time frame, actual expenditures, and co-financing in the following format, which is modeled after the project identification form (PIF).

### I. Project general information:

<b>Project title</b>	
<b>GEF ID No.</b>	
<b>UNIDO project No. (SAP ID)</b>	
<b>Region</b>	
<b>Country(ies)</b>	
<b>GEF Focal area and operational program:</b>	
<b>Co-implementing agency(ies)</b>	
<b>GEF Agencies (implementing agency)</b>	
<b>Project executing partners</b>	
<b>Project size (FSP, MSP, EA)</b>	
<b>Project CEO endorsement/approval date</b>	
<b>Project implementation start date (PAD issuance date)</b>	
<b>Original expected Implementation end date (indicated in CEO endorsement/approval document)</b>	
<b>Revised expected implementation end date (if any)</b>	
<b>Project duration (months)</b>	
<b>GEF grant (USD)</b>	
<b>GEF PPG (USD) (if any)</b>	-
<b>Co-financing (USD) at CEO endorsement</b>	
<b>Total project cost (USD) (GEF grant + Co-financing at CEO endorsement)</b>	
<b>Agency fee (USD)</b>	

## II. Dates

Milestone	Expected Date	Actual Date
Project CEO endorsement/approval date		
Project implementation start date (PAD issuance date)		
Original expected implementation end date (indicated in CEO endorsement/approval document)		
Revised expected implementation end date (if any)		
Terminal evaluation completion		
Planned tracking tool date		

## III. Project Framework

Project component	Activity type	GEF Financing (in USD)		Co-financing (in USD)	
		Approved	Actual	Promised	Actual
1.					
2.					
3.					
4.					
5.					
6. Project management					
Total					

Activity types are:

- a) Experts, researches hired
- b) technical assistance, Workshop, Meetings or experts consultation scientific and technical analysis, experts researches hired
- c) Promised co-financing refers to the amount indicated on endorsement/approval.

## IV. Co-financing

Source of co-financing	Type	Project preparation		Project implementation		Total	
		Expected	Actual	Expected	Actual	Expected	Actual
Host gov't contribution							
GEF Agency(-ies)							
Bilateral aid agency(ies)							
Multilateral agency(ies)							
Private sector							
NGO							
Other							
Total cofinancing							

Expected amounts are those submitted by the GEF Agencies in the original project appraisal document. Co-financing types are grant, soft loan, hard loan, guarantee, in kind, or cash.



## Annex 6 – Job descriptions

### TERMS OF REFERENCE FOR PERSONNEL UNDER INDIVIDUAL SERVICE AGREEMENT (ISA)

<b>Title:</b>	International evaluation consultant
<b>Main Duty Station and Location:</b>	Home based
<b>Missions:</b>	Missions to Vienna, Austria and Ecuador
<b>Start of Contract (EOD):</b>	May 1, 2015
<b>End of Contract (COB):</b>	July 31, 2015
<b>Number of Working Days:</b>	21 working days spread over 3 months

#### 1. ORGANIZATIONAL CONTEXT

The Office for Independent Evaluation is responsible for the independent evaluation function of UNIDO. It supports learning, continuous improvement and accountability, and provides factual information about result and practices that feed into the programmatic and strategic decision-making processes. Evaluation is an assessment, as systematic and impartial as possible, of a program, a project or a theme. Independent evaluations provide evidence-based information that is credible, reliable and useful, enabling the timely incorporation of findings, recommendations and lessons learned into the decision-making processes at organization-wide, program and project level. The Office for Independent Evaluation is guided by the UNIDO Evaluation Policy, which is aligned to the norms and standards for evaluation in the UN system.

#### 2. PROJECT CONTEXT

Energy consumption in Ecuador is very inefficient compared to the peer developing countries, mainly due to the low energy price set up by the Government. In order to increase energy efficiency (EE) in the country, the government has developed a National Plan for Energy Efficiency in 2004, created the new Ministry of Electricity and Renewable Energy (MERE) in July 2007 inter-alia, to coordinate and implement this National Plan.

Promoting the efficient and rational use of energy is one of six long-term goals of the Ministry. However, recognizing the enormous potential of energy savings to the entire economy, and particularly in the industrial sector, and considering the increasing pressure to reduce industrial energy intensity in order to improve competitiveness and reduce emissions CO<sub>2</sub>, the government requested the United Nations Industrial Development Organization (UNIDO) to develop the project on Energy Efficiency for Industry in Ecuador, to promote energy efficiency improvements in the Ecuadorian industry through the development of national energy management standards and application of systems optimization.

The main objective of the project is to promote Energy Efficiency (EE) improvements in the industry sector of Ecuador through the development and implementation of national energy management standards and application of system optimization.

Detailed background information of the project can be found the Terms of Reference (TORs) for the terminal evaluation.

### 3. DUTIES AND RESPONSIBILITIES

MAIN DUTIES	Concrete/ Measurable Outputs to be achieved	Working Days	Location
1. Review project documentation and relevant country background information (national policies and strategies, UN strategies and general economic data); determine key data to collect in the field and adjust the key data collection instrument of 3A accordingly (if needed); Assess the adequacy of legislative and regulatory framework relevant to the project's activities and analyze other background info.	<ul style="list-style-type: none"> <li>Adjust table of evaluation questions, depending on country specific context;</li> <li>Draft list of stakeholders to interview during the field missions;</li> <li>Brief assessment of the adequacy of the country's legislative and regulatory framework.</li> </ul>	2 days	HB
2. Briefing with the UNIDO Office for Independent Evaluation, project managers and other key stakeholders at UNIDO HQ.  Preparation of the Inception Report	<ul style="list-style-type: none"> <li>Detailed evaluation schedule with tentative mission agenda (incl. list of stakeholders to interview and site visits); mission planning;</li> <li>Division of evaluation tasks with the National Consultant.</li> <li>Inception Report</li> </ul>	2 days	Vienna, Austria
3. Conduct field mission to Ecuador in <b>June/July 2015<sup>4</sup></b> .	<ul style="list-style-type: none"> <li>Conduct meetings with relevant project stakeholders, beneficiaries, etc. for the collection of data and clarifications;</li> <li>Agreement with the National Consultant on the structure and content of the evaluation report and the distribution of writing tasks;</li> <li>Presentations of the evaluation's initial findings, draft conclusions and recommendations to stakeholders in the country at the end of the missions.</li> </ul>	7 days	Ecuador
4. Present overall findings and recommendations to the stakeholders	<ul style="list-style-type: none"> <li>After field mission(s): Presentation slides,</li> </ul>	1 days	Vienna, Austria

<sup>4</sup> The exact mission dates will be decided in agreement with the Consultant, UNIDO HQ, and the country counterparts.

MAIN DUTIES	Concrete/ Measurable Outputs to be achieved	Working Days	Location
at UNIDO HQ	feedback from stakeholders obtained and discussed		
5. Prepare the evaluation report according to TOR; Coordinate the inputs from the National Consultant and combine with her/his own inputs into the draft evaluation report.	• Draft evaluation report.	6 days	HB
6. Revise the draft project evaluation reports based on comments from UNIDO Office for Independent Evaluation and stakeholders and edit the language and form of the final version according to UNIDO standards.	• Final evaluation report.	3 days	HB
	<b>TOTAL</b>	<b>21 days</b>	

#### MINIMUM ORGANIZATIONAL REQUIREMENTS

##### Education:

Advanced degree in environment, energy, engineering, development studies or related areas

##### Technical and functional experience:

- Minimum 10 years' experience in environmental projects
- Knowledge about multilateral technical cooperation and the UN, international development priorities and frameworks.
- Knowledge of and experience in environmental projects management and/or evaluation (of development projects)
- Working experience in developing countries
- Experience in evaluation of GEF energy projects and knowledge of UNIDO activities an asset

##### Languages:

Fluency in written and spoken English is required.

##### Reporting and deliverables

- 1) At the beginning of the assignment the Consultant will submit a concise Inception Report that will outline the general methodology and presents a concept Table of Contents;
- 2) The country assignment will have the following deliverables:
  - Presentation of initial findings of the mission;
  - Draft report;
  - Final report, comprising of executive summary, findings regarding design, implementation and results, conclusions and recommendations.
- 3) Debriefing at UNIDO HQ:
  - Presentation and discussion of findings;

- Concise summary and comparative analysis of the main results of the evaluation report.

All reports and related documents must be in English and presented in electronic format.

**Absence of conflict of interest:**

According to UNIDO rules, the consultant must not have been involved in the design and/or implementation, supervision and coordination of and/or have benefited from the program/project (or theme) under evaluation. The consultant will be requested to sign a declaration that none of the above situations exists and that the consultants will not seek assignments with the manager/s in charge of the project before the completion of her/his contract with the UNIDO Office for Independent Evaluation.

## TERMS OF REFERENCE FOR PERSONNEL UNDER INDIVIDUAL SERVICE AGREEMENT (ISA)

<b>Title:</b>	National evaluation consultant
<b>Main Duty Station and Location:</b>	Home-based
<b>Mission/s to:</b>	Travel to potential sites within Ecuador
<b>Start of Contract (EOD):</b>	1 May 2015
<b>End of Contract (COB):</b>	31 July 2015
<b>Number of Working Days:</b>	21 days spread over 3 months

### ORGANIZATIONAL CONTEXT

The Office for Independent Evaluation is responsible for the independent evaluation function of UNIDO. It supports learning, continuous improvement and accountability, and provides factual information about result and practices that feed into the programmatic and strategic decision-making processes. Evaluation is an assessment, as systematic and impartial as possible, of a program, a project or a theme. Independent evaluations provide evidence-based information that is credible, reliable and useful, enabling the timely incorporation of findings, recommendations and lessons learned into the decision-making processes at organization-wide, program and project level. The Office for Independent Evaluation is guided by the UNIDO Evaluation Policy, which is aligned to the norms and standards for evaluation in the UN system.

### PROJECT CONTEXT

The National Evaluation Consultant will evaluate the projects according to the Terms of Reference under the leadership of the Team Leader (International Evaluation Consultant). S/he will perform the following tasks:

MAIN DUTIES	Concrete/measurable outputs to be achieved	Expected duration	Location
Review and analyze project documentation and relevant country background information (national policies and strategies, UN strategies and general economic data); in cooperation with the Team Leader: determine key data to collect in the field and prepare key instruments in both English and local language (questionnaires, logic models) to collect these data through interviews and/or surveys during and prior to the field missions; Coordinate and lead interviews/	<ul style="list-style-type: none"> <li>List of detailed evaluation questions to be clarified; questionnaires/interview guide; logic models; list of key data to collect, draft list of stakeholders to interview during the field missions</li> <li>Drafting and presentation of brief assessment of the adequacy of the country's legislative and regulatory framework in the context</li> </ul>	8 days	Home-based

MAIN DUTIES	Concrete/measurable outputs to be achieved	Expected duration	Location
<p>surveys in local language and assist the Team Leader with translation where necessary;</p> <p>Analyze and assess the adequacy of legislative and regulatory framework in Ecuador, specifically in the context of the project's objectives and targets; provide analysis and advice to the Team Leader on existing and appropriate policies for Ecuador for input to the midterm evaluation.</p>	of the project.		
<p>Review all project outputs/publications/feedback;</p> <p>Briefing with the evaluation team leader, UNIDO project managers and other key stakeholders.</p> <p>Coordinate the evaluation mission agenda, ensuring and setting up the required meetings with project partners and government counterparts, and organize and lead site visits, in close cooperation with the Project Management Unit.</p> <p>Assist and provide detailed analysis and inputs to the Team Leader in the <b>Preparation of the Inception Report.</b></p>	<ul style="list-style-type: none"> <li>• Interview notes, detailed evaluation schedule and list of stakeholders to interview during the field missions.</li> <li>• Division of evaluation tasks with the Team Leader.</li> <li>• Inception Report.</li> </ul>	7 days	Home-based (telephone interviews)
<p>Coordinate and conduct the field mission with the Team Leader in cooperation with the Project Management Unit, where required;</p> <p>Consult with the Team Leader on the structure and content of the evaluation report and the distribution of writing tasks.</p>	<ul style="list-style-type: none"> <li>• Presentations of the evaluation's initial findings, draft conclusions and recommendations to stakeholders in the country at the end of the mission.</li> <li>• Agreement with the Team Leader on the structure and content of the evaluation report and the distribution of writing tasks.</li> </ul>	7 days (including travel days)	Ecuador
<p>Prepare inputs and analysis to the evaluation report according to TOR and as agreed with the Team Leader.</p>	Draft evaluation report prepared.	6 days	Home-based
<p>Revise the draft project evaluation reports based on comments from UNIDO Office for Independent Evaluation and stakeholders and edit the language and form of the final version according to UNIDO standards.</p>	Final evaluation report prepared.	2 days	Home-based
<b>TOTAL</b>		<b>30 days</b>	

## REQUIRED COMPETENCIES

### **Core values:**

1. Integrity
2. Professionalism
3. Respect for diversity

### **Core competencies:**

1. Results orientation and accountability
2. Planning and organizing
3. Communication and trust
4. Team orientation
5. Client orientation
6. Organizational development and innovation

### **Managerial competencies (as applicable):**

1. Strategy and direction
2. Managing people and performance
3. Judgement and decision making
4. Conflict resolution

## MINIMUM ORGANIZATIONAL REQUIREMENTS

**Education:** Advanced university degree in environmental science, engineering or other relevant discipline like developmental studies with a specialization in industrial energy efficiency and/or climate change.

### **Technical and functional experience:**

- A minimum of five years practical experience in the field of environment and energy, including evaluation experience at the international level involving technical cooperation in developing countries.
- Exposure to the needs, conditions and problems in developing countries.
- Familiarity with the institutional context of the project in the Ministry of Industry and Trade is desirable.

**Languages:** Fluency in written and spoken English is required.

### **Absence of Conflict of Interest:**

According to UNIDO rules, the consultant must not have been involved in the design and/or implementation, supervision and coordination of and/or have benefited from the program/project (or theme) under evaluation. The consultant will be requested to sign a declaration that none of the above situations exists and that the consultants will not seek assignments with the manager/s in charge of the project before the completion of her/his contract with the Office for Independent Evaluation.

## Annex 6. List of Interviewees

Name	Position
Bettina Schreck	UNIDO Project Manager
Silvia Alamo	UNIDO Office for Independent Evaluation
Michaela Berndl	UNIDO Office for Independent Evaluation
Javier Guarnizo	Senior officer UNIDO Office for Independent Evaluation
Jose Pena	National ONUDI/MEER project coordinator.
María Fernanda Valencia	Project Team Member/ MEER
Alex Poso	National Energy Efficiency Director. MEER
Carlos Dávila	Subsecretario MEER.
Jefferson Sánchez	Subsecretaria de calidad. MIPRO
Paulina Vicuña	Subsecretaria de Desarrollo Industrial. MIPRO
Ing. Carlos Álvarez	Jefe de Mantenimiento. TEIMSA
Danilo Ramírez	Auxiliar de Gerencia de Planta. TEIMSA
Fernando Díaz	Sub gerente de tintura y acabados. TEIMSA
Tatiana Ortiz	Asistente de Gerencia de Planta. TEIMSA
Rodrigo Barzola	Coordinador eléctrico. Cervecería Guayaquil
Erick D. Chacón	Gerente de Mantenimiento y Servicios. Cervecería Guayaquil
Elvira Tovar	Coordinadora SGI. Cervecería Guayaquil
Pablo Ruiz	Equipo de energía. ENKADOR
Ángel Tobar	Equipo de Energía. Ideal Alambrec
Jaime Rojas	Equipo de Energía. Ideal Alambrec
Luis Valero	Coordinador sistemas de Gestión. Plásticos ecuatorianos SA
John Jayro	Jefe de Impresión. Plásticos ecuatorianos SA
Jorge Saltos Ramírez	Jefe de Mantenimiento. Plásticos ecuatorianos SA
Alberto Fernández	Supervisor Gestión de Sistemas Internos. Plásticos ecuatorianos SA
Johnny Jarrin	Jefe de producción. Plásticos ecuatorianos SA
Marcela Espinosa	Gerente de recursos Humanos. Plásticos ecuatorianos SA
Blaz Venezenic	Gerente Operaciones. Plásticos ecuatorianos SA
Francisco Cuesta	Jefe de Calidad. Plásticos ecuatorianos SA
Carlos Verdugo	Equipo de Energía. Novacero Lasso
Roberto Logroño	Ministerio de Ambiente
Daniel Varela	Ministerio de Ambiente



## **Annex 7. List of documents reviewed**

1. Terms of Reference Independent terminal evaluation of UNIDO project: Industrial Energy Efficiency in Ecuador.
2. PROJECT IDENTIFICATION FORM (PIF). Submission Date: 1 October 2009. Re-submission: 12 November 2009.
3. REQUEST FOR CEO ENDORSEMENT/APPROVAL. Submission Date: 29 March 2011. Re Submission Date: 21 April 2011.
4. Proyecto de cooperación externa no reembolsable: Eficiencia Energética para la Industria en el Ecuador (EEI). (No reimbursement foreign cooperation project: Industrial Energy Efficiency in Ecuador).MEER. 2011.
5. Minutas del Taller de validación de documentos de proyecto. Proyecto de Eficiencia Energética Industrial en el Ecuador. (Notes of inception workshop of the Industrial Energy Efficiency in Ecuador project). Quito – 13/01/2011.
6. Carta de Entendimiento para la Ejecución del Proyecto “Eficiencia Energética Industrial en Ecuador”. (Letter of understanding for implementation of the Industrial Energy Efficiency in Ecuador).2012.
7. Anexo 1. Acuerdo MEER - Técnico formado en la implementación de sistemas de gestión de energía en concordancia con los requisitos de la Norma ISO 50001 (Annex 1. Agreement MEER – trainee for implementation of energy management system following ISO Standard 50001). Enero 2014 o Junio 2014.
8. Documentación sobre la implementación de los SGEEn en 33 empresas. (Documentation on implementation of EMS in 33 companies)
9. Final Report. Energy Management System. MSc Alberto José Fossa, International expert, UNIDO consultant. October, 2013.
10. Final report. Motor System Optimization (MSO). Capacity Building Program. Prof. Anibal De Almeida - International MSO-IEE Expert, Prof. Enrique C. Quispe-International MSO-IEE Expert. June 2014.
11. Informe final. Revisión de informes de estudios sobre optimización de sistemas de motores. (Final Report. Review of reports on studies on motor system optimization). Danilo Alvarado Polo. Mayo 2015.
12. Final report. Steam and cogeneration system focus. Greg Harrell, Ph.D., P.E. – Lead Instructor UNIDO International Consultant in Steam, Cogeneration, and Compressed Air Systems. June 2014.
13. Contracts between The United Nations Industrial Development Organization and companies implementing pilot Project related to reimbursement of incremental operating costs and incremental capital costs for eligible enterprises for industrial energy efficiency in Ecuador. 2015.

14. Reportes de ejecución de gastos. Ministerio de Finanzas. (Report of expenses. Ministry of Finance) 2012, 2013, 2014, 2015.
15. UNIDO annual project implementation report (PIR). 2012, 2013, 2014, 2015.
16. Mid Term Evaluation Report. Industrial Energy Efficiency in Ecuador. July 2013.
17. UNIDO Evaluation Policy. January 2015.
18. Glossary of evaluation and results based management (RBM) terms. OECD. 2000.
19. Review of the use of 'Theory of Change' in international development. Review Report Isabel Vogel, April 2012.