

Independent Terminal Evaluation

GEF UNIDO Reducing Greenhouse Gas Emissions through Improved Energy Efficiency in the Industrial Sector in Moldova

UNIDO ID: 103043

GEF Project ID: 3719



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO INDEPENDENT EVALUATION DIVISION

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Abbreviations and acronyms

Abbreviation	Meaning
AEA	Austrian Energy Agency
BAS	Business Advisory Services in Moldova
BPID	Best Practice Information and Dissemination
BPR	Best Practice Recognition
CCO	Climate Change Office (under the Ministry of Environment)
CHP	Combined heat and power
COP	(UN Climate Change) Conference of the Parties
EBRD	European Bank for Reconstruction and Development
EE	Energy efficiency
EnMS	Energy management systems
EnPMI	Energy Performance Measurement and Indicators
EOP	End of project
ESCO	Energy service company
EU	European Union
EUREM	European Energy Manager
GDP	Gross Domestic Product
GEB	Global environmental benefits
GEF	Global Environment Facility
GHG	Greenhouse gas
GoM	Government of Moldova
IEE	Industrial energy efficiency
IEMC	Industrial Energy Manager Certification
LEDS	Low Emission Development Strategy until 2030
M&E	Monitoring and Evaluation
M%V	Monitoring and verification
MAEE	Moldovan Agency for Energy Efficiency
MEEF	Moldovan Energy Efficiency Fund
MoEC	Ministry of Economy
MoEN	Ministry of Environment
MoSEFF	Moldovan Sustainable Energy Financing Facility
MRV	Monitoring, reporting and verification
MTB	Monitoring, tracking and benchmarking
NEEAP	National Energy Efficiency Action Plan 2013-2015

Abbreviation	Meaning
NGO	Nongovernmental Organization
NIMS	Moldova National Institute of Standardization and Metrology
NCPC	National Clean Production Centre
NPM	National Project Manager
ODG/EVA	UNIDO Office for Independent Evaluation
PAA	Project Administrative Assistant
PAC	Project Advisory Committee
PIR	Project Implementation Report
PMU	Project Management Unit
PPG	Project preparation grant
PRF	Project results framework
RBM	Results Based Management
RCE	Request for CEO Endorsement
ROtI	Review of Outcomes to Impacts
SDG(s)	Sustainable Development Goal(s)
SEC	Specific energy consumption
SEMISE	Support to Energy Market Integration and Sustainable Energy in the NIS (EU funded)
SMART	Specific, measurable, achievable, relevant and time-bound
SSO	Steam systems optimization
TE	Terminal Evaluation
ToC	Theory of Change
TOE	Tonnes of oil equivalent
ToR	Terms of Reference
ToT	Training of trainers
TUM	Technical University of Moldova
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organisation
USD	United States Dollar

Glossary of evaluation-related terms

Term	Definition
Baseline	The situation, prior to an intervention, against which progress can be assessed.
Effect	Intended or unintended change directly or indirectly due to an intervention.
Effectiveness	The extent to which the development intervention's objectives were achieved or are expected to be achieved.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Impact	Positive & negative, intended & non-intended, directly & indirectly, long term effects that represent fundamental durable change in the condition of institutions, people & their environment brought about by the Project.
Indicator	Quantitative or qualitative factors that provide a means to measure the changes caused by an intervention.
Intermediate States	The transitional conditions between the Project's outcomes & impacts which must be achieved in order to deliver the intended impacts.
Lessons learned	Generalizations based on evaluation experiences that abstract from the specific circumstances to broader situations.
Logframe (logical framework approach)	Management tool drawing on results-based management principles used to facilitate the planning, implementation and evaluation of an intervention. It involves identifying strategic elements (activities, outputs, outcomes, impacts) and their causal relationships, indicators, and assumptions that may affect project success or failure. The logframe is also referred to in the report as the Project Results Framework (PRF)
Outcomes	The likely or achieved short- to medium-term behavioural or systemic effects to which the Project contributes, which help to achieve its impacts.
Outputs	The products, capital goods, and services that an intervention must deliver to achieve its outcomes.
Relevance	The extent to which an intervention's objectives are consistent with beneficiaries' requirements, country needs, global priorities and partners' and donor's policies.
Risks	Factors, normally outside the scope of an intervention, which may affect the achievement of an intervention's objectives.
Sustainability	The continuation of benefits from an intervention, after the development assistance has been completed.
Target groups	Specific entities for whose benefit an intervention is undertaken.

Figure 1: Administrative Map of the Republic of Moldova¹



¹ From the Fourth National Communications Report of the Republic of Moldova, pg 53

Executive Summary

Evaluation Background and Methodology

An independent terminal evaluation (TE) of the UNIDO-GEF Project in Moldova entitled “Reducing Greenhouse Gas Emissions through Improved Energy Efficiency in the Industrial Sector in Moldova” (hereafter, IEE Moldova Project or Project) was carried out during the period of February-September 2018. The IEE Moldova Project was launched in Moldova in June 2010 by UNIDO, executed by the Ministry of Environment and Ministry of Economy of the Republic of Moldova as co-financing partners, and was completed in December 2017 over a period of 7.5 years. This TE followed UNIDO Evaluation Policy and GEF Monitoring & Evaluation Policy. To deliver an evidence-based evaluation, data and information was sourced from key project documentation, desk studies, literature reviews, meetings with individuals and focus groups, and direct observations. The evaluation employed a participatory approach where key stakeholders were kept informed and consulted throughout the process.

Although this TE was conducted 18 months after most of the substantive activities have been completed, this delay has availed information regarding energy savings generated from the participating industrial entities. The primary challenge of this TE, however, has been to overcome the reluctance of industrial entrepreneurs in the private sector to sharing information with the evaluation team. While the evaluation has managed to meet 3 industrial enterprises in Moldova, meeting additional industrial enterprises would have been beneficial for the evaluation, especially to strengthen the rationale as to why IEE investments have not reached targeted levels.

Summary of the Main Evaluation Findings

Impact

Project impacts are summarized in Table A against intended outcomes of the Project Results Framework and the Theory of Change for the IEE Moldova Project.

Table A: Comparison of Intended Project Outcomes from the Inception Report to Actual Outcomes

Intended Outcomes in revised Project Results Framework of June 2010 and Theory of Change (see Figure 3)	Actual Outcomes as of December 2017
Goal: To reduce energy use related emissions of greenhouse gases produced by Moldova manufacturing sector activities and growth	Actual impact toward objective: Against a 20% target for cumulative reduction of CO _{2eq} emissions and the reduction of SEC (over the period 2012-2023), there is a strong likelihood that less than 5% was achieved due to the lower volume of IEE projects, and difficulties related to obtaining energy consumption information from other industrial enterprises, based on perceived reluctance on sharing information with competitors. See Table 7.
Objective: Improved energy efficiency of Moldovan Industrial Sector leading to reduced global environmental impact and enhanced competitiveness.	Actual impact toward objective: Against a target of 90 ktons CO _{2eq} of emission reductions, the Project achieved 125 ktons CO _{2eq} of lifetime reductions generated by industrial entities who have adopted EnMS and undertaken energy saving measures and EE investments, some with the assistance of the Project. Notwithstanding, 86% of these direct GHG emissions came from one project, the CHP-2 plant. See Para 57 for further details.
Outcome 1: Establishment of policy, legal and regulatory frameworks that promote and support sustainable	Actual Outcome 1: Policy, legal and regulatory frameworks have been established to promote and support sustainable industrial energy efficiency. This includes an IEE Monitoring, Tracking and

Intended Outcomes in revised Project Results Framework of June 2010 and Theory of Change (see Figure 3)	Actual Outcomes as of December 2017
industrial energy efficiency and stimulate the creation of a national market for IEE products and services.	Benchmarking (MTB) Program, IEE Best Practice Dissemination Program, and IEE Best Practice Recognition Program (see Table 9) and an Energy Auditor Certification program (see Para 67). This has stimulated the creation of a small market for IEE products and services.
Outcome 2: Increased adoption by Moldovan industries of energy efficient technologies and energy management as integral part of their business practices.	Actual Outcome 2: Despite the Project qualifying 14 persons as EnMS experts and 13 certified as SSO experts, adoption by Moldovan industries of energy efficient technologies and energy management has not increased to targeted levels. This includes only 8 companies certified for EN16001 or ISO 50001 against a target of 10 companies, and only 4 companies with IEE service contracts against a target of 400 over the 2013 -2023 period (see Table 10).
Outcome 3: Broader set of case studies on IEE best practices available in Moldova, notably for refrigeration and compressed air systems amongst other EE options.	Actual Outcome 3: Only 3 IEE investments were completed against a target of 6 which did not provide for a “broader set of case studies on IEE best practices being available in Moldova” that could facilitate a rapid rise in interest by the Moldovan industrial sector in energy efficiency (see Para 76).

Project Design

The overall design of the IEE Moldova Project is *satisfactory* due to its clear focus on building institutional capacity and helping local industrial stakeholders to become more knowledgeable on the benefits, planning, design, implementation, operation and monitoring of IEE investments. With lessons learned from implementing IEE pilot projects and strengthened local technical and managerial capacities, the Project was to play a role in assisting the Government in strengthening its regulatory framework and policies to promote IEE on a national scale (see Para 43). The success of the Project was to have led to establishment of market-oriented policies and regulatory instruments to sustain improvements of Moldovan industries toward best international standards for energy performance (see Para 42).

Relevance

The relevance of the IEE Moldova Project was *highly satisfactory* as it is pertinent to international, global and national priorities, the needs of the Moldovan industrial sector, donor priorities, and UNIDO’s mandate, competences, and strategy for inclusive and sustainable industrial development (see Paras 51-55).

Effectiveness

Project effectiveness was *moderately satisfactory*. It was effective in setting up numerous policy support activities including preparing M&V and benchmarking programs, engaging the Moldova National Institute of Standardization and Metrology (NIMS) on improving the quality of national standard settings, promoting and supporting the adoption of the ISO 50001 energy management systems and steam system optimization (SSO) measures, setting up of the MAEE website, strengthening linkages with other sources of IEE funding, and support for the Energy Auditor Certification program (see Paras 63-66). The Project was also effective in its training program for EnMS

and SSO experts and delivery of practical guides for EnMS (see Paras 69-71) with feedback from trainees of the need for continuation of these training activities that provide credible and technology neutral energy performance solutions (see Para 113). This training, however, did not result in IEE investments to targeted levels in part due to similar assistance offered from MoSEFF, and many enterprises who took EnMS training not reporting EE investments or housekeeping efforts to the Project (see Para 72).

Efficiency

Project efficiency was *moderately satisfactory* due to the Project substantially exceeded its planned timespan from 3 to 7 years. After the first 2 years of delivering training and capacity building activities, a slower resource burn rate was experienced after 2012 due to extensive efforts to identify pilot investments and to support EnMS deployment for up to 9 industrial enterprises. By July 2016, 94% of the GEF budgeted was expended, leaving metering work with one pilot project as the only outstanding expenditure to be implemented (see Para 74 and Table 10). Delays in decision-making on IEE investments were related to management changes within many of the industrial enterprises, and reluctance of some industrial enterprises to invest in energy efficiency due to poor economic outlook of Moldova for their businesses (see Para 79). These conditions made efficient implementation of the IEE Moldova Project difficult.

Sustainability of Benefits

Sustainability of the Project is only *moderately likely* given the poor economic conditions in Moldova making industrial entities less willing to invest in energy efficiency, local funds at MAEE to support being available but likely in insufficient amounts, only a few of the experts trained by the Project in EnMS and SSO being able to develop a pipeline of new EnMS-EE assignments with industrial clients, and numerous and recent changes of ministries with oversight on the energy sector in Moldova that leads to the weakening of government capacity to regulate energy efficiency (see Para 82).

Monitoring and Evaluation (M & E)

M&E for the Project was *moderately unsatisfactory*. The M&E plan as specified in the RCE document was generic, stating that M&E was to be conducted “in accordance to established UNIDO and GEF procedures” leaving the interpretation of M&E to the PMU. The PRF did not have a complete set of SMART indicators (as detailed on Para 45). Implementation of the M&E plan had an issue with the reporting in the PIRs that was only up to the outcome level (see Para 96). Despite these shortcomings, there were numerous examples of adaptive management resulting from information provided in the PIRs (see Para 98). M&E budgeting was a mere USD27,000 in the RCE Document with this budget appearing to only consist of the final evaluation. There is an appearance that that the ongoing M&E efforts were covered under Project management costs (see Para 100).

Quality at Entry/Preparation and Readiness

The Project objectives were reasonably clear with 3 distinct components designed to strengthen local capacity to support and encourage IEE investments in Moldova. However, the design of a 3-year Project duration was clearly insufficient time to achieve all targets and objectives. While the CCO was the primary executing agency for the IEE Moldova Project, the Project at its commencement in August 2010 was not able to become fully operational until the full establishment of the MAEE was completed, which did not occur until May 2011, 9 months after the commencement of the Project. As such, the quality of entry and the preparation and readiness was assessed as *moderately satisfactory* (see Para 104).

Implementation Approach

The implementation approach of the Project was *satisfactory* in building the capacities of relevant institutions, technical and academic specialists, and private industrial businesses for the purposes of enabling these stakeholders to plan, design and implement energy efficiency measures for the Moldovan industrial sector. The implementation approach of the Project follows similar approaches to other UNIDO IEE projects globally with technical assistance provided for regulatory strengthening, national promotional programs, capacity building for local energy professionals and others involved in the supply chain for energy efficiency, followed by pilot EE investments (see Para 121).

UNIDO Backstopping

UNIDO's backstopping performance was assessed as *satisfactory* in undertaking the responsibility for the Project's timely implementation, delivery of planned outputs, technical backstopping, and monitoring achievement of expected outcomes. This was conducted in a manner responsive to the requests and needs of the GoM and Moldovan industrial stakeholders (see Para 112). This resulted in feedback that the participation and reputation of UNIDO was highly valued by Project stakeholders (see Para 113). Despite the less successful outcomes of the Project, UNIDO is well-positioned to continue the much-needed IEE technical assistance and awareness raising to Moldovan industrial stakeholders (see Para 115).

Conclusions

The overall Project was assessed as *moderately satisfactory*. It was a significant contributor to raising awareness and improved technical knowledge for industrial energy efficiency in Moldova under challenging economic and institutional conditions (Para 131). Despite the positive feedback on the IEE Moldova Project, the Project was not able to meet its intended targets for IEE investments due to poor economic conditions resulting in reluctance of industrial entities to invest in EE, institutional changes delaying the finalization of a new draft Law on Energy and causing industrial stakeholders to defer their decisions on IEE investments, general reluctance of industrial stakeholders to share commercial information on energy usage, and reluctance of senior industrial managers to depart from old mindsets on modernizing energy systems (see Para 132). There still remains an insufficient level of awareness and technical competency of energy efficiency amongst industrial stakeholders and public authorities (Para 133).

Summary of Lessons Learned and Recommendations

Lesson #1: Two means of effective initial engagement of industrial entities in Moldova includes the sharing of energy consumption information from regional counterparts and the awareness raising and training on Energy Management Systems and ISO 50001 (see Para 134).

Lesson #2: Project preparations need to carefully consider the level of efforts and time required to build the appropriate levels of capacity in proportion to the size of the Project grant (see Para 135).

Lesson #3: A 5-year project duration is not sufficient for a more complete transformation of the Moldovan industrial sector considering prevailing business environment in Moldova characterized by industrial entities reluctant to allow insight in their operations, not sharing energy information amongst themselves, and the general malaise of Moldova's economy (see Para 136).

Lesson #4: Lack of readiness of a partner institution can have a significant impact on a project's ability to achieve its targeted GEBs (see Para 137).

Recommendation #1 (to the Ministry of Economy and UNIDO): Seek additional resources for the continuation of awareness raising events and specific training workshops for industrial entities, experts and service providers in Moldova (see Para 138).

Recommendation #2 (to Ministry of Economy): Ensure that programmes and secondary legislation to be developed for implementation of the new Energy Efficiency Law adopted in July 2018 will promote and support implementation of EnMS-ISO50001 and Steam System Optimization, stimulating market demand for the services of existing and qualified Moldovan experts (see Para 139).

Recommendation #3 (to UNIDO): Expand efforts to collect and analyse energy performance information of regional industries and power generation facilities that can be shared with local Moldovan industries (see Para 140).

Recommendation #4 (to the Ministry of Economy and UNIDO): Identify an institution or agency with capacity to support industries to adopt EE measures through arrangements that would raise the level of trust between qualified energy professionals, the nominated agency and the industrial entity (see Para 141).

Recommendation 5 (to the Ministry of Economy and UNIDO): Design a mechanism through which industries can share energy management and performance data (see Para 142).

Recommendation 6 (to the Ministry of Economy and UNIDO): Provide assistance to GoM on reviewing and amending or easing “prescriptive” technical regulations that are outdated and have the unintended effects of increasing the cost of EE measures, making decision makers reluctant to implement technically sound and cost-effective EE changes, emboldening “old mindsets” and inefficient practices just for reasons of compliance with provisions of the “Law on Technical Regulation 2006” (see Para 143).

1 Evaluation Objectives, Methodology, Process

1.1 Introduction and Background on the Terminal Evaluation

1. An independent terminal evaluation of the UNIDO Project in Moldova entitled “Reducing Greenhouse Gas Emissions through Improved Energy Efficiency in the Industrial Sector in Moldova” (hereafter, IEE Moldova Project or Project) was included as a part of the 2010 Project design. Following UNIDO Evaluation Policy and GEF Monitoring & Evaluation Policy, this Terminal Evaluation (TE) has been carried out during the period of February-September 2018 by an independent team including an international consultant (Mr. Roland Wong), who also acted as the team leader, and a national consultant (Ms. Ludmila Gofman).
2. The IEE Moldova Project was launched in Moldova in June 2010 by UNIDO, and executed by the Ministry of Environment and Ministry of Economy of the Republic of Moldova as co-financing partners. IEE Moldova was completed in December 2017 over a period of 7.5 years.

1.2 Objectives and Scope of the Terminal Evaluation

3. Guided by Terms of Reference given by UNIDO (see Annex 1), this evaluation had 3 objectives:
 - Assess project performance in terms of relevance, effectiveness, efficiency, sustainability of benefits, and progress to impact;
 - 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;
 - Develop findings, lessons, and recommendations that could be used to enhance the design of new projects and implementation of ongoing projects of UNIDO.
4. This TE covers the Project’s duration from its start on 18 August 2010 until 31 December 2017, which included several no-cost extensions (as detailed in Para 98).
5. In terms of scope, the TE assessed the extent to which the Project achieved its objective of “improving energy efficiency of the Moldovan industrial sector that leads to reduced global environmental impact and enhanced competitiveness”. In this context, the evaluation considered the extent to which the technical assistance of the IEE Moldova Project was effective in building local capacity for IEE and the suitability of the Moldovan Energy Efficiency Agency as the responsible government entity for achieving this objective.
6. The evaluation also assessed the likelihood of sustainability of Project results following completion of the IEE Moldova Project. This involved looking into the extent to which the Project provided assistance to: i) establish policy, legal and regulatory framework for promoting and supporting sustainable IEE and stimulating creation of a national market for IEE products and services; ii) facilitate increased adoption by Moldovan industries of energy efficient technologies and energy management as integral part of their businesses; iii) increase the availability of a broader set of case studies on IEE best practices to Moldovan industrial entities, notably for refrigeration and compressed air systems amongst other energy efficiency (EE) options.

1.3 Evaluation Methodology

7. The TE was carried out by an independent team in accordance with the required guidance²

² UNIDO’s 2015 Evaluation Policy, UNIDO’s 2006 Guidelines for the Technical Cooperation Project and Project Cycle, GEF

following criteria elaborated in the evaluation's ToR, which were rated using UNIDO's 6-point scale, with justifications elaborated through the Report's main body and findings.

8. The evaluation employed a participatory approach where key stakeholders were kept informed and consulted throughout the process. The evaluation team liaised with UNIDO's Independent Evaluation Division regarding methodological issues and the conduct of the evaluation.
9. To deliver an evidence-based qualitative and quantitative evaluation, data and information was sourced from key project documentation, desk studies, literature reviews, meetings with individuals and focus groups, and direct observations. Documentation was provided by the UNIDO Project Manager based in Vienna, and the Project Management Unit (PMU) housed within the Climate Change Office (under the Ministry of Environment) in Moldova, and some of the owners and managers who implemented the IEE pilot projects. Most of this information was accessible and made available in a timely manner to the evaluation team. During the 1-6 March 2018 mission to Chisinau, 8 interviews were conducted with a range of key stakeholders from the Government ministries, the UNIDO Field Office in Chisinau, UNIDO staff in Vienna, to the owners and managers of the various industrial enterprises implementing IEE pilot projects, and the energy management and IEE specialists trained by the Project.
10. The evaluation methodology consisted of:
 - a review of Project documents;
 - a review of the validity of IEE Moldova's Theory of Change. This was to involve a re-examination of the Project Results Framework (PRF) against which Project performance is evaluated;
 - briefings at UNIDO HQ in Vienna prior to mission travel to Chisinau;
 - interviews with the Project Management Unit (PMU) at the CCO in Chisinau, personnel associated with Project management, country focal points from key ministries of the Government of Moldova, and project beneficiaries;
 - field visits to various SME industrial facilities that were targeted as pilot IEE projects to validate progress and effectiveness of IEE measures undertaken;
 - de-briefing with PMU staff in Chisinau;
 - de-briefing with UNIDO HQ in Vienna on mission findings;
 - follow-up phone conversations, emails and reporting writing from home base; and
 - a period of additional gathering of information, validation of findings and editing of draft report to reflect factual accuracy of the findings.
11. Steps were undertaken to enhance stakeholder engagement and the quality of consultation:
 - i) interviewees were informed about the aims of the TE and guided in their consultation responses through a semi-structured protocol;
 - ii) well-formulated, open-ended questions and further probes were used to promote balanced reflection, generate new insights, and yield higher quality information (as opposed to yes/no questions or an 'audit' approach), as it was considered that input to this evaluation required contextualisation, complex description, and explanation;
 - iii) interviewees were assured of the anonymity and confidentiality of their input whenever deemed appropriate.

1.4 Challenges and Limitations

12. The IEE Moldova Project was substantially completed by the end of 2016 with less than 2% of the GEF budget unallocated in 2017. The Terminal Evaluation was actually conducted 18

months after most of the substantive activities have been completed. Though this is later than recommended with GEF and UNIDO Evaluation Guidelines for an evaluation, the delay in the evaluation has availed information regarding energy savings generated from the participating industrial entities.

13. The primary challenge of this evaluation, however, has been to overcome the reluctance of a significant proportion of industrial entrepreneurs in the private sector to sharing information with the evaluation team. This would include energy performance data of their energy efficiency demonstration projects or EE projects they have financed themselves. While the evaluation has managed to meet 3 industrial enterprises in Moldova, meeting additional industrial enterprises would have been beneficial for the evaluation, especially to strengthen the rationale as to why other industrial enterprises have not made IEE investments.

2 Country and Project Background

2.1 Country Background

14. Moldova has a population of 3.5 million, with less than 43% of the population living in urban areas. In 2017, Moldova had a GDP of USD 8.13 billion, with a GDP per capita of USD 2,165 and a GDP growth rate of 4.5% in 2017. Moldova's economy as of 2017 consists of 55.4% of its GDP in the service sector with industry at 17.9% and agriculture 12.2%³. Moldova's economy, however, is highly reliant on former Soviet countries for energy and raw materials. This includes the import of natural gas and coal for the generation of the country's electricity, and primary fuel for its industry and CHP plants mainly located in Chisinau.
15. In terms of consumption, the energy intensity in Moldova is still relatively high despite a significant decrease in overall energy consumption since 2005. With current levels of energy intensity being significantly higher than comparable and modern technologies and processes within the EU and globally, there is scope for substantial improvements for energy efficiency in Moldova. Numerous factors contribute to overall inefficiencies of energy consumption including ageing technology, equipment and networks, and operation of systems well below design loads.
16. The fivefold increase in average annual natural gas import prices from USD 76.1/1000 m³ in 2005 to USD379.6/1000 m³ in 2013 has resulted in steep tariff increases for gas supplies as well as locally produced electricity and heat⁴. At the commencement of the IEE Moldova Project, the natural gas price was to USD191/1000 m³ in 2009, more than double the price of 2005. These price increases continue to be a primary driving force behind the search for alternative energy sources, and also energy efficiency and the optimisation of energy consumption in all sectors of the Moldovan economy. Notwithstanding that consumption of natural gas has decreased from 2005 to the present by more than 25%, Moldova's reliance on energy imports exposes its economy to global energy pricing, a threat to its energy security. With the 2009 increases in the prices of imported power and natural gas, the cost of electricity generation and supply of heat to Moldovan residents, both rural and urban, and industry exceeded tariffs being paid by these consumers. As a consequence, local power generation companies have been operating at a loss for several years, and local industries are much less competitive.

³ <https://www.statista.com/statistics/513314/moldova-gdp-distribution-across-economic-sectors/>

⁴ Report on the activity of the National Agency for Energy Regulation in 2013, Chisinau, 2014

2.2 Sector-specific issues of concern to the project

17. As of 2015, the industrial sector was the third highest consumer of energy in Moldova after the residential and transport sectors, consuming the equivalent of 460,000 TOE⁵. Comparing this to 2010 at the commencement of the IEE Moldova Project, industrial sector was the 2nd highest consumer of energy in Moldova, consuming the equivalent of 675,000 TOE. This reduction of energy consumption in the industrial sector is not necessarily a reflection of energy efficiency, but rather the fluctuations of industrial outputs as an indicator of the health of Moldova's economy over this period of time.
18. The primary issue of concern being addressed by the IEE Moldova Project is the high energy intensity of the country's industrial activities per unit of output. As of 2015, an estimated 88% of Moldova's industrial production is in processing that includes the food and drinks industry (including processing and canning of meat and meat products, fruit and vegetables, and production of dairy products, pastry, bread and baked products, confectionary, sugar, cocoa, chocolate, confectionary, alcoholic drinks, wine, and beer) as well as production of other products of non-ferrous minerals (such as manufacturing of glass and glass products, bricks and tiles, cement, lime, and gypsum)⁶.
19. Moldova's economy has been in decline since the 1990s, primarily due to the lack of domestic energy resources and raw materials. This has contributed considerably to the nation's strong dependence on other former Soviet Republics. Other reasons for the decline in Moldova's economy include its transition from a centralized economy to a market economy which has led to the loss of the industries located in Transnistria, frequent droughts affecting agrarian communities, and civil conflict. Energy efficiency is recognized by the Government of Moldova as a key measure to reduce operational costs of industrial sector entities in Moldova, and to increase the competitiveness of this sector.
20. The Fourth National Communications of the Republic of Moldova estimates that emissions from the industrial sector in a business-as-usual scenario (without energy efficiency) will result in GHG emissions being 16% higher than emissions from the baseline year of 1990. With energy efficiency measures, these industrial sector emissions can be reduced by 7.5 to 18.8% from the 1990 baseline year.
21. Notwithstanding this recognition of energy efficiency, the Moldovan industrial sector continues to operate at 3 to 4 times the high intensity levels in comparison to their counterparts in Western Europe. With energy prices spiking in 2008, barriers existed in Moldova to fully embracing energy efficiency in the industrial sector:
 - *A policy, institutional and legal framework that was not fully supportive of energy efficiency for industry in Moldova.* In addition to a paucity of financial and human resources, the focus of the GoM's energy sector was mainly on energy efficiency on the supply of heating and natural gas distribution networks. Past attempts to setup a national energy efficiency agency ended in 2006;
 - A lack of understanding amongst decision-makers in the industrial sector of the economic potential of energy efficiency investments. Though many of them are aware of their energy costs, they do not have available to them information on feasible energy efficiency options, options that are available in Moldova that can be applied to industrial enterprises, and examples of energy efficiency that exist in Moldovan industrial enterprises;
 - Insufficient technical capacity within industrial enterprises and in the market to identify and develop and implement "technology neutral" IEE options. This lack of technical capacity is

⁵ <https://www.iea.org/statistics/statisticssearch/report/?country=Moldova&product=balances&year=2015>

⁶ Fourth National Communication of the Republic of Moldova available on: <http://clima.md/doc.php?l=en&id=4256&idc=81>

prevalent across the entire spectrum of energy efficiency development, from energy audits targeting energy efficiency to modern energy management practices (such as ISO 50001);

- *Difficulties in transitioning away from subsidized energy prices to real energy prices.* Prior to the start of IEE Moldova Project, energy subsidies were being gradually removed. As of 2018, there are still residual subsidies on energy prices to industrial entities. As such, the importance of energy efficiency to industrial entity decision-makers has not yet become a top priority issue;
- *Difficulties faced by private and public enterprises to access credit and financing for energy efficiency.* Prior to the commencement of the IEE Moldova Project, there were no dedicated funds or credit lines in place for developing and implementing industrial energy efficiency projects.

22. Removal of these barriers to industrial energy efficiency formed the basis of the IEE Moldova Project, as described in the following section of this report.

2.3 Project Summary

2.3.1 Project Goal, Objective and General Information

23. The goal of the IEE Moldova Project was to “reduce energy use related emissions of greenhouse gases produced by Moldova manufacturing sector activities and growth”. The objective of the Project was to “improve energy efficiency of Moldovan industrial sector leading to reduced global environmental impact and enhanced competitiveness”.

- To achieve the goal and objective, the Project was structured into 3 components, each of which were themselves structured into a further 9 outputs, supported by monitoring and evaluation, and elaborated in a full Project Results Framework (PRF), an abbreviated version that is contained in
- No outcome for Component 3 in the PRF. The outcome for Component 3 is contained within the Component 3 narrative on pg 16 of the RCE Document.

24. The IEE Moldova Project design and its PRF were also re-examined using a Theory of Change (ToC). The ToC essentially describes the Project as a roadmap of pathways driven by regulatory or market drivers in combination with project activities to reach intended project outcomes and long-term outcomes to reflect the sustainability of the project activities. A ToC for the IEE Moldova Project was prepared for this TE as shown on Figure 3 that is closely linked to the IEE Moldova PRF in Annex 5, and using UNIDO’s “Generic Theory of Change for UNIDO Energy Efficiency Programs”. The logic of the ToC diagram flows in a horizontal direction (left to right) from component activities and outputs (brown boxes) to long term IEE impacts (dark blue boxes) of the IEE Moldova Project. In between, there are the IEE Moldova Project pathways (light pink ovals), direct outcomes (green boxes), and an intermediate state that lead to the intended long-term impacts of the IEE Moldova Project of “EE of industrial production is improved and GHG emissions are reduced” and “positive economic and social impacts achieved through increased productivity and profitability”. The initial assessment of the IEE Moldova PRF led to minor adjustments to the language of the ToC (essentially rewording objectives to outcomes and outcomes to outputs, etc.) which led to re-constructing the Project’s ToC.

25. with a full version in Annex 5.

26. The “Reducing Greenhouse Gas Emissions through Improved Energy Efficiency in the Industrial Sector in Moldova” (IEE Moldova Project) has 3 components:

- **Component 1:** Development, formulation and implementation of policies, regulation and programs to promote and support sustainable IEE. The purpose of this component was to address the inadequacy of existing policies, institutions and regulatory framework for effective promotion and support of industrial energy efficiency; the lack of technical expertise, resources and programs; and raising industry awareness of its economic potential for energy efficiency improvements and stimulating increased demand for IEE services;
- **Component 2:** Capacity building and development of tools for implementation of industrial systems optimization and energy management. The purpose of this component was primarily focused on addressing insufficient technical capacity within enterprises and in the market to identify, develop and implement industrial energy efficiency projects and continually improve energy performance; and
- **Component 3:** Industrial energy efficiency pilot projects. The purpose of this component was to assist industrial enterprises and their lack of funds for the development and preparation of IEE projects, and the lack of demonstrations of national IEE best practices to support awareness raising and IEE promotion.

27. General approved information of the IEE Moldova Project is presented in Table 1. Key dates of the IEE Moldova Project are provided on Table 2. Project expenditures broken down into Project components and co-financing are provided on Table 2. More details of co-financing are provided in Annex 4.

Table 1: General Information on the IEE Moldova Project

Project title	Reducing greenhouse gas emissions through improved energy efficiency in the industrial sector in Moldova
GEF ID number	3719
UNIDO Project No. and ID	GF/MOL/10/001 - 103043
Region	ECA
Country (ies)	Moldova
GEF Focal area and operational program:	GEF-4 Climate Change 2: Promoting energy efficiency in the industrial sector, SP2 – Industrial Energy Efficiency
Co-implementing agency(ies)	
GEF agencies (implementing agency)	UNIDO
Project executing partners	Ministry of Environment, Ministry of Economy of the Republic of Moldova
Project Size (FSP, MSP, EA)	MSP
Project CEO endorsement/Approval date	27 May 2010
Project implementation start date (PAD issuance date)	27 August 2010
Original expected implementation end date (indicated in CEO endorsement / Approval document)	31 December 2013
Revised expected implementation end date (if any)	31 December 2017

Project duration (months)	88 months
GEF grant (USD)	960,000
GEF PPG (USD) (if any)	40,000
Co-financing (USD) at CEO endorsement	3,302,500
Total project cost (USD) (GEF grant + co-financing at CEO endorsement)	4,292,500
Agency fee (USD)	n/a

Table 2: Key dates for the IEE Moldova Project

Milestone	Expected date	Actual date
Project CEO endorsement / Approval date	27 May 2010	18 August 2010
Project implementation start date (PAD Issuance Date)		
Original expected implementation end date (indicated in CEO endorsement/approval document)	31 December 2013	31 December 2017
Revised expected implementation end date (if any)	31 December 2014	31 December 2017
Terminal evaluation completion	March 2014	September 2018
Planned tracking tool date	March 2014	September 2018

Table 3: Summary of IEE Moldova Project Framework

Project Component	Activity Type ⁷	GEF financing (in USD)		Co-financing (in USD)	
		Approved	Actual ⁸	Promised	Actual
1. Development, formulation and implementation of policies, regulation to promote and support sustainable IEE.	a,b	240,000	n/a	188,500	169,000
2. Capacity building, development of tools for and implementation of industrial systems optimization and energy management	a, b	410,000	n/a	1,340,500	1,227,990
3. Industrial energy efficiency pilot projects	c	200,000	n/a	1,670,500	1,229,934
4. M&E- Final Evaluation	a	17,000	n/a	10,000	15,000
5. Project management	a	93,000	n/a	93,000	105,000
Total		960,000	960,000	3,302,500	2,746,924

2.3.2 Partners and Stakeholders

28. The project was launched with GEF funding, together with in-kind and cash contributions from UNIDO and co-financing partners in Moldova. As the implementing agency for the project, UNIDO was accountable for the GEF grant and in-kind contributions provided by the Moldovan government as well as in-kind and cash contributions from the private sector. Details concerning financing aspects are in Annex 4. Key stakeholders involved in project execution and their envisaged roles at the commencement of the IEE Moldova Project are outlined in

⁷ Activity types are:

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

⁸ Project expenditures were not monitored into separate components

29. . These actors were identified and engaged in the project based on their ability and interest to benefit from the project's outcomes and play a role in sustaining its results.

Table 4: Key Stakeholders involved in Project Execution

Stakeholder and Mandate	Role in the IEE Moldova Project
<p>Ministry of Environment (MoEN), Climate Change Office (CCO) Develops and promotes Moldova's state policy on environmental protection and rational use of natural resources, oriented toward creating conditions beneficial for life, the country's sustainable development, international cooperation, the approximation of national legislation to the European Union.</p>	<p>The CCO served as the Execution Agency for the Project, housing the PMU and ensuring the day-to-day operations of the local staff and project international experts and serving as the focal points for UNIDO missions during the Project.</p>
<p>Ministry of Economy (MoEC) – Agency for Energy Efficiency (MAEE) Amongst other responsibilities, MoEC was responsible for both the industrial and energy sectors. For the industrial sector, MoEC had oversight on:</p> <ul style="list-style-type: none"> • modernizing the traditional branches of the industry; • increasing the efficiency of the use of human, material and financial resources based on advanced industrial production technologies. <p>For the energy sector, MoEC had oversight on:</p> <ul style="list-style-type: none"> • General Energy Security and Efficiency Directorate • Energy Efficiency Agency • Energy Efficiency Fund • State Energy Inspectorate • Consolidated Unit for Implementing and Monitoring Energy Projects. 	<p>MoEC served as the lead executing partners for the Project, serving as member of the Project Advisory Committee (PAC), and facilitating the establishment of MAEE as a focal agency for IEE in Moldova to carry out work in Component 1 including:</p> <ul style="list-style-type: none"> • promoting the use of industrial tracking and benchmarking; • disseminating IEE best practices; • managing the IEE best practices recognition program; • managing the national industrial energy manager certification program.
<p>Technical University of Moldova (TUM) Serves as an important educational, scientific and cultural center, and as a center for engineering and economic specialties from the Moldova State University.</p>	<p>TUM were to serve as local training officers in the Steam System Optimization Expert Training, Energy Management Expert Training and other training sessions that targeted the food processing industrial sector. They were also to contribute to the development of the Industrial Energy Manager Certification Program.</p>
<p>Private sector industrial enterprises These are the primary beneficiaries of the IEE Moldova Project. Initially, 4 industrial enterprises were committed to IEE investments using the assistance of the Project.</p>	<p>These enterprises were the primary beneficiaries of the Project's technical assistance. These enterprises were to send personnel in charge of steam systems and energy management for courses offered by the Project and certification. These enterprises were also to be recipients of technical and fiscal assistance to ensure successes on their IEE investments.</p>

2.3.3 Key Events in Project Design and Implementation

30. documents the key milestones related to project design and implementation.

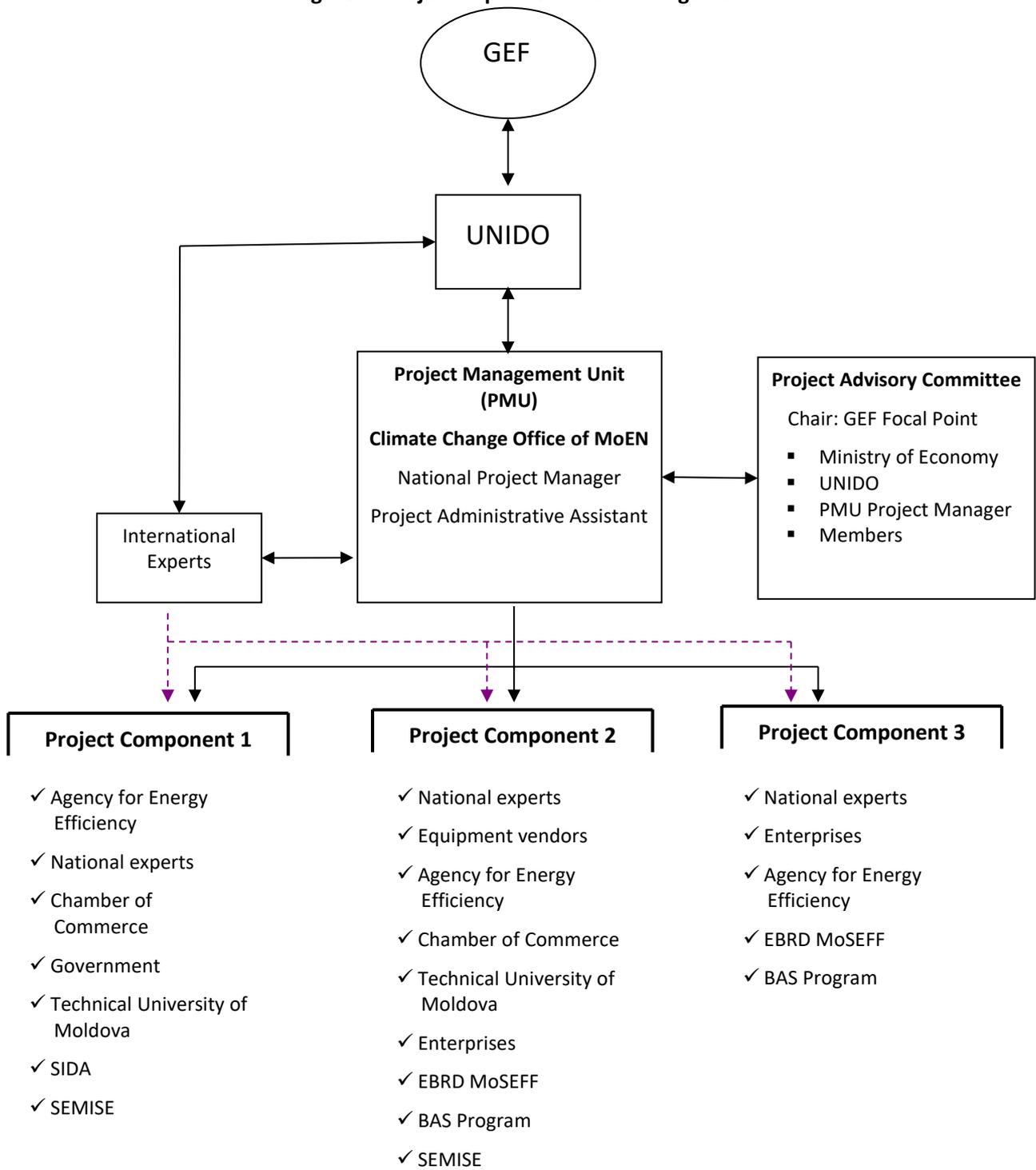
Table 5: Key events in the IEE Moldova Project design and implementation

Key project event	Date
Project design was undertaken during economic downturn and rise of oil prices	2007-09
Project preparations for IEE Moldova undertaken	July-December 2009
CEO endorsement approval	27 May 2010
Implementation start date of Project	18 August 2010
Delays in full official implementation due to Energy Efficiency Agency not being established and fully staffed	May 2011
Engagement of industrial stakeholders, energy efficiency professionals and other stakeholders with training on ISO50001	2011
Pilot EE measures identified during PPG were undertaken	2011-12
EE training for ISO 50001 (including energy audits) for over 200 participants conducted from 2011 to 2014	2011-14
Pilot EE measures undertaken by 3 enterprises between 2014 and 2016 consisting of energy audits, assistance in procurement of EE equipment and metering devices, and setup and operation of EnMS and other tools for determining energy consumption	2014 to 2016
<p>Training for Steam System Optimization (SSO) was undertaken for 44 professionals from companies, vendors, consultancies and academia. Integral aspects of the training programme included conducting 9 energy assessment with reports prepared and submitted to the enterprises:</p> <ul style="list-style-type: none"> • First Module of the SSO EXPERT training program delivered in Chisinau on 14-17 November 2012 to 18 qualified engineers from partner enterprises and consultants; • Second SSO USER training delivered in Chisinau on 24-25 June 2013 to 8 engineers of Moldovan enterprises and consultancy firms; • Half-day workshop for steam system equipment vendors delivered on 27 June 2013. See Para 70 for details; • Second and final module of the SSO EXPERT training program delivered by international SSO expert on 28 June 2013 to 14 qualified engineers from partner enterprises and consultants from Moldova. This included these national trainees carrying out steam system assessments. See Para 70 and Table 10 for details. 	Nov 2012 – Sep 2013
Pilot EE measures undertaken by 4 enterprises between 2014 and 2017 consisting of energy audits, assistance in procurement of EE equipment and metering devices, and setup and operation of EnMS and other tools for determining energy consumption	16 July 2014
Project completion delayed to complete EnMS and metering installations at “JLC”, a dairy enterprise in Chisinau	From December 2016 to December 2017

2.3.4 Implementation Arrangements and Project Partners

31. As the GEF Implementing Agency, UNIDO had the responsibility for the delivery of the planned outputs and the achievement of the expected outcomes. As agreed with the Government of Moldova (GoM) and in line with its legislation, execution of the IEE Moldova Project was assigned to the Climate Change Office (CCO) under the Ministry of Environment (MoEN) with the Moldovan Agency for Energy (MAEE) of the Ministry of Economy (MoEC) being responsible for work under Project Component 1.
32. UNIDO's responsibilities to the IEE Moldova Project included overall management and monitoring, Project performance reporting to GEF, procurement of international expertise to deliver outputs planned under the 3 project components, and providing supplemental technical expertise to ensure technically sound deliverables that are consistent with project requirements.
33. A Project Management Unit (PMU) was established within the CCO of MoEN. The PMU was staffed with a National Project Manager (NPM) and the Project Administrative Assistant (PAA). PMU responsibilities to the IEE Moldova Project included day-to-day management, monitoring and evaluation of project activities as per approved work plans, and coordination of all project activities being carried out by project national experts and partners (in close collaboration with MAEE), organization and coordination of seminars and trainings under Project Component 2. UNIDO provided the PMU with GEF funds as required by the work plans and to support the necessary management and monitoring during implementation of the IEE Moldova Project. Implementation arrangements for the IEE Moldova Project are illustrated on Figure 2.

Figure 2: Project Implementation Arrangement



34. A Project Advisory Committee (PAC) was also to be established for reviewing project implementation progress, facilitate co-ordination between project partners, provide transparency and guidance, and ensuring ownership, support and sustainability of the project results. The PAC was to have balanced representation from key ministries, public institutions, private sector, NGOs, UNIDO and other international organizations partnering in the project or having relevant ongoing programs, and was to be chaired by the GEF Political Focal Point of Moldova. The PAC was never formed for the IEE Moldova project with the CCO. Instead, the PMU through its coordination role, held regular bilateral or group meetings to update counterparts, co-financing partners and other stakeholders on IEE Moldova Project implementation progress. Until 2015, many of these meetings were held during biannual or annual missions of the UNIDO PM.
35. Detailed working plans for the entire duration of the IEE Moldova Project were to be developed by UNIDO in collaboration with the PMU, the MoEC and the international teams of experts. The work plans were to clearly define roles and responsibilities for the execution of Project activities, including monitoring and evaluation, and to set milestones for deliverables and outputs. The working plan would be used as the management and monitoring tool by UNIDO and the PMU and be reviewed and updated as appropriate on a biannual basis.

2.3.5 Positioning of the UNIDO Project

36. The IEE Moldova Project was positioned at the time of its design in 2009 to support improvements in energy efficiency under the Moldovan National Program of Energy Conservation for the years 2003-2010 approved by Government Decree No 1078 dated 05.09.2003. After the commencement of the IEE Moldova Project, the GoM has updated its legislative and legal framework for energy efficiency including:
 - the *National Development Strategy "Moldova 2020"* and the *"Energy Strategy of Moldova until 2030"* where improving energy efficiency and energy security were among the main priorities. The Energy Strategy provides guidance on enhancing energy efficiency and recognizes the critical importance of international development assistance in achieving the Energy Strategy objectives, the most relevant to this Project being a decrease in energy intensity of 10% by 2020 and a decrease in 1990 GHG emissions of 25% by 2020;
 - The *Law on Energy Efficiency* was approved in 2010 conforming to the EU Directive 2006/32/EC on energy end-use efficiency and energy services. This Law defines regulated activities to reduce energy intensity to targeted levels⁹ that includes establishing and supporting the institutional activity in development and implementation of programmes, plans, energy services and other energy consumption efficiency measures. The Law appoints a national Agency for Energy Efficiency with the responsibility for the development and maintenance of energy efficiency indicators, establishing mechanisms for monitoring and tracking energy savings and energy intensity, disseminating information and undertaking education campaigns on energy efficiency;
 - The *National Energy Efficiency Programme 2011-2020* and the *National Energy Efficiency Action Plan 2013-2015* (NEEAP) were adopted to provide the necessary set of measures to meet the aforementioned National Development Strategy targets for overall reduction in final energy consumption in all sectors. NEEAP makes specific mention of the UNIDO's involvement (through the IEE Moldova Project) under the section on the "Introduction of

⁹ 428 kTOE of energy savings from 2013 to 2015 including the industrial sector at 10% or 43 kTOE.

Energy Management System and best practices in the industrial sector”¹⁰;

- *Environmental Policy* of the Republic of Moldova adopted by the Parliament in November 2001 (Parliament Decision No. 605-XV of 02.11.2001) provides the framework for Ministry of Environment (MoE) activities with the goal of reconciling ongoing social and economic changes of the country with environment sustainability at the national, regional and global level;
 - The *Low Emission Development Strategy (LEDS) until 2030* adopted by Parliament on 30 December 2016. The LEDS strengthens and guides the sector development approach that sets the country’s long-term climate change mitigation objectives and strategy. The overall goal of the Strategy is consistent with the one set forth in the Intended Nationally Determined Contribution (INDC) paper borne from the Paris Climate Agreement, which commits Moldova to achieve a 64-67% GHG emissions reduction to the 1990 baseline year that includes the industrial sector to contribute to GHG emissions reduction by 45% in 2030 compared to the level of 1990.
37. The IEE Moldova Project also contributes to the building of government technical capacity which has been constrained by lack of financial and human resources, and access to expertise to implement substantive and effective policies and programs to promote and support energy efficiency in industry. However, as of 2009, there had been little to no support for building these capacities to implement energy efficiency improvements in the industrial sector.
38. The IEE Moldova Project was also to be positioned amongst several other donor-related projects related to energy efficiency in Moldova including:
- the **Moldovan Sustainable Energy Finance Facility (MoSEFF)** supported by the European Bank for Reconstruction and Development (EBRD). The MoSEFF established a €22 million credit line in 2012 through partner Moldovan commercial banks for on-lending to investments in sustainable energy. With its focus on energy efficiency in industries, agribusiness and commercial buildings as well as renewable energy production, the loans were to range from €25,000 to €2 million offered at commercial terms and interest rates. MoSEFF was also to provide some technical assistance to prospective borrowers and participating banks to develop their capacities for due diligence of EE and RE investments;
 - the **Moldova Business Advisory Service (BAS) Program** which commenced in February 2009, and launched a new Energy Efficiency initiative, funded by the Swedish International Development Agency (SIDA), aimed to raise awareness of SMEs in the commercial and industrial sector about energy efficiency and to support the implementation of energy saving actions by providing consultancy services for the development of EE projects;
 - the **Support to Energy Market Integration and Sustainable Energy in the CIS (SEMISE)** project which was launched in October 2009. SEMISE is under the EU-funded INOGATE programme, one of the longest running energy technical assistance programmes. One of the objectives of SEMISE is to promote development of sustainable energy policies through the provision of technical assistance, institutional strengthening and capacity building;
39. Considering the aforementioned, the IEE Moldova Project was well positioned within Moldova to assist the GoM to improve energy efficiency and to meet their targets within their National Development Strategy “Moldova 2020” and the “Energy Strategy of Moldova until 2030. The IEE Moldova Project implemented by UNIDO was to occupy the unique space of focusing on the development of the human, institutional and industry capacity, and supporting structure necessary to realize the industrial energy efficiency related goals of the Energy Strategy, Energy Conservation Program and Energy Efficiency Law of the Republic of Moldova.

¹⁰ See Para 103 in NEEAP under “Section 2. Measures aimed at enhancing energy efficiency in the industrial sector”.

3 Project Assessment

3.1 Project Design

Formulation of the intervention, the plan to achieve a specific purpose.

3.1.1 Overall Design

40. The IEE Moldova Project design was assessed against the baseline scenario and the needs of the industrial sector in Moldova in 2009, characterized as follows:
- Attention to EE increased after 2008 after which the GoM committed to energy efficiency through a number of laws and general directives including those mentioned in Para 34;
 - Industrial stakeholder approaches to their own operations only focused on profitability through production efficiency, not energy efficiency;
 - Energy costs of most industrial enterprises was in the order of 25-50% of operational costs, with energy intensities being much higher than their EU counterparts;
 - The lack of detailed energy-related information on manufacturing enterprises mainly due to most industrial enterprises not sharing such information;
 - Few, if any, industries had a systematic approach to energy efficiency;
 - Mindsets of many senior industrial personnel were and still are resistant to change. Unfortunately, a large proportion of these personnel are also decision makers for the enterprises;
 - An increasing number of industrial entities supported by direct foreign investment from the EU with some knowledge on energy efficiency which is not shared.
41. The design concept for the IEE Moldova Project was aimed at overcoming these issues and lowering identified barriers (as described in Para 21) through establishing policy, legal, and regulatory frameworks that promote and support sustainable industrial energy efficiency, and stimulating the creation of a national market for related IEE products and services. A number of PPG activities were undertaken by UNIDO during the second half of 2009 to determine the baseline and barriers to IEE (see Paras 21 and 38). This included:
- Profiling the industrial sector through seminars in Moldova with the Ministries of Environment and Economy, local technical industrial specialists and personnel from some of Moldova's largest industrial entities;
 - Industrial energy information collected from questionnaires sent to industrial entities throughout Moldova;
 - Close collaboration with the MoEN and MoEC on the IEE Moldova Project design including the need for pilot IEE projects;
 - Walk-through energy audits completed with selected industrial stakeholders for the screening of pilot IEE projects to be supported by the IEE Moldova Project;
 - Negotiation of co-financing commitments from government counterparts and industrial stakeholders with pilot IEE investments;
 - Preparations of the RCE document for submission to GEF for funding.
42. The 2009 design of the IEE Moldova Project incorporated an approach of improving institutional and industrial stakeholder capacities, and using Project resources to pilot IEE measures within the most energy intensive industrial sectors to demonstrate tangible benefits of IEE practices and technologies. A workshop was conducted in September 2009 to formulate

the IEE Moldova Project design into a logical framework approach using information collected from the questionnaires from responsive industrial enterprises were discussed. This PPG workshop was attended by more than 40 persons from the Ministries, academia, IEE services and equipment providers and private sector industrial enterprises.

43. The IEE Moldova Project was designed with the objective that Moldovan industries will increase adoption of energy efficient technologies and energy management as an integral part of their business practices. System optimization and energy management were the primary measures to be adopted for generating significant GHG emission reductions, estimated to be 90,000 tons CO_{2eq} of direct GHG emissions savings (cumulative 2012 to 2021)¹¹, and indirect emissions savings up to 180,000 to 300,000 tons CO_{2eq} by 2023. Generation of these global environmental benefits was largely conditional on the successful replication of proposed IEE pilot projects. The concerns of the evaluation team with regards to these GHG emission targets included the following issues:
- Were the direct GHG emission reductions achievable in consideration that over 50 enterprises were willing to adopt EnMS and SSO measures during implementation of the IEE project?
 - Were direct GHG emission reductions measurable under the assumption that most enterprises will share energy consumption information with other industrial enterprises?
 - Indirect GHG emission reductions should not have been included as a target since its determination (according to GEF guidance) is based on an empirical causality factor multiplied by the 10-year market size of GHG emission reduction potential in the Moldovan industrial sector. The 10-year GHG emission reduction potential number is not measurable, and thus is not a SMART indicator if included in the PRF.
 - While the evaluation team appreciates the uncertainties of estimating global environmental benefits of the IEE Moldova Project, the indicators and targets for GEBs should meet all SMART criteria including being achievable and measurable.
44. The success of the IEE Moldova Project was to have led to the establishment of market-oriented policy and regulatory instruments to sustain improvements of Moldovan industries toward best international standards for energy performance. The design of the IEE Moldova Project included the establishment of a benchmarking program and energy management systems (EnMS) compliant with EN 16001 and ISO 50001 international standards, a mandatory IEE expert certification program, and an established platform for setting energy efficiency targets. The desired outcomes of the IEE Moldova Project were the increased awareness of personnel in the industrial sector, their suppliers, and energy efficiency experts of the economic potential for energy efficiency improvements in the manufacturing sector, and the availability of tools to industrial stakeholders to realize these benefits.
45. The overall design of the IEE Moldova Project is satisfactory due to its clear focus on building institutional capacity and helping local industrial stakeholders to become more knowledgeable on the benefits, planning, design, implementation, operation and monitoring of IEE investments. With lessons learned from implementing IEE pilot projects and strengthened local technical and managerial capacities, the Project was to play a role in assisting the Government in strengthening its regulatory framework and policies to promote IEE on a national scale. The outcome of the PPG process for the IEE Moldova Project was to have led to a Project design that reflected the needs of the industrial sector in 2009 for improving their energy efficiency and competitiveness.

¹¹ The estimate for direct GHG emission reductions is derived from the minimum and maximum direct GHG emission reductions on Table 25 in Annex F (page 42) of the RCE Document.

The rating for overall design is “satisfactory”

3.1.2 Logframe and Reconstructed Theory of Change

46. The PRF for IEE Moldova was assessed to obtain a comprehensive understanding of intended outcomes in comparison with the actual outcomes achieved. In addition, the quality of the PRF was assessed for the presence of SMART indicators that was to have facilitated effective progress monitoring of various indicators and targets specified in the PRF. A condensed version of the PRF is contained in Table 6 with the full IEE Moldova PRF provided in Annex 5.
47. While the overall design of the IEE Moldova Project appeared responsive to the needs of Moldovan industrial stakeholders in 2009, the general quality of the PRF in the context of best practices for its preparation is satisfactory with most indicators generally meeting SMART criteria. Some comments on the quality of the PRF follows:
- Output descriptions are written as outcomes. For example, Output 1.2 should be worded as “an established National IEE Best Practices information and dissemination program”;
 - Most of the PRF indicators are not time-bound. As such, project implementers would have difficulties in sequencing activities to achieve these targets. In a few cases, there are indicators that may be difficult to measure given the breadth and number of energy efficiency measures in each enterprise (generated by the use of EnMS), and which measures are being undertaken during project implementation. For example, in CHP-2, the evaluators were informed of a list of more than 15 EE measures that could be undertaken. To monitor the direct energy savings from CHP-2, the enterprise would need to report to the PMU of when these measures would be implemented along with their estimated energy savings;
 - Indirect CO₂ emission reductions cannot be considered a SMART indicator for this Project as the evaluation team has doubts that this indicator is measurable within the time frame and resources of this Project (this would require an agency such as MAEE to maintain a database of industrial enterprises reporting its energy efficiency which it did not have the capacity during this evaluation). As such, indirect CO₂ emission reductions should not be included as a target. However, an estimate of indirect CO₂ emission reductions has been made in this report based on the best information available and empirical causality factors provided under GEF guidance provided in the document “Calculating Greenhouse Gas Benefits of the Global Environment Facility Energy Efficiency Projects”¹²;
 - No milestones are provided for any of the targets during the course of implementing IEE Moldova. While a number of Project Documents do not contain target milestones, their presence in a project document can assist implementers in the design and costing of the Project’s M&E plan;
 - No outcome for Component 3 in the PRF. The outcome for Component 3 is contained within the Component 3 narrative on pg 16 of the RCE Document.
48. The IEE Moldova Project design and its PRF were also re-examined using a Theory of Change (ToC). The ToC essentially describes the Project as a roadmap of pathways driven by regulatory or market drivers in combination with project activities to reach intended project outcomes and long-term outcomes to reflect the sustainability of the project activities. A ToC for the IEE Moldova Project was prepared for this TE as shown on Figure 3 that is closely linked to the IEE Moldova PRF in Annex 5, and using UNIDO’s “Generic Theory of Change for UNIDO Energy Efficiency Programs”¹³. The logic of the ToC diagram flows in a horizontal direction (left to right) from component activities and outputs (brown boxes) to long term IEE impacts (dark

¹² Available on: https://www.thegef.org/sites/default/files/publications/GEF_EE_Methodology_v1.0_2.pdf

¹³ 2017 UNIDO Independent Evaluation Division Elaboration

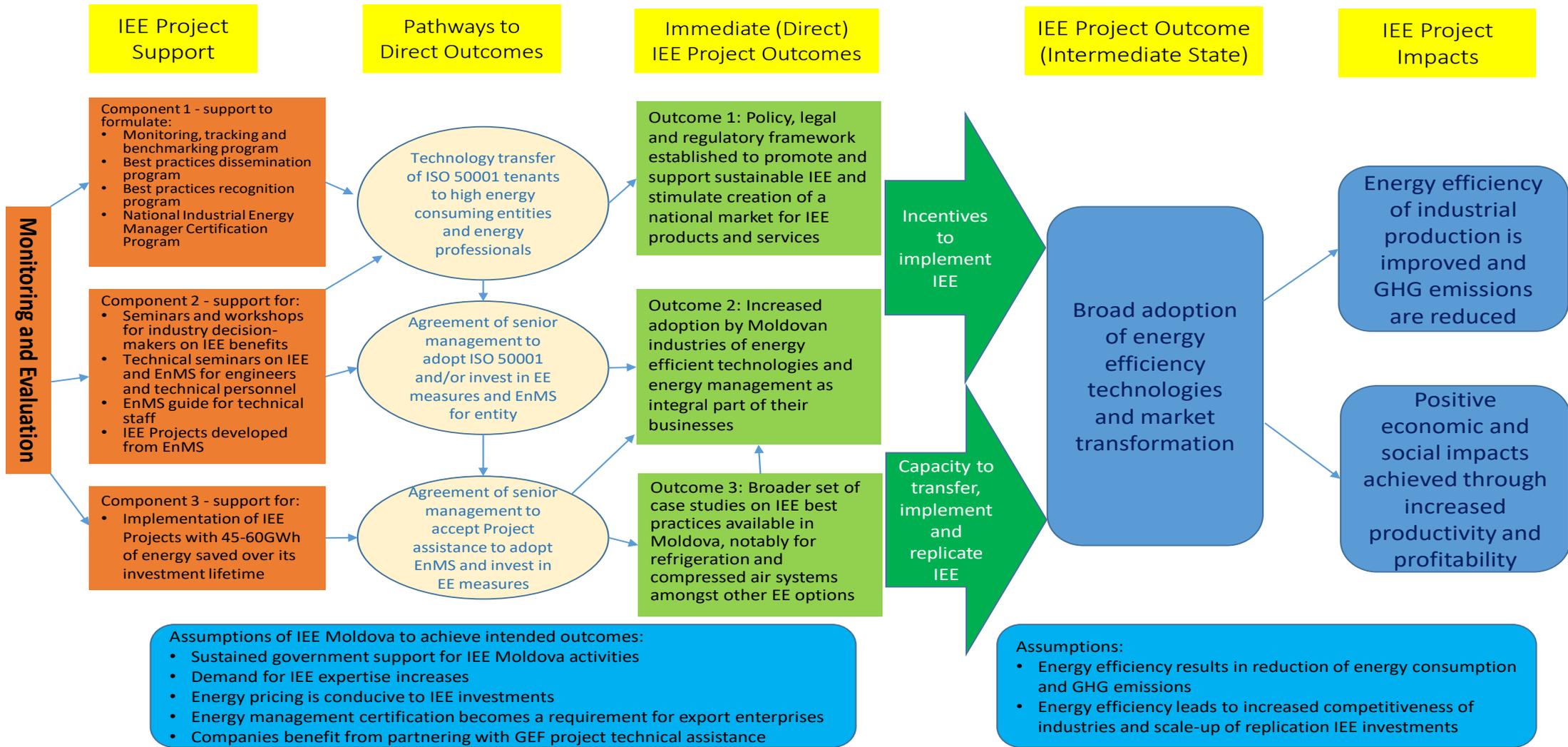
blue boxes) of the IEE Moldova Project. In between, there are the IEE Moldova Project pathways (light pink ovals), direct outcomes (green boxes), and an intermediate state that lead to the intended long-term impacts of the IEE Moldova Project of “EE of industrial production is improved and GHG emissions are reduced” and “positive economic and social impacts achieved through increased productivity and profitability”. The initial assessment of the IEE Moldova PRF led to minor adjustments to the language of the ToC (essentially rewording objectives to outcomes and outcomes to outputs, etc.) which led to re-constructing the Project’s ToC.

Table 6: IEE Moldova Project Results Framework

Components	Outcomes	Outputs (as provided in RCE document)
Project Goal	Reduce energy use related emissions of greenhouse gases produced by Moldova manufacturing sector activities and growth	
Project Objective	Improve energy efficiency of Moldovan industrial sector leading to reduced global environmental impact and enhanced competitiveness	
C1: Development, formulation and implementation of policies, regulation and programs to promote and support sustainable industrial energy efficiency	Establishment of policy, legal and regulatory frameworks that promote and support sustainable industrial energy efficiency and stimulate the creation of a national market for IEE products and services	<p>O1.1: Structure and procedures for monitoring, tracking and benchmarking energy consumption in industry are developed and established</p> <p>O1.2: National IEE Best Practices information and dissemination program is developed and established</p> <p>O1.3: National IEE Best Practices recognition program is developed and established</p> <p>O1.4: National Industrial Energy Manager Certification (IEMC) Program is developed and established</p>
C2: Capacity building, development of tools for and implementation of industrial systems optimization and energy management	Increased adoption by Moldovan industries of energy efficient technologies and energy management as integral part of their business practices	<p>O2.1: Industry decision-makers understand their potential for EE gains and consequent environmental and economic benefits</p> <p>O2.2: A cadre of 40 professionals comprising of industry engineers,</p>

Components	Outcomes	Outputs (as provided in RCE document)
		<p>industrial equipment vendors and energy systems/ efficiency consultants are trained at an expert level and are equipped with the technical capacity and tools required to: a) develop and implement energy management systems and energy efficiency projects, focusing on steam system optimization, in industry; b) provide training to industry and energy professionals and offer commercial IEE services</p> <p>O2.3: An Energy Management System Implementation Guide in compliance with EN 16001/ ISO 50001 is developed</p> <p>O2.4: At least 40 IEE projects for cumulative 213-416 GWh of energy savings are developed and implemented by industrial enterprises as result of their participation in the Expert Training program of the project</p>
C3: Industrial energy efficiency pilot projects	Broader set of case studies on IEE best practices being available in Moldova, notably for refrigeration and compressed air systems amongst other EE options	O3.1: At least 6 pilot IEE projects for cumulative 45-60 GWh of energy savings over the investments duration are implemented by enterprises, from key industrial sectors, partnering in the project.

Figure 3: Reconstructed Theory of Change – IEE Moldova Project



49. The ToC analysis re-confirms the intended outcomes of the IEE Moldova Project that would generate long-term impacts after the end of project (EOP) to be driven by:
- Industrial incentives to implement industrial energy efficiency. This would include simple low-cost EE measures that enhance enterprise profitability; and
 - The capacity of local services to transfer, implement and replicate industrial energy efficiency projects. The IEE Moldova Project provided support for the building of this capacity.
50. In this ToC visualisation, success of IEE Moldova Project to achieve its intended direct outcomes was predicated on the following assumptions (as mentioned in the PRF) that are somewhat beyond the control of IEE Moldova Project:
- the Moldovan Government sustains its support for industrial energy efficiency;
 - demand for IEE expertise increases. Without development of more IEE investments, local IEE expertise will not be available for Moldovan industries requiring this expertise;
 - energy pricing is conducive to IEE investments. Energy pricing is mentioned due to fuel subsidies that are being gradually removed in Moldova over the past decade. Notwithstanding, the price of natural gas in Moldova has been recently fluctuating¹⁴, not creating the clear business case required for energy efficiency investments by industry;
 - energy management certification becomes a requirement for export enterprises, and companies benefitting from partnerships with GEF project technical assistance.
51. As a part of the Review of Outcomes to Impacts (ROtI), the pathways from direct outcomes achieving the long-term impacts (also expressed as the goal and objective of the IEE Moldova Project) include the necessary intermediate state of “broad adoption of energy efficiency technologies and market transformation”. Assumptions that will increase the likelihood of achieving these long-term impacts includes “energy efficiency results in reductions in energy savings and GHG emissions”, and “energy efficiency leads to increased industry competitiveness and a scale-up of replication IEE investments”. The second assumption can also be considered a driver that is somewhat related to the driver of “incentives to implement IEE”.
52. In summary, the PRF utilized to document the logic intervention and subsequently guide project implementation is moderately satisfactory due to the some of the indicators not meeting all SMART criteria (including some indicators not being time-bound) and with Component 3 not having a defined outcome, which has been resolved through taking key narratives of Component 3 in the RCE document as the intended outcome.

The rating for the logframe is “moderately satisfactory”

3.2 Project Performance

3.2.1 Relevance

The extent to which the development intervention is suited to the priorities and policies of the target group, recipient government, and donor.

53. The Government of Moldova (GoM) has recently updated its legislative and legal framework for energy efficiency as well as its strategic and action plans, all described in detail in Para 34.

¹⁴ This is exacerbated by the current contracts for natural gas coming into Moldova expiring in 2020. A post-2020 scenario for natural gas deliveries to Moldova envisages a natural gas line being constructed from Romania. The cost of natural gas to Moldova after 2020 as such is uncertain.

The relevance of the IEE Moldova Project was to assist the country in overcoming its persistent lack of expertise and poor resources endowment for industrial energy efficiency program development and implementation and to provide the required external technical assistance to both institutional and private stakeholders on the best international practices for energy efficiency to Moldova's industrial sector. As mentioned in Para 35, there has been little to no support for institutional capacity building for the Moldovan Government in energy efficiency for industry.

54. The IEE Moldova Project targeted the **Energy Efficiency Agency (MAEE)** under the administrative authority of the Ministry of Economy (succeeding the Agency for Energy Conservation in 2010) for this institutional capacity building. This has enabled MAEE to implement its mandate of enforcing state policy in the field of energy efficiency and renewable energy (RE), and undertaking surveillance and monitoring of national and local energy efficiency programmes and action plans, as well as international energy efficiency and RE development programmes joined by Moldova.
55. The IEE Moldova Project was also relevant to the **Energy Efficiency Fund (EEF)** established in 2010 to identify, evaluate and finance energy efficiency and RE projects, aiming at increasing energy efficiency and reduction of GHG emissions. Improved knowledge of the EEF Management Board was to reduce investment risks to funds from the EEF.
56. The Project was under and supported GEF-4 Climate Change Strategic Program 2: Promoting energy efficiency in the industrial sector. By addressing key existing information, capacity and policy barriers for sustainable industrial energy efficiency, the IEE Moldova Project will directly contribute to promote and increase the deployment and diffusion of energy efficient technologies and practices in industrial production and manufacturing processes (Climate Change Strategic Long-term Objective 2). The Project also made a tangible contribution to stimulate the creation of a Moldovan market for IEE products and services.
57. Given that the IEE Moldova Project was highly pertinent to international, global and national priorities, the needs of the target group, donor priorities, and UNIDO's mandate, competences, and strategy for inclusive and sustainable industrial development¹⁵, the Project was assessed as highly relevant.

The rating for relevance is "highly satisfactory"

3.2.2 Effectiveness

The extent to which the development intervention's objectives were achieved, or are expected to be achieved, considering their relative importance.

58. The effectiveness of the IEE Moldova Project was assessed by assessing the extent to which targets against the outcomes and outputs in the PRF and TOC were achieved, or are expected to be achieved in the near future. Accordingly, the results of these analyses are provided in Tables 7, 9, 10 and 11.
59. Table 8 provides the status of goal and objective-level targets. The PMU reported that direct GHG emission reductions of 125,328 tons CO₂ (over a 10-year investment period) were generated by the IEE Moldova Project, the details as provided on Table 7. While this has exceeded the target of 90,000 tons CO₂, the direct GHG emissions from the CHP-2 plant accounted for over 86% of these direct GHG emission reductions. Notwithstanding that

¹⁵ IEE Moldova is closely linked to UNIDO's programmatic focus of its 4 strategic priorities: creating shared prosperity; advancing economic competitiveness; safeguarding the environment; and strengthening knowledge and institutions. It is also highly relevant to the Lima Declaration to promote and accelerate inclusive and sustainable industrial development (ISID) in Eastern Europe (available on: https://www.unido.org/sites/default/files/2015-07/UNIDO_in_EUR_CA_Region_0.pdf).

enterprises have responded with enthusiasm to the Project's offer for training and investment oriented technical assistance, only 7 other enterprises had reported direct energy savings and GHG emission reductions, below the expected volume of IEE investments for the IEE Moldova Project. The direct GHG emission reductions without CHP-2 was less than 17,000 tons CO₂, considerably below the target of 90,000 tons CO₂.

60. The low number of enterprises reporting direct energy savings to the IEE Moldova Project may also be attributable to the unwillingness of industrial enterprises to share this data in public. A large number of these enterprises that participated in training were nonresponsive to Project requests on their opinions of the technical assistance and a follow-up of their enterprises to implement energy saving measures as a result of their newfound knowledge on EnMS and SSO.
61. The underreporting of energy consumption by enterprises who benefitted from EnMS and SSO training may also be due to those enterprises who sought financing and technical assistance from the EBRD-managed MoSEFF after 2014. In 2015, MoSEFF reported energy savings performances from their program were reported to be 25,451 MWh/yr of electricity savings, 303,594 MWh/yr of primary fuel energy savings, and 66,880 tons CO_{2eq} emissions reductions. Unfortunately, a breakdown of these energy savings into enterprises was not made available to the IEE Moldova Project evaluation team.
62. The low number of IEE investments reporting to the project as reflected in Table 8 and the issues related to the lack of access to energy information of several industrial enterprises made it difficult for the PMU to monitor industry-sector levels of specific energy consumption (SEC) against industrial outputs (or energy use per ton/unit of output for a specific manufacturing subsector), and estimating indirect emission reductions (deemed to not be a SMART indicator as mentioned in Paras 41 and 45). Possible indirect emission reductions could include:
 - 20,000-25,000 tons CO_{2eq} from 2 hospitals (under GIZ funding as reported by 2 UNIDO EnMS qualified experts) and a few other projects;
 - 30,000-40,000 tons CO_{2eq} emissions reductions from SSO (which would be difficult to quantify considering savings from SSO are usually included in energy audits for building EE);
 - 80,000 tons CO_{2eq} emissions reductions possibly from additional investments over the next 3 to 4 years due to Moldova's adoption of the Energy Efficiency Law, transposed from EE Directive EU/2012/27 where Article 8 (which provides large enterprises with a waiver to conducting a mandatory energy audit every 4 years if they have an EnMS ISO 50001 certified) could be promoted by national EnMS experts resulting in some additional investments.
 - As such, the evaluation team has made an assumption that the targeted SEC reductions were likely not achieved by the Project.

Table 7: Summary of the Project's Success in Goal and Objective

Goal: To reduce energy use related emissions of greenhouse gases produced by Moldova manufacturing sector activities and growth	
Target/Indicators	Status as at December 2017
1. Cumulative reduction of CO _{2eq} emission reduction by more than 20% over the period 2012-2023 (tons of CO _{2eq})	<i>There has been no progress reporting on this outcome indicator. However, there is a strong likelihood that this will not be achieved due to the lower volume of IEE projects and investments that were supported by this UNIDO project, and difficulties related to obtaining energy consumption information from other industrial enterprises (based on perceived issues sharing information with competitors).</i>
2. Cumulative reduction of SEC by more than 20% over the period 2012-2023 (energy use per ton/unit of output) for selected manufacturing sub-sectors	<i>Reduction of SEC will be reduced by less than 5% based on the lower than expected volume of IEE investments catalysed by this project, and the difficulties in obtaining energy consumption information from other industrial enterprises (based on perceived issues sharing this information with competitors). The 20% target of projection, however, may be achieved after 2023 when most industrial entities will have the resources and interest in investing in energy efficiency measures. See Para 60.</i> <i>This indicator is no longer considered a reliable indicator for energy management and real energy performance improvement. The evaluator understands that the IEE Moldova Project was the second UNIDO project on EnMS shortly after which UNIDO found that regression-based analysis was best-practice for monitoring enterprise level energy management. See Paras 41 and 45.</i>
Objective: Improved energy efficiency of Moldovan industrial sector leading to reduced global environmental impact and enhanced competitiveness	
1. 90,000 tons CO _{2eq} over period 2012-2021 of direct CO _{2eq} emission reductions	125,328 tons CO _{2eq} over period 2012-2021. See Para 57.
2. 400,000 tons CO _{2eq} over period 2012-2023 of indirect CO _{2eq} emission reductions	< 150,000 tons CO _{2eq} over period 2012-2021. See Para 60.
3. SEC average annual reduction of 2% over period 2012-2023 of selected enterprises	Achieved for 3 out of the 8 companies where EnMS adopted as shown in Table 8. Low SEC reduction for 3 power generation companies, CET-2, CET Nord and Termocom, is not an issue for evaluation team since these power plants will be implementing an aggressive suite of EE measures designed to further lower SEC of these plants when they receive internal approval for implementation.

Component 1: Development, formulation and implementation of policies, regulation and programs to promote and support sustainable industrial energy efficiency (IEE)

63. Component 1 was designed to provide technical assistance to develop an enabling regulatory environment to support sustained progression of Moldovan industries towards best international practices and energy performance, creating a national market for industrial

energy efficiency products and services. To facilitate establishment of market-oriented policies, programs and normative instruments for this transformation, Component 1 was set up to deliver:

- Output 1.1: An established IEE monitoring, tracking and benchmarking program. This program would provide a national reporting structure on energy consumption of various industries that is tailored to the Moldovan manufacturing sector. Such a programme would provide more credible information on energy consumption by the sector, better informing the EEA on impacts of its policies and setting future programme targets;
- Output 1.2: National IEE best practices dissemination program. This was designed to raise awareness within the industrial sector on best practices and benefits of energy efficiency and energy management for their sector, and to provide a platform for industrial technical personnel containing an information repository on EE and energy management;
- Output 1.3: An established national IEE best practices recognition program. This was designed as a linkage to Output 1.1 and an incentive to industrial enterprises on optimizing their energy performance under this UNIDO project;
- Output 1.4: An established National Industrial Energy Manager Certification program. This was designed as an initial step to strengthen the skills of local energy professionals to deliver professional services for industrial entities on developing energy efficient investments, installing EE products and implementing EE measures.

Table 9 provides a summary of the status of delivery of these outputs and outcomes.

Table 8: Summary of the companies generating direct GHG emission reductions

Company	EnMS Implementation Year	Annual energy savings (MWh)	Cumulative energy savings to December 2017 (MWh)	Annual financial saving (USD)	Annual Energy Efficiency Improvement (%) ¹⁶	Annual GHG emission reduction (tons CO ₂)	GHG reduction over 10-year investment period (tons CO ₂)
Lactis	2011-2012	328	1,968 (328x6)	USD 22,000	5.6	160	1,600
JLC	2011-2012	265	1,590 (265x6)	USD 14,100	2.2	114	1,140
CET-2	2013-2014	20,800	103,200 (20,800x4)	USD 889,100	0.8	10,837	108,370
Urban Bus Park	2014	87	349 (87.2x4)	USD 10,600	7.0	43	428
CET-Nord	2014-2015	955	1,909 (954.5x2)	USD 40,800	0.3	463	4,630
Termocom	2014-2015	229	687 (229x3)	USD 25,000	0.1	160	1,600
Apa-Canal Chisinau	2015	1,361	4,083 (1,361x3)	-	1.7	709	7,090
Danube Logistic	2015	94	281 (93.7x3)	USD 11,400	1.0	47	470
Total	-	23,070	114,067	USD 1,013,000		12,533	125,328

¹⁶ Based on baseline energy consumption at start of EE measures and annual energy savings achieved by the company up to March 2016

Table 9: Summary of the Project's Success in Producing Outputs under Outcome 1

Expected Outcome 1: Establishment of policy, legal and regulatory frameworks that promote and support sustainable industrial energy efficiency and stimulate the creation of a national market for IEE products and services		
<i>Programmed Outputs</i>	<i>Target/Indicators</i>	<i>Status as at December 2017</i>
<i>n/a</i>	Outcome target 1: Three national IEE policy programs operate and develop smoothly: IEE Monitoring, Tracking and Benchmarking (MTB) Program; IEE Best Practice Dissemination Program; IEE Best Practice Recognition Program	<i>Three national IEE policy programs were developed and are being implemented including IEE Monitoring, Tracking and Benchmarking (MTB) Program; IEE Best Practice Dissemination Program; IEE Best Practice Recognition Program</i>
<i>n/a</i>	Outcome target 2: National Industrial Energy Manager Certification Program as regulatory measure to support IEE and market transformation	<i>Not delivered. See Para 66.</i>
1.1 Monitoring, tracking and benchmarking programme	<ol style="list-style-type: none"> 1. Reporting structure is put in place 2. Reporting templates are developed and used 3. Website is created 4. Benchmarking methodology is developed and tested 	<ol style="list-style-type: none"> 1. Reporting structure is created 2. Reporting templates developed and used by industrial entities for tracking energy consumption 3. Website is created: http://energyefficiency.clima.md/pageview.php?l=en&idc=231 4. Benchmarking methodology for the dairy sector was developed and tested.
1.2 Best practices dissemination programme	<ol style="list-style-type: none"> 1. Two half-day seminars per year 2. IEE Best Practice Website 3. 15 case studies developed 4. Energy Management Implementation Guide 5. Articles & videos 6. 500 companies reached by the end of the project 	<ol style="list-style-type: none"> 1. Seminars delivered; 2. IEE Best Practice website established: (http://www.aee.md/en/energy-efficiency/technical-assistance-projects/unido) 3. Energy Management Implementation Guide delivered 4. Articles and videos delivered 5. No official count on number of companies reached at EOP but estimated to be less than 100

Expected Outcome 1: Establishment of policy, legal and regulatory frameworks that promote and support sustainable industrial energy efficiency and stimulate the creation of a national market for IEE products and services

1.3 Best practices recognition program	1. One annual National IEE Best Practice Recognition Award ceremony/ event starting from the Year 2 of project implementation	Delivered. See Para 65. This output was integrated in the annual “Moldova Eco-Energetica” conference and competition established by the UNDP GEF 5 Biomass project. The IEE Moldova project together with the MAEE introduced an industry sector competition category
1.4 National Industrial Energy Manager Certification Program	1. National IEMC program is developed and offered in the market	Not achieved since EUREM program had already started a similar program. The IEE Moldova project provided some support to the MAEE for the establishment of a national certification programme for Energy Auditors. See Para 66.

64. Activities of this Component were commenced after the staffing of MAEE had reached a total of 8 (including the Director and Deputy Director) in September 2011. Between January 2012 and May 2014, the Austrian Energy Agency (AEA) delivered the 4 outputs of this Component. Activities of AEA were conducted in a responsible logical manner where their initial activities focused on building their understanding and initial capacity assessment of MAEE and other relevant stakeholders on methodologies and best practices to be delivered under this Component. Initially, this included training for 19 personnel including MAEE staff, national experts and relevant stakeholders. Consultations with these 19 personnel included their knowledge on Moldova's national energy efficiency action plans, experience in setting up agreements with industrial enterprises and an overview of the process for EU energy data collection from enterprises. AEA also closely consulted with EEA staff on concept and templates for each methodology, implementation steps and further training needs including a decision to pilot the benchmarking methodology in the dairy sector.

65. With regards to the delivery of Output 1.1:

- MAEE was actively involved and very supportive of project activities, adding to coordination efforts and taking advantage of synergies with other ongoing technical assistance initiatives. Project activities such as the peer-to-peer network meetings with dairies and other interested companies strengthened MAEE's vision for scaling up IEE work from the IEE Moldova Project including the Monitoring & Verification (M&V) and Benchmarking Programs. The collaboration between MAEE and the AEA catalyzed by the IEE Moldova Project has also led to renewable energy cooperation outside the Project;
- Commencing in 2012, the IEE Moldova Project supported activities on the Benchmarking Program, strengthened through the setup of meetings peer-to-peer networks between Moldovan industrial entities allowing them to compare their energy consumption with other similar industrial entities. This provided the basis for establishing benchmark graphs and curves for the dairy sector in Moldova, and comparing them with benchmarks from Austrian dairies. This catalyzed interest in scheduling more peer-to-peer gatherings;
- With the IEE Moldova Project delivering dissemination workshops during the period of 2012 and 2013 on benchmarking and energy management systems for Moldovan companies, the pilot benchmarking experience was compared with international benchmarking experiences in Austria and Ukraine, where another GEF-UNIDO project was developing energy efficiency benchmarking curves for 9 agro-food sectors. This catalyzed MAEE's interest in launching and replicating benchmarking efforts in 4 additional agro-food sectors in Moldova: bakeries, fruit and vegetable processing, meat production and processing, and sugar production;
- By 2016, MAEE with the assistance of the Project through AEA successfully completed the first-ever piloting of an energy benchmarking methodology for Moldova and industry in the dairy sector.

66. With regards to the delivery of Output 1.2:

- UNIDO and the CCO engaged the Moldova National Institute of Standardization and Metrology (NIMS) on improving the quality of national standard settings, and promoting and supporting the adoption of the ISO 50001 Energy management systems. NIMS engagement was to convert ISO50001 to a national Moldovan standard (SM ISO 50001:2012) and provide guidelines for its use;
- In March 2012, ISO 50001 was adopted as the Moldavian national energy management system standard SM ISO 50001:2012 in 2012. The advertisement for this adoption is shown on Figure 4;
- Since 2012, the Project supported the preparation of documentation of various tools and

methodologies for the M&V Program and the Benchmarking Program for dissemination using the Best Practice Information and Dissemination (BPID) Program. The BPID program included seminars, postings on the MAEE website and case studies. These dissemination plans were shared with over 15 MAEE staff and national experts;

- In 2013, MAEE issued the “Practical Guide on Implementing an Energy Management System (in line with ISO 50001)” that was published by the GEF-UNIDO project and presented to MoEN in 2013 for distribution;
- Figure 4: ISO 50001 Introduction Advert¹⁷

ISO 50001 a fost adoptat ca standard national – SM ISO 50001:2012 Sisteme de Management al Energiei

03/04/2012 2 COMMENTS

☆☆☆☆☆ Rate This



Dupa ce la 15 iunie 2011 a fost publicat standardul international ISO 50001 – Sisteme de Management al Energiei, in octombrie 2011 o echipa de experti din Moldova au beneficiat de primele instruiri pe subiectul acestui standard. Mai curind standardul a fost adoptat ca standard national. Atit instruirea care cit si adoptarea standardului au fost realizate cu sprijinul programului UNIDO (United Nations Industrial Development Organization) in cadrul proiectului implementat de catre Oficiul Schimbarea Climei „Reducerea emisiilor de gaze cu efect de seră prin imbunatatirea eficientei energetice în sectorul industrial din Republica Moldova”.

Facilitarea accesului ISO 50001 prin traducerea si adoptarea acestuia in calitate de standard national va oferi posibilitatea intreprinderilor doritoare care presteaza orice gen de activitate, in deosebi celor enegofage, sa sporeasca eficienta consumului de energie, respectiv reducerea ponderii costurilor pentru energie in pretul final al produselor. La moment citeva intreprinderi pilot din Republica Moldova printre care S.A. Franzeluța, S.A. Carmez, S.A. Macon, S.R.L. JLC, S.R.L. Lactis, S.R.L. Natur Bravo, S.R.L. Sudzucker Moldova și Universitatea Tehnică a Moldovei, implementeaza acest standard iar in toamna 2012 se asteapta primele rezultate ale implementarii. Proiectele pilot privind implementare a ISO 50001 la intreprinderile mentionate are loc sub supravegherea a doi experti internationali, coautori ai standardului.

Cei care doresc sa intre in posesia standardului il pot procura la pretul de 116,40 MDL de la Fondul National de Standarde a Institutului National de Standardizare si Metrologie.

- An MAEE website (<http://www.MAEE.md/en/energy-efficiency/technical-assistance-projects/unido>) was setup in 2013 to introduce IEE and EnMS sections. In 2016, an Industry EE Section was added to the MAEE website with 4 new case studies on the implementation of EnMS and SSO in Moldovan companies.

67. With regards to the delivery of Output 1.3:

- In 2013, workshops provided were delivered to promote implementation of two ISO 50001 energy management systems under Lactis S.A and JLC S.A, two Moldovan dairy sector entities that received support of IEE Moldova. The presentations provided information on their EnMS implementation experience and the results achieved using videos and effective presentations. This provided a basis for presenting the Incentive Program for the Implementation of Energy Management Systems in Moldovan industry;

¹⁷ Source: Ion Muntean, un blog despre eficienta (si) energética, available on: <http://ionmuntean.com/2012/04/03/iso-50001-adoptat-ca-standard-national-sm-iso-500012012/>

- IEE Moldova supported synergies to increase availability of funding for IEE investments with the newly established Moldovan Energy Efficiency Fund (MEEF). Calls for MEEF project proposals were made in 2013 and 2014. This resulted in more than 138 EE projects eligible for funding (totalling ~ USD39 million) with only 10 private sector energy efficiency projects totalling ~USD1.57 million;
 - According to National Energy Efficiency Action Plan (2013-2015), the total impact of energy efficiency measures for the 2013-2015 period was envisaged to be in the order of 428 kTOE of energy saved and 962,848 tons of CO₂ of GHG emissions reduced¹⁸;
 - In 2014, the EBRD setup the second phase of the Moldovan Sustainable Energy Financing Facility (MoSEFF), to support energy efficiency investments of Moldovan enterprises. Under MoSEFF II, €22 million Euro was made available for on-lending through local partner banks from 2013-2016. To make investments into energy efficiency projects attractive, MoSEFF provided an EU-funded grant component for eligible projects (dependent on the energy savings and CO₂ emission reductions achieved with the grant reaching from 5% to 20% of the loan amount). MoSEFF provided technical assistance and advice on the optimization of the energy consumption and supply designed to hasten the pace of EE investments;
 - The IEE Best Practice Recognition (BPR) Program was featured in the Eco Energetică Conference in 2015 “as IEE as a specific category” of the competition for the best sustainable energy projects. This will be held on an annual basis at Eco-Energetica Conferences, and generate additional case studies and content for the MEEA website.
68. With regards to the delivery of Output 1.4, the Industrial Energy Manager Certification Program was not developed under the IEE Moldova Project. Instead, it was cancelled due to work under the GIZ-supported EUREM program which had already started work on certification of energy auditors and certification of energy managers. IEE Moldova Project resources originally earmarked for the development of the Industrial Energy Manager Certification Program were re-allocated to support the Energy Auditor Certification program, with strong consent from MAEE and the Ministry of Economy.
69. In summary, Component 1 has delivered most of its intended outputs and has provided a desired outcome of “establishment of policy, legal and regulatory frameworks that promote and support sustainable industrial energy efficiency and stimulate the creation of a national market for IEE products and services”. Augmenting the delivery of these intended outputs and outcome were synergies developed with ongoing and parallel work of the MAEE with EU technical assistance related to the development of a national MRV framework and consolidated through the provision of substantial inputs about best-practice indicators for the industrial sector and associated energy and production data requirements. To this end, the technical knowledge and capacity for IEE within MAEE has been substantially increased.

Component 2: Capacity building, development of tools for and implementation of industrial systems optimization and energy management

70. Component 2 was designed to build and strengthen the technical capacity for energy management and steam optimization primarily targeting industrial enterprises, technical service providers and regulatory agencies. Using a “training of trainers” (ToT) approach, a target of at least 40 energy efficiency projects were to be developed and implemented. This was to lead to the delivery of 4 outputs:
- Output 2.1: Seminars and workshops for industry decision-makers on IEE benefits. These sessions were to awareness of IEE benefits to decision makers of these enterprises and

¹⁸ There are unverified reports that checking of these estimates could have been done during the development of the NEEAP.

approve investments;

- Output 2.2: Technical seminars on IEE and EnMS for engineers and technical personnel. The seminars delivered had the level of technical detail required for these personnel to implement IEE measures;
- Output 2.3: EnMS guide for technical staff. This output takes the EnMS implementation guide from Output 2.2 and translates it into the Romanian language for local technical personnel;
- Output 2.4: IEE Projects developed from EnMS. These projects were envisaged to be primarily no-cost and low-cost improvement measures identified as results of the training, assessments and implementation work for EnMS and SSO.
- Table 10 provides a summary of the status of delivery of these outputs and outcomes.

71. With regards to the delivery of Output 2.1:

- Delivery of this output commenced in 2011 with discussions with actual and potential partner enterprises. This included seminars, workshops and private one-on-one meetings that concluded with agreements with 10 partner enterprises and institutions where collaboration agreements were signed;
- As of June 2016, 298 people from Moldovan industries, local energy efficiency service providers, municipal authorities and other energy stakeholders received training on EnMS and SSO through joint-initiatives with the MAEE, the Chamber of Commerce and Industry, the Ministry of Environment and the IEE Moldova Project.

72. With regards to the delivery of Output 2.2:

- Material for EnMS training seminars compliant with ISO 50001 Energy Management Standard for EXPERTs and USERs, and SSO for EXPERTs, USERs and VENDORs was developed in mid-2011;
- Seminars for technical personnel on EnMS were first delivered in September 2011 (Module 1 on Planning), followed by subsequent sessions in October 2011, March 2012, and November 2012 (Module 2 – Implementation and Operation). The number of participants on EnMS training ranged from 32 in October 2011 to 28 in November 2012. An international UNIDO EnMS expert mission was conducted in November 2012 to review progress in EnMS EXPERT training. The program and its national expert trainees worked with 7 enterprises¹⁹ and the Technical University of Moldova to implement EnMS with overall positive feedback and results. In December 2012, 13 EnMS EXPERT trainees passed the final examination of the EnMS EXPERT training program;
- Seminars for SSO Capacity Building and Piloting Program commenced with a first mission to identify suitable candidates to host or to partner with SSO EXPERT training program. With 22 candidates selected (8 from enterprises and 14 consultants) in July 2012, the first SSO user training was delivered in November 2012, followed by subsequent and final SSO training session in June 2013. As a part of the training, 9 on-site steam system assessments were completed at Lactis S.A. in Riscani (milk processing plant) and CHP-North in Balti (combined heat and power production plant). In 2012, 13 out of the 22 engineers completed the entire course by July 2013 passing as EXPERT trainees;

¹⁹ JLC SA in Chisinau (milk processing); Carmez SA in Chisinau (meat processing); Natur Bravo SA in Cupcini (cannery); Orhei-Vit SA in Orhei (cannery); Floare-Carpet SA in Chisinau (carpets production); Efes-Vitanta Moldova Brewery SA in Chisinau (beer production); Sudzucker Moldova SA (sugar plant in Drochia)

Table 10: Summary of the Project's Success in Producing Outputs under Outcome 2

Outcome 2: Increased adoption by Moldovan industries of energy efficient technologies and energy management as integral part of their business practices		
<i>Programmed Outputs</i>	<i>Target/Indicators</i>	<i>Status as at December 2017</i>
<i>n/a</i>	<i>Outcome 2 target: 100% increase of annual number of implemented projects between 2010 and 2023</i>	<i>Strong likelihood of achievement given that more than 200 enterprise personnel received EnMS and several companies implemented EE projects. However, PMU did not monitor this indicator and the baseline condition was not clear to the evaluation.</i>
<i>n/a</i>	<i>Outcome 2 target: Ten companies get certified to EN16001 or ISO 50001 by 2015</i>	<i>Only 8 companies certified for EN16001 or ISO 50001 by 2015</i>
<i>n/a</i>	<i>Outcome 2 target: 400 IEE services contracts stipulated by EM and SSO national experts trained by the GEF project with Moldova enterprises between 2013 - 2023</i>	<i>Up to 2016, only 40 companies approached for IEE services with only 4 currently with IEE service contracts. The target of 400 IEE service contracts up to 2023 is not measurable.</i>
2.1 Seminars and workshops for industry decision-makers on IEE benefits	<p>1. 300 companies participating in the project seminars and workshops</p> <p>2. 200 enterprises staff attend project energy management and steam system optimization trainings</p>	<p>1. More than 150 companies/ organizations/ business entities achieved by the project seminars and workshops, including 30 municipalities</p> <p>2. 254 participants in EnMS trainings and 44 in SSO trainings</p>
2.2 Technical seminars on IEE and EnMS for engineers and technical personnel	<p>1. 20 energy management system experts trained</p> <p>2. 20 steam systems optimization experts trained</p> <p>3. 20-25 seminars and trainings for enterprises managers and engineers delivered by EM and SSO national experts trained by the GEF project</p>	<p>1. 26 expert trainees trained in EnMS (24 men and 2 women) and 14 qualified as UNIDO National EnMS Experts (12 men and 2 women)</p> <p>2. 14 SSO experts were trained with 13 certified as UNIDO qualified National SSO Experts (10 men and 3 women)</p> <p>3. Only 7 seminars and trainings were delivered</p>
2.3: EnMS guide for technical staff	1. An Energy Management System Implementation Guide	1. An EnMS Guide compliant with ISO 50001 was delivered in Romanian

Outcome 2: Increased adoption by Moldovan industries of energy efficient technologies and energy management as integral part of their business practices		
	in compliance with EN 16001/ ISO 50001 standards is produced in Romanian language	language.
2.4: IEE Projects developed from EnMS	<ol style="list-style-type: none"> 1. 20 steam systems assessment carried out 2. 20 steam systems optimization projects developed 3. 20 steam system optimization projects are implemented. 4. 20 companies put in place an energy management system 5. 20 companies implement at least 2 energy management operational improvements each 	<ol style="list-style-type: none"> 1. By 2015, only 9 steam system assessments were completed. 2. and 3. Exact number of SSO measures developed and implemented is not known. However, there is a strong likelihood that 20 projects may have been implemented including measures to improve cooling towers or fan systems to supply air to the boilers 4. Only 8 companies have put EnMS system into place 5. Only 8 companies have implemented a minimum of 2 energy management operational improvements.

- On 27 June 2013, a half-day workshop targeting steam system equipment vendors was delivered but poorly attended. Despite PMU efforts to promote the event, only 5 participants representing steam systems sellers, instruments dealers & technical services providers attended the training;
- The NISM in partnership with Romanian Movement for Quality started to promote and offer training on SM ISO 50001:2012;
- By the EOP, only 4 of the 14 UNIDO qualified national EnMS experts have continued to offer EnMS implementation services to existing and potential new clients in the manufacturing sector, power and heat generation sector, and in the public sector, with these experts approaching at least 40 enterprises and organizations. SSO experts have been providing services to the 3 enterprises where Project support was provided in Component 3;
- Two training session for Energy Performance Measurement and Indicators (EnPMI) was organized in the premises of MAEE in May 2015. This was attended by 27 experts.

73. With regards to the delivery of Output 2.3:

- In May 2013 a Practical Guide on Implementing an Energy Management System (in line with ISO 50001) was published, in Romanian, in collaboration with the MAEE and the Ministry of Environment. Dissemination of the Practical Guide took place through distribution to key education institutions, industrial and professional associations, energy efficiency NGOs and services providers as well as through seminars and workshops such as the MEEA workshop on benchmarking and energy management system in May 2013; and the GEF-UNIDO-MEEA EnMS USER training for Municipalities Energy Managers in October 2013;

74. With regards to the delivery of Output 2.4:

- By 2013, collaboration agreements have been discussed and finalized with 13 partner enterprises and institutions²⁰ for implementation of EnMS. This was coupled with an incentive program for the “Implementation of Energy Management Systems in Moldovan Industry”, underwritten by the IEE Moldova Project that offered coverage of 50% of the expert costs for the setup of an EnMS in line with ISO 50001:2011 (Moldovan standard SM ISO 50001:2012) and 100% of the cost of training for company personnel on EnMS. By 2013, only CHP-2 in Chisinau and CHP-North in Balti had made use of the Incentive Program;
- By 2015, only 9 steam system assessments were completed at 9 Moldovan industrial enterprises²¹ that were submitted to the enterprises;
- By 2016, only 8 companies have implemented EnMS with third-party certification to ISO 50001²² in close collaboration with the IEE Moldova Project,
- By 2015, the Incentive Program was impacted by the assistance from MoSEFF resulting in less than anticipated uptake in IEE Moldova technical assistance from its experts for EnMS and SSO. In 2015, MoSEFF had approved 239 projects totalling € 55.4 million in project loans approved by MoSEFF team, and €6.5 million in ongoing project and loan assessments;
- Implementation of EnMS resulted in energy savings and GHG emission reductions from 5 enterprises (Urban Bus Park, CET-Nord, Termocom, Apa-Canal Chisinau, and Danube Logistic as shown on Table 8);
- Though not to targeted levels, there is a strong likelihood that there are many enterprises who took EnMS training not reporting EE investments or housekeeping efforts to the CCO to the PMU.

Outcome 3: Industrial energy efficiency pilot projects

75. Component 3 was designed to develop a number of demonstration IEE projects that have high energy savings and replication potential to catalyse interest amongst industrial stakeholders in Moldovan. IEE investments under this Component were to receive support from the Project for development through specific technical assistance and energy audits, and financing from IEE Moldova resources. Energy audits carried out during the PPG had identified a range of technological opportunities for energy savings, with refrigeration systems and compressed air systems being between the most recurrent and attractive. The intended outcome of Component 3 was changed by the evaluation team (as per ToC diagram on Figure 3) to obtain a “broader set of case studies on IEE best practices being available in Moldova, notably for refrigeration and compressed air systems amongst other EE options”. To achieve this outcome, the delivery of 2 outputs was proposed:

- Output 3.1: IEE projects implemented. The target in the RCE Document was for the Project to support a minimum of 6 IEE investments;
- Output 3.2: Cumulative energy savings. This was to be generated with the completion of implementation of the 6 IEE investments with a cumulative energy savings of 45 to 60 GW hours over the life time of the investments.
- Table 11 provides a summary of the status of delivery of these outputs.

²⁰ Includes JLC SA (milk processing); Lactis SA (milk processing); Carmez SA (meat processing); Natur Bravo SA (cannery); Orhei-Vit SA (cannery); Floare-Carpet SA (carpets production); Efes-Vitanta Moldova Brewery SA (beer production); Sudzucker Moldova SA (sugar plants in Drochia and Falesti); Macon SA (bricks and expandable clay production); Franzeluta SA (bread and pastry production); Technical University of Moldova (TUM) CHP-2 in Chisinau; and CHP-North in Balti.

²¹ Lactis S.A. in Riscani, JLC S.A. in Chisinau, Carmez S.A. in Chisinau, Natur-Bravo S.A. in Cupcini, Floare-Carpet SA in Chisinau; Efes-Vitanta Moldova Brewery SA in Chisinau; CHP-North in Balti; CHP-1 and CHP-2 in Chisinau

²² This only includes TERMOSERVICII subdivision of CHP-2 from Chisinau (former TERMOCOM SA), CHP-North from Balti, INLAC SA from Cupcini, APA-CANAL SA from Chisinau, and ICS Danube Logistics SRL.

Table 11: Summary of the Project's Success in Producing Outputs under Outcome 3

Outcome 3: Broader set of case studies on IEE best practices available in Moldova, notably for refrigeration and compressed air systems amongst other EE options		
<i>Outputs</i>	<i>Target/Indicators</i>	<i>Status as at December 2017</i>
3.1: Implementation of IEE Projects with 45-60GWh of energy saved over its investment lifetime	1. 6 IEE projects implemented with direct support from the GEF project	Only 3 projects implemented with direct UNIDO support
	2. Cumulative 45-60 GWh of energy savings over the EE investments lifetime	214 GWh. A breakdown of these energy savings over a 10-year investment period: <ul style="list-style-type: none"> • 3,280 MWh for LACTIS; • 208,000 MWh for CET-2; and • 2,650 MWh for JLC S.A.

76. The development of pilot IEE investments did not take place until 22 months into the Project (May-June 2012) when discussions with partner enterprises were initiated. Prior to their engagement, the Project needed to familiarize potential project partners of the EnMS-ISO 50001 and SSO implementation and benefits, followed by energy audits, designing an IEE investment complete with objectives, targets and action plans that meet the needs of the industrial enterprise. The pilot IEE investments in this Component were designed to be stand-alone and separate from those implemented in Component 2. This process was one of the primary reasons why IEE Moldova was not able to complete its activities within the 3-year design period in the RCE Document. Details of the 3 pilot investments are provided in Table 12.

Table 12: Summary of the IEE investments receiving direct Project support

Name of industrial entity	Intended EE intervention	Status as of December 2017
JLC S.A. in Chisinau	Pilot implementation of a first-of-its-kind automated energy performance monitoring and reporting system using regression analysis in Moldova dairy sector	This was implemented after the initial implementation of EnMS in JLC (2011-2012) as part of JLC's efforts to continually improve effectiveness of its EnMS and energy performance. This led to Project support for a feasibility study of improved boiler efficiency of boilers for plant steam production. Implementation of EE boilers, however, was then financed in 2014 through MoSEFF instead of UNIDO project due to more generous terms of MoSEFF. After completion of MoSEFF-financed activities in 2016, Project provided

Name of industrial entity	Intended EE intervention	Status as of December 2017
		<p>assistance in the installation of gas meters and a data logger for automated and faster monitoring and reporting of electricity and natural gas consumption in their operations. The delivery of the data logger was delayed until July 2016. Energy consumption information was collected during 2016 and 2017 for analysis and acceptance of meter equipment installations and finalization of the advanced analytics algorithms.</p>
<p>Termoelectrica CET/CHP-2 in Chisinau</p>	<p>CET-2 is the largest Combined-Heat and Power plant in Chisinau, supplying heat and electricity from natural gas. EnMS and pilot project implementation for CHP-2 was driven by plant managers wanting to modernize their facility. This resulted in plans for the pilot implementation of a boiler air preheater retrofit and modernization investment project with high rate of return</p>	<p>CET-2 is the largest Combined-Heat and Power plant in Chisinau, supplying heat and electricity from natural gas. In 2013 CET-2 started the implementation of an EnMS and carried out a SSO assessment with the technical assistance of UNIDO qualified national EnMS-SSO experts. The EnMS work and the SSO assessment identified numerous operational improvements as well capital investments which would lower operational costs, deemed highly beneficial to CET-2 in reducing their operational losses. Energy performance improvement measures that were completed by CET-2 included:</p> <ul style="list-style-type: none"> • Optimization of the operation of generation units; • Reduction of starting times of generation units; • Changing the lining on the cooling towers pipes and valves; <p>The pilot project supported by the IEE Moldova Project was the retrofit (leakage elimination) and modernization of the boiler air pre-heaters. All these measures led to immediate savings, and incentivized plant management to undertake further EnMS and energy performance improvement measures, including installation of VSD for network pumps.</p>
<p>LACTIS S.A. in Riscani</p>	<p>Pilot implementation of a refrigeration system modernization project in a dairy and cheese making factory.</p>	<p>This pilot project was implemented after the initial implementation of EnMS in LACTIS (2011-2012) as part of LACTIS' efforts to continually improve effectiveness of its EnMS and energy performance. EnMS implementation led to the identification of numerous operational improvements which</p>

Name of industrial entity	Intended EE intervention	Status as of December 2017
		<p>would lower operational costs, deemed highly beneficial for Lactis. Energy efficiency measures completed by the end of 2012 included:</p> <ul style="list-style-type: none"> • Installation of an energy monitoring system to identify where energy wastage was occurring; • Installation of energy meters to control energy consumption of compressors; • Redistribution and rescheduling of production batches allowing shutoff of one 5 tons of steam per hour boiler; <p>In 2013, the IEE Moldova Project worked with LACTIS to modernize the factory refrigeration system, contributing to the procurement of new energy efficient chiller. Other identified measures were to be implemented to continue driving down operational costs of Lactis.</p>

77. In 2013, more than 10 enterprises were in discussion with IEE Moldova PMU on the development of pilot IEE projects. Delays were experienced in closing agreements due to management changes within some of the partner companies. Only 3 pilot EE projects (Lactis S.A in Riscani, JLC S.A in Chisinau, and CHP-2 in Chisinau), were identified in 2013 with only one envisaged to be implemented by the end of 2014 (out of a target of 6). Project support for JLC S.A. was complicated in 2014 after the Project supported the completion of the feasibility study on improving the plant’s efficiency in steam production. JLC S.A. then withdrew from the IEE Moldova Project support for the EE boilers, opting instead for MoSEFF support, which offered more attractive lending conditions as well as a grant component which was 20% of the loan amount²³. By 2016, JLC requested and received approval for IEE Moldova Project support for the procurement and installation of gas meters and a data logger for automated monitoring of natural gas consumption in their operations.

78. While the target for cumulative energy savings of 45-60 GWh over a 10-year investment period has been exceeded, this outcome was not entirely satisfactory in that 86% of these energy savings were from the CET-2 power plant. The 3 IEE investments made in this Component did not constitute achievement of the outcome of a “broader set of case studies on IEE best practices being available in Moldova” that could facilitate a rapid rise in interest by the Moldovan industrial sector in energy efficiency.

The rating for project effectiveness is “moderately satisfactory”

3.2.3 Efficiency

A measure of how economically resources/inputs (funds, expertise, time) are converted to results.

79. Up to the EOP date of 31 December 2017, 98% of the GEF resources or USD 941,866.63 were

²³ According to MoSEFF, the enterprise was not eligible to apply in parallel to different investors and donors; as such, JLC SA had to choose either MoSEFF or the UNIDO/GEF Project for its financing.

expended over a 7-year period for undertaking IEE Moldova activities as shown on Table 13. The original project duration was 42 months for completion but instead took 88 months requiring several no-cost extensions. An outstanding total of USD 18,133.37 remains for which no report has been submitted. Due to limitations of the UNIDO accounting system, GEF expenditures, unfortunately could not be broken down into component expenditures.

80. Table 13 also reveals 84% of the budget was expended on experts and local subcontractors. The expenditure lines for national experts, subcontracts and the equipment were mostly assistance provided to designing and implementing IEE investments under Components 2 and 3. According to PIRs prepared for IEE Moldova, cumulative expenditures of the GEF funds were as follows:

- USD461,217 (48%) up to July 2012;
- USD636,000 (66%) up to October 2013 prompting a request for a no-cost extension to December 2014;
- USD744,851 (78%) up to July 2014 prompting another request for a no-cost extension to December 2015;
- USD794,136 (83%) up to July 2015; and
- USD902,748 (94%) up to July 2016.

Table 13: IEE Moldova Project Resource use breakdown up to December 2017

• UNIDO Cost Code	• Amount (USD)
• 1100 - International Experts	• 326,202.58
• 1500 - Project Travel	• 13,987.41
• 1700 - National Experts	• 230,685.73
• 2100 - Subcontracts	• 236,737.06
• 3000 - Trainings/Fellowships/Study Tours	• 36,239.27
• 4300 - Premises	• 12,513.70
• 3500 - International Meetings	• 5,397.48
• 4500 - Equipment	• 73,529.93
• 5100 - Sundries	• 6,573.47
• TOTAL	• 941,866.63

81. While the IEE Moldova Project has substantially exceeded its planned timespan from 3 to 7 years, the first 2 years delivered the training resources and capacity building activities for the sector. The slowdown in resource burn rate after 2012 was related to extensive efforts to identify pilot projects and investments and to support EnMS deployment for up to 9 industrial enterprises. By July 2016, 94% of the GEF budgeted was expended, leaving metering work with JLC SA as the only outstanding expenditure to be implemented (see Para 74 and Table 10). These delays were related to management changes within many of the industrial enterprises, delays in decision making on IEE investments, and reluctance of some industrial enterprises to invest in energy efficiency due to poor economic outlook of Moldova for their businesses.

82. With an emphasis on training and building local capacity, 60% of IEE Moldova Project resources were spent on international and national consultants whose primary roles were to collect

baseline data at factories, design appropriate training programmes, and deliver quality technical/advisory services for energy auditing, energy management system implementation and realization of EE measures to industrial clients. Roughly 32% of the funds were expended on equipment and subcontracts that included equipment for EE measures (such as energy monitoring hardware and software for JLC SA, variable speed drives for motors (partial payment in the form of a grant) for LACTIS SA).

83. On the actual values of GEF assistance to the 3 pilot projects, the 3 pilot projects were to be supported up to a maximum of 25% of the capital cost of the investment. Details include:
- USD20,000 was provided to JLC SA for technical assistance from international consultants in 2016 and installation of the meters mentioned in Para 75;
 - USD40,000 for LACTIS SA for technical due diligence and verification of performance and partial payment of energy efficient equipment related to Freon-based refrigeration for ice water and cheese production in 2013;
 - USD32,000 in technical assistance was provided to CET/ CHP-2 for the installation of the air preheater retrofit and modernization equipment.

The rating for project efficiency is “moderately satisfactory”

3.2.4 Sustainability of Benefits

The continuation of benefits from a development intervention following project closure. The probability of continued long-term benefits. The resilience-to-risk of the net benefit flows over time.

84. Sustainability of the IEE Moldova Project has been assessed as moderately likely (ML). Primary reasons for this assessment are as follows:
- Poor economic conditions in Moldova has made industrial entities less willing to invest in energy efficiency;
 - Despite these poor economic conditions, local IEE funds from MAEE available but likely in insufficient amounts. The allocation of future MAEE funds will depend on the level of subscription to current MAEE funds and the reaction of the donor community to provide further funding for the continual lowering of barriers to IEE investments that include lack of awareness and the strengthening of the supply chain for energy efficiency equipment and services;
 - EnMS-ISO50001 training has informed a large number of (>100) energy consuming entities, in industry as well as other sectors (public and power generation) of the benefits of adopting EnMS and EE measures. However, experts trained by the Project in EnMS and SSO have been struggling to develop a pipeline of new EnMS-EE assignments with industrial clients; and
 - Numerous and recent changes of ministries with oversight on the energy sector in Moldova that leads to the weakening of government capacity to regulate energy efficiency.

Financial Risks

85. The sustainability of IEE investments in Moldova is dependent to a high degree on the availability of financing. The IEE Moldova Project has demonstrated the availability of financing through the Moldova Energy Efficiency Fund, MoSEFF and its on-lending to Moldovan commercial banks, and the funds available from UNIDO used to fund up to 25% of IEE investments.
86. With the IEE Moldova Project not meeting its targets of pilot IEE investments in Component 3, there is a perception by the evaluation team that the availability of financing is not an issue in Moldova for IEE investments. Moreover, the donor community appears quite active in

assisting the Moldovan Government in reaching his energy efficiency goals through further training projects such as EUREM with GIZ. However, without any demonstrable willingness of industrial entities in Moldova to invest in energy efficiency, the availability of IEE funds after this project is questionable.

87. While the Government of Moldova has made energy efficiency financing available through its own MAEE funds, it still requires the support of regional banks and other donors to ensure there are sufficient funds to sustain continual lowering of barriers consisting of lack of awareness as well as strengthening supply chain for energy efficiency equipment and energy services. Furthermore, there is evidence of growing foreign direct investment into Moldova's industrial sector, many of which adhere to best international practices for energy efficiency. For local Moldovan industries to stay competitive with these foreign managed industrial entities, there is a strong likelihood that financing would be made available to these industries to stay competitive within the Moldova market. From a financial perspective, the sustainability of IEE Moldova Project outcomes is *moderately likely (ML)*.

The rating for financial risks is “moderately likely”

Sociopolitical Risks

88. As mentioned in Paragraph 85, there are some foreign direct investments into the industrial sector in Moldova which reportedly employ best practices for energy efficiency. The emergence of these efficient industrial entities in Moldova is expected to force locally owned industrial entities in Moldova to modernize their mindsets in the context of energy management. While the evaluation is unsure of the extent of industrial entities are willing to modernize their approaches to energy management, the evaluation believes that these changes will occur at a slower pace, especially without donor support.
89. Political support in Moldova for energy efficiency is also uneven. While the Government of Moldova has many policies and programs in place to encourage energy efficiency, the almost constant changing of ministry portfolios with other agencies within government over the past 4 years, has diverted attention away from driving and incentivizing energy efficiency in the industrial sector. However, many of the EnMS experts interviewed by the evaluation team mentioned the emergence of the direct foreign investments (as mentioned in Para 85) as entities using best international practices for energy management. The presence of these entities may, depending on their domestic market share, force other Moldovan industrial entities (without DFI) to improve their own energy performance to stay competitive. The evaluation, however, can only speculate on this possible outcome due to a business environment where there is a lack of information sharing amongst enterprises.
90. The emergence of energy efficiency expertise in Moldova through the training and qualification provided by IEE Moldova project has certainly enhanced the confidence in IEE investments. The evaluation was witness to examples where the 3 pilot projects from Component 3 had significantly benefited from the inputs of these experts into their IEE investments and set up and implementation of EnMS systems. However, the issue for the evaluation is the sustainability of business opportunities for these experts (as mentioned in Para 81), many of whom appeared to be struggling to develop a pipeline of energy efficiency assignments with various industrial entities. To the knowledge of the evaluation team, there are a number of foreign ESCOs willing to come to Moldova to perform IEE work, which in the estimation of the evaluation team would facilitate an acceleration of IEE adoption. However, their decisions were delayed pending approval of the new Law on Energy and its legitimization of the ESCO modality (see Para 90). As previously mentioned in Para 79, there appears to be a general reluctance of most industrial enterprises in Moldova to invest in energy efficiency due to the country's poor economic conditions.

91. Moreover, many of the industrial entities who participated in the EnMS training sessions were keen to learn of the best practices for energy management and generating energy savings. Unfortunately, many of these entities did not want to communicate further with the Project on the benefits that they had derived from learning about EnMS, generating uncertainty in evaluating the benefits of the IEE Moldova Project. In addition, many of these industrial enterprises still harbour “old mindsets” in managing their facilities adhering to Soviet-styled prescriptive technical regulations. In a poor economic climate, this unwillingness to communicate and adopt modernized energy management is exacerbated. Overcoming of this barrier will take time with the emergence of younger professionals and sustained inputs from technical experts. From a sociopolitical perspective, the sustainability of the IEE Moldova Project is assessed as *moderately likely (ML)*.

The rating for sociopolitical risks is “moderately likely”.

Institutional Framework and Government Risks

92. Para 34 provides an overview of the outputs of the Government of Moldova with regards to promoting energy efficiency and a low carbon economy. Notwithstanding the strong list of strategies and policies, the Government of Moldova has been undergoing numerous changes to key ministries that oversee energy efficiency (some of which is mentioned in Para 87). The consequences of these changes is likely to result in frequent changing of government personnel responsible for energy efficiency oversight, which leads to losses in the capacity of the government to regulate and manage energy efficiency in the country. This scenario also leads to further delays in amending the Law on Energy to legitimize ESCOs and the Energy Performance Contract modality which would certainly be useful to the industrial sector (as mentioned in Para 88). These delays cause uncertainty in further investments into IEE in Moldova.

93. In addition, these changes in ministries that oversee energy efficiency disrupts and weakens the effective coordination mechanisms developed between the industrial entities and the government; this creates confusion amongst industrial entities as to which government agency should they be reporting to for obtaining permits and reporting compliance with energy efficiency policies of the government. This may result in a reluctance by industrial entities to spend more time seeking approval for energy efficiency investments. As such, from an institutional framework and governance perspective, the sustainability of the IEE Moldova Project is assessed as *moderately likely (ML)*.

The rating for institutional framework and government risks is “moderately likely”.

Environmental Risks

94. The IEE Moldova Project is aimed at achieving global environmental benefits, including improvements in resource efficiency, and the reduction of electricity and primary fuel consumption that would lead to substantial GHG emission reductions. The general perception within the industrial sector in Moldova is that efficiency of resource consumption should lead to increased profitability provided that good economic conditions persist in the country that would lead to long-term sustainability of the industrial enterprise. For these reasons, the environmental risks of an IEE program promoted by this Project is a low risk. From an environmental perspective, these sustainability of the IEE Moldova project is assessed as *highly likely (HL)*.

The rating for environmental risks is “highly likely”

The rating for sustainability of benefits is “moderately likely”

3.3 M & E System

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

M & E Design

95. M&E design is rated as **moderately satisfactory**. This was based on an M&E system plan as specified in the RCE document in a generic manner (stating that M&E was to be conducted “in accordance to established UNIDO and GEF procedures” leaving the interpretation of M&E to the PMU), and the fact that the PRF of this Project did not have a complete set of SMART indicators (as detailed on Para 45) that were not time bound.
96. The M&E design refers to the impact and performance indicators defined in the PRF, specifying that the monitoring plan will track, report on and review project activities and accomplishments in relation to:
- Energy savings and GHGs emission reductions directly generated by the UNIDO GEF project energy efficiency projects developed and implemented;
 - Energy savings and GHGs emission reductions indirectly generated by the UNIDO-GEF project. Indirect emission reductions are generally not monitored on GEF projects which is the reason why GEF projects have causality factors associated with the estimate of indirect GHG emission reductions;
 - Energy efficiency investments generated by the UNIDO GEF project, directly and indirectly. Similar to the previous point, indirect IEE investments would also be very difficult to track in Moldova, especially when most enterprises are unwilling to share information on energy consumption;
 - Development of policy programs and normative instruments aimed to promote and support industrial energy efficiency; and
 - Level of awareness and technical capacity for industrial energy efficiency and energy management within relevant institutions, in the market and within enterprises. Technical capacity should have been measured in terms of how many of the trained experts are still working in IEE projects at the EOP.

M & E Implementation

97. M&E implementation for the IEE Moldova Project was assessed as **moderately unsatisfactory**. The IEE Moldova Project compiled PIRs on an annual basis, using a Word format from 2011 up to 2013, followed by a switch to an Excel spreadsheet format from 2015 to 2016. The 2017 PIR was formatted as a Word document which only provided updates on progress, of which very little progress occurred during 2017.
98. The basic issue with the reporting in the PIRs was related to reporting progress on indicators in the PRF only up to the outcome level. There was no consistent output-level reporting on the PIRs; much of the output reporting on PIRs was confined to narratives at the outcome level (more predominant in the PIR format up to 2013). Output level reporting in the 2014 to 2015 PIRs was also not satisfactory with the reporting focusing mainly on outcome monitoring and its targets. As such, the evaluation team encountered some difficulties in reporting progress on outputs of the IEE Moldova Project.
99. IEE Moldova was to have developed a monitoring, tracking and benchmarking program for the MAEE where direct emission reductions from pilot projects and adoption of EnMS by participating industrial entities were to be calculated and documented for the purposes of learning and dissemination. With the number of pilot projects under Component 3 falling

below targeted levels, and due to the unwillingness of most industrial entities who had adopted EnMS to share their energy consumption information, energy savings and GHG emission reductions from the Project were not regularly reported in the PIRs and by the Project itself. This is likely due to the difficulties of this monitoring after the conclusion of the EnMS training programme.

100. Despite these shortcomings, there were numerous examples of adaptive management resulting from information provided in the PIRs. Examples include:

- diversion of Project support from the Industrial Energy Manager Certification Program in 2012 (Output 1.4) due to potential overlaps with the EUREM program for certification of energy auditors and energy managers. Resources were diverted to:
 - development of the Energy Auditor Certification Programme. AEA provided expert inputs to review the curriculum and the reporting templates to be used by the certified energy auditors. These templates and AEA activities were translated into English for MAEE;
 - Supporting a joint UNDP-MAEE organized study tour to Vienna for Moldovan journalists to build their knowledge and competencies on effective communication and promotion of sustainable energy solutions.
- an agreement with the Moldovan counterparts in 2013 to request an extension to the IEE Moldova Project to the end of 2014 due to the slow pace of Project expenditures, mostly related to delays in the start-up of MAEE, technical assistance to implement IEE projects under Component 3 and major difficulties in finding partner enterprises willing and able to invest in IEE pilot projects;
- the realization by 2015 that the investment environment for the industrial sector in Moldova was not healthy leading to only 3 pilot EE projects (JLC SA, Lactis SA and CHP-2), out of a target of 6. These delays in the progress of implementing pilot IEE projects were somewhat beyond the control of the PMU due to senior management changes of some of the companies. By late 2015, another project extension, this time for 2 years, was granted to the end of 2017 in the hopes of achieving the planned output of supporting and implementing a target of 6 projects.

101. Due to the size of the GEF grant being under USD1 million to be expended over a period of 3 years, no mid-term review was planned for IEE Moldova.

Budgeting and Funding for M&E Activities

102. Budgeting and funding of M&E activities has been rated as **unsatisfactory**. The M&E budget was budgeted in the RCE Document at a mere USD27,000 without any detail of the breakdown of this cost (other than the co-financing contributions of USD2,000 from the Government and USD8,000 from UNIDO). From information in the PIRs, funding for M&E activities appears to only consist of the final evaluation. There were no separate M&E activities listed in the PIRs that were identified in the RCE Document²⁴. With 66% of the GEF budget spent by October 2013 (less than 3 years of the Project), there is an appearance that that the ongoing M&E efforts were covered under Project management costs.

The rating for M&E implementation is “moderately unsatisfactory”

3.4 Monitoring Long Term Changes

103. Output 1.1 was “an established IEE monitoring, tracking and benchmarking program”

²⁴ As on page 4 of RCE Document

designed to provide a national reporting structure on energy consumption of various industries tailored to the Moldovan manufacturing sector. Such a programme would provide more structured means of presenting credible information on energy consumption for the benefit of stakeholders in the industrial sector and other high-energy consuming entities, and provide MAEE with information to assess the impacts of its policies and setting future programme targets designed to assist the Moldovan industrial sector to monitor long-term changes in the energy consumption of their plants.

104. Based on UNIDO's final report in April 2014 on Component 1, the Project had setup a benchmarking system for 9 industrial subsectors for the entry of their specific information on their energy consumptive patterns with the long-term objective of comparing their energy consumption with other companies of the same subsector in Moldova and other countries. Templates for the presentation of the data collected was prepared, as well as the benchmarking system which included data collection, walk-through audits, data processing and storage, data control and verification, confidentiality requirements, database ownership, result distribution criteria and reporting rules. A pilot benchmarking study was setup for the dairy subsector against dairy operations in Austria and the Ukraine. While MAEE had included the replication of the dairy benchmarking studies in its 2015 working plan (funded from extra-budgetary resources and donors), this funding was never mobilized. In addition, an MAEE meeting with representatives from the meat processing sector to present benchmarking concepts and results of the dairy pilot resulted in a less than encouraging response with the primary concerns raised being the confidentiality of business and energy-related information being shared.
105. While the IEE Moldova Project has left behind this monitoring, tracking and benchmarking program, the uptake of this tool by Moldovan industrial stakeholders is likely to be limited until their reluctance to share data related to their products, use of primary fuels and electricity and other raw materials, can be overcome. This may require sustained participation of these industrial entities to workshops to provide something similar to peer pressure (at a regional level) when these entities will be witness to continual energy performances of their competitors in the same industrial sub-sector.

3.5 Processes affecting achievement of project results

3.5.1 Preparation and readiness / quality at entry

106. The Project objectives were reasonably clear with 3 distinct components designed to strengthen local capacity to support and encourage IEE investments in Moldova. Despite this clarity, the 3-year duration of the Project as mentioned in the RCE Document was clearly insufficient time to achieve all targets and objectives. While the CCO was the primary executing agency for the IEE Moldova Project, the Project at its commencement in August 2010 was not able to become fully operational until the full establishment of the MAEE was completed. Full establishment of the MAEE did not occur until May 2011, 9 months after the commencement of the project. It was only in April and May 2011 that the MAEE was able to recruit 9 personnel including its Director and Deputy Director. As such, the IEE Moldova Project was not in an appropriate state of readiness to be implemented after its approval.

The rating for quality at entry/preparation and readiness is "moderately satisfactory"

3.5.2 Country Ownership

107. Country ownership of the IEE Moldova Project is strong and reflected in the Government of Moldova's strong support of energy efficiency under the Moldovan National Program of Energy Conservation for the years 2003-2010, the *National Development Strategy "Moldova*

2020”, the “Energy Strategy of Moldova until 2030”, the 2010 *Law on Energy Efficiency*, *National Energy Efficiency Programme 2011-2020* and the *National Energy Efficiency Action Plan 2013-2015* (NEEAP), the 2001 *Environmental Policy* of the Republic of Moldova, and the 2016 *Low Emission Development Strategy (LEDS)*. These strategies and policies are all explained in detail in Para 34.

108. Country ownership of this Project was further demonstrated in its commitment to establish its Agency for Energy Efficiency, and the establishment of the Moldovan Energy Efficiency Fund. As mentioned in Para [87](#) and Footnote [24](#), the Government are considering the merging of these 2 entities.

3.5.3 Stakeholder Involvement

109. Stakeholder engagement on the IEE Moldova Project activities was effective. During the PPG phase of the Project in late 2009, UNIDO was able to consult with all relevant government agencies, professional personnel through the Technical University of Moldova (TUM), and 50 industrial entities, a majority of whom responded to questionnaires regarding energy usage, and giving Project designers an excellent foundation on which to formulate incremental IEE activities. The quality of these consultations has led to a reasonably well designed GEF project.
110. During implementation of the Project, stakeholder engagement was the one of the primary roles of the PMU housed within the CCO. At the commencement of the Project, the PMU made numerous arrangements with key stakeholders such as the Ministry of Economy on the establishment of the MAEE, TUM in assisting of the delivery of workshops and seminars on IEE and identifying suitable candidates for training in EnMS and SSO, and Moldovan industrial entities, many of whom had already been in contact with the Project during the PPG phase. Their efforts to engage these industrial entities intensified towards the latter stages of the Project to engage them in awareness raising and training for EnMS and SSO, and energy audits, all of which were crucial in obtaining industry entity commitments to implement EE measures or make EE investments. To improve its effectiveness in outreach to industrial stakeholders, the PMU engaged with the Moldovan Chamber of Industry and Commerce to utilize their outreach channels to their members, many of whom are in the industrial sector. The Project also made efforts to link with other donor projects such as MoSEFF with EBRD, and the ESCO Project with UNDP that would improve the industrial sector’s access to additional sources of financing.

3.5.4 Financial Planning

111. Financial planning of the IEE Moldova Project was based primarily on annual work plans prepared by the PMU in close collaboration with UNIDO HQ. The flow of funds for Project operations was triggered by the PMU on a biannual basis, the amounts of which would be rationalized by the aforementioned annual work plan.
112. With the delivery of funds to the PMU in Chisinau, a total of 10 missions were made to Moldova between 2011 and 2015 to conduct due diligence on the expenditure of 83% of the Project funds, and to monitor the progress of engaging private industrial entities (under Component 3) to provide co-financing or investment into energy efficient measures for their facilities. As previously mentioned in Paras 79, 88 and 89, the targeted levels of co-financing did not meet the targeted levels based on the reluctance of the industrial sector in general to invest in energy efficient measures given the uncertain state of the Moldovan economy. Actual co-financing of the IEE Moldova Project is found in Table 3 and in Annex 4.
113. Another 3 missions were conducted during 2016 and 2017, related to the JLC S.A. pilot IEE project. The Project has not made available to the evaluation any financial statements or financial audits.

3.5.5 UNIDO Support

114. As GEF's implementing agency, UNIDO had responsibility for the Project's timely implementation, delivery of planned outputs, technical backstopping, and monitoring achievement of expected outcomes. UNIDO was also accountable to the GEF grant and other funding resources provided by the GoM and the private sector. UNIDO's performance in undertaking these responsibilities was conducted in a manner that was responsive to the requests and needs of the GoM and Moldovan industrial stakeholders.
115. The participation and reputation of UNIDO was highly valued by stakeholders participating on the Project. The 3 pilot project stakeholders interviewed on this evaluation remarked on the importance of UNIDO's association with promoting energy efficiency and expressed its support for its continuation. Feedback from other stakeholders through CCO and MAEE indicated that many of the industrial stakeholders who had participated on the Project, also expressed their need for a continuation of the IEE Moldova Project activities due to the Project providing credible and technology neutral energy performance solutions. CCO and MAEE also mentioned that these industrial stakeholders recognize the benefits of energy efficiency but required more information to justify their investment, under trying economic circumstances.
116. One area of improvement for UNIDO management on the IEE Moldova Project would have been in the monitoring and reporting of progress according to GEF guidelines. As mentioned in Para 96, PIR reporting on targets was only at the outcome level, not to the output level which was originally intended. Guidance could have been provided to the PMU on monitoring of both outcome and output indicators and reporting against their respective targets. As mentioned in Para 97, UNIDO also experienced more difficulties in any systematic progress reporting of direct energy savings and GHG emission reductions after the conclusion of EnMS training.
117. While UNIDO has been responsive to the needs of the Moldovan industrial stakeholders, it cannot be faulted for the Project not reaching some of its targets related to IEE pilot projects due to the aforementioned difficult investment environment and the general lack of sharing of information amongst industrial stakeholders. Notwithstanding, UNIDO has provided credible "technology-neutral" technical assistance through its international advisors on EnMS and SSO, using its long-standing EnMS experience for industries in many of UNIDO member countries. In its workshops and presentations, UNIDO has shared EnMS success stories from other countries with Moldovan industrial stakeholders boosting the credibility of the information. Despite the less successful outcomes of the IEE Moldova Project, UNIDO is well-positioned to continue the much-needed IEE technical assistance and awareness raising to Moldovan industrial stakeholders.

The rating for UNIDO's support is "satisfactory"

3.5.6 Co-Financing on Project Outcomes and Sustainability

118. Project co-financing did not reach its targeted levels due to a shortage of industrial entities who implemented EE measures resulting from adoption of EnMS under Component 2, and those making more substantial investments that were supported by the Project under Component 3. Co-financing details of the IEE Moldova Project by components can be found in Annex 4. As detailed in Paras 59 and 75 and Table 12, the IEE Moldova Project was competing with MoSEFF for opportunities to financially assist industrial stakeholders in implementing IEE measures. Co-financing amounts of the IEE Moldova Project have been adversely affected by the availability of MoSEFF financing and technical assistance.
119. IEE Moldova with the support of MAEE achieved strong synergies with other ongoing technical assistance initiatives leveraging significant in-kind contributions from other donor

funded projects, EU and GIZ in particular. However, the shortfall in reaching co-financing targets is a reflection of the moderately sustainability assessment of the IEE Moldova Project.

3.5.7 Delays of Project Outcomes and Sustainability

120. As detailed in Para 78, Project expenditures up to the original terminal date of December 2013 was only 66%. Project implementation delays were experienced at the commencement of the Project with delays in the establishment of MAEE until May 2011, 9 months after the August 2010 startup.
121. Delays were also experienced in finding partner enterprises for IEE pilot projects under Component 3. Up to 2013, only 2 out of a target of 6 IEE projects were identified and implemented. Their commitments to IEE investments, as detailed in Para 74, required potential partners to become familiar with EnMS-ISO 50001 and SSO implementation, all of which delayed implementation of Component 3. In addition, the Project needed to deal with management changes amongst the several potential partners they were in negotiations with, and slow decision making of these enterprises due to the weak economic conditions of Moldova.
122. The aforementioned delays do highlight the design weakness of the IEE Moldova Project with regards to the implementation period. A longer implementation period of up to 5 or 6 years, would have provided sufficient time for the Project to expend more than 66% of the funds at the designed EOP, to be closer to delivering all outputs and achieving intended outcomes, and resulted in a more sustainability rating for the Project.

3.5.8 Implementation approach

123. The key approach of the IEE Moldova Project was to build the capacities of relevant institutions, technical and academic specialists, and private industrial businesses for the purposes of enabling these stakeholders to plan, design and implement energy efficiency measures for the Moldovan industrial sector. The implementation approach of the IEE Moldova Project follows similar approaches to other UNIDO IEE projects globally with technical assistance provided for regulatory strengthening, national promotional programs, capacity building for local energy professionals and others involved in the supply chain for energy efficiency, followed by pilot EE investments. The intention of this approach was to strengthen local capacities and local ownership of all energy efficiency initiatives in the Moldovan industrial sector to the extent that they could use these new skills on pilot projects supported by Project resources. This implementation approach closely follows and complies with the principles and stated commitments of the Paris Declaration.

The rating for implementation approach is “satisfactory”

3.6 Project coordination and management

The extent to which a development intervention is managed based on results, instead of activities.

124. The roles of the Moldovan-based PMU in relation to UNIDO HQ was clear in the context of managing and coordinating Project implementation. The role of Project coordination and management was undertaken by the PMU within the Climate Change Office under MoEN. The CCO facilitated close collaboration with MAEE to ensure the best possible coordination and synergies with other ongoing technical assistance initiatives, especially those related to the establishment of the MRV Framework and Energy Efficiency Best Practice Recognition Program.
125. The PMU fulfilled an important role in providing oversight over stakeholder discussions led

by the Austrian Energy Agency during the early phases of the Project in 2011 and 2012. These discussions were designed to strengthen MAEE staff outreach to other relevant stakeholders (Ministry of Economy, Moldova Energy Efficiency Agency, Climate Change Office, Embassy of Sweden, ÅF-Mercados EMI, Chamber of Commerce and Industry of Moldova, National Bureau of Statistics, Institute of Power Engineering of the ASM, National Cleaner Production Program Moldova and others) regarding the IEE Moldova Project objectives, resources, work plan, roles and responsibilities.

126. The IEE Moldova Project, however, did experience significant delays in the start-up of pilot projects under Component 3. This required a more intensive involvement of the PMU to find appropriate industrial partners that would host these pilot IEE investments, and more frequent communications with UNIDO HQ on the progress of these negotiations. In conclusion, the difficult investment environment for the industrial sector in Moldova could not be overcome by the PMU or UNIDO HQ. In the opinion of the evaluation team, the Project did well to complete 3 pilot EE investments under Component 3. Aside from these issues, both UNIDO HQ and the PMU did support the timely, smooth and coordinated execution of all other Project activities. To the extent possible, the PMU also promoted and raised the visibility of the IEE Moldova Project within the Ministry of Economy and other government ministries and donors, and sustained healthy dialogue and collaboration with partner enterprises.
127. From the outset, the CCO has provided strong support to coordinate and facilitate the achievement of intended outcomes and delivery of outputs of the IEE Moldova Project. While the selection of CCO as the executing partner for IEE Moldova does not appear at this time to be fully in line with its mandate, its selection was based on CCO being the most appropriate agency at the start of the Project in 2010, considering that the MAEE had not yet been fully established and staffed. CCO's work in facilitating the 3 pilot projects under Component 3 can be considered satisfactory notwithstanding the fact that the target of 6 pilot projects was not achieved; as mentioned in Para 88, the investment environment for the industrial sector in Moldova during the IEE Moldova Project was not sufficiently attractive due to uncertainties of the overall economic climate in Moldova.
128. Considering its work in reaching out to other ministries as a part of Moldova's National Communications, CCO already had an established network to execute IEE Moldova. One of the roles of the PMU housed within CCO's offices was to convene meetings of the Project Advisory Committee (PAC) for periodically reviewing project implementation and coordinating meetings between project partners and providing a transparent environment under which the Project could be implemented for sustainable results. Unfortunately, the evaluation team does not have any evidence that any PAC meetings were conducted during the implementation of the Project. Instead, one-on-one meetings or Project seminars were used as the platform on an opportunistic basis to replace PAC meetings to inform key stakeholders of Project progress. According to interviews with the PMU, difficulties were encountered to arrange PAC meetings amongst the private sector, other key ministries within the government, other international organizations involved with IEE, and the unwillingness of many of these partners to communicate in a transparent manner on sectoral improvements within the industrial sector. With this business environment, it is doubtful that the holding of any PAC meetings would have been beneficial to the outcomes of the IEE Moldova Project.
129. The MAEE also undertook an active role in the implementation of Component 1 since its establishment in mid-2011, including Outputs 1.1, 1.2 and 1.3. Despite this active role, the stability of MAEE and its staff had come into question during the latter stages of the Project with the Government stating its intention to consolidate MAEE with its Energy Efficiency Fund. Balancing the aforementioned comments, the overall assessment of the Project coordination and management can be assessed as "moderately satisfactory".

The rating for Project coordination and management is “moderately satisfactory”

3.7 Gender Mainstreaming

The extent to which UNIDO interventions have contributed to better gender equality and gender-related dimensions were considered in the intervention.

130. The UN has a mandate to address human rights and gender equality in all interventions to promote social justice and equality²⁵. Since the IEE Moldova Project was designed as a GEF-4 project at its design stage in 2009-10, there were no explicit recommendations or requirements for gender mainstreaming or for gender disaggregated targets. Since 2011 when training activities of IEE Moldova had intensified, the Project had strived and proactively worked to ensure the highest possible participation of women to identify and train EnMS and SSO expert candidates through encouraging enterprise management to appoint women for this training. This is evidenced through the observations of the evaluation team of the presence of women as EnMS experts (2 out of 13 qualified experts) and SSO experts (4 out of 13 qualified experts).
131. With the implementation period of the Project extending into the periods of GEF-5 and GEF-6 where monitoring of these gender mandates was better defined after 2014, gender monitoring for IEE Moldova only commenced in 2015. The results presented in the PIRs of 2015 and 2016 present an outcome below expectation, with women’s participation on the project ranging from 10% to 15%, with participation slightly higher for the EnMS related activities, despite the aforementioned higher number of qualified SSO women experts than EnMS (as mentioned in Para 128).

The rating for gender mainstreaming is “moderately satisfactory”

132. The overall performance of the IEE Moldova Project is rated as moderately satisfactory. An overall summary of these evaluation ratings²⁶ and findings is provided in Table 14.

²⁵ Guidance Document: Integrating Human Rights and Gender Equality in Evaluations, UN Evaluation Group, Aug 2014, pg19

²⁶ Highly Satisfactory (HS); Satisfactory (S); Moderately Satisfactory (MS); Moderately Unsatisfactory (MU); Unsatisfactory (U); Highly Unsatisfactory (HU). Sustainability and Benefits is rated from Highly Likely (HL) to Highly Unlikely (HU)

Table 14: Summary of Findings and Ratings by Evaluation Criteria for the IEE Moldova Project

Criterion	Summarized Assessment of the Findings	Rating
Attainment of project objectives and results (overall rating)		
Relevance	Government of Moldova has placed strategic priority on energy efficiency through numerous policies, strategies, programs, and action plans (see Para 51). Project also strongly relevant with GEF-4, SP-2 (see Para 54)	HS
Effectiveness	The expected volume of IEE investments did not materialize. This is reflected in some of the important targets not being achieved including 8 out of 10 targeted companies certified for EnMS ISO50001, 4 IEE service contracts against a target of 400 contracts between 2013 and 2023 (Outcome 2), 8 out of 20 targeted companies having an EMS system in place (Output 2.4), and 3 out of 6 targeted IEE pilot projects achieved (Output 3.1). See Tables 10 and 11.	MS
Efficiency	Only 66% of funds expended at original terminal date of December 2013. The remainder of these funds were expended over another 48 months to the current terminal date of December 2017 (see Para 78).	MS
Sustainability of project outcomes (overall rating)	Poor economic conditions in Moldova has made industrial entities less willing to invest in energy efficiency. Increased availability of funds for IEE capacity building needs to be supported by donors (Para 82 and 85).	ML
Financial Risks	There are EE funds available within MAEE financing IEE measures and for building local capacity building to strengthen supply chain for EE services and equipment. Financing support will still be required from regional banks or donors for which there are currently no commitments (Para 85).	ML
Socio-political Risks	General reluctance of most industrial enterprises in Moldova to invest in energy efficiency due to poor economic conditions (Para 88), and difficulties in overcoming old mindsets in energy management in Moldova (Para 89).	ML
Institutional framework and governance risks	Government has been undergoing numerous changes to key ministries that oversee energy efficiency (Para 90). This further delays government legitimizing ESCOs (Para 90) and may create confusion amongst industrial entities on permitting for IEE investments (Paras 90 and 91)	ML
Environmental risks	Efficiency of consumption of resources should lead to increased profitability provided that good economic conditions persist in the country that would lead to long-term sustainability of the industrial enterprise (Para 92)	HL

Criterion	Summarized Assessment of the Findings	Rating
Monitoring and evaluation		
M&E design	Design is in RCE document in a generic manner stating that M&E was to be conducted “in accordance to established UNIDO and GEF procedures” leaving the interpretation of M&E to the PMU (Para 93).	MS
M&E plan implementation	Reporting in the PIRs was related to reporting progress on indicators in the PRF only up to the outcome level. There was no consistent output-level reporting on the PIRs (Para 96).	MU
Budgeting and funding for M&E activities	M&E budget was budgeted in the RCE Document at a mere USD27,000 without sufficient detail of the breakdown of this cost). From information in the PIRs, GEF funding for M&E activities appears to only consist of the final evaluation (Para 100).	U
UNIDO specific ratings		
Quality at entry/Preparation and Readiness	The 3-year duration of the Project as mentioned in the RCE Document was clearly insufficient time to achieve all targets and objectives. The Project at its commencement in August 2010 was not able to become fully operational until the full establishment of the MAEE was completed in May 2011, 9 months after the commencement of the Project (Para 104).	MS
Implementation Approach	Implementation approach was to strengthen local capacities and local ownership of all energy efficiency initiatives in the Moldovan industrial sector to the extent that they could use these new skills on pilot projects supported by Project resources (Para 121)	S
UNIDO Supervision and Backstopping	One area of improvement for UNIDO management on the IEE Moldova Project would have been in the monitoring and reporting of progress according to GEF guidelines, specifically on monitoring of both outcome and output indicators (Para 114).	S
Overall rating	Project was a significant contributor to raising awareness and improved technical knowledge for IEE in Moldova under challenging economic and institutional conditions. With only 3 pilot IEE projects completed, a broader set of IEE case studies was only partially achieved.	MS

4 Conclusions, Lessons Learned, Recommendations

4.1 Conclusions

133. The IEE Moldova Project was a significant contributor to raising awareness and improved technical knowledge for industrial energy efficiency in Moldova under challenging economic and institutional conditions. The common perception amongst all stakeholders and project beneficiaries interviewed was that the IEE Moldova Project provided valuable knowledge transfers on the best practices on EnMS-ISO50001 and steam system optimization, noting that nothing similar in the country was being offered. The Project also leaves a legacy of UNIDO qualified experts in EnMS- ISO 50001 implementation (14 experts) and Steam System Optimization (13 experts). The Project did exceed its intended cumulative energy savings target (214 GWh against a target of 45-60 GWh) and GHG emission reduction targets (125,328 tons CO_{2eq} against a target of 90,000 tons CO_{2eq}). With the conclusion of IEE Moldova Project, all project participants and stakeholders expressed the need for Moldova for the continuance of this line of technical assistance, notably to give then opportunities to converse with similar industrial entities on their production efficiencies.
134. Despite the positive feedback on the IEE Moldova Project, the Project was not able to meet its intended targets for IEE investments:
- Poor economic conditions in Moldova resulted in a perceived reluctance of industrial entities to invest in energy efficiency, likely related to the uncertainty of investment recovery. An indication of this reluctance is reflected in the fact that only 4 of the qualified experts trained by the Project are known to be using this training to work for industrial entities to implement IEE measures (see Para 70);
 - At the time of writing of this evaluation report, several GoM institutions involved with energy efficiency were being reformed. The impact of these institutional changes delays the finalization of a new draft Law on Energy, causing industrial stakeholders to defer their decisions on IEE investments. To the knowledge of the evaluation team, there are a number of foreign ESCOs willing to come to Moldova to perform IEE work. However, their decisions are being delayed pending approval of the new Law on Energy and its legitimization of the ESCO modality (see Paras 88 and 90);
 - A poor communication environment between most industrial entities and the Project. The cause of this was two-fold: changes in the management of many of these entities during the course of the Project, and the general reluctance amongst many of the industrial stakeholders to share commercial information on energy usage for proprietary reasons. This reluctance only increases the likelihood of enterprises not reporting EE investments and energy savings (from adoption of EnMS) to the PMU (see Paras 72 and 89);
 - Reluctance of senior industrial managers to depart from old mindsets and modernize energy management of their industrial facility, opting to keep prescriptive Soviet style technical regulations which only add to the cost of EE measures (see Para 89); and
 - Some industrial entities opting to access EE funding from MoSEFF (see Para 59 and 72).
135. With the conclusion of the IEE Moldova Project, there still remains an insufficient level of awareness and technical competency of energy efficiency amongst industrial stakeholders and public authorities. This is exacerbated somewhat by a growing number of industrial entities in Moldova with direct foreign investment who are perceived to have already adopted IEE best practices though this may not be true. It is known that these enterprises do not share any information with local industrial enterprises (see Para 87). There is a likelihood that local

industrial enterprises without direct foreign investment may become less competitive. As such, continued support for IEE in Moldova is required to assist industrial entities with or without direct foreign investment.

4.2 Lessons Learned

In the spirit of promoting organisational learning, key lessons have been distilled from the Project's experience, which are seen to be relevant for future programme formulation and implementation by UNIDO, GEF, the Government of Moldova, and other main project partners.

136. Lesson #1: Two means of effective initial engagement of industrial entities in Moldova includes the sharing of energy consumption information from regional counterparts and the awareness raising and training on Energy Management Systems and ISO 50001. These means of engagement steer clear of the sensitivities of sharing information with local industrial entities where protection of proprietary information amongst industrial entities in Moldova is important. MAEE and other industrial stakeholders expressed an interest in scaling-up benchmarking activities for other industrial sub-sectors such the bakeries, fruit and vegetable processing, meat production and processing, and sugar production sectors (see Para 63). In addition, feedback from all stakeholders on the EnMS training was very positive with a strong likelihood of strong uptake if there is any further continuation of EnMS training in other technical areas or other energy consumptive activities, possibly combined with some policy push. Such actions have the potential to facilitate acceleration of energy efficiency for the industrial sector of Moldova;
137. Lesson #2: Project preparations need to carefully consider the level of efforts and time required to build the appropriate levels of capacity in proportion to the size of the Project grant. This would entail a more in-depth understanding of the business environment (the reluctance of passing information between industrial entities) and the absorptive capacities of the industrial managers (especially those with old mindsets who may be difficult to convince in modernizing their approaches to industrial energy management). One of the reasons the IEE Moldova Project was unable to meet its pilot project target of 6 within the 3-year design period as defined in the RCE Document was the lengthy time required to develop pilot IEE investments, an activity deemed necessary to build more case studies for IEE in Moldova. Prior to potential IEE project partners making investment decisions, the Project needed to develop benchmarking and monitoring procedures followed by training to familiarize potential partners with EnMS process and benefits, energy audits, and designing an IEE investment complete with objectives, targets and action plans that meets the needs of the industrial enterprise (Para 70). Such a process would take a substantial portion of the 36 months if efficiently implemented. A 5-year period of project implementation would have been more appropriate.
138. Lesson #3: A 5-year project duration is not sufficient for a more complete transformation of the Moldovan industrial sector considering prevailing business environment in Moldova characterized by industrial entities reluctant to allow insight in their operations, not sharing energy information amongst themselves, and the general malaise of Moldova's economy. As such, there is demand by stakeholders in the Moldovan industrial sector for additional awareness raising and training events to promote industrial energy efficiency as well as the need for policy frameworks that proactively promote and support energy efficiency in industry.
139. Lesson #4: Lack of readiness of a partner institution can have a significant impact on a project's ability to achieve its targeted GEBs. The Moldovan Agency for Energy Efficiency, a key partner in Project execution, was only established 9 months after the official

commencement of a 36-month project. This placed the Project immediately behind its intended schedule, making previous Project plans for the generation of GHG emission reductions redundant, and forcing project executors to consider compression of IEE Moldova Project activities related to EnMS implementation (Component 2) and pilot projects (Component 3) or seek a no-cost extension (Para 98).

4.3 Recommendations

Recommendations made with the aim of sustaining the results of the IEE Moldova Project and reaching impact, all based on the conclusions of this Terminal Evaluation and lessons learned.

140. Recommendation #1 (to the Ministry of Economy and UNIDO): Seek additional resources for the continuation of awareness raising events and specific training workshops for industrial entities, experts and service providers in Moldova:
 - awareness raising events should target decision makers of private industrial entities on the benefits of energy efficiency with the intention of convincing them to adopt EnMS and commit to IEE investments. Such promotional activities should also highlight examples of benefits accruing from information sharing on energy management best-practices. This would address a need identified in Paras 132 and 133;
 - training workshops should target both existing and new experts to reinforce the national pool of EE experts in Moldova. The continued support would allow these experts to continue strengthening their skills, and increase public confidence in their abilities to setup their own consultancies for public and private entities to source EE funds, and provide services to recommend technology-neutral EE measures. This would address a need identified in Para 115;
 - use momentum of the popularity of EnMS to continue strengthening of EnMS-EE skills to other technical components such as cooling and other energy consumptive activities, and to increase its exposure to the municipal companies as well as residential and public buildings.
141. Recommendation #2 (to Ministry of Economy): Ensure that programmes and secondary legislation to be developed for implementation of the new Energy Efficiency Law adopted in July 2018 will promote and support implementation of EnMS-ISO50001 and Steam System Optimization, stimulating market demand for the services of existing and qualified Moldovan experts. Articles 7 (Energy efficiency obligation schemes), 8 (Energy audits and energy management systems) and 5 (Exemplary role of public bodies buildings) of the EU EE Directive EU/2012/27 that was transposed into the new Moldova EE Law can offer many opportunities and proven means to stimulate the creation of a local market for EnMS-ISO 50001 and SSO services. This potential is mentioned in Para 60.
142. Recommendation #3 (to UNIDO): Expand efforts to collect and analyse energy performance information of regional industries and power generation facilities that can be shared with local Moldovan industries. The interest shown by the dairy subsector in Moldova on dairy benchmarking with other dairy operations in Austria led to IEE investments by those dairy industries. This would address a need identified in Para 103. Strategically, future IEE activities in Moldova should include benchmarking studies with regional counterparts for other sectors that may include:
 - Wine processing where energy data from Austria, Italy and other EU wine producing countries could be shared;

- Fruit and vegetable processing where EU country data can be made available; and
 - CHP plants operating on natural gas. There should be a wealth of information from other neighbouring EU countries.
143. Recommendation #4 (to the Ministry of Economy and UNIDO): Identify an institution or agency with capacity to support industries to adopt EE measures through arrangements that would raise the level of trust between qualified energy professionals, the nominated agency and the industrial entity. The challenge for the nominated agency will be to obtain agreement with the industrial entity to share energy performance data. Sharing of specific industrial subsector energy performance data (such as data related to production, use of primary fuels and electricity and other raw materials) should have an impact of accelerating industrial entities adoption of EE measures. Possible agencies to fulfil this role would be the Moldovan Chamber of Industry and Commerce and the NCPC. This would address a need identified in Para 103;
144. Recommendation 5 (to the Ministry of Economy and UNIDO): Design a mechanism through which industries can share energy management and performance data. The Project under Output 1.1 had developed a monitoring, tracking and benchmarking program tool for use by Moldovan industrial stakeholders. The uptake of this tool by Moldovan industrial stakeholders, however, is likely to be limited until their reluctance to share energy related data can be overcome (Para 103). Using the institution or agency nominated under Recommendation #4, a sustained series of workshops should be organized for the industrial entities to inform them of the continual improvements of energy performances being made within the same industrial sub-sector, and to devise ways to mitigate concerns of the industrial entities. The impact of such workshops would provide something similar to peer pressure, pressuring these entities into the adoption of EE measures. This would address a need identified in Para 103;
145. Recommendation 6 (to the Ministry of Economy and UNIDO): Provide assistance to GoM on reviewing and amending or easing “prescriptive” technical regulations that are outdated and have the unintended effects of increasing the cost of EE measures, making decision makers reluctant to implement technically sound and cost-effective EE changes, emboldening “old mindsets” and inefficient practices just for reasons of compliance with provisions of the “Law on Technical Regulation 2006”. This recommendation is primarily addressed to impact operations of public entities such as CHPs. This would address a need identified in Paras 89 and 132.

Annex 1. Evaluation ToR

A1.1 Scope and purpose of the evaluation

The terminal evaluation will cover the whole duration of the project from its starting date in June 2010 to the estimated completion date in December 2014. It will assess project performance against the evaluation criteria: relevance, effectiveness, efficiency, sustainability and impact.

The terminal evaluation 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 terminal evaluation 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 specific objectives under the three core project 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 terminal evaluation is whether the project has achieved or is likely to achieve the project objective, i.e. if the project has improved the Energy Efficiency of Moldovan Industrial Sector leading to reduced global environmental impact and enhanced competitiveness.

A1.2 Evaluation approach and methodology

The terminal evaluation will be conducted in accordance with the UNIDO Evaluation Policy, the UNIDO Guidelines for the Technical Cooperation Programmes 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) on the conduct of the evaluation and methodological issues.

The evaluation team will be required to use different methods to ensure that data gathering and analysis deliver evidence-based qualitative and quantitative information, based on diverse sources: 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), GEF Tracking Tool, output reports (case studies, action plans, sub-regional strategies, etc.) 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. Since the project document contains a project results framework (included in annex 8 of the ToR), the evaluation team will assess performance against this framework. The validity of the theory of change will be re-examined through specific questions in the interviews and, possibly, through a survey of the following stakeholders and co-financers: Ministry of Environment of the Republic of Moldova, Ministry of Economy – AEE of the Republic of Moldova, Technical University of Moldova, and to the representatives from the private and public sector companies that have partnered with and have been assisted by the project: Carmez, Franzeluta, Lactis, Natur Bravo, Sudzucker and others.
3. Counter-factual information: Baselines and background information for the benchmarks exist for this project.
4. Interviews with project management and technical support including staff and management at UNIDO HQ and – if necessary - staff associated with the project’s financial administration and procurement.
5. Interviews with project partners including Government counterparts from the Republic of Moldova, 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 Project Advisory Committee (PSC) members and the various national and sub-regional authorities dealing with project activities as necessary. If deemed necessary, the evaluator shall also gain broader perspectives from discussions with relevant GEF Secretariat staff.
9. Other interviews, surveys or document reviews as deemed necessary by the evaluator 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.

A1.3 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 information relevant 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 programme/projects.

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

Time schedule and deliverables

The evaluation is scheduled to take place in the period from October to December 2015. The field mission is planned for October 2015. At the end of the field mission, there will be a presentation of the preliminary findings for all stakeholders involved in this project in the Republic of Moldova.

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. The draft Terminal evaluation report will be submitted 4-6 weeks after the end of the mission.

A 1.4 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 the 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. The rating system to be applied is specified in annexes 1 and 2.

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;
- Project has a clear thematically focused development objective, the attainment of which can be determined by a set of verifiable indicators;
- Project was formulated based on the logical framework (project results framework) approach;
- 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.

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 Republic of Moldova, 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 programme strategies: In retrospect, were the project's outcomes consistent with the focal areas/operational program strategies for climate

change, more specifically promoting energy efficiency in the industrial sector of GEF? Ascertain the likely nature and significance of the contribution of the project outcomes to the wider portfolio of GEF's Strategic Program 2: Promoting energy efficiency in the industrial sector;

- UNIDO's thematic priorities: Were they in line with UNIDO's mandate, objectives and outcomes defined in the Programme & Budget and core competencies?
- Does the project remain relevant taking into account the changing environment?

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.

Efficiency

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 project implementation delayed, and, if it was, did that affect cost effectiveness or results? Wherever possible, the evaluator should also compare the costs incurred and the time taken to achieve outcomes with that for similar projects. Are the project's activities in line with the schedule of activities as defined by the project team and annual work plans? Are the disbursements and project expenditures in line with budgets?
- 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?

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 organization sustainability will be reviewed. This assessment should explain how the

risks to project outcomes will affect continuation of benefits after the GEF project ends. It will include both exogenous and endogenous risks. The following four dimensions or aspects of risks to sustainability will be addressed:

- **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?
- **Socio-political 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?
- **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?
- **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.

Assessment of monitoring and evaluation 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 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.

Monitoring of long-term changes

The monitoring and evaluation 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:

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

Assessment of processes affecting achievement of project results

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

- 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 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 through 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 approach¹.** 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 modelled after the GEF's project identification form (PIF).

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

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?

A1.5 Reporting

Inception report

This Terms of Reference provides some information on the evaluation methodology but this should not be regarded as exhaustive. After reviewing the project documentation and initial interviews with the project manager the 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.

Evaluation report format and review procedures

The draft report will be delivered to UNIDO, 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 feed-back in preparing the evaluation report. A presentation of preliminary findings will take place in Moldova and at HQ after the field mission.

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

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

Evaluation work plan

The evaluation work plan includes the following main products:

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

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

- 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;
- 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;
- 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;
- A draft terminal evaluation report will be forwarded electronically to the Office for Independent Evaluation and circulated to main stakeholders;
- Final terminal evaluation report will incorporate comments received.

Evaluation phases	Deliverables
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
Field mission Present preliminary findings and recommendations to key stakeholders in the field	Presentation of main findings to key stakeholders in Moldova
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

A1.6 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. 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 2. List of Documents Reviewed

Project Documents and Other Relevant Documentation

Request for CEO Endorsement document for the IEE Moldova Project (2010)
IEE Moldova Project Implementation Reports (PIR), 2011 to 2017
Annual Project Implementation Report (PIR), UNIDO/PMU, 2016
Final Benchmarking Study Report for Component 1 by AEA, April 2014
Final Report for Component 1 by AEA, May 2014
Case studies for JLC and LACTIS of 2014 and 2015
Files related to UNDP-led journalist study tour in 2013
UNIDO Practical Guide for Implementing and Energy Management System
4th National Communication of the Republic of Moldova, 2018
National Energy Policy Information for Regional Analysis for the Republic of Moldova, UNECE, September 2009
National Energy Efficiency Action Plan for 2013-15, Government of Moldova Decision No. 113, February 2013
EU Directive 2012/27/EU of European Parliament
In-Depth Review of Energy Efficiency Policy of Moldova, Energy Charter Secretariat, 2015

Guidance Documents Consulted

Evaluation Manual (draft), UNIDO Independent Evaluation Division, August 2017
Evaluation Report Format Guidance, UNIDO Independent Evaluation Division, September 2017
Introduction to Theory of Change / Impact Pathways, the ROTI Method and the ROTI Results Score Sheet (UNEP, last updated December 2015)

Annex 3. List of Respondents

Related to UN Agencies

Name	Organisation	Position	Role in IEE Moldova	Location
Marco MATTEINI	UNIDO	Industrial Development Officer	IEE Moldova Project Manager	Vienna, Austria
Dona SCOLA	UNIDO	National Consultant to Moldova Regional Division for Europe and Central Asia	Involved in IEE Moldova at the early stage from UNIDO headquarters side	Chisinau, Moldova
Inga PODOROGHIN	UNDP	Programme Specialist/Cluster Lead, Climate Change, Environment and Energy	A renewable energy option for industrial enterprises	Chisinau, Moldova
Silvia PANA-CARP	UNDP	Programme Associate, Climate Change, Environment and Energy	A renewable energy option for industrial enterprises	Chisinau, Moldova
Ina ZGLAVUTA	UNDP	Communication and Media Officer, Energy and Biomass Project	A renewable energy option for industrial enterprises	Chisinau, Moldova
Nicolae ZAHARIA	UNDP	Project Manager, UNDP-GEF ESCO Project in Moldova	Management of UNDP-GEF ESCO Project	

Related to National Agencies

Name	Organisation	Position	Role in IEE Moldova	Location
Vasile SCORPAN	Climate Change Office, Ministry of Environment	National Project Manager	Lead for Execution Agency	Chisinau, Moldova
Marius TSARANU	Climate Change Office, Ministry of Environment	Senior Expert	Lead for Execution Agency	Chisinau, Moldova
Denis TUMURUC	Department of Energy Efficiency and Renewable Energy Policies, Ministry of Economy and Infrastructure	Department Head	Policymaking for the energy sector	Chisinau, Moldova
Igor ZANOAGA	Moldova Energy Efficiency Agency	Consultant	Strategic advice for PMU	Chisinau, Moldova
Lucia SOP	National Cleaner Production Center	National Programme Director	Training contributions related to resource efficiency	Chisinau, Moldova

Industrial Enterprises in Moldova

Name	Organisation	Position	Role in IEE Moldova	Location
Gheorghe ANGHELUTA	LACTIS SA	Manging Director	Managing Director of LACTIS for pilot project	Riscani, Moldova
Mihail BEJAN	JLC SA	Entrepreneur	Energy manager for JCL SA, a pilot project	Chisinau, Moldova
Vitalie MITA	CHP-2/CET	Entrepreneur	Energy manager for CHP-2, a pilot project	Chisinau, Moldova
Nicolae GLINCEAN	Termoelectrica SA	Development Director	EnMS inputs into pilot project	Chisinau, Moldova
Iurie RAZLOVAN	Termoelectrica SA	Technical Director	EnMS inputs into pilot project	Chisinau, Moldova
Inesa IORDATI	Moldova Chamber of Commerce and Industry	Director	Energy management training on behalf of GIZ pertaining to building energy efficiency	Chisinau, Moldova

National Experts

Name	Organisation	Position	Role in IEE Moldova	Location
Ms. Corina CHELMENCIUC	UNIDO Qualified Expert	EnMS and SSO Expert for Termoelectrica	Expertise input on pilot project	Chisinau, Moldova
Sergiu CODREANU	UNIDO Qualified Expert	EnMS Expert for JLC SA	Expertise input on pilot project	Chisinau, Moldova
Sergiu ROBU	UNIDO Qualified Expert	EnMS and SSO Expert for LACTIS SA	Expertise input on pilot project	Riscani, Moldova
Iurie PANFIL	UNIDO Qualified Expert	Independent EnMS and SSO Expert	Expertise input on pilot project and technical assistance to IEE Moldova	Chisinau, Moldova
Sergiu APARTATU	UNIDO Qualified Expert	EnMS and SSO Expert for CHP-2	Expertise input on pilot project	Chisinau, Moldova

Annex 4. Summary of Project Identification and Financial Data

Project Factsheet

Milestone	Expected date	Actual date
Project CEO endorsement/approval date	27 May 2010	27 May 2010
Project implementation start date (PAD issuance date)	21 October 2013	18 August 2010
Original expected implementation end date (indicated in CEO endorsement/ approval document)	31 December 2013	n/a
Revised expected implementation end date	31 December 2015	31 December 2017
Terminal evaluation completion	31 December 2013	8 August 2018

Project budget

Financing plan summary

	Project Preparation	Project	Total (USD)
Financing (GEF / others)	40,000	960,000	1,000,000
Co-financing (cash and in-kind)		3,302,500	3,302,500
Total (USD)	40,000	4,262,500	4,302,500

Financing plan summary - Outcome breakdown

Project outcomes	Donor (GEF) (USD)	Co-Financing (USD)	Total (USD)
1. Policy, legal and regulatory framework established to promote and support sustainable IEE and stimulate creation of a national market for IEE products and services	240,000	188,500	428,500
2. Increased adoption by Moldovan industries of energy efficient technologies and energy management as integral part of their	410,000	1,340,500	1,750,500

Project outcomes	Donor (GEF) (USD)	Co-Financing (USD)	Total (USD)
businesses.			
3. Broader set of case studies on IEE best practices available in Moldova, notably for refrigeration and compressed air systems amongst other EE options.	200,000	1,675,500	1,870,500
Project management	93,000	93,000	186,000
Monitoring and evaluation	17,000	10,000	27,000
Total	960,000	3,302,500	4,262,500

Co-Financing sources, breakdown and actual co-financing realized

Name of Co-financier (source)	Classification	Type	Amount committed at design (USD)	Actual amount realized (USD)
UNIDO	GEF Agency	In kind	200,000	110,000
		Cash		231,000
		Cash		15,000 ²⁷
Ministry of Environment	National Government	In-kind	51,000	50,000
Ministry of Economy - MAEE	National Government	In-kind	112,000	59,000
		Cash		80,000
Technical University of Moldova	Public Institution	In-kind	11,000	10,000
Institute for Standardization of Moldova	Public Institution	In-kind	0	5,000
Private sector - Carmez	Private sector	In-kind	16,500	0
		Cash	104,000	0
Private sector - Franzeluta	Private sector	In-kind	2,500	0
		Cash	314,000	0
Private sector - Lactis ²⁸	Private sector	In-kind	5,500	See footnote 29
		Cash	45,000	See footnote 29
Private sector - Natur Bravo	Private sector	In-kind	6,000	0
		Cash	85,000	0

²⁷ For Terminal Evaluation

²⁸ Lactis made pilot project investments that are included within the actual Component 3 co-financing of USD30,000 (in-kind) and USD 1,189,934 (cash)

Name of Co-financier (source)	Classification	Type	Amount committed at design (USD)	Actual amount realized (USD)
Private sector - Sudzucker	Private sector	In-kind	30,000	0
		Cash	2,320,000	0
Private sector (under Component 2 or EnMS investments)	Private sector	In-kind	0	78,390
		Cash	0	888,600
Private sector (under Component 3 or pilot project investments) ²⁹	Private sector	In-kind	See footnote 30	30,000
		Cash	See footnote 30	1,189,934
Total Co-Financing (USD)			3,302,500	2,746,924³⁰

²⁹ Amount committed at design are listed in the 5 private sector entities above. Co-financing realized includes Lactis (see footnote 29), CET-2 (USD15,000 of in-kind and USD 975,012 in cash) and JLC (USD10,000 of in-kind and USD 15,000 in cash).

³⁰ Co-financing from Carmez, Franzeluza, Natur Bravo and Sudzucker was not realized for a variety of reasons beyond the control of the Project including changes and resistance from management, relocation of facilities and an unforeseen unwillingness to

Annex 5. Project Results Framework

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
Goal	To reduce energy use related emissions of greenhouse gases produced by Moldova manufacturing sector activities and growth	1. Incremental CO ₂ eq emission reduction (tons of CO ₂ eq) 2. Specific energy consumption (energy use per ton/unit of output) for selected manufacturing sub-sectors	1-2. Specific energy consumption (SEC) for 3 manufacturing sub-sectors in the focus of the GEF project SEC referred to output quantities currently not available for any sub-sector. To be defined in Year 1 of project implementation under PC1	Cumulative reduction of SEC by more than 20% over the period 2012-2023	1. Agency for Energy Efficiency 2. End of project Survey	A1. Moldova Governments remain committed in the medium and long-term to improve national energy security and implement environmental policies. A2. Energy costs reduction becomes a first priority for industry.
Objective of the project	Improved Energy Efficiency of Moldovan Industrial Sector leading to reduced global environmental impact and enhanced competitiveness.	1. Incremental direct CO ₂ eq emission reductions (tons of CO ₂ eq) 2. Incremental indirect CO ₂ eq emission reductions (tons of CO ₂ eq) 3. Specific energy consumption of selected enterprises	1. No direct CO ₂ eq emission reductions 2. No indirect CO ₂ eq emission reductions 3. Values to be determined during Year 1 of project implementation through Survey results and further data collection	1. Direct emission reductions: 90,000 tons CO ₂ eq over period 2012-2021 2. Indirect emission reductions: 400,000 tons CO ₂ eq over period 2012-2023 3. SEC average annual reduction of 2% over period 2012-2023	1. Monitoring, tracking and benchmarking program to be established by the project with the Agency for Energy Efficiency (MAEE) 2. End of project Survey 3. Final evaluation	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. A3. Various international IEE technical cooperation programs achieve good synergy and leverage of respective complementarities

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
Outcome 1	Establishment of policy, legal and regulatory frameworks that promote and support sustainable industrial energy efficiency and stimulate the creation of a national market for IEE products and services.	1. Number of IEE policy programs developed and put in operation 2. Adoption of regulatory measures to support IEE and market transformation	1. No IEE specific policy program is in place 2. No specific regulation to support IEE is in place	1. Three national IEE policy programs operate and develop smoothly: IEE Monitoring, Tracking and Benchmarking (MTB) Program; IEE Best Practice Dissemination Program; IEE Best Practice Recognition Program 2. National Industrial Energy Manager Certification Program operates	1. Agency for Energy Efficiency Annual Report 2. Final evaluation	A1. Sustained Government support to agreed project activities.
Project Component 1						
Output 1.1.	Structure and procedures for monitoring, tracking and benchmarking energy consumption in industry are developed and established.	Structures, tools and methodologies to monitor, tracking and benchmarking energy consumption and efficiency in industry	No structures, tools and methodologies are in place	1. Reporting structure is put in place 2. Reporting templates are developed and used 3. Website is created 4. Benchmarking methodology is developed and tested	1. Agency for Energy Efficiency Annual Report 2. Internet/Web 3. Project reports 4. Final evaluation	A1. Sustained Government support to agreed project activities.
Output 1.2	National IEE Best Practices information and dissemination program is developed and	IEE information and dissemination seminars, education and outreach material (articles, brochures, videos,	No IEE Best Practices information and dissemination program is in place and will be in place in the near future.	1. Two half-day seminars per year 2. IEE Best Practice Website 3. 15 case studies	1. Agency for Energy Efficiency Annual Report	A1. Sustained Government support to agreed project activities.

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
	established.	website)	No IEE seminars held and education and outreach material produced by national institutions	developed 4. Energy Management Implementation Guide 5. Articles & videos 6. 500 companies reached by the end of the project	2. Internet/Web 3. Public media 4. Final evaluation	
Output 1.3	National IEE Best Practices recognition program is developed and established.	Public recognition events	No IEE Best Practice Recognition program is in place and will be in place in the near future	1. One annual National IEE Best Practice Recognition Award ceremony/ event starting from the Year 2 of project implementation	1. Agency for Energy Efficiency Annual Report 2. Public media	A1. Industry values public Recognition programs for good corporate image and as marketing tool.
Output 1.4	National Industrial Energy Manager Certification (IEMC) Program is developed and established.	List of professional certification programs accredited by national relevant body	No national Industrial Energy Manager Certification Program is in place and will be in place in the near future	1. National IEMC program is developed and offered in the market	1. National accreditation institution 2. Continual education/ professional certifying institutions	A1. Article 17 of current draft Law on Energy Efficiency will remain in the enacted law. A2. In the medium term industry's demand for qualified IEE experts and their services increases
Outcome 2	Increased adoption by Moldovan industries of energy efficient technologies and energy management as integral part of their business practices.	1. Number of energy efficiency projects implemented annually 2. Number of EN16001 or	1. Not available. Value to be determined during Year1 of project implementation. through Survey results and further data collection	1. 100% increase of annual number of implemented projects between 2010 and 2023 2. Ten companies get	1. Agency for Energy Efficiency Annual Report (MTB program) 2. End of project Survey	A1. Energy prices remain high in the medium and long-term A2. Industry drive for energy costs reduction and enhanced energy efficiency grows progressively stronger

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
		ISO 50001 certified companies 3. Number of IEE service contracts stipulated by Energy Management and Steam System Optimization national experts trained by the GEF project	2. Number of EN16001 or ISO 50001 certified companies 3. Past and near future IEE projects mostly developed and implemented using foreign experts	certified to EN16001 or ISO 50001 by 2015 3. 400 IEE services contracts stipulated by EM and SSO national experts trained by the GEF project with Moldova enterprises between 2013 - 2023	3. Moldova standard authority or certification bodies (TUV and others)	A3. In the medium EN 16001 and ISO 50001 certification becomes tool and/or requirement for export oriented enterprises and for market access
Project Component 2						
Output 2.1	Industry decision-makers understand their potential for EE gains and consequent environmental and economic benefits.	1. Number of companies participating in the project seminars 2. Number of companies personnel participating in the project trainings	Few trainings on EE for manufacturing and commercial enterprises are planned for 2010 and 2011 within the Moldova Business Advisory Service Program	1. 300 companies participating in the project seminars and workshops 2. 200 enterprises staff attend project energy management and steam system optimization trainings	1. Project progress report 2. End of project Survey 3. Final evaluation	A1. Sustained Government support to agreed project activities for the National Energy Efficiency Agency A2. Costs reduction remains a first priority for companies' top management.
Output 2.2	A cadre of 40 professionals comprising of industry engineers, industrial equipment vendors and energy systems/ efficiency consultants are trained at an expert level and are equipped with the	1. Number of energy management system experts in the Moldova market 2. Number of energy system optimization experts in the Moldova market 3. Number of IEE seminars	1. No energy management system experts in the Moldova market 2. No industrial steam system optimization experts in the Moldova market but few engineering companies provide partial services 3. IEE seminars and	1. 20 energy management system experts trained 2. 20 steam systems optimization experts trained 3. 20-25 seminars and trainings for enterprises managers	1. Project progress report 2. End of project Survey 3. Final evaluation	A1. Sustained Government support to agreed project activities for the National Energy Efficiency Agency A2. Industry drive for energy costs reduction is and will remain strong A3. Energy efficiency consultants, industrial equipment supplier and

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
	technical capacity and tools required to: a) develop and implement energy management systems and energy efficiency projects, focusing on steam system optimization, in industry; b) provide training to industry and energy professionals and offer commercial IEE services.	and trainings delivered	trainings bound to be delivered by international experts	and engineers delivered by EM and SSO national experts trained by the GEF project		vendors, and other relevant entities recognize the economic potential of the IEE market in Moldova
Output 2.3	An Energy Management System Implementation Guide in compliance with EN 16001/ ISO 50001 is developed	Tools available for supporting energy efficiency in industry	No tools are and will be most likely available during and immediately after the GEF project implementation period	1. An Energy Management System Implementation Guide in compliance with EN 16001/ ISO 50001 standards is produced in Romanian language	1. IEE Best Practices dissemination program website 2. Project report 3. Final evaluation	A1. Sustained Government support to agreed project activities for the National Energy Efficiency Agency
Output 2.4	At least 40 IEE projects for cumulative 213-416 GWh of energy savings are developed and implemented by industrial enterprises as result of their participation in the	1. Number of steam system assessments carried out 2. Number of steam systems optimization projects developed	Few steam system assessments and optimization projects are likely to be carried out within the scope of the EBRD MoSEFF.	1. 20 steam systems assessment carried out 2. 20 steam systems optimization projects developed	1. Project progress report 2. Companies participating in the Expert training	A1. Companies partnering in the expert capacity building program with the GEF project maintain or improve their economic performance and fulfill

Project Strategy		Objectively verifiable indicators				
		Indicator (quantified and time-bound)	Baseline	Target	Source of verification	Risks and Assumptions
	Expert Training program of the project	<p>3. Number of steam system optimization projects implemented.</p> <p>4. Number of companies putting in place an energy management system</p> <p>5. Number of companies implementing energy management operational improvements</p>	No enterprise has, and will very likely have by the end of the project, an energy management system in place	<p>3. 20 steam system optimization projects are implemented.</p> <p>4. 20 companies put in place an energy management system</p> <p>4. 20 companies implement at least 2 energy management operational improvements each</p>	3. Final evaluation	their co-financing/ participation commitments
Project Component 3						
Output 2.5	At least 6 pilot IEE projects for cumulative 45-60 GWh of energy savings over the investments duration are implemented by enterprises, from key industrial sectors, partnering in the project.	<p>1. Number of IEE projects implemented with direct support from the GEF project</p> <p>2. Energy savings (MWh) achieved over the project lifetime</p>	Many companies, particularly SMEs, have major potential for economic EE improvements but not the resources (human and/or financial) to develop and implement such projects.	<p>1. 6 IEE projects implemented with direct support from the GEF project</p> <p>2. Cumulative 45-60 GWh of energy savings over the EE investments lifetime</p>	<p>1. Companies partnering in the IEE projects.</p> <p>2. Agency for Energy Efficiency (MTB Program)</p> <p>3. Project report</p> <p>4. Final evaluation</p>	<p>A1. Companies partnering with the GEF project maintain or improve their economic performance.</p> <p>A2. Companies partnering with the GEF project fulfill their co-financing commitments</p>