Independent Terminal Evaluation

GEF UNIDO Improving energy efficiency and promoting renewable energy in the agro-food and other small and medium enterprises (SMEs) in Ukraine

UNIDO SAP ID: 103078

GEF Project ID: 3917

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

UNIDO OFFICE OF EVALUATION AND INTERNAL OVERSIGHT

INDEPENDENT EVALUATION DIVISION

Independent Terminal Evaluation

GEF UNIDO Improving energy efficiency and promoting renewable energy in the agro-food and other small and medium enterprises (SMEs) in Ukraine

UNIDO SAP ID: 103078

GEF Project ID: 3917

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna, December 2018

Distr. GENERAL
ODG/EIO/IED/18/R.

March 2019

Original: English

This evaluation was managed by the responsible UNIDO Project Manager with quality assurance by the Independent Evaluation Division

Table of Contents

Acknowledgements

The Evaluation Team engaged to undertake this independent terminal evaluation of the "GEF UNIDO Improving energy efficiency and promoting renewable energy in the agro-food and other small and medium enterprises (SMEs) in Ukraine" (IEEPRE Ukraine) would like to acknowledge and thank all of the partners, counterparts, and other actors who shared their valuable perspectives and provided input to this evaluation.

Particular thanks are extended to the Evaluation Officer (Ms. Ulvinur Müge Dolun) and Project Manager (Mr. Mark Draeck) at UNIDO Headquarters in Vienna and the National Project Manager (Mr. Igor Krylychuk) and his team in Kiev for their precious time, support, and the organisation of the field mission conducted in the Ukraine during 28 August - 5 September 2018.

The Evaluation Team emphasizes its appreciation to all those interviewed for their openness and the quality of their reflection, which has allowed for the development of robust findings, lessons learned, and recommendations that can usefully guide and inform the design and implementation of projects within the domain of industrial energy efficiency, and beyond.

Mr. Roland Wong, Team Leader and International Evaluation Consultant

Ms. Natalia Perestyuk, National Evaluation Consultant

Abbreviations and acronyms

CM	Council of Ministers
CMU	Cabinet of Ministers of Ukraine
COMFAR	Computer Model for Feasibility Analyses and Reporting
COP	(UN Climate Change) Conference of the Parties
EBRD	European Bank for Reconstruction and Development
EE	Energy efficiency
EIB	European Investment Bank
EnC	Energy Community
EOP	End of Project
ES	Energy Savings
ESCO	Energy Service Company
ESP	Eastern Europe Energy Efficiency and Environment Partnership
EU	European Union
FIT	Feed in tariff
GCIP	Global Cleantech Innovation Programme
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse gas
GIZ	German International Cooperation
GJ	Gigajoule
GoU	Government of Ukraine
HQ	Headquarters
IEEPRE in	GEF project entitled “Improving energy efficiency and promoting renewable energy in the agro-food and other small and medium enterprises (SMEs) in Ukraine”
IFC	International Finance Corporation
IRE	Institute of Renewable Energy
KPI	Key Performance Indicator
ktoe	Kilo tonnes of oil equivalent
LED	Late emitting diode
M&E	Monitoring and Evaluation
MoAP	Ministry of Agrarian Policy

NEEAP	National EE Action Plan
NEFCO	Nordic Environment Finance Corporation
NPM	National Project Manager
NREAP	National RE Action Plan
ODG/EVA	UNIDO Office for Independent Evaluation
OECD	Organization for Economic Cooperation and Development
PAA	Project Administrative Assistant
PAC	Project Advisory Committee
PIR	Project Implementation Report
PMU	Project Management Unit
PPG	Project preparation grant
PRF	Project Results Framework
PSC	Project Steering Committee
RCE	Request for CEO endorsement
RE	Renewable energy
RES	Renewable energy sources
ROtI	Review of outcomes to impacts
SAEE	State Agency of Ukraine for Efficient Use of Energy Resources
SDG(s)	Sustainable Development Goal(s)
SIDA	Swedish International Development Cooperation Agency
SMART	Specific, measurable, achievable, realistic and time bound
SME	Small to medium enterprise
SWOT	Strengths, weaknesses, opportunities and threats
TE	Terminal Evaluation
ToC	Theory of Change
ToT	Training of trainers
ToR	Terms of Reference
UKEEP	Ukraine Energy Efficiency Program
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organisation
USD	US dollar
USELF	Ukraine Sustainable Energy Lending Facility

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.

Executive Summary

Evaluation Background and Methodology

An independent terminal evaluation (TE) of the UNIDO-GEF Project in the Ukraine entitled "Improving energy efficiency and promoting renewable energy in the agro-food and other small and medium enterprises (SMEs) in Ukraine" (hereafter, IEEPRE Ukraine Project or Project) was carried out during the period of August-November 2018. The IEEPRE Ukraine Project was launched in Kiev in July 2011 by UNIDO, with the Institute of Renewable Energy (IRE), the State Agency for Energy Efficiency (SAEE) and the Ministry of Agrarian Policy (MoAP) as co-financing partner. The IEEPRE Ukraine Project terminal date was scheduled for 31 December 2018, a period of 7.5 years of implementation. 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.

This TE was conducted 3 months prior to the completion of the Project. The primary challenge of this TE was not being able to visit all pilot project sites, a minor limitation considering the pilot projects visited were indicative of the interest catalyzed by the Project in EE and RE investments for agro-food and industrial SMEs in the Ukraine (Para 11).

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 IEEPRE Ukraine Project.

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

Intended Outcomes in Project Results Framework of May 2011 and Theory of Change (see Figure 2)	Actual Outcomes as of September 2018
Objective: Develop a market environment for improved energy efficiencies and enhanced use of renewable energy technologies in energy intensive manufacturing small and medium enterprises (SMEs) in Ukraine.	**Actual impact toward objective**: Against a target of 2.2 million tonnes CO_{2eq} (10-year lifetime) of emission reductions, the Project achieved 1.9 million tonnes CO_{2eq} of emission reductions by 10 industrial entities (8 of which are agro-food entities) who made US$ 9.6 million of investments to undertake EE and RE investments though assistance of the Project. This excludes two investments made in Crimea which if verified and counted in the emission reduction estimate, likely would have resulted in the Project meeting or exceeding its target of 2.2 million tonnes CO_{2eq} of emission reductions. Investments by the Project demonstrate energy savings and generation of renewable energy in the Ukraine will contribute to the country's energy independence, creating market demand for such investments. See Tables 7 and 8 and Paras 49-51 for further details.
Outcome 1: Policy and regulatory framework regarding energy management and use of renewable energy revised.	**Actual Outcome 1**: Policy, legal and regulatory frameworks have been revised to promote and support energy management and use of renewable energy. This includes a 2012 analysis of Ukrainian policies and laws designed with a specific focus on the scale up of EE and RE for energy intensive industrial SMEs can be operationalized, reports in

Intended Outcomes in Project Results Framework of May 2011 and Theory of Change (see Figure 2)	Actual Outcomes as of September 2018
	2014 on launching market mechanisms in financial and fiscal instruments to improve EE and promote RE, the use of policy instruments from EU best practices to promote EE and RE investments, technical assistance in the development of the National Renewable Energy Action Plan (NREAP), and technical assistance was provided to the working group on developing national standards for the sustainable production of biomass in Ukraine (Table 9 and Paras 54-59).
Outcome 2: 10 Pilot projects, demonstrating the reduced energy costs due to better energy management and use of renewable energy.	**Actual Outcome 2**: 10 pilot projects were completed by the Project demonstrating reduced energy costs from energy management, energy savings measures, and the use of renewable energy (Tables 8 and 10, Paras 62-64).
Outcome 3: Energy intensive SMEs in the Ukraine increase their investment in improved EE and RE technologies.	**Actual Outcome 3**: Demand for EE and RE technologies has increased amongst energy intensive SMEs as indicated by the 30 agro-food entities that prepared business plans for such investments. These investments in EE and RE, however, have not substantially increased due to the high cost of financing these investments (see Paras 71 and 84).
Outcome 4: Capacity of key players such as senior managers of SMEs, ESCOs and EE & RE technology suppliers to develop and implement energy efficiency projects enhanced.	**Actual Outcome 4**: Capacity has been enhanced for key personnel involved with EE and RE investments in the Ukraine. This would include senior managers of SMEs to plan and implement, and some local suppliers and installation personnel of EE and RE equipment in the Ukraine (see Para 73). The capacity of ESCOs, however, has not been enhanced pending availability of less costly financing and legislation for energy performance contracting by ESCOs (see Paras 84 and 87).

Project Design

The Project Results Framework (PRF) for the IEEPRE Ukraine Project is *moderately unsatisfactory* due to the lack of SMART indicators and target for outputs to be delivered by the Project (see Para 37). Notwithstanding, the overall design of the IEEPRE Ukraine Project is *satisfactory* due to its clear focus on the approach of strengthening policy and regulatory frameworks to encourage EE and RE investments, designing and implementing EE and RE pilot investments, scaling up these investments using lessons learned from the pilots, and training technical expertise and raising awareness of EE and RE in the industrial sector through successful pilot projects (see Para 43).

Relevance

The relevance of the IEEPRE Ukraine Project was *highly satisfactory* as it is pertinent to addressing a number of energy policies including the Ukrainian Energy Strategy till 2030 as approved in 2006 (see Para 44). The Project also supports *GEF-4 Climate Change Strategic Program 2: Promoting energy efficiency in the industrial sector* (see Para 46), and UNIDO's mandate, competences, and strategy for inclusive and sustainable industrial development (see Para 47)**.**

Effectiveness

Project effectiveness was *satisfactory* considering the IEEPRE Ukraine Project made a substantial contribution to the development of the policy and regulatory framework and a strengthened institutional capacity for promoting EE and RE in the agro-food and industrial sectors (Para 60), the IEEPRE Ukraine Project has made a substantial contribution to the development of pilot projects demonstrating reduced energy operational costs for more than 15 industrial entities, mainly in the agro-food subsector (Para 65), delivering useful reports to SAEE on how the GoU may approach the development of a green bond market and reducing the high cost of commercial borrowing for SMEs in the Ukraine (Para 71), and the training program and other awareness raising activities were scaled up using positive lessons learned from implementing the Component 2 pilot projects (Para 77).

Efficiency

Project effectiveness was *satisfactory* considering the challenges faced by the Project on the aforementioned political and military issues (including the loss of grant supported projects in Crimea totaling US$482,000), but being able to able to sustain support to revised EE and RE policies throughout the Project duration, achieve satisfactory quality of the pilot projects to provide tangible examples of energy savings to the agro-food sector of Ukraine, and deliver capacity building activities that has received positive feedback from participants (Para 80).

Sustainability of Benefits

Sustainability of the Project is only *moderately unlikely* primarily due to widespread enthusiasm for EE and RE investments in the agro-food industrial sector tempered by the high cost of borrowing that is unaffordable to the majority of industrial entities in the Ukraine (see Para 81).

Monitoring and Evaluation (M & E)

M&E for the Project was *moderately satisfactory*. The basic issue with this rating was related to PIR progress reporting on outputs where there were no corresponding SMART indicators and targets in the PRF. Despite this shortcoming, there were numerous examples of PMU adaptive management, many actions of made up for the shortfall of SMART indicators in the PRF (see Para 93).

Quality at Entry/Preparation and Readiness

Project preparations undertaken between August 2009 and December 2010 were led by a Project Manager from UNIDO HQ with strong support from IRE, and included collection of supplemental data and its analysis, outreach to agro-food stakeholders on proposed implementation strategy, and design of 20specific demonstration projects complete with technical and economic analyses of EE and RE. As such, the quality of entry and the preparation and readiness was assessed as *satisfactory* (Para 99).

Implementation Approach

The implementation approach of the Project was *satisfactory* due to its emphasis on pilot project implementation at its commencement where lessons from these pilot projects can be used for training and capacity building of local energy professionals and others involved in the supply chain and installation of EE and RE equipment (see Para 112).

UNIDO Backstopping

UNIDO supervision and backstopping for this project resulted in achievement of most of the

objective level targets and intended outcomes (Para 106). In addition, the participation of UNIDO on this Project was highly valued by all stakeholders (Para 107).

Conclusions

The overall Project was assessed as *satisfactory* as it was a significant contributor to a list of successfully implemented EE and RE investments in the agro-food subsector that served to boost the awareness and confidence of other industrial SMEs in considering EE and RE measures to reduce their operational costs and increase the competitiveness. However, given the political events of late 2013 to mid-2014 resulting in the devaluation of Ukraine's currency and an increase in the cost of borrowing, the volume of EE and RE investments after 2015 did not substantially increase during Project implementation. The Project does leave a legacy of certified EE and RE experts who have not yet had opportunities under this Project to apply their knowledge on such investments (Para 122).

IEEPRE Project successes includes the successful demonstration of the feasibility of biofuel production in the Ukraine for which further scale-up in the Ukrainian agricultural sector is limited unless actions are taken towards the removal of an excise tax on domestically produced biofuels specifically for use in the Ukraine (Para 123).

The IEEPRE Ukraine Project at its conclusion also leaves financing as a primary barrier to further scale up of EE and RE investments in the agro-food sector of the Ukraine. This includes the fact that there are no energy performance contracts that are active in the industrial sector in the Ukraine (Para 124).

Summary of Lessons Learned and Recommendations

Lesson #1: The implementation approach of the IEEPRE Ukraine Project by first implementing pilot projects followed by training can be a more effective tactic convincing the industrial sector to increase its investment towards energy efficiency and renewable energy, on the condition that the cost of financing such investments is affordable (Para 125).

Lesson #2: Despite the completion of a US$5.1 million grant project to promote EE and RE in the agro-food sector over a 7.5 year period, capacity building is still required for agro-food and industrial enterprises to sustain implementation of measures to reduce energy costs in their sectors (Para 126).

Lesson #3: Project investments that use biomass as feedstock need to have secure supplies of biomass to be viable, and market demand for products from the investment (Para 127).

Recommendation #1 (to the IRE and SAEE): Seek the continuation of awareness raising and capacity building for all industrial sector stakeholders (Para 128).

Recommendation #2 (to SAEE, IRE and UNIDO): Continue with efforts to seek less costly sources of financing for the scale-up of EE and RE investments (Para 129).

Recommendation #3 (to the Ministry of Agrarian Policy and the Ministry of Energy): Continue efforts to mainstream the use of domestically sourced biofuels in the Ukraine that includes discussions with higher level government officials on the removal of a 25% excise tax (Para 130).

Recommendation 4 (to the GEF, Ministry of Agrarian Policy and UNIDO): Use resources of follow-up projects including a Global Cleantech Innovation Programme to extend the benefits of EE and RE technologies to more rural agro-food industries, notably in autonomous energy generation in rural areas (Para 131).

Recommendation 5 (to the SAEE): Engage dialogue with the Ministry of Economic Development and Trade to transition the PMU of the IEEPRE Ukraine Project into a facilitation center that can provide guidance to industrial SMEs in reducing their operational energy costs (Para 132).

Recommendation 6 (to SAEE and MoAP): Find donors or resources to continue the updating of the roadmaps for the implementation of energy-efficient measures at agro-food industry enterprises (Para 133).

1 Evaluation Objectives, Methodology, Process

1.1 Introduction and Background on the Terminal Evaluation

1. An independent terminal evaluation of the UNIDO Project in Ukraine entitled "Improving energy efficiency and promoting renewable energy in the agro-food and other small and medium enterprises (SMEs) in Ukraine" (hereafter, "IEEPRE Ukraine" or the "Project") was included as a part of the project design of 2010. Following UNIDO Evaluation Policy and GEF Monitoring & Evaluation Policy, this Terminal Evaluation (TE) has been carried out during the period of June-October 2018 by an independent team including an international consultant (Mr. Roland Wong), who also acted as the team leader, and a national consultant (Ms. Natalia Perestyuk).

2. The IEE Ukraine Project was launched in the Ukraine in 20 July 2011 by UNIDO, and executed by the Institute of Renewable Energy (IRE), the State Agency of Ukraine for Efficient Use of Energy Resources (SAEE)[1], and Ministry of Agrarian Policy (MoAP) as co-financing partners. The IEEPRE Ukraine Project is to be completed in December 2018 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 (as provided in 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 that were required in 2014 and 2015 due to the political events and military conflict in Crimea and Eastern Ukraine.

5. In terms of scope, the TE assessed the extent to which the Project achieved its objective of "developing a market environment for improved energy efficiencies and enhanced use of renewable energy technologies in energy intensive manufacturing small and medium enterprises (SMEs) in Ukraine". In this context, the evaluation considered the extent to which the technical assistance of the IEEPRE Ukraine Project was effective and assessed the likelihood of sustainability of Project results in achieving 4 intended outcomes: i) policy and regulatory framework regarding energy management and use of renewable energy revised; ii) 10 Pilot projects demonstrating the reduced energy costs due to better energy management and use of renewable energy, implemented; iii) energy intensive SMEs in the Ukraine increase their investment in improved EE and RE technologies; and iv) capacity of key players such as senior managers of SMEs, ESCOs and EE & RE technology suppliers to develop and implement energy efficiency projects enhanced.

[1] Formerly the National Agency of Ukraine for Efficient Use of Energy Resources

1.3 Evaluation Methodology

6. The TE was carried out by an independent team in accordance with the required guidance[2] 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.

7. 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.

8. To deliver evidence-based qualitative and quantitative information, the collection of data and information was sourced from key project documentation, desk studies, literature reviews, meetings with individuals and focus groups, surveys and direct observations. Documentation was provided by the UNIDO Project Manager based in Vienna, and the Project Management Unit (PMU) housed within the IRE in Kiev, and some of the owners and managers who implemented the pilot projects. Most of this information was accessible and made available in a timely manner to the evaluation team. During the 28 August - 5 September 2018 mission to Kiev, more than 10 interviews were conducted with a range of key stakeholders from the Government ministries, the UNIDO Field Office in Kiev, UNIDO staff in Vienna, to the owners and managers of the various industrial enterprises implementing pilot projects, and energy management and IEE/RE specialists trained by the Project.

9. The evaluation methodology consisted of:

   - a review of project documents;
   - a re-examination of the Project Results Framework (PRF) through a Theory of Change (ToC) analysis and a Review of Outcomes to Impacts (ROtI) to be used as the indicator and targets against which Project performance is evaluated;
   - briefings at UNIDO HQ in Vienna prior to mission travel to Kiev;
   - interviews with the PMU in KIev, personnel associated with Project management, country focal points from key ministries of the Government of Ukraine (GoU), and project beneficiaries;
   - field visits to various SME agro-food and industrial facilities that were targeted as pilot projects to validate progress and effectiveness of EE and RE measures undertaken;
   - de-briefing with PMU staff in Kiev;
   - de-briefing with UNIDO HQ in Vienna on mission findings;
   - follow-up phone conversations, emails and reporting writing from home bases; and
   - a period of additional gathering of information, validation of findings and editing of draft report to reflect factual accuracy of the findings.

10. Steps were undertaken to enhance stakeholder engagement and the quality of consultation: i) interviewees were informed about the TE's aims and guided in their input 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 data (as opposed

[2] UNIDO's 2015 Evaluation Policy, UNIDO's 2006 Guidelines for the Technical Cooperation Project and Project Cycle, GEF Guidelines for GEF Agencies in Conducting Terminal Evaluations, GEF Monitoring and Evaluation Policy, and GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies.

to yes/no questions or an "audit" approach), as it was considered that input to this TE 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

11. The IEEPRE Ukraine Project is to be completed on 31 December 2018. As such, the TE is being conducted within the time period recommended by GEF and UNIDO Evaluation Guidelines for an evaluation. The Evaluation Team spent a total of 8 calendar days in the Ukraine, making efforts to see as many pilot projects as possible. Considering that these pilot projects were evenly spread throughout the Ukraine, the completion of visits to 6 out of 10 of these pilot projects was a good achievement. Limitations to this evaluation were in not being able to visit all pilot project sites, a minor limitation considering the pilot projects visited were indicative of the interest catalyzed by the Project in EE and RE investments for agro-food and industrial SMEs in the Ukraine.

2 Country and Project Background

2.1 Country Background

12. Ukraine is located in the heart of Eastern Europe, occupying a fertile plain, north of the Black and Azov Seas and sharing borders with Belarus, Poland, Romania, Slovakia, Hungary and Moldova in the west and Russia in the east. It has a population of 44 million who live on 580,000 km^2 of land with 24,000 km^2 of water bodies. Ukraine's 2017 GDP per capita was US$ 8,700 with GDP contracting at -9.8% in 2015 but growing at 2.4% and 2.5% in 2016 and 2017 respectively. Ukraine's economy as of 2017 consists of 58.2% of its GDP in the service sector with industry at 27.8% and agriculture 14%[3].

13. In terms of consumption, the energy intensity in Ukraine is still relatively high despite a significant decrease in recent years (for the Ukraine, a decrease from 27 MJ per dollar of GDP in 1996 to 11.79 MJ per dollar of GDP in 2015[4]). With current levels of energy intensity being significantly higher than comparable and modern technologies and processes within the EU (in the range of 2.2 to 5.51 MJ per dollar GDP for a range of countries in Europe[5]) and globally, there is scope for substantial improvements for energy efficiency in Ukraine. Numerous factors contribute to overall inefficiencies of energy consumption including ageing technology, equipment and networks, operation of systems well below design loads. Although the energy intensity of OECD countries has also improved over the same period, the rate of improvement in Ukraine has been faster but insufficient to be competitive with OECD countries.

14. Ukraine has historically been dependent on Russia for its natural gas imports. The price for its import, however, has been rising and unpredictable since 2005. The price in 2005 was US$50/1000 m^3 rising to US$430/1000 m^3 in 2013. With the global price of natural gas decreasing in 2014, the price of natural gas imports from Russia decreased to $268/1000 m^3 in January 2014[6]. Natural gas supplies from Russia to Ukraine were disrupted in April 2014, forcing

[3] CIA World Fact book was used as a source for statistical data for this chapter https://www.cia.gov/library/publications/the-world-factbook/geos/up.html
[4] https://knoema.com/atlas/Ukraine/Energy-intensity
[5] https://knoema.com/atlas/topics/Energy/Total-Energy/Energy-intensity
[6] https://en.wikipedia.org/wiki/Natural_gas_in_Ukraine

Ukraine to secure natural gas supplies from the EU (through Slovakia) at a price of US$378/1000 m^3. The April 2018 natural gas price in the Ukraine was US$310/1000 m^3. The volatility of these prices continues to be a primary driving force for energy security in the Ukraine, as well as energy efficiency and the optimisation of energy consumption in all sectors of the Ukrainian economy.

2.2 Sector-specific issues of concern to the project

15. As of 2016, the industrial sector was the one of the highest consumers of energy in the Ukraine, consuming 30.7% of all energy, the equivalent of 51.65 mTOE[7]. Comparing this to 2011 at the commencement of the IEEPRE Ukraine Project, industrial sector was consuming the equivalent of 75.72 mTOE. This reduction of energy consumption in the industrial sector is not necessarily a reflection of energy efficiency, but rather the impacts of the political events in the Ukraine and the disruptions to their natural gas supplies in 2014.

16. The primary issue of concern being addressed by the IEEPRE Ukraine Project is the high energy intensity of the agricultural sector, the country's primary economic driver. According to the National Investment Council of Ukraine, the agricultural sector comprises for 10-12% of the country's GDP between 2015 and 2017, and accounted for 44% of the country's export market[8]. This includes the export of mainly grain-related products such as sunflower oil (largest globally), corn, barley, wheat and soybean as well as dairy products, eggs and honey. The GoU has been keen on improving the competitiveness of this sector including its energy performance. One "informal" indicator for the evaluation team of the need to improve energy performance in this sector has been the percentage of their energy costs to overall operational costs being in the order of 30 to 40%[9]. Through energy efficiency, these SMEs could increase their profits by 5 to 25% by decreasing the energy costs of their operations.

17. Despite opportunities to improve their energy performance, the Ukrainian agro-food sector as well as other industrial sub-sectors continue their operations at more than double the energy intensity levels to their counterparts in Western Europe. Barriers in 2010 to SME industries in Ukraine in fully adopting measures to reduce their energy costs includes:

    - *A weak legal and regulatory framework*. Legislation often has a "command-and-control" character inherited from the era of central planning;
    - Low level of awareness among company owners and senior management of the opportunities for, and benefits of energy efficiency and renewable energy investments. Though many of them are aware of their energy costs, they are not aware of their energy intensities versus their production;
    - *No culture of energy efficiency in most enterprises*. Investments are made to increase output or labor productivity rather than energy efficiency investments. Staff do not regard energy efficiency as their responsibility;

[7] Source: IEA World Energy Balances 2018, https://www.iea.org/statistics/?country=UKRAINE&year=2016&category=Key%20indicators&indicator=TFCShareBySector&mode=chart&categoryBrowse=false&dataTable=BALANCES&showDataTable=true

[8] See pages 2 and 3 of 2018 NICU report on "Agricultural sector of Ukraine", available on: https://www.agroberichtenbuitenland.nl/binaries/agroberichtenbuitenland/documenten/rapporten/2018/07/04/ua-report-investment-council-ua-agriculture/agro-small.pdf

[9] Collected through informal interviews with senior managers of some of the SMEs visited during the August-September 2018 Evaluation mission.

- *Many agro-food enterprises operate at narrow profit margins constraining their ability to invest in modernization* (with exceptions being enterprises for beer and other alcoholic beverages). As a result, access to loan finance for energy efficiency is limited, along with high interest rates and collateral requirements that are difficult to meet;

- *Absence of a fully-functioning market for energy efficiency and renewable energy equipment.* Suppliers of equipment often lack a culture of marketing and business planning, while potential users often have little experience of project management;

- *High cost of renewable energy equipment, leading to excessively long payback periods for renewable energy projects*. Most equipment including biogas plants (which would be beneficial to numerous agro-food enterprises) are costly and generally foreign-produced, though such plants could be largely produced in Ukraine at lower costs;

- *Procedures for obtaining "green" feed-in tariffs are complicated*. The status of biogas under the green tariff system remains uncertain with no clear legal mechanism to permit the regional energy utility companies to buy electricity at the green tariff rates;

- *Low level of awareness* among company owners and senior management in the agro-food sector of opportunities for utilizing the energy content of waste streams;

- Lack of any clear state policy on bioenergy with no government programmes to define immediate and long-term goals for biomass energy production. This includes:

    - lack of regulations to mandate the use of bioenergy where suitable raw materials exists. This may include, for example, the compulsory inclusion of a biogas plant in the plans for major new projects by agro-food companies;

    - practice of agreeing long-term contracts between producers and consumers for biomass supply is not established;

    - no system of standardization and certification for biofuels;

- *Image of renewable energy is poor* among potential investors and users, and the population at large.

18. Removal of these barriers to energy efficiency and renewable energy form the basis of the IEEPRE Ukraine Project, as described in the following section of this report.

2.3 Project Summary

2.3.1 Project Goal, Objective and General Information

19. The objective of the IEEPRE Ukraine Project was to "develop a market environment for improved energy efficiencies and enhanced use of renewable energy technologies in energy intensive manufacturing small and medium enterprises (SMEs) in Ukraine". To achieve this objective, the Project was structured into 4 components, each of which were themselves structured to deliver outputs, supported by monitoring and evaluation, and elaborated in a full Project Results Framework (PRF), an abbreviated version that is contained in Table with a full version in Annex 5.

20. The IEEPRE Ukraine Project's 4 components are as follows:

    - *Component 1: Policy support Integrating EE and RE priorities into national industrial policies and development programmes on Agro-food industry and SMEs in Ukraine*. The purpose of

this component was to address the inadequacy of existing policies, institutions and regulatory framework for effective promotion and support of improved energy management and use of renewable energy;

- *Component 2: Energy Efficiency and Renewable Energy Interventions*. The purpose of this component was primarily focused on supporting the development of pilot projects to demonstrate the feasibility of reducing energy costs through improved energy management and the deployment of renewable energy;
- *Component 3: Scaling up Strategy and Catalyzing Investment*. The purpose of this component was to support the subsequent scale-up of industrial enterprise investments in energy efficiency improvements and renewable energy through assisting SMEs with technical and financial packages;
- *Component 4: Capacity Building*. This component was designed to prepare guidebooks of EE and RE investments targeting energy intensive SMEs, and to provide training for key players such as SME managers, ESCOs and suppliers of EE and RE technologies.

21. General approved information of the IEEPRE Ukraine Project is presented in Table 1. Key dates of the IEEPRE Ukraine Project are provided on Table 2. Project expenditures broken down into Project components and co-financing are provided on Table 3. More details of co-financing are provided in Annex 4.

Table 1: General Information on the IEEPRE Ukraine Project

Project title	Improving Energy Efficiency and Promoting Renewable Energy in the Agro-Food and other Small and Medium Enterprises (SMEs) in Ukraine
GEF ID number	3917
UNIDO ID (SAP Number)	GF/UKR/11/004
Region	ECA
Country(ies)	Ukraine
GEF Focal area and operational program:	GEF-4 Climate Change 2: Climate Change, SP2 - Industrial EE, SP4 – Renewable Energy Production, Promoting EE in the Industrial Sector
Co-implementing agency(ies)	n/a
GEF agencies (implementing agency)	UNIDO
Project executing partners	Institute of Renewable Energy (NASU), National Agency of Ukraine for Efficient Use of Energy Resources, Ministry of Agrarian Policy of Ukraine
Project Size (FSP, MSP, EA)	FSP
Project CEO endorsement/Approval date	13 May 2011
Project implementation start date (PAD issuance date)	20 July 2011
Original expected implementation end date (indicated in CEO endorsement / Approval document)	April 2016
Revised expected implementation end date (if any)	31 December 2018
Project duration (months)	89 months
GEF grant (USD)	5,156,108

GEF PPG (USD) (if any)	88,000
Co-financing (USD) **at CEO endorsement**	82,230,568
Total project cost (USD) (GEF grant + co-financing at CEO endorsement)	87,474,676
Agency fee (USD)	524,400

Table 2: Key dates for the IEEPRE Ukraine Project

Milestone	Expected date	Actual date
Project CEO endorsement / Approval date	13 May 2011	20 July 2011
Project implementation start date (PAD Issuance Date)	n/a	n/a
Original expected implementation end date (indicated in CEO endorsement/approval document)	April 2016	31 December 2017
Revised expected implementation end date (if any)	31 December 2014	31 December 2017
Terminal evaluation completion	March 2016	November 2018
Planned tracking tool date	March 2016	November 2018

Table 3: Summary of IEEPRE Ukraine Project Framework

Project Component	Activity Type[10]	GEF financing (in USD)		Co-financing (in USD)	
		Approved	Actual	Promised	Actual
1. Policy support	a,b	508,140	923,081	1,265,000	450,000
2. Energy efficiency and renewable energy interventions	c	3,209,820	2,741,697[11]	30,930,568	13,755,769
3. Scaling up strategy	a, b	519,860	478,446	48,270,000	14,500,000
4. Awareness raising and capacity building in energy intensive SMEs	a, b	512,860	715,088	1,015,000	250,000
Project management	a	405,428	259,136	750,000	250,000
Total		**5,125,108**	**5,117,448**	**82,830,568**	**29,225,769**

2.3.2 Partners and Stakeholders

22. The IEEPRE Ukraine Project was launched with GEF funding, together with in-kind and cash contributions from UNIDO and co-financing partners in the Ukraine. As the implementing agency for the Project, UNIDO was accountable for the GEF grant and in-kind contributions provided by the Ukraine 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 IEEPRE Ukraine Project are outlined in Table . 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.

[10] 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.

[11] This expenditure is divided into US$539,406 for "Developing markets for EE and RE" and US$2,202,291 for "Policy Support" that includes introduction of policy incentives, institutional support on EE &RE, and biomass sustainability assessments

Table 4: Key Stakeholders involved in Project Execution

Stakeholder and Mandate	Role in the IEEPRE Ukraine Project
State Agency on Energy Efficiency and Energy Saving (SAEE) SAEE implements the state policy in the field of efficient use of fuel and energy resources, energy saving, renewable energy sources and alternative fuels, ensures an increase in the share of renewable energy sources and alternative fuels in the energy balance of Ukraine, and advances and sustains state expertise in the fields of energy conservation and energy audit.	SAEE is the lead agency in setting and promulgation of policies related to EE and RE development. The Project has provided technical assistance to SAEE to update and advance these policies.
The Institute for Renewable Energy (IRE) IRE is one of several research institutes within the National Academy of Sciences of Ukraine (NASU) that serves as an independent entity but coordinates its activities with the Ministry of Education and Science (MES). IRE conducts research into renewable energy, drafts policies for RE, and holds workshops and seminars for info dissemination.	The IRE provides its knowledge and experience on the research and drafting of policies related to renewable energy to host workshops and other events to promote renewable energy.
Ministry of Agrarian Policy (MoAP) MoAP is responsible for national agricultural policy supervising, implementation and monitoring that includes oversight on agriculture and food security policy, public policy and regulation for fisheries, land related policies, mapping and surveying, forestry and hunting.	MoAP provides policy guidance for the Project on the development of secure sources of biomass as a means of developing renewable energy sources that would reducing energy costs for rural households.
Private sector industrial enterprises These are the primary beneficiaries of the IEEPRE Ukraine Project. An initial call for proposals during the PPG Phase yielded 20 pre-selected proposals, most of which were classified under the agro-food sector.	These enterprises were the primary beneficiaries of the Project's assistance, both technical and financial to ensure successes on their EE or RE investments.

2.3.3 Key Events in Project Design and Implementation

23.

24. Table documents the key milestones related to project design and implementation.

Table 5: Key events in the IEEPRE Ukraine Project design and implementation

Key project event	Date
Project design was commenced during economic downturn and rise of oil prices	2009
Project preparations for IEEPRE Ukraine undertaken	August 2009 – December 2010
CEO endorsement approval	13 May 2011
Implementation start date of Project	20 July 2011
Project policy support (Component 1) commenced in late 2011 with steady inputs throughout the duration of the Project to the EOP	November 2011 – November 2018
Capacity building under Component 4 commenced with study tours	2012-13
Pilot project implementation (Component 2) commenced in early 2012 with 4 projects completed in 2013	2013
Project disrupted by political and external conflict in Eastern Ukraine	from September 2013 to September 2014
Training for managers of senior managers of agro-food enterprises on energy management, the use of renewable energy and improving EE at energy-intensive SMEs	2014-15
Loss of 2 pilot projects in Crimea	February 2014
Scale-up strategy of Component 3 could not be implemented due to 2014 conflict. Resources adaptively managed to focus on formulation of strategies on green bonds to reduce cost of financing for scale-up of EE and RE for agro-industrial sector	2017-18
3 pilot projects of Component 2 completed	2017
2 pilot projects of Component 2 completed	2018

Key project event	Date
Terminal date of IEEPRE Ukraine	31 December 2018

2.3.4 Implementation Arrangements and Project Partners

25. 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 Ukraine (GoU), UNIDO was also to directly execute the IEEPRE Ukraine Project with its execution partners SAEE, IRE and MoAP whose profiles are provided in Table 4. UNIDO's responsibilities to the IEEPRE Ukraine Project included overall management and monitoring, Project performance reporting to GEF, procurement of international expertise to deliver outputs planned under the 4 project components, and providing supplemental technical expertise to ensure technically sound deliverables that are consistent with project requirements.

26. A Project Management Unit (PMU) was established with the contributions of the IRE. The PMU was staffed with a National Project Manager (NPM) and the Project Administrative Assistant (PAA). PMU responsibilities to the IEEPRE Ukraine 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 national experts and partners (in close collaboration with SAEE and MoAP. UNIDO provided the PMU with GEF funds as required by the work plans and to support the necessary management and monitoring of the IEEPRE Ukraine Project. Execution arrangements for the IEEPRE Ukraine Project are illustrated on Figure 1.

27. The Project management arrangements also included:

- A Project Advisory Committee (PAC) that was to be established with representatives of ministries, industry and academia to provide technical and institutional support to the delivery of the project. The PAC was to meet every 6 months but was never convened; however, these were replaced by weekly discussion meetings on working issues of the Project which were convened by IRE with key representatives of the Project;

- A Project Steering Committee (PSC) that was to be established with representatives from the SAEE, IRE, MoAP, UNIDO, and the GEF Focal Point in Ukraine. The Board was to review project plans, provide advice on strategic approaches and solutions to ensure that project objectives are achieved. Meetings of the Supervisory Board were to be held every 6 months. Instead, according to information received by the Evaluation Team, these meetings were convened annually.

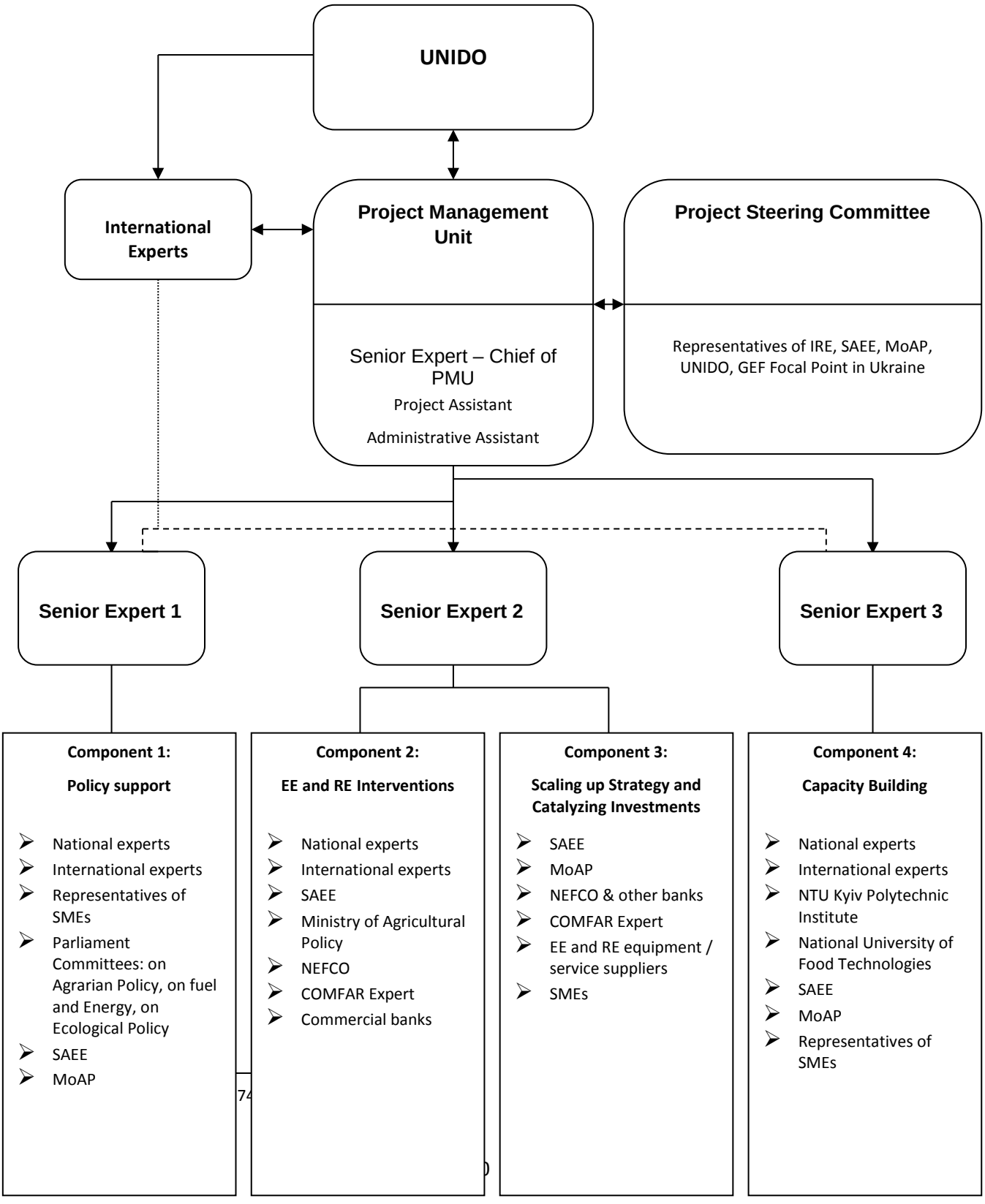
28. Detailed working plans for the entire duration of the IEEPRE Ukraine Project were to be developed by UNIDO in collaboration with the PMU. The work plans were to clearly define roles and responsibilities for the execution of Project activities, as well as monitoring and evaluation, and to set milestones for deliverables and outputs. The working plan would be used as a basis for advancing funds to the PMU, and as a management and monitoring tool by UNIDO and the PMU to be reviewed and updated as appropriate on a biannual basis.

2.3.5 Positioning of the UNIDO Project

29. The IEEPRE Ukraine Project was positioned at the time of its design in 2010 to support its drivenness to reduce its dependence on imported fossil fuels for its energy supplies. Early legislation and international obligations supporting Ukraine's energy independence includes:

- The Law on Energy Savings (Law on ES)[12] which is the reference legislative and regulatory document for energy savings and energy efficiency at the national level. It sets up the legal, economic, social and environmental basis for energy savings for all Ukrainians (including enterprises, associations and organizations active on the territory of Ukraine). This includes a number of EE incentives as defined in Article 16 of the Law:

Figure 1: Project Execution Arrangement



- Tax preferences for producers of EE equipment, machinery and materials, tools for measuring, controlling and managing fuel and energy use, and equipment using RE sources;
- Tax preference for companies that use RE and equipment powered from RE sources;
- Priority financing by state banks on measures that demonstrate rational use and saving of fuel and energy resources[13]; and
- Targeted subsides and grants for basic research in RE and EE areas on new EE equipment and technology production and exploration.[14]

- Given the importance of the agro-food sector in the Ukraine and its high energy intensity, the "Energy Strategy of Ukraine to 2030" formulated in 2006 identified the economic potential for energy conservation through technological improvements in the sector;
- Ukraine became a member of the Energy Community (EnC)[15] in 2011 committing Ukraine as an EnC member to achieving and maintaining RE at a level of 10%, and obliging Ukraine to update its 2006 Energy Strategy to ensure its compliance with EnC.

30. The IEEPRE Project was also positioned to assist the GoU in updating its energy strategy and national policy on EE and RE under Component 1 to improve incentives for the agro-food industrial sector to be energy efficient and reduce their reliance on imported fossil fuels. Considering that Ukraine had a weak legal and regulatory framework that had not been fully detached from a central planning approach to governance, the Project was positioned to assist in building and developing Ukraine's institutional capacity to improve the adoption of EE and RE in its agro-food sector. Energy strategy and national policies on EE and RE developed during the IEEPRE Project included:

    - National EE Action Plan[16] (NEEAP) which specified implementation of EE measures in the residential, public services, industry and transport sectors to:
        - achieve energy savings in 2020 at the level of 9% from average final energy consumption, specifically 6,283 kTOE[17];
        - reduce energy intensity of manufacturing production and provision of services by 9% from 2012 levels;
        - reduce the level of heat energy losses in public and residential buildings by 50%

[13] Resolution #439 of the Council of Ministers (CM) dated 13.04.11 "On Approval of the Procedure of the Use of the Funds Provided in the State Budget for Governmental Support to Energy Saving Measures via Easy Loan Mechanism"; Order of the Ministry for Economic Development dated 27.09.11, #64, "On Approval of the Procedure of Competitive Selection of EE Projects Eligible for Governmental Support from the State Budget Funds Provided for the Programme of Governmental Support to Energy Saving Measures via Easy Loan Mechanism".

[14] Order of conducting competitive basis of evaluation and selection of investment projects involving budget funds approved by the CM of Ukraine by its Resolution No 2145 dd. 25.11.1999, and Order of determining the usage of budget funds for energy saving projects implementation approved by the CM of Ukraine by its Resolution No 241 dd. 14.03.2001.

[15] In 2010 Protocol concerning the accession of Ukraine to the Treaty establishing the Energy Community was signed and later on ratified by Law of Ukraine № 2787-VI dated 15.12.2010. This Law came into force on 01.02.2011.

[16] Approved by the CM of Ukraine by its Resolution as of 01.10.2014 # 902-p

[17] ktoe = 1000 toe. The tonne of oil equivalent (toe) is a unit of energy: the amount of energy released by burning one tonne of crude oil, approximately 42 GJ (as different crude oils have different calorific values, the exact value of the toe is defined by convention).

from 2012 levels;

- reduce average specific annual energy consumption of Ukraine's housing stock and bring it in line with the EU norms and standards;
- reduce the volume of natural resources usage by 15-20% through decreased consumption of fuel and energy resources;
- secure the decrease of pollutant emission by 15-20%;
- improve the level public utility services provided to the Ukrainian public at large;

- National RE Action Plan[18] (NREAP) that stipulated:
  - 11% of energy to be produced from RES (in total energy consumption);
  - A "feed-in tariff" (or "green" tariff) as a primary incentive to promote development of RE in Ukraine with the green tariff regulated by the Law on Electricity Market[19] (Article 9-1).
  - Abolishment of VAT on imported equipment related to the generation of renewable energy (until early 2020);
- Ukrainian Energy Strategy to 2035, approved by the Cabinet of Ministers of Ukraine in 2017[20] that states the share of renewables in primary energy supply should be 25%.

31. With these new legislative changes and strategies for energy developments, the IEEPRE Ukraine project was also positioned to raise the level of awareness amongst company owners and senior managers of EE and RE opportunities. Through collaboration with UNIDO and GEF, the IEEPRE Ukraine Project was aiming to change the mindsets of these personnel, in effect changing their approaches to energy management and energy savings for the agro-food industry, and to demonstrate operational savings that will allow these agro-food enterprises to modernize.

32. The IEEPRE Ukraine Project was also positioned amongst other donor related projects related to the GoU's drive to become more energy independent. A sampling of some of these projects included:

- The Ukraine Sustainable Energy Lending Facility (USELF)[21] that was launched by the European Bank for Reconstruction and Development (EBRD) in 2009 to provide tailor-made financing and technical assistance to businesses and local authorities in the pursuit of sustainable energy supplies, and financing efficient use of energy to cut demand and imports, reduce pollution and mitigate the effects of climate change. The current lending portfolio of USELF is €140 million;
- The Ukraine Energy Efficiency Program (UKEEP) was a credit line established by the EBRD in 2007 up to 2016 to provide targeted financing for energy saving projects with Ukrainian private companies, disbursed via partner commercial banks and independent technical consulting support from international and local experts that were funded by the Austrian Federal Ministry of Finance;

[18] Approved by the CM of Ukraine by its Resolution as of 25.11.2015 # 1228-p
[19] Dated as of 13.04.2017 # 2019-VIII
[20] Approved by the Ordinance of the Cabinet of Ministers of Ukraine № 605-p dated 18.08.2017
[21] http://www.uself.com.ua/index.php?id=2

- European Investment Bank (EIB) programme on "Development of Municipal Infrastructure in Ukraine", which is a €400 million loan that commenced in February 2016 of which €160 million was allocated to heating energy efficiency in buildings[22]

- The DemoUkrainaDH programme funded by the Nordic Environment Finance Corporation (NEFCO), the Swedish International Development Cooperation Agency (SIDA) and the Eastern Europe Energy Efficiency and Environment Partnership (E5P) for supporting modernization of district heating in Ukraine commencing in 2014;

- The UNDP-GEF project on "Removing Barriers to increase investment in Energy Efficiency in Public Buildings in Ukraine through the ESCO modality in Small and Medium Sized Cities" whose objective was to accelerate implementation of energy efficiency measures in public buildings in Ukraine through the ESCO modality, utilising EPC contracts, by leveraging over significant private sector investment over its 5-year implementation period (commencing September 2015), including through the launching of a financial support mechanism, as well as by introducing a single nationwide energy management information systems (EMIS) for Ukraine[23]; and

- The UNDP-GEF Project on "Development and Commercialization of Bioenergy Technologies in the Municipal Sector in Ukraine" that was commenced in June 2014 to reduce greenhouse gas emissions in Ukraine by creating favourable legal, regulatory and market environment and building institutional, administrative and technical capacities to promote the utilisation of the country's extensive agricultural biomass potential for municipal heat and hot water services[24].

33. Considering the aforementioned, the IEEPRE Ukraine Project was well positioned within Ukraine to occupy the unique space of focusing on the development within the agro-food sector of the human, institutional and industrial capacity, and supporting its structure necessary to increase its compliance with the Law on Energy Saving, its activities towards meeting the goals of the Energy Strategy of Ukraine to 2030, and their obligations as a member of the EnC.

3 Project Assessment

3.1 Project Design

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

3.1.1 Overall Design

34. The IEEPRE Ukraine Project design was assessed against the 2010 baseline scenario and barriers to energy efficiency and renewable energy for the agro-food sector in Ukraine as described in Para 17. The design concept for the IEEPRE Ukraine Project was aimed at overcoming these issues and lowering identified barriers through establishing policy, legal, and regulatory frameworks that promote and support sustainable agro-food industrial investments in energy efficiency and renewable energy, implementing pilot EE and RE projects for the sector to demonstrate reduced energy costs, scaling up these investments throughout the sector, and

[22] See pg 35 on https://www.energy-community.org/dam/.../EECG_042017_UNDP_Mechanisms.pdf
[23] http://www.ua.undp.org/content/ukraine/en/home/projects/energy-efficiency-in-public-buildings-in-ukraine-.html
[24] http://www.ua.undp.org/content/ukraine/en/home/projects/bioenergy-technologies.html

training technical personnel and raising awareness of the industrial sector on EE and RE opportunities. A number of PPG activities were undertaken by UNIDO between August 2009 and December 2010 to determine the baseline and barriers to EE and RE in the agro-food sector (Para 17). This included:

- collection and analysis of information on the agro-food industrial sector, capacity needs of relevant national institutions, and baseline policy and regulatory mechanisms that could serve as a basis for project actions;
- consultations with relevant agro-food industrial stakeholders that included stakeholder buy-in to the proposed implementation strategy, and ownership of proposed Project activities by SMEs who were to receive Project assistance[25];
- submission of over 20 proposals for specific pilot EE and RE projects complete with summaries of the project description, goals, equipment and investments required, and technical and economic analyses[26]; and
- preparations of the Request for CEO Endorsement (RCE) document for submission to GEF for funding.

35. The IEEPRE Ukraine Project design incorporated a unique approach from other UNIDO projects with an approach to first improving the regulatory and policy framework, followed by support for pilot projects to demonstrate reduced energy costs. With lessons learned from the completion of the pilot projects including information on the generated energy savings, the training of trainers (ToT) was undertaken to increase the pool of qualified technical expertise that would scale-up EE and RE investments in the Ukraine agro-food sector.

36. The IEEPRE Ukraine Project was designed with the objective that Ukrainian industries will not only recognize the importance of EE and RE investments to their profitability, but will also increase their confidence in any of their EE or RE investments. Energy management systems were the designated tool for determining the necessity of adapting EE or RE measures to generate significant GHG emission reductions, targeted to be 2.2 million tonnes CO_{2eq} of direct GHG emissions savings (over a 10 year lifetime)[27], and the mobilization of over US$44 million in EE and RE investments by these industrial entities. The energy management systems proposed under this Project differed from those on other projects where IS0 50001 systems were proposed; SMEs in Ukraine were not considered large enough to justify adoption of the ISO 50001 certification process. The concerns of the evaluation team with regards to these GHG emission targets included the following issues:

    - Were the direct GHG emission reductions from co-financing partners sufficient to meet the target of 2.2 million tonnes CO_{2eq} of direct GHG emissions savings (over a 10 year lifetime)?
    - Were direct GHG emission reductions measurable within a business environment where most enterprises may not share energy consumption information?

    While the evaluation team appreciates the uncertainties of estimating *global environmental benefits of the IEEPRE Ukraine Project*, only the indicators and targets for GHG emission

[25] Over 65 proposals were received.
[26] The IEEPRE Project team screened these proposals for support during Project implementation.
[27] The estimate for direct GHG emission reductions is derived from the direct GHG emission reduction estimation in Annex F (pgs 48-50) of the RCE Document.

reductions meet SMART criteria including being achievable and measurable. The targets for level of energy savings and renewable energy generated did not meet this SMART criteria.

The rating for overall design is "satisfactory"

3.1.2 Logframe and Reconstructed Theory of Change

37. The Project Results Framework (PRF) for IEEPRE Ukraine Project 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 facilitates 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 IEEPRE Ukraine PRF provided in Annex 5. Table 6 also provides amendments to the description of outputs in the PRF that are clearly described in the "Project Strategy" section of the RCE Document. Although there are no indicators for each output described in RCE Document, the description of each output was sufficient for the PMU to prepare work plans.

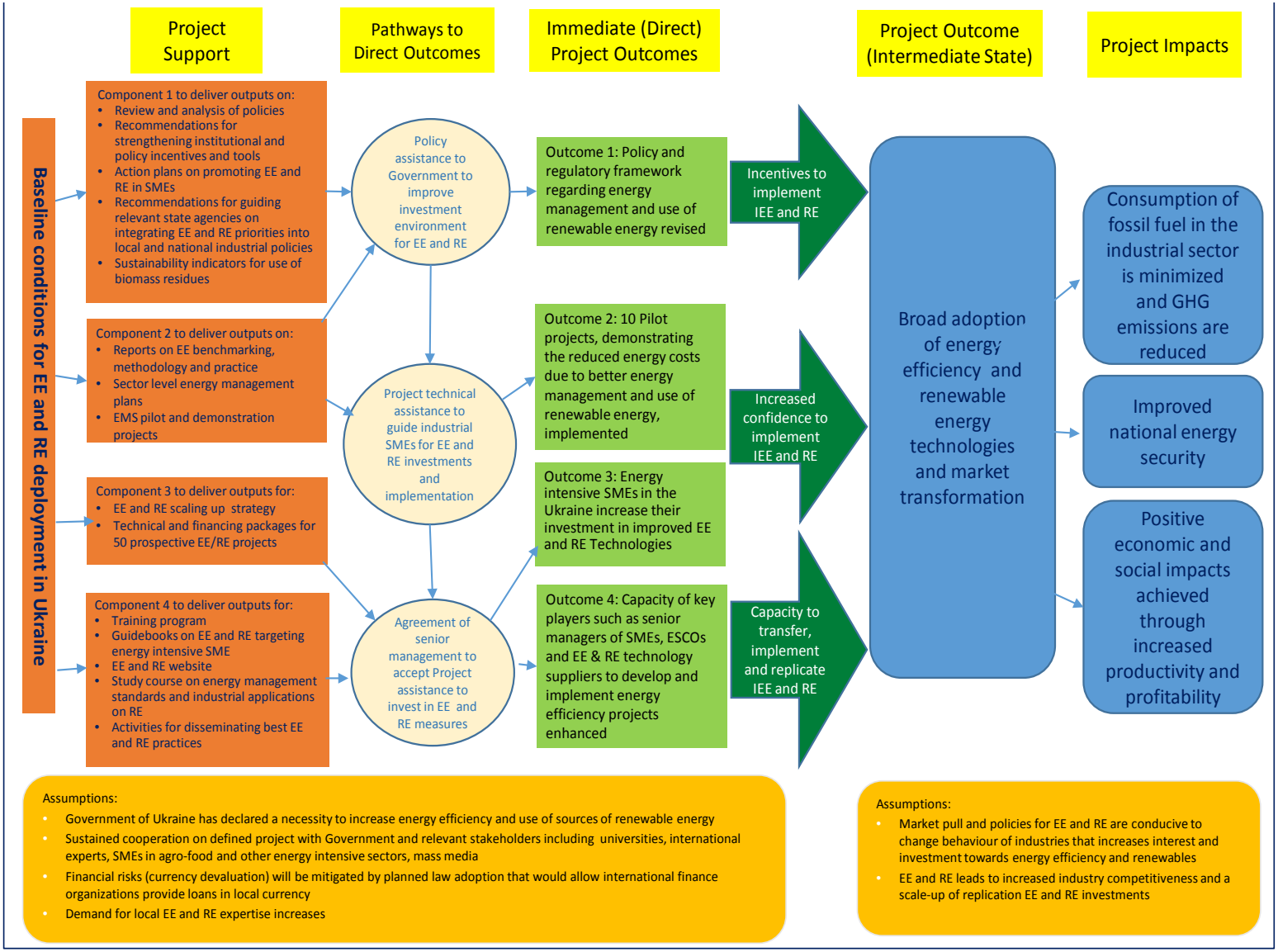
38. While the overall design of the IEEPRE Ukraine Project appears responsive to the needs of Ukrainian industrial stakeholders in 2009, the general quality of the PRF in the context of best practices for its preparation is *moderately unsatisfactory* with outcome and output descriptions being generally clear but with most component indicators not meeting most SMART criteria. Comments on the quality of the PRF includes:

- Objective level indicators and targets all meet SMART criteria with the exception of their achievability (see Para 51);
- Notwithstanding that output descriptions are prepared according to UNIDO guidance (including the 2011 UNDG RBM handbook), outputs can be better distinguished from outcomes or actions by simply dropping the verb from the wording of an output. For example, Output 1.2 can be be worded as "recommendations for changing the policy and regulatory framework", simply corrected by dropping the word "prepared". Table 6 provides revised wording of all outputs on this basis;
- Component-level indicators do not meet SMART criteria:
    - Some of the indicators are not or are difficult to meet the "measurable" criteria. Examples include the Outcome 2 indicator of "convergence with international norms……allowing greater profitability to be achieved" where there does not appear to be a corresponding target for this indicator, and the Outcome 3 indicator of "level of investments (domestic and foreign) in EE and RE projects in the agro-food sector in general" where the target of "an increased level of domestic and foreign investments to agro-food sector…." should be expressed in terms of monetary value of the investments or the number of enterprises investing in EE and/or RE measures by the EOP;
    - None of the indicators and targets within the components are time-bound. This would create difficulties for project implementers in sequencing activities to achieve these targets;
    - Components 2 to 4 have outputs with indicators, many of which do not have corresponding targets. For example, Component 4 has 5 outputs but only one indicator with an unmeasurable target of "raised awareness";

Table 6: IEEPRE Ukraine Project Results Framework

Components	Outcomes	Outputs (in 2011 PRF)	Revised Outputs (for ToC analysis)
Project Objective	Develop a market environment for improved energy efficiencies and enhanced use of renewable energy technologies in energy intensive manufacturing small and medium enterprises (SMEs) in Ukraine		
C1: Policy support Integrating EE and RE priorities into national industrial policies and development programmes on Agro-food industry and SMEs in Ukraine	Policy and regulatory framework regarding energy management and use of renewable energy revised	O1.1: Analysis of the existing policy and regulatory framework regarding energy management and use of renewable energy performed O1.2: Recommendations for changing the policy and regulatory framework prepared O1.3: Policy incentives and institutional tools to promote EE and RE in SMEs put in place	O1.1: Review and analysis of policies O1.2: Recommendations for strengthening institutional and policy incentives and tools O1.3: Action plans on promoting EE and RE in SMEs O1.4: Recommendations for guiding relevant state agencies on integrating EE and RE priorities into local and national industrial policies O1.5: Sustainability indicators for use of biomass residues
C2: Energy Efficiency and Renewable Energy Interventions	10 Pilot projects, demonstrating the reduced energy costs due to better energy management and use of renewable energy	O2.1: Sector diagnostic reports on energy consumption prepared O2.2: Sector level energy management plans prepared O2.3: Projects in technologies selected for demonstration O2.4: Technology supply chain strengthening O2.5: Returns on investment in EE and RE pilot projects demonstrated	O2.1: Reports on EE benchmarking, methodology and practice O2.2: Sector level energy management plans O2.3: EMS pilot and demonstration projects
C3: Industrial energy efficiency pilot projects	Energy intensive SMEs in the Ukraine increase their investment in improved EE and RE technologies	O3.1: Scaling up strategy on EE and RE in energy intensive SMEs prepared and operationalized O3.2: Technical and financing packages for SMEs developed	O3.1: EE and RE scaling up O3.2: Technical and financing packages for 50 prospective EE/RE projects
C4: Capacity building	Capacity of key players such as senior managers of SMEs, ESCOs and EE & RE technology suppliers to develop and implement energy efficiency projects enhanced	O4.1: Key representatives of public and private institutions trained on EE and RE opportunities O4.2: Guidebooks on EE and RE for energy intensive SMEs prepared O4.3: Website launched and maintained O4.4: Study course on energy management standards developed for 2 selected universities O4.5: Best practices disseminated	O4.1: Training program O4.2: Guidebooks on EE and RE targeting energy intensive SME O4.3: EE and RE website O4.4: Study course on energy management standards and industrial applications on RE O4.5: Activities for disseminating best EE and RE practices

Figure 2: Reconstructed Theory of Change - IEEPRE Ukraine Project



- Component 1 has indicators of "a number of policy measures", "number of pieces of primary or secondary legislation", and "number of national and local development plans". However, the targets for each of these indicators do not reflect a number and cannot be considered targets that are "measurable".

39. Due to these aforementioned issues, the IEEPRE Ukraine Project design and its PRF were 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 activities to reach intended outcomes and long-term outcomes to reflect the sustainability of Project activities. A ToC for the IEEPRE Ukraine Project was prepared for this TE as shown on Figure 2 that is closely linked to the IEEPRE Ukraine PRF in Annex 5, and using UNIDO's "Generic Theory of Change for UNIDO Energy Efficiency Programs"[28] with slight changes made to include renewable energy

40. The logic of the ToC diagram in Figure 2 flows in a horizontal direction (left to right) from component activities and outputs (brown boxes) to long term Project impacts (dark blue boxes) of the IEEPRE Ukraine Project. The ToC includes Project pathways (light pink ovals), direct outcomes (green boxes), and an intermediate state that leads to 3 intended long-term impacts of the IEEPRE Ukraine Project of "consumption of fossil fuel in industrial production is minimized and GHG emissions are reduced", "improved national energy security" and "positive economic and social impacts achieved through increased productivity and profitability". The initial assessment of the IEEPRE Ukraine PRF led to some adjustments to the language of the outputs in the ToC (essentially rewording of outputs that clarify required actions to achieve the intended outcome) which led to re-constructing the Project's ToC. These reworded outputs are also reflected in the PMU's "Draft Final Report on the IEEPRE Ukraine Project", given to the Evaluation Team during its August-September 2018 mission in Kiev.

41. The ToC analysis re-confirms the intended outcomes of the IEEPRE Ukraine Project would generate long-term impacts after the end of project (EOP) that would need to be driven by:

    - Incentives to implement measures related to EE and RE. This would include simple low cost EE and RE measures that would enhance enterprise profitability, and the use of biomass waste to displace the costly use of imported fossil fuels or coal;

    - Increased confidence of investors to implement EE and RE based on successful implementation of pilot projects from Component 2;

    - The capacity of local services to transfer, implement and replicate EE and RE projects. The IEEPRE Ukraine Project was to provide support for the building of this capacity after substantial completion of the 10 pilot projects of Component 2.

42. In this ToC visualisation, success of IEEPRE Ukraine Project to achieve its intended direct outcomes was predicated on the following assumptions (some of which are mentioned in the PRF) that are somewhat beyond the control of IEEPRE Ukraine Project:

    - Financial risks (currency devaluation) will be mitigated by planned law adoption that would allow international finance organizations provide loans in local currency[29];

    - Demand for local EE and RE expertise increases. Without development of more EE and RE

[28] 2017 UNIDO Independent Evaluation Division Elaboration

[29] This draft law has support from the National Bank of Ukraine.

investments in the Ukraine, a critical mass of local and competent EE and RE expertise will not be readily available for Ukrainian agro-food as well as other industrial SMEs requiring this expertise.

43. 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 IEEPRE Ukraine Project) include the necessary intermediate state of "broad adoption of energy efficiency and renewable energy technologies and market transformation". Assumptions that will increase the likelihood of achieving these long term impacts includes "market pull and policies for EE and RE are conducive to change behaviour of industries that increases interest and investment towards energy efficiency and renewables", and "EE and RE leads to increased industry competitiveness and a scale-up of replication EE and RE investments". The second assumption can also be considered a driver that is somewhat related to the driver of "incentives to implement EE and RE".

44. In summary, the overall design of IEEPRE Ukraine Project is *satisfactory* due to its clear focus on the approach of strengthening policy and regulatory frameworks to encourage EE and RE investments, designing and implementing EE and RE pilot investments, scaling up these investments using lessons learned from the pilots, and training technical expertise and raising awareness of EE and RE in the industrial sector through successful pilot projects. However, the PRF utilized to document the logic intervention and subsequently guide project implementation is *moderately unsatisfactory* due to the lack of a full set of SMART indicators and clear targets within the Components of the Project.

The rating for the log frame is "moderately unsatisfactory"

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.

45. The IEEPRE Ukraine Project is relevant to the priorities of the Government of Ukraine (GoU) that includes strategy level documents defining actions required to implement Ukrainian national policy on EE and RE. This includes:

- The Ukrainian Energy Strategy till 2030, approved by the Cabinet of Ministers of Ukraine (CMU) in 2006;
- The National RE Action Plan (NREAP); and
- The National EE Action Plan (NEEAP).

46. The IEEPRE Ukraine Project also strengthens the country's standing as a member of the Energy Community (EnC) with clear political intentions for European integration. This includes a 2014 Memorandum of Understanding between Ukraine and the EnC Secretariat[30]. This Project also

[30] Memorandum of Understanding on establishing an implementation partnership between the Ministry of Energy and Coal Industry of Ukraine and the Secretariat of Energy Community, dated 7 February 2014. By signing the Memorandum, Ukraine confirms its commitment to transpose into its national legal framework and fully implement Energy Community legislation. Ukraine and the Secretariat have agreed to set up an effective implementation mechanism, including the

Continued…

bolsters the Presidential Decree[31] requiring the update of the Ukrainian Energy Strategy to ensure its compliance with international obligations on RE.

47. The Project falls under and supports *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 IEEPRE Ukraine Project was to directly contribute to promoting and increasing 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 is also making a tangible contribution to *GEF-4 Climate Change Strategic Program 6: Promoting sustainable energy production from biomass* as well as to the *GEF-4 Climate Change Long-Term Objective 4: Promoting promote the use of renewable energy for the provision of rural energy services (off-grid)* which is not directly pursued in GEF-4.

48. Given that the IEEPRE Ukraine 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 development[32], the Project is 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, taking into account their relative importance.

49. The effectiveness of the IEEPRE Ukraine 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 12.

50. Table 8 provides a summary of the status of achieving objective-level targets, mainly from pilot investments from Component 2 (details of pilot projects are provided in Table 11). The PMU reported that direct GHG emission reductions of 1.94 million tonnes CO_2 were generated by the IEEPRE Ukraine Project, the details as provided on Table 7. This was based calculations from the business plans using COMPFAR II software, a grid emissions factor of 1.195 tonnes CO2/MWh[33], and other conversions based on the displacement of natural gas. While this was below the target of 2.2 million tons CO_2, the achievement of these GHG emission reductions to this extent is ***satisfactory*** considering major obstacles to efficiencies in implementation that include:

---

establishment of working groups for amending and drafting legislation to transpose the Energy Community law. Each working group should include the representatives of all relevant stakeholders, including regulatory authorities, network operators, consumers, relevant businesses and industry associations, donors, international financial institutions and development banks, civil society organizations, expert centers, etc. The Secretariat will ensure a draft law's compliance with the Energy Community Treaty and provide technical and legal assistance when requested.

[31] Decree of the President "On the decision of the National Security and Defense Council of Ukraine of 28 April 2014 "On the State to ensure energy security in connection with the situation concerning the supply of natural gas to Ukraine" # 448/2014 dated 1May 2014

[32] The IEEPRE Ukraine Project 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).

[33] See pg 9 of https://www.slideshare.net/MykolaShlapak/carbon-emission-factor-for-ukrainian-electricity-grid-80745723

- political instability experienced in Ukraine from late 2013 to mid-2014; and
- the annexation of Crimea by Russia in early 2014, where equipment paid for by the Project had already been delivered to pilot projects in Crimea with the Project being unable to verify that the delivered equipment had generated energy savings and renewable energy. With the GoU requesting that the severance of partnerships with any private sector entities in Crimea in 2015, the likely emission reductions from these investments could not be counted as a credit to the Project. It is likely that the 2.2 million tonnes CO_{2eq} target would have been exceeded.

51. The scale-up of EE and RE investments by the agro food industrial sector in the Ukraine as envisioned under Component 3 were hampered by these events. In addition to the devaluation of the Ukraine currency, the cost of commercial lending from Ukrainian banks had risen from 15% in 2013 to 25 to 30% in 2014 to 2016. Lending rates in the Ukraine have been decreasing since 2016 to a current rate of 17%. Regardless, these high interest rates have had an adverse impact on the pace of scaling-up of EE and RE development in Ukraine's industrial sector.

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

Objective: Develop a market environment for improved energy efficiencies and enhanced use of renewable energy technologies in energy intensive manufacturing small and medium enterprises (SMEs) in Ukraine	
Target/Indicators	*Status as at September 2018*
1. 2.2 million tonnes (over 10 year lifetimes) by 2015 of CO_{2eq} emission reductions as a result of the investments in industrial energy efficiency	*1.9 million tonnes CO_{2eq} emission reductions was achieved by 2018 resulting from investments made by industrial entities in energy efficiency and renewable energy. This excludes the investments made in Crimea which if verified and counted in the emission reduction estimate, likely would have resulted in the Project meeting or exceeding its target of 2.2 million tonnes CO_{2eq} of emission reductions. See Para 49.*
2. US$44 million of investment mobilized	*Only US$ 9.6 million of investment was mobilized. See Para 51 and Table 8.*
3. 20 Gwh/yr energy saved as a result of the project	960 MWh/yr of energy saved as a result of the Project. See Para 51 and Table 8.
4. 30 GWh/yr of energy generated by renewable sources as a result of the project	208 MWh/yr of energy generated by renewable energy sources. See Para 51 and Table 8.

52. With regards to targets for investment mobilized, energy savings and renewable energy generated, the Project did not meet these targets by a considerable margin, leading the Evaluation Team to an assessment of the realistic achievability of these targets, disqualifying them as SMART targets (Para 35). However, the Project was successful in identification of companies that were interested in energy savings. From the observations of the Evaluation Team, some of these companies were not SMEs as per their Ukrainian definition[34] (such as TMC Lvivholod); as such, larger companies would be in better financial position to execute scale-up of EE and RE pilot investments. Regardless, the Evaluation Team was witness to the genuine appreciation of the pilot project proponents for UNIDO involvement in identifying and implementing technology-neutral solutions. The success of the pilot projects can be attributed to the PMU's extensive efforts during the early stages of the IEEPRE Project to find the appropriate pilot project partners that are typical of several UNIDO projects, to contribute to demonstrating the potential for Ukraine's energy independence, and to create market demand for such investments.

[34] A medium-sized enterprise employs up to 250 employees and has a gross annual income of <€50million

Table 8: Summary of companies generating direct GHG emission reductions (up to September 30, 2018)

Company, Location (implementation Year)	Activities to date	Total Investment (USD)	Project Contribution (US$)	Direct annual energy savings (MWh)	Annual energy generated by RE sources (MWh)	Annual GHG emission reduction (tons CO_2)	GHG reduction over 10-year investment period (tons CO_2)
Krympapir, Simferopol, Crimea (2012-14)	Steam turbine installed to utilize waste steam	650,289	162,289	n/a	n/a	n/a	n/a[35]
OJSC Krymmoloko, Simferopol, Crimea (2012-14)	Solar thermal system installed	1,122,280	310,000	n/a	n/a	n/a	n/a[36]
PJSC Khlibprom, Lviv (2012-13)	Heat exchangers installed to utilize waste heat from bake ovens installed; gas burners modernized; EMS introduced; reactive power compensation system installed; compressors modernized; steam boilers replaced; pipelines insulated; energy efficient ovens installed	5,000,000[37]	223,180	40,338	0	42,147	421,470
LED lights Projects:				_	_	_	_
• TMC Lvivholod LLC, Lviv (2015)	LED lighting system installed; heating system modernized; cooling system modernized; recuperation system installed; EMS introduced; "green office" information campaign introduced	881,801[38]	57,166	46,964	0	56,477	564,770
• Rivnenska fabryka netkanyh materialiv (PJSC) or RFNM, Rivne (2015)	LED lighting system installed; heating system modernized; production system converted from steam boiler house to gas system	212,136	36,136	8,771	0	8,926	89,260
• Firma favor, LLC, Kyiv (2015)	LED lighting system installed; cooling system modernized	24,266	4,616	103	0	126	1,260
• Confectionary	LED lighting system installed; heating system changed to biomass	89,250	20,612	966	217	1,222	12,220

[35] System was to be installed in 2014. Unfortunately after conflict in Crimea, this investment has had to disassociate itself from this Project

[36] Ibid 35

[37] This includes investments into the entire EE improvement plan of the enterprise catalyzed by the Project's involvement in the investment in EnMS measures. This also includes financing from NEFCO for US$0.5 million at 5% (https://www.nefco.org/taxonomy/term/31?language=en)

[38] This does not include US$5.0 million financing (@16%) that company received from EBRD for other EE measures

Company, Location (implementation Year)	Activities to date	Total Investment (USD)	Project Contribution (US$)	Direct annual energy savings (MWh)	Annual energy generated by RE sources (MWh)	Annual GHG emission reduction (tons CO_2)	GHG reduction over 10-year investment period (tons CO_2)
factory "Svat" LLC, Kharkivska oblast (2015)	system; buildings insulated; energy efficient windows and doors installed; ventilation system modernized; biomass oven installed						
• Agro Plus 1 LLC, Lugansk Oblast (2015)	LED lighting system installed; heating system modernized; buildings insulated; bakery facility modernized	406,231	22,870	887	346	721	7,210
• Agrotrans LLC, Odessa Oblast (2015)	LED lighting system installed; heating system modernized; production and office facilities and granaries modernized and insulated	870,000[39]	22,011	6,140	0	7,419	74,190
• Domrent LLC, Mykolaiv (2015)	LED lighting system installed; heating system modernized; buildings insulated; cooling system modernized, installation of modern heating and cooling system	250,138	53,520	4,250	0	5,077	50,770
Variatsiya, Boryspil (near Kiev) (2015)	Biomass boiler house installed, aspiration system installed, buildings insulated, production facilities modernised to modern energy efficient ones; LED lights installed	1,395,640	192,000	1,200	7,588	2,746	27,460
Pavlivskyy Brewery, Volynska Oblast (2015)	Thermal solar complex for water pre-heating before steam boiler installed; efficient windows and doors replaced; building insulated; pipelines insulated; ventilation system modernized; cooling system modernized; heating system modernized	543,376	115,302	1,410	2,000	1,314	13,140
PE Kilgan (2012-18)	Biodiesel production installed; LED lighting system installed	720,524[40]	150,669	10	193,979	51,554	515,540
SE "Progres", Kyiv (2018)	Cooling system modernized; buildings insulated; heating system modernized; cold storage facilities modernized	999,476	192,000	12,417	0	15,006	150,060
Azov, LLC	Modernization of cooling system at fish processing factory	Project cancelled		**0**	0	0	0

[39] Includes financing from Raiffeisen Bank Aval (https://www.aval.ua/en/personal/) for US$0.87 million at 15%.
[40] Includes credit agreement with OTP Bank (https://en.otpbank.com.ua) for US$0.5 million at 12%.

Company, Location (implementation Year)	Activities to date	Total Investment (USD)	Project Contribution (US$)	Direct annual energy savings (MWh)	Annual energy generated by RE sources (MWh)	Annual GHG emission reduction (tons CO_2)	GHG reduction over 10-year investment period (tons CO_2)
Druzhba, LLC	Supply and provision of services for biomass grain drying system	462,380	116,000	**7**	2,880	1,290	6,927
Total		**13,627,787**	**1,678,371**	**123,463**	**207,010**	**194,025**	**1,934,277**

Component 1: Policy support integrating EE and RE priorities into national industrial policies and development programmes on agro-food industry and SMEs in Ukraine

53. Component 1 was designed to provide technical assistance to develop an enabling regulatory environment to support sustained adoption of Ukrainian agro-food industries towards best international practices and energy performance. Many of these policies are ambitious with weak implementation. Previous development of primary and secondary legislation in the sphere of energy efficiency and renewable energy has only comprised of frameworks with no mechanisms or procedures for implementation. As a result, many potentially good pieces of legislation have not worked efficiently nor have they achieved the intended results.

54. In addition, Ukraine has elaborated and implements several programmes in the agro-food sector. Integration of energy efficiency and renewable energy priorities into these programmes was to promote elaboration of related legislation and create favourable conditions for attracting internal and external investors. The GoU through SAEE and MoAP undertook efforts to catalyse biofuel production by integrating its activities with Directive 2009/28/EC on the "promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC" as of June 25th, 2009, with a transitional period to allow member states toincorporate provisions of the directive within their respective national legislations. The directive establishes obligatory sustainability standards for certain types of biofuel, which apply to raw materials production (due to land-use limitations) and biofuels production (to address GHG emissions reduction requirements) as well as wide range of social sustainability issues.

55. To address these regulatory weaknesses to reduce the carbon footprint of agro-food industries in the Ukraine, Component 1 was set up to deliver the following outputs (these coincide with revised output wording in ToC in Figure 2):

- *Output 1.1: Review and analysis of existing policy and regulatory framework regarding energy management and use of renewable energy*. This would address effectiveness of the existing policy and regulatory framework for its support for increased adoption of EE and RE measures in the agro-food sector, including lessons learned from experiences in other countries;

- *Output 1.2: Recommendations for strengthening institutional and policy incentives and tools*. This was designed to accelerate the development of policies and financial mechanisms that would accelerate adoption by energy intensive SMEs of EE and RE measures;

- *Output 1.3: Action plans on promoting EE and RE in SMEs*. This output was designed to support national organizations on effectively implementing EE and RE action plans;

- *Output 1.4: Recommendations for guiding relevant state agencies on integrating EE and RE priorities into local and national industrial policies*. This output was designed to ensure policy support at all levels of government for EE and RE development;

- *Output 1.5: Sustainability indicators for use of biomass residues*. This was designed as an initial step to the development of biofuel and biomass raw materials sustainability standards certification for the GoU, in line with EU standards.

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

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

Expected Outcome 1: Policy and regulatory framework regarding energy management and use of renewable energy revised		
Programmed Outputs	*Target/Indicators*	*Status as at September 2018*
1.1 Review and analysis of the existing policy and regulatory framework regarding energy management and use of renewable energy	The indicator was a "number of policy measures and mechanisms introduced by GoU to foster EE / RE applications in SMEs in the industrial sector" with a target of "new, more effective policy measures and mechanisms are introduced"	2 reports were produced for review and analysis of policy measures and mechanisms relevant in the support to promote EE and RE applications for SMEs in the industrial sector. See Para 55.
1.2 Recommendations for strengthening institutional and policy incentives and tools	Indicator was "number of pieces of primary or secondary legislation on EE/RE in industrial sector debated in parliament/enacted by relevant executive body, with target of "recommendations for primary and secondary legislation are debated in parliament / enacted by GoU".	6 knowledge products were produced in support of this output. See Para 56.
1.3 Action plans on promoting EE and RE in SMEs	No indicators or targets in PRF	2 activities were undertaken to support the delivery of this output. See Para 57.
1.4 Recommendations for guiding relevant state agencies on integrating EE/RE priorities into local and national industrial policies	Number of national and local development plans that integrate EE/RE objectives	2 reports were produced to support delivery of this output. See Para 58.
1.5 Sustainability indicators for use of biomass residues	No indicators or targets in PRF	5 knowledge products were produced to support delivery of this output. See Para 59.

56. Two reports were produced in the delivery of Output 1.1:

- A 2012 analysis of 17 draft laws on energy efficiency, energy savings and renewable energy sources;
- A 2012 analysis of current policy, legislative and regulatory frameworks in the Ukraine on how policies and laws designed with a specific focus on the scale up of EE and RE for energy intensive industrial SMEs can be operationalized. The analysis included a review of international practices especially those of the EU that were used to regulate EE and energy savings in the Ukraine. This included 13 existing laws in the Ukraine that were promulgated from 1994 to 2003 on energy savings, alternative energy sources, the promotion and production and use of biofuels, amongst other existing laws.

57. With regards to the delivery of Output 1.2:

- a report was prepared in 2014 on analysing the efficiency and performance of existing financial mechanisms and rules in the development of energy efficiency and renewable energy complete with recommendations for improving these mechanisms;
- a report was prepared in 2014 on recommendations for launching market mechanisms in financial and fiscal instruments to improve energy efficiency and promote renewable energy. Several of these recommendations provide details of incentives for agro-food SMEs to consider EE and RE investments;
- a report was prepared in 2014 on the use of policy instruments to promote EE and RE investments, using examples from the EU on best practice policy approaches;
- a report was prepared in 2017 on the development of methodology for calculating energy produced by heat pumps in accordance with the Ukrainian Law on "amendments to the law of Ukraine on alternative energy sources that classifies heat pumps as equipment that

use renewable energy". The report also included development of a draft regulation on the implementation of 2009/28/EC to promote the use of energy from renewable sources known as the Renewable Energy Directive (RED) that has become mandatory by order of EnC Council Directive 2012/04/MC-EnC;

- a report was issued in 2015 providing drafts of the Law on energy efficiency that is consistent with the requirements of the Energy Community Secretariat;

- an analytical note was prepared in 2015 on the possible establishment of a Ukrainian Energy Efficient Fund that would be aligned with EU Directive 2006/32/EC on energy end-use efficiency and energy services. The report also covers potential sources of financing and GEF, legislative bases for the fund, fund management personnel, and international experience in the establishment of similar funds.

58. With regards to the delivery of Output 1.3:

- the Project provided technical assistance in the development of the National Renewable Energy Action Plan (NREAP) in response to the mandatory requirements of the RED (under Council Directive 2009/28/EC), and to Ukraine acceding to the treaty establishing them as a member of the Energy Community (EnC). This assistance resulted in Ukraine's acceptance of the NREAP in 2014 as the Cabinet of Ministers (CMU) Decision "on NREAP until 2020" #902, dated 01.10.2014. In addition to the NREAP stipulations mentioned in Para 29, Project assistance to the adopted NREAP includes:
    - forecasts of final energy consumption in Ukraine up to 2020 for heating, cooling, electricity and transport resulting from energy efficiency measures undertaken;
    - actions to reach an 11% target share of RES nationally by 2020;
- a report was prepared in 2014 providing specific recommendations on measures to implement Directive 2009/28/EU. This report included an analysis comparing the development of wind and solar energy in the Ukraine with other countries with an emphasis on EU member states. The report also provided narratives to the weaknesses of existing legislative acts in the Ukraine, suggestions for their improvement, and comprehensive descriptions of national standards for renewable energy in Ukraine for different sectors.

59. With regards to the delivery of Output 1.4:

- a report was produced in 2014 examining various measures that could be undertaken to popularize and educate the public on the benefits of EE and RE at the local levels. This would include awareness campaigns that were targeted businesses, households and energy intensive industries on the importance of undertaking EE and RE measures and their economic advantages;

- a report was produced in 2012 containing a comprehensive analysis of Ukraine's agro-food sector, technical conditions of equipment used within these enterprises, and the potential of using bioenergy and solar PV in the agro-food sector. This report also provided important information on energy consumption in the production of various products ranging from meat processing, production of dairy products to canning of vegetables and other food products. The report also provided similar energy consumption information in the food processing sector in Western Europe.

60. With regards to the delivery of Output 1.5:

- a report was produced in 2012 to assess existing international certification schemes for production of fuel from biomass and the development of a national implementation plan towards their formal acceptance in the Ukraine. Development of this implementation plan required the undertaking of the 10 activities outlined in the report;

- a report was produced in 2012 examining biomass sustainability schemes in the EU complete with suggestions on implementing similar schemes in the Ukraine;

- a report was produced in 2013 on sustainable biomass criteria in EU countries and issues regarding the quality and security of raw material production in Ukraine;

- technical assistance was provided to the working group on developing national standards for the sustainable production of biomass in Ukraine. This assistance emphasized that the significant potential of biomass for energy production in the Ukraine consisted of agricultural wastes and wood residues with the need to develop cultivation of energy crops;

- technical assistance was provided to develop standard for the "sustainable production of biomass and biofuel". This included the establishment and introduction of terms, general conditions, definition of the criteria for sustainable production of biomass. This standard was developed for voluntary certification of operations that can prove sustainable production of biomass for energy use and biofuel.

61. In summary, notwithstanding that several of the outputs in Component 1 did not have measurable targets (as mentioned in Para 37), the outputs delivered by the Project were driven by the Government of Ukraine (specifically SAEE and MoAP) to address their most urgent policy and regulatory needs to facilitate an accelerated pace of adoption of EE and RE measures by the agro-food sector. Moreover, the spirit of these unmeasurable targets in this Component were "achieved" including the indicators/targets listed in Table 9. To this end, the IEEPRE Ukraine Project made a substantial contribution to the development of the policy and regulatory framework and a strengthened institutional capacity for promoting EE and RE in the agro-food and industrial sectors. Component 1 is assessed as *satisfactory*.

Component 2: Energy efficiency and renewable energy interventions

62. Component 2 was designed to build and strengthen competence of all stakeholders and the preparation and implementation of investment projects to demonstrate EE and RE technologies as applied to energy management systems and strengthened technology supply chains. This would involve the delivery of 3 outputs:

- *Output 2.1: Reports on EE benchmarking, methodology and practice*. These reports would provide opportunities for industrial entities to view their patterns of energy use, and to identify opportunities for energy savings within their industrial processes;
- *Output 2.2: Sector level energy management plans*. These management plans were intended to identify specific energy saving measures within a particular agro-food sector that would comply with established environmental requirements;
- *Output 2.3: EMS pilot and demonstration projects*. This output was intended to provide practical demonstrations of implementing EE and RE measures using best international practices, mainly from EU member states and other middle income in developing countries that are similar to the Ukraine.

Table 10 provides a summary of the status of delivery of these outputs and outcomes.

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

Outcome 2: 10 Pilot projects, demonstrating the reduced energy costs due to better energy management and use of renewable energy, implemented		
Programmed Outputs	*Target/Indicators*	*Status as at September 2018*
2.1 Reports on EE benchmarking, methodology and practice	Convergence with international norms in the energy intensity of selected agro-food and energy intensive SMEs, allowing greater profitability to be achieved. Profitability of enterprises implementing demonstration projects is increased by project completion as a result of adopting EE and RE technologies	9 benchmarking reports were produced for 9 Agro food subsectors. See Para 62.
2.2 Sector level energy management plans	Convergence with international norms in the energy intensity of selected agro-food and energy intensive SMEs, allowing greater profitability to be achieved. Profitability of enterprises implementing demonstration projects is increased by project completion as a result of adopting EE and RE technologies	8 Agro food sector level energy management plans were prepared. See Para 63.
2.3: EMS pilot and demonstration projects	Number of energy efficiency / renewable energy projects in the agro-food sector implemented as a result (at least partially) of the demonstration effect achieved through the demonstration projects Number of agro-food and energy intensive SMEs implementing ISO EMS as a result (at least partially) of the demonstration effect achieved through the demonstration project implemented 10 energy efficiency / renewable energy / EMS projects implemented, where the impetus for project development can be attributed in part to the demonstration effect achieved through the demonstration projects	10 EE/RE pilot projects implemented. One of these pilot projects includes the installation of LED systems in 7 different locations throughout Ukraine. See Para 64 and Table 11 for details.

63. With regards to delivery of Output 2.1, the PMU prepared EE benchmarking reports for various agro-food sectors in the Ukraine to inform these businesses of their energy intensities of production, in some cases comparing their production with other similar industries in other countries. EE benchmarking reports were prepared in 2013 for 9 agro-food subsectors including bakeries, beverages, canning (for meat, fish, natural vegetables and fruit), confectionaries, dairy products, livestock raising (mainly milk cattle, pigs and poultry), meat processing, vegetable oil (mainly sunflower oil), and sugar.

64. With regards to delivery of Output 2.2, energy efficiency improvement roadmaps were developed in 2013 for 9 agro-food subsectors, developed as a resource for the SAEE to assist these subsectors in accelerating their development to become competitive industrial entities through reducing their energy costs. These roadmaps consisted of an overview of the industrial subsector, attendant problems, SWOT analysis of options for reducing its energy intensity, presentation of potential scenarios to increase EE and implement RE generation, KPIs, activities required to implement appropriate EE policies, phasing and financing of roadmap implementation, expected outcomes, and monitoring of EE and RE measures undertaken. Agro-food subsectors where roadmaps were prepared include bakeries, beverages, confectionary, canned food, livestock raising, meat processing, sugar, vegetable oils, and dairy products.

65. With regards to the delivery of Output 2.3, consisting of preparing and implementing 10 pilot projects to demonstrate energy management systems (one of which was installing LED systems in 7 locations throughout the Ukraine and another in biodiesel production certification with PE Kilgan as further discussed in Para 123), the PMU undertook a number of activities including ongoing meetings and networking by the PMU from 2012 to 2015 to identify appropriate industrial partners in the agro-food sector to serve as appropriate partners for EE and RE pilot projects, and for sourcing qualified equipment suppliers and installation personnel. As an extension of Table 8 and the narratives in Paras 49 to 51, Table 11 provides details of the activities on these pilot projects.

Table 11: Summary of the pilot project investments receiving direct IEEPRE Ukraine Project support

Name and location of demonstration	Rationale for energy savings	Intended intervention	Assistance received by Project	Status as of August 2018	RE or EE measures undertaken after Project assistance
1. Krympapir, Simferopol, Crimea	High energy costs that increase production costs and reduce company's competitiveness.	Installation of modern DU 16-14-GMO boiler along with the set of steam turbines and turbine generator for electricity generation from plant steam pressure	Commencing in 2012, Project provided assistance in preparing working arrangements, ToR, business planning, and provided a US$162,289 grant towards the purchase of an US$800,000 turbine generator. Indian-manufactured steam turbine was installed by local personnel due to military conflict.	System was to be installed in 2014. Project team has been unable to monitor the installation and performance of the system due to military conflict in the area. Investment by the Project has essentially been written off.	Unknown due to military conflict in the area.
2. OJSC Krymmoloko, Simferopol, Crimea	The rising cost and insecure supply of natural gas for the production of steam has been a rationale for consideration of renewables.	Solar thermal system	Commencing in 2012, Project provided assistance in preparing working arrangements, ToRs, business plans, preparation of a letter of guarantee, US$310,000 grant towards the purchase of an US$1.122 million solar thermal system from a company in Austria.	System was to be installed in 2014. Project team has been unable to monitor the installation and performance of the system due to military conflict in the area. Investment by the Project has essentially been written off.	Unknown due to military conflict in the area.
3. PJSC Khlibprom, Lviv	Rising costs of natural gas has been rationale for a large bakery in Lviv to consider EE measures.	Heat recovery modules for bakery ovens.	Commencing in 2012, the Project provided assistance in preparing the grant application form, working arrangements, ToRs, business plans, and providing US$223,180 towards partial purchase of heat recovery modules, supplied by a Ukrainian company and installed by local personnel.	The evaluation team visited this project. While this investment has only saved 20 to 30% of energy consumed in the baking process, plant managers are intent on seeking other EE and RE measures for continual and sustained reduction of their energy costs.	None at the time of the evaluation.
4a. TMC Lvivholod LLC, Lviv - LED lights project	Reductions in operational costs could be realized through EE lighting for workshops, warehouses and process lines.	Replacement of existing incandescent and CFL lighting systems with modern LED systems.	Commencing in 2015, Project assisted in energy auditing, business planning and provided funds towards covering LED installation costs. A Ukrainian company supplied the LED lighting system with installation conducted by local personnel.	LED lighting system installed; heating system modernized; cooling system modernized; recuperation system installed; EMS introduced; "green office" information campaign introduced	Evaluation team visited TMC Lvivholod LLC where significant energy savings with LED systems has been realized, further catalyzing plant management to consider other energy savings measures to be undertaken as a part of plant modernization programs
4b. Rivnenska fabryka netkanyh materialiv	Reductions in operational costs could be realized through EE lighting for workshops, warehouses and process lines.	Replacement of existing incandescent and CFL lighting systems with modern LED systems	Commencing in 2015, Project provided assistance in energy auditing, business planning and LED installation costs. A Ukrainian company supplied the LED lighting system with installation	LED lighting system installed; heating system modernized; production system changed from steam boiler house for whole factory to gas system for one facility.	Evaluation team visited "Rivnenska fabryka netkanyh materialiv" (PJSC) or RFNM, a fabric recycling plant in Rivne where significant energy savings with LED systems has been realized, further

Name and location of demonstration	Rationale for energy savings	Intended intervention	Assistance received by Project	Status as of August 2018	RE or EE measures undertaken after Project assistance
(PJSC) or RFNM, Rivne			conducted by local personnel.		catalyzing plant management to consider other energy savings measures to be undertaken as a part of plant modernization programs
4c. Firma favor, LLC, Kyiv	Reductions in operational costs could be realized through EE lighting for workshops, warehouses and process lines.	Replacement of existing incandescent and CFL lighting systems with modern LED systems	Commencing in 2015, Project provided assistance in energy auditing, business planning and LED installation costs. A Ukrainian company supplied the LED lighting system with installation conducted by local personnel.	LED lighting system installed; cooling system modernized	Plans made for the installation of EE equipment.
4d. Confectionary factory "Svat" LLC, Kharkivska oblast	Reductions in operational costs could be realized through EE lighting for workshops, warehouses and process lines.	Replacement of existing incandescent and CFL lighting systems with modern LED systems	Commencing in 2015, Project provided assistance in energy auditing, business planning and LED installation costs. A Ukrainian company supplied the LED lighting system with installation conducted by local personnel.	LED lighting system installed; heating system changed to biomass system; buildings insulated; energy efficient windows and doors installed; ventilation system modernized; biomass oven installed	Plans made for the installation of EE equipment.
4e. Agro-Plus 1, 5 other LED projects	Reductions in operational costs could be realized through EE lighting for workshops, warehouses and process lines.	Replacement of existing incandescent and CFL lighting systems with modern LED systems	Commencing in 2015, Project provided assistance in energy auditing, business planning and LED installation costs. A Ukrainian company supplied the LED lighting system with installation conducted by local personnel.	LED lighting system installed; heating system modernized; buildings insulated; bakery facility modernized.	Plans made for further modernization of the thermal properties of the building.
4f. Agrotrans LLC, Odeska oblast	Reductions in operational costs could be realized through EE lighting for workshops, warehouses and process lines.	Replacement of existing incandescent and CFL lighting systems with modern LED systems	Commencing in 2015, Project provided assistance in energy auditing, business planning and LED installation costs. A Ukrainian company supplied the LED lighting system with installation conducted by local personnel.	LED lighting system installed; heating system modernized; production and office facilities and granaries modernized and insulated	Investments were being made to modernize infrastructure and machinery that would result in lower energy use. This includes plans for installing an industrial heat water system using solar thermal collectors.
4g. Domrent LLC, Mykolaiv	Reductions in operational costs could be realized through EE lighting for workshops, warehouses and process lines.	Replacement of existing incandescent and CFL lighting systems with modern LED systems	Commencing in 2015, Project provided assistance in energy auditing, business planning and LED installation costs. A Ukrainian company supplied the LED lighting system with installation conducted by local personnel.	LED lighting system installed; heating system modernized; buildings insulated; cooling system modernized	Plans made for further modernization of the thermal properties of the building.
5. Variatsiya, Boryspil (near Kiev)	Oak processing plant that manufactures wood flooring panels and other related	Biomass boiler system using waste would (from sawdust and oak bark) to	Commencing in 2015, Project provided assistance to prepare a business plan for transitioning to biomass, sourcing	Evaluation team visited this plant and observed the usage of the biomass boiler, offsetting more than 50% of	None observed. There appears to be limited scope in undertaking other EE measures.

Name and location of demonstration	Rationale for energy savings	Intended intervention	Assistance received by Project	Status as of August 2018	RE or EE measures undertaken after Project assistance
	products use natural gas for drying purposes. With the rising and fluctuating costs of natural gas, the company wanted to convert to a renewable source of energy.	offset natural gas usage	appropriate technologies, and grant for partial payment of biomass boiler installation. A Ukrainian company supplied the biomass boiler system with installation conducted by local personnel.	its use in natural gas. Actual savings in the usage of natural gas has been dependent on sales volumes which bury each year. Assistance by UNIDO has been a significant contribution to the modernization program of the Variatsiya plant, catalyzing management into considering other	
6. Pavloskiya Brewery, Volynska Oblast.	Fluctuating and rising costs of natural gas used in the production of steam for beer making.	Installation of a solar thermal system used as preheating of water for steam production	Commencing in 2015, the Project provided assistance in business planning, working arrangements, preparing ToR for design services and for equipment and installation, progress reports from suppliers. A grant of US$115,302 was also provided towards the purchase and installation of the solar thermal system. The Ukrainian branch of an international company supplied the solar thermal system with installation by local personnel.	Evaluation team visited this solar collector system used for preheating boiler water from 15°C up to 40 to 80°C depending on availability of sunshine and the season. This offsets natural gas consumption between 50 and 75% during the summer. Plant management are satisfied with the investment. Annual beer demand appears to be constant for this brewery. Pilot project contributes to plant modernization, and catalyzing plant management to consider other RE and EE measures to reduce operating costs.	Planning for other EE measures being considered at time of evaluation including the use of biomass boilers and EE lighting systems.
7. PE Kilgan	Kilgan has developed their own process for the generation of biodiesel from rapeseed oil and other cooking oils from the surrounding districts. Demand for biodiesel is strong in agricultural-based applications considering the fluctuating price of imported diesel, especially in neighbouring countries outside of the Ukraine.	Certification of biodiesel for the purposes of foreign sales.	Project has been providing assistance between 2012 and 2018 in preparing the grant application form, working arrangements, ToRs, business plan, guarantee letters, statement on Biodiesel Production, and report on EU fuel certification (permitting Kilgan to export biodiesel). Project also provided grant for installment of equipment related to electro-magnetic cavitation technology	The evaluation team visited this plant and observed that the installation of the catalyzing machine has been completed allowing for small scale production of biodiesel at Sambir plant. With EU certification of this plant in November 2018, Mr. Kilgan is able to export his biodiesel to Czech Republic and Poland where he has supply contracts. This is an important achievement of the Project in legitimizing the process and quality of biofuel production in the Ukraine.	Plans in place for an expansion of the current biodiesel production facilities on current land near Sambir.

Name and location of demonstration	Rationale for energy savings	Intended intervention	Assistance received by Project	Status as of August 2018	RE or EE measures undertaken after Project assistance
8. Progres, KIev	Modernization of their cold storage facilities is required to reduce energy costs.	Replacement of ammonium-based refrigeration system with a safe, durable energy efficient system complete with room installation	Since 2016, the Project provided assistance in preparation of ToRs for design services as well as equipment and installation, business planning, working arrangements, letter of guarantee, and evaluation of bids. It has also provided a grant of US$192,000 towards partial purchase of the energy efficient refrigeration system. An international company supplied modern refrigeration system with installation conducted by local and international personnel.	New EE refrigeration system delivered to Progres on 4 September 2018. According to management personnel, equipment should be operational by December 2018.	Repairing and insulation of floor, roof, ceilings of cooling chambers, and walls and facade of cold storage plant. Installation of other refrigeration units is planned on other entities of Progres.
9. Azov, Henichesk, Kherson Oblast	Modernization of their cold storage facilities is required to reduce energy costs.	Replacement of Freon-based refrigerator system for fish freezing to an ozone-friendly refrigerant to increase EE.	Since 2015, Project has provided assistance in preparing working arrangements, ToRs, and defining appropriate technologies.	Project cancelled.	
10. Druzba, Saratskyl Rayon, Odessa Region	Reductions in operational costs could be realized by replacing fluctuating and rising costs of natural gas with free biomass sources available in the enterprise	Biomass fired grain dryer	Since 2015, Project has provided assistance in preparing working arrangements, ToRs, and defining appropriate technologies. A grant of US$ 116,000 was also provided towards the purchase of a biomass-fired grain dryer. A Ukrainian company supplied the biomass dryer with installation to be conducted by local personnel.	The first tender in April 2018 did not identify an appropriate technology supplier that complied with the technical specifications. A second tender issued in August 2018 was closed with the expectation of the dryer being installed in December 2018	Plans to implement an Energy-Saving Action Program (2014-2018) to reduce energy costs and improve overall profitability of the company including: 1) Procurement of state-of-the-art machinery and equipment for the agricultural production; 2) Procure and install state-of-the-art grain drying plant; 3) Modernization LED lighting at Druzhba SVK and Zorya village; 4) Launch fuel briquette production using agricultural waste straw; and 5) Procure and install a solar thermal system for pre-heating of process water for meat processing department.

66. In summary, the delivery of outputs of Component 2 is assessed as *satisfactory*. To this end, the IEEPRE Ukraine Project has made a substantial contribution to the development of pilot projects demonstrating reduced energy operational costs for more than 15 industrial entities, mainly in the agro-food subsector.

Component 3: Scaling up Strategy and Catalyzing Investments

67. Component 3 was designed to strengthen capacities of the government stakeholders, the financial sector and industrial companies to technically analyse energy management solutions and projects that would have the impact of scaling up of EE and RE investments for Ukrainian industries. Outputs from this Component 3 would be bolstered by the experiences gained from the pilot projects implemented under Component 2, leading to a higher likelihood of meeting the outcome of "energy intensive SMEs in the Ukraine increase their investment in improved EE and RE technologies". To achieve this outcome, the delivery of 2 outputs was proposed:

- *Output 3.1: EE and RE scaling-up strategy*. This strategy would be addressed to industrial owners, and relevant government stakeholders such as SAEE who wish to overcome the primary barrier to scale up of EE and RE investments, being availability of affordable financing for industrial SMEs and other entities;
- *Output 3.2: Technical and financing packages for 50 prospective EE/RE projects*. This output was designed to develop a pipeline of feasible EE and RE investments within the agro-food industrial subsector.

Table 12 provides a summary of the status of delivery of these outputs.

Table 12: Summary of the Project's Success in Producing Outputs under Outcome 3

Outcome 3: Energy intensive SMEs in the Ukraine increase their investment in improved EE and RE Technologies		
Outputs	*Target/Indicators*	*Status as at September 2018*
3.1: EE and RE scaling-up strategy	An indicator of "level of investments (domestic and foreign) in EE and RE projects in the agro-food sector in general with a target of "Increased level of domestic and foreign investments to agro-food sector, in particular to investments that significantly improve energy efficiency or introduce renewable energy resource utilization"	Scale up strategy was supported by the delivery of 4 reports targeting SME managers and owners, SAEE. See Para 67.
3.2: Technical and financing packages for 50 prospective EE/RE projects		Business plans were prepared for 30 agro-food entities from which 10 were selected for pilot project support under Component 2. See Paras 68-70.

68. With regards to the delivery of Output 3.1, a number of reports were produced for both agro-food stakeholders and relevant government agencies by the Project on various aspects of scaling up EE and RE investments in the Ukraine agro-food sector. The delivery of these reports during the late phases of the IEEPRE Ukraine Project was done intentionally, but also impacted by the 2014 military conflict in Crimea which dampened investment confidence throughout the country. Reports contributing to the preparation of an EE and RE scale-up strategy included:

- A toolkit targeting industrial SME owners on their identification of opportunities for scaling up development of agro-food businesses, of which significant investments can be made into EE and RE measures designed to reduce energy costs, and making the business more competitive;
- A 2018 report on best international practices for the creation of green bond markets for the purposes of raising financing for EE and RE measures for all economic sectors of the Ukraine. This report as requested by SAEE looks into successful development of markets

for non-sovereign and sovereign green bonds in countries such as Poland, France, the United Kingdom, Sweden and Belgium. The report also examines types of green bonds issued, provides an overview of green bond qualification criteria that includes independent reviews, provides types of projects that are financed under green bonds, and gives examples of typical green bond transactions;

- A 2018 report on developing a draft concept for green bond market introductions into the Ukraine. This report was also requested by SAEE and examines the national legislation that applies to the introduction of green bonds in the Ukraine, identifies the barriers that need to be removed to introduce green bond market into the Ukraine, and provides proposals for a draft concept in action plan to introduce a green bonds market into the Ukraine;

- A 2018 report on the establishment of the UNIDO centre that facilitates the preparation of green projects for the purposes of attracting and transferring technologies in the Ukraine. This report identifies the current barriers inhibiting SMEs from investing in modernization of their businesses including SME financial illiteracy, rigidity of specific requirements of financial institutions or SME lending, and the lack of sustained assistance by donor organizations in building the capacities of SMEs prepare their own grant or loan applications for financing modernization of their businesses. The report also provides an initial scope of this facilitation centre to assist SMEs in improving their access to financial assistance.

69. With regards to the delivery of Output 3.2, the PMU had organized the preparation of more than 30 business plans (against a target of 50). This was done in response to a call for proposals from SME industries in the agro-food sector throughout the Ukraine and in partnership with the UkrExIm and CreditWest Banks in an effort to consolidate activities into a larger effort that merges interests into a larger SME investment fund. This effort was commenced early in the Project in an effort to select industrial entities that the Project could support under its grant financing in Component 2. Out of these 30 proposals, 10 proposals were selected for support under Component 2 based on criteria that included a low cost of 1 tonne of CO_2 emission reductions, high replication potential, project payback periods, contribution to demonstrating technology innovations for low carbon, compliance with government priorities, and the industrial entities share of equity capital into these projects.

70. Preparation of these business plans was based on the COMFAR III Expert software tool for the 30 projects. The COMFAR III Expert software product is a recognized and widely used efficient tool economic and financial analysis of investment projects. Training sessions were held for 66 representatives of small and medium enterprises, governmental agencies and higher educational institutions on the use of COMFAR III Expert software. In addition, assistance to SAEE has been provided in further development of the interactive map posted at SAEE's website and aimed to support potential investors[41].

71. To a large extent, scale up strategies from this Component have not included MoAP whose sphere of interest on this Project is confined to security of biomass supplies to biomass and biofuel development projects that would benefit agricultural enterprises and their cost of using imported diesel fuels for machinery operations. For many of the biomass-based investments to date on this Project, investments were made based on the biomass being available to that particular business such as Variatsiya (wood waste) and PE Kilgan (rapeseed). Scale up

[41] https://www.google.com/maps/d/viewer?mid=1s-CEXS6ltCny91b3FhUANkYgQIw&ll=48.90808025323108%2C31.16436740000006&z=6

investments for biodiesel production for PE Kilgan, however, would need to remove the barrier of an excise tax that exists for the sale of domestically produced biodiesel within the Ukraine. Without the removal of this tax, domestic production of biodiesel for sale in the Ukraine is not economical. As such, no scale up strategies prepared in this component are targeting MoAP policies.

72. In summary, the delivery of outputs within Component 3 is assessed as *satisfactory*. While there were really no targets in the Projects PRF, the contributions of the outputs from this component were the key to delivery of the targets of pilot projects in Component 2. In addition, this component also delivered useful reports to SAEE on how the GoU may approach the development of a green bond market. However, the high cost of commercial borrowing for SMEs in the Ukraine has limited the increases in EE and RE investments in this sector, prompting the concept of initiating a green bond market which is theoretically attractive given the potential for availing green financing at rates lower than 17%.

Component 4: Capacity Building

73. Component 4 was designed to strengthen capacities of government stakeholders, the financial sector and agro-food industrial enterprises to technically analyse energy management solutions and projects that would have the impact of scaling up of EE and RE investments for Ukrainian agro-food entities and industries in general. Outputs from this Component would be bolstered by the experiences gained from the pilot projects implemented under Component 2, leading to higher likelihood of meeting the intended Outcome 3 of "capacity of key players such as senior managers of SMEs, ESCOs and EE & RE technology suppliers to develop and implement energy efficiency projects enhanced". To achieve this outcome, the delivery of 5 outputs was proposed:

- *Output 4.1: Training of trainers program*. This program was designed to train agro-food and industrial representatives, local officials, ESCOs, equipment suppliers and other stakeholders involved in EE and RE development and fuel switching. Training materials was to be developed under Output 4.2, and the training was designed to commence during the early stages of the Project with formal training sessions on design towards the end of the Project. Though not mentioned in the PRF, the target of this output was to train 500 representatives through the training of 50 training of trainers in 20 sessions. In addition, the target also included 40 representatives from government, industry and academic institutions to broaden their knowledge and experience on European best practices for EE and RE policies, technologies and management;

- *Output 4.2: Guidebooks on EE and RE targeting energy intensive SME*. This output was designed to share information on UNIDO benchmarking efforts of other countries covering 9 agro-food subsectors from Outputs 2.1 and 2.2. These guidebooks were to be designed to explain production processes, corresponding energy consumption required, international best technology available, and available technology suppliers and financial assistance;

- *Output 4.3: EE and RE website*. This output was to serve as the communication platform for all relevant stakeholders of the Project. Aside from covering topics related to energy management, the website was intended to provide a forum for professional networking and facilitating information exchanges on energy efficiency and renewable energy topics;

- *Output 4.4: Study course on energy management standards and industrial applications on RE*. This output was designed to ensure that topics on energy management and the industrial applications for renewable energy are covered in the highest educational

institutes in the Ukraine, specifically the National Technical University of the Ukraine;

- *Output 4.5: Activities for disseminating best EE and RE practices.* This output was designed specifically to target senior management and technical specialists within industrial SMEs and in government to expose them to best EE and RE practices in the Ukraine (from pilot projects under Component 2) and in other regional countries.

Table 13 provides a summary of the status of delivery of these outputs.

Table 13: Summary of the Project's Success in Producing Outputs under Outcome 4

Outcome 4: Capacity of key players such as senior managers of SMEs, ESCOs and EE & RE technology suppliers to develop and implement energy efficiency projects enhanced		
Programmed Outputs	*Target/Indicators*	*Status as at September 2018*
4.1 Training program	Indicator of "number of senior managers of enterprises in the agro-food sector who implement energy efficiency / renewable energy projects or energy management systems as a result of attending training or study tours, using guidebooks, using the website or studying on the university study courses" with a target of "raised awareness of climate change mitigation and energy efficiency objectives, capacity built for adoption of EE and RE technologies in energy intensive SMEs in agro-food and other sectors"	Training sessions on the use of renewable energy sources and improvement of energy efficiency at energy-intensive SMEs were delivered to 320 representatives of small and medium enterprises in the agro-food sector. See Para 73.
4.2 Guidebooks on EE and RE targeting energy intensive SME		2 guidebooks have been delivered. See Para 74.
4.3: EE and RE website		EE and RE website has been launched at: http://www.reee.org.ua/en, and is updated on a regular basis.
4.4: Study course on energy management standards and industrial applications on RE		Study courses have been delivered on energy management standards and industrial applications on RE. See Para 75.
4.5: Activities for disseminating best EE and RE practices		Newsletters, study tours, awareness visits and workshops have been conducted throughout the duration of the Project. See Para 76.

74. With regards to the delivery of Output 4.1, training was delivered in 3 phases:

- 50 trainers were trained under a "training for trainers" program for the purposes of scaling up a number of trainees commencing 2014;
- 28 training modules were developed and published for the purposes of training materials targeting SME agro-food representatives in 2015;
- training for 320 senior managers of private sector industrial SMEs, local officials, ESCOs and equipment suppliers in 2014 and 2015. All participants who had successfully completed the 108-hour training were granted certifications from the Project as well as government approved diplomas for advanced training. Training was held at 3 Ukrainian educational institutions all of which had been screened by the Project as officially accredited research institutions, as having relevant specializations in EE and RE, and having developed and hosted other advanced training courses.

75. With regards to the delivery of Output 4.2, the Project delivered:

- a guidebook on "Energy efficiency and renewable energy sources in agro-food enterprises" targeting industrial stakeholders as well as educational institutions;

- a 2012 report on "assessment of current education programs on industrial applications of renewable energy in Ukraine in universities". This report provided an assessment of educational programs in these institutions on alternative and renewable sources of energy, and the means to improve the delivery of these programs.

76. With regards to the delivery of Output 4.4, the Project delivered 24 manuals and textbooks on the applicability of renewable energy sources for the agro-food industry that was distributed to 12 higher educational institutes. The impact of these manuals and textbooks was to improve the quality of the academic courses offered in these institutes on renewable energy source development.

77. With regards to the delivery of Output 4.5, the Project delivered the following activities to disseminate best EE and RE practices:

- study tours which were offered during the early phases of the IEEPRE Ukraine Project, designed to expose agro-food enterprises, professional associations, municipalities, and manufacturers and suppliers of EE and RE equipment. This included study tours to Germany in 2012 in 2013;
- in June 2015, a study trip to Austria was organized jointly by UNIDO and UNDP for journalists covering climate change issues in the Ukraine;
- organization of a press club in partnership with KPMG Ukraine in June 2013 to discuss the status and progress of green energy in the Ukraine;
- organization and participation in various workshop forums including the GEF Expanded Constituency Workshop involving eastern and southern European countries in March 2017 in Lviv (which involved a visit of several international journalists to the PJSC Khlibprom pilot project);
- TV spots shown between 2015 and 2017 during prime time on the experience of pilot projects in implementing EE and RE investments.

78. In summary, the delivery of outputs in Component 4 was assessed as *satisfactory*. The effectiveness of the delivery of these outputs was enhanced by focusing on study tours during the early stages of the project, and prior to the completion of a significant number of Component 2 pilot projects. With a larger number of these Component 2 pilot projects completed by 2015, the training program and other awareness raising activities were scaled up using positive lessons learned from implementing the Component 2 pilot projects.

The rating for project effectiveness is "satisfactory"

3.2.3 Efficiency

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

79. Up to the TE date of 20 November 2018, 99.8% of the GEF resources or US$ 5,117,448 was expended over a 7-year period for undertaking IEEPRE Ukraine Project activities as shown on Table 3. The original project duration was 60 months but is likely to take 90 months with the current terminal date of the project being 31 December 2018. Table 14 provides an overview of UNIDO budget lines on which the GEF grant has expended funds (up to 31 October 2018). Almost 50% of the budget was expended mostly on experts and local subcontractors for technical assistance provided to design and implement EE and RE investments under Component 2. Another sizable tranche of funds (US$ 1,678,331 or just under 33% of GEF funds)

was provided as grant financing under Component 2 for the 10 pilot EE and RE investments as detailed in Table 8.

Table 14: IEEPRE Ukraine Project Resource use breakdown up to 31 October 2018[42]

UNIDO Cost Code	Amount (US$)
1100 - International Experts	347,686
1500 - Project Travel	163,273
1700 - National Experts	1,358,328
2100 - Subcontracts	1,063,886
3000 - Trainings/Fellowships/Study Tours	122,355
4300 - Premises	0
3500 - International Meetings	23,028
4500 - Equipment	1,820,312
5100 - Sundries	92,331
TOTAL	4,991,199

80. According to PIRs prepared for IEEPRE Ukraine Project, cumulative expenditures of the GEF funds were as follows:

- US$481,730 (9%) up to July 2012;
- US$1,741,527 (34%) up to 30 June 2013;
- US$2,688,641 (52%) up to 30 June 2014;
- US$2,980,664 (58%) up to 30 June 2015;
- US$3,426,146 (66%) up to 30 June 2016;
- US$4,280,831 (83%) up to 30 June 2017; and
- US$4,991,199 (96%) up to 31 October 2018.

This disbursement rate reflects the initial enthusiasm for EE and RE investments prior to the political events will of late 2013 and the first half of 2014. These disbursement figures also reflect the slowdown in disbursement of the GEF grant following these events, primarily due to the lack of investment confidence in the Ukrainian economy from 2014 to 2015.

[42] The total GEF amount of US$ 4,991,199 is up to 31 October 2018 which differs from the amount on Table 3 of US$5,117,448 which is up to 20 November 2018.

81. While IEEPRE Ukraine Project will have exceeded its planned timespan from 5 to 7.5 years, the efficiency of the grant resource use has been assessed as ***satisfactory*** considering the challenges faced by the Project on the aforementioned political and military issues (this included the loss of grant supported projects in Crimea totaling US$482,000 as detailed on Table 8). Despite these difficulties, the IEEPRE Ukraine Project has managed to:

- sustain support to revised EE and RE policies throughout the Project duration, a service that was praised by the Project's executing partners, IRE, SAEE and MoAP;
- achieve satisfactory quality of the pilot projects of Component 2 which provided tangible examples of energy savings to the agro-food sector of Ukraine;
- deliver capacity building activities that has received positive feedback from participants. Of note, agro-food and industrial stakeholders appreciated the introduction to the COMFAR III Expert software which provided these entities with a useful tool for quickly determining the quality of EE and RE investments.

The rating for project efficiency is "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.

82. Sustainability of the IEEPRE Ukraine Project has been assessed as *moderately unlikely (MU).* Primary reasons for this assessment are as follows:

- Widespread enthusiasm for EE and RE investments in the agro-food industrial sector tempered by the high cost of borrowing (caused by the political events and the military conflict of 2013-14) that is unaffordable to the majority of industrial entities in the Ukraine;
- The likelihood of several agro-food SMEs awaiting the succession of senior managers with younger more progressive technicians and engineers willing to invest in EE and RE measures; and
- Numerous and recent changes of SAEE counterpart staff with oversight of EE and RE policies in the Ukraine that leads to a weakening of government capacity to regulate government programs to increase energy savings in the industrial sector.

Financial Risks

83. The sustainability of EE and RE investments in the Ukraine for the industrial sector is dependent to a high degree on the availability of affordable financing. The IEEPRE Ukraine Project has demonstrated through its pilot projects in Component 2 that EE and RE investments in the industrial sector are feasible provided the rates of debt financing are affordable to the borrowing entity.

84. The Cabinet of Ministers of Ukraine have approved the legal entity of an Energy Efficiency Fund (UEEF) in January 2018. In addition, the GoU came to an agreement with EU and Germany in April 2018 to cooperate and support the activities of the UEEF that includes an initial fund capitalization of €50 million. Unfortunately, the UEEF appears to address financing energy efficiency for the residential sector (since the UEEF is managed under the Ministry of Regional Development, Construction, Housing and Communal Services), and not the agro-food industrial sector.

85. A primary sustainability issue for this Evaluation is the insufficient availability of cheaper non-commercial loans for industrial entities wishing to invest in EE and RE measures[43]. This lack of available financing for industrial EE and RE investments provides some rationale for SAEE's request for the IEEPRE assistance under Component 3 for a draft concept to develop a green bond market in. For Ukrainian industries to improve their energy performance and reduce their energy intensities of production, access to sources of less costly financing is crucial including energy performance contracting by ESCOs (see Para 87). From a financial perspective, the sustainability of the IEEPRE Ukraine Project outcomes is *moderately unlikely (MU)*.

The rating for financial risks is "moderately unlikely"

Socio-political Risks

86. Sustainability of this Project is dependent to a high degree on the sociopolitical status of the senior managers and owners of the industrial entities. The Evaluation Team observed that the industrial entities visited during the mission were highly motivated to reduce their energy costs to place their businesses in a position of increased profitability. It appears that most industrial entities in the Ukraine have a number of personnel who support these type of investments, and are willing to make initiatives on behalf of the industrial entity to implement these investments. However the Evaluation Team also observed that all senior industrial managers of these pilot projects were interviewed during the TE mission were well versed in forward-thinking concepts of energy efficiency and renewable energy. Some of these managers provided anecdotal evidence of older managers not willing to adopt the concepts of increased energy efficiency and RE investments. One small sociopolitical risk of this Project is the slower pace of EE and RE transformation in the agro-food sector due to many SMEs awaiting the process of succession of senior managers to more modern managers who would embrace the adoption of energy management systems along with increased EE and RE investments.

87. The sustainability of the IEEPRE Ukraine Project is also dependent to a high degree on political stability of the country. Notwithstanding the political events of 2013 and 2014, the economy of the Ukraine is recovering to the extent where investment confidence is slowly returning. However, as noted by the personnel and the PMU, there have been several changes of senior personnel within SAEE to the extent (over 5 Directors of SAEE have had dealings with the IEEPRE Ukraine Project in over 7 years) leading to PMU personnel expending considerable time and effort to continually familiarize senior SAEE personnel of the Project and its work plans. It is difficult for the Evaluation Team to predict if this sustained turnover of SAEE personnel will persist. From a sociopolitical perspective, the sustainability of the IEEPRE Ukraine Project is assessed as *moderately likely (ML)*.

The rating for socio-political risks is "moderately likely".

Institutional Framework and Government Risks

88. As mentioned in Para 86, the turnover of senior managers within the key executing partner of the IEEPRE Ukraine Project has raised concern over the sustainability of SAEE to continue its valuable regulatory role in promoting EE and RE in the agro-food industrial sector as well as other sectors in the Ukrainian economy. Despite the aforementioned turnover, Ukraine already has a fairly strong regulatory and policy framework (notably with the Law on Energy Savings) to

[43] Donor and financial institutions that have provided financing for the Component 2 pilot projects include NEFCO, EBRD, Raiffeisen Bank, UkrExim Bank, and OTP Bank. Other banks who provided a co-financing commitment in 2011 such as Erste Bank, had pulled out of Ukraine after the 2014 conflict.

encourage industrial SMEs to adopt and implement EE and RE measures, which should sustain to a moderate extent the growth of industrial entities who are implementing RE and EE measures. This does include secondary legislation for ESCOs that the government has yet to pilot in terms of implementation to provide confidence to both ESCOs and industrial SMEs that energy performance contracting can be successfully implemented in the Ukraine.

89. In summary, frequent personnel changes in SAEE that oversee EE and RE implementation will disrupt and weaken the effective coordination mechanisms developed between the industrial entities and the government; this creates will likely create delays amongst agro-food industrial entities seeking approval for obtaining permits for RE projects (notably applications for FITs) and reporting compliance with energy efficiency policies of the GoU. This may result in a reluctance by agro-food and other 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 IEEPRE Ukraine Project is assessed as *moderately likely (ML)*.

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

Environmental Risks

90. The IEEPRE Ukraine Project is aimed at achieving global environmental benefits, including improvements in resource efficiency, increased adoption of renewable energy sources 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 the Ukraine is that 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 and improved environmental conditions. As such, the environmental risks of a program promoting EE and RE by this Project are low. From an environmental perspective, sustainability of the IEEPRE Ukraine Project is assessed as *highly likely (HL)*.

The rating for environmental risks is "highly likely"

The rating for sustainability of benefits is "moderately unlikely"

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

91. M&E design is rated as **moderately unsatisfactory**. This was based on an M&E system plan as specified on pages 5 to 7 in the RCE document, stating that M&E was to be conducted "in accordance to established UNIDO and GEF procedures". However, there was an absence of SMART indicators and targets at the output level of the IEEPRE PRF (as detailed on Para 37).

92. The M&E design makes reference to the impact and key performance indicators defined in the PRF at the objective level, specifying that the monitoring plan will track, report on and review the performance-based framework, which states the project outcomes, indicators, baselines and targets, and is the basis for planning the project work (budgeting, staffing, allocating resources). However, without a full set of SMART indicators for the outputs, the M&E design *without output level targets* is open to interpretation in terms of what is to be delivered by the Project, and the resources required to achieve a particular output and outcome.

M & E Implementation

93. M&E implementation for the IEEPRE Ukraine Project was assessed as **moderately satisfactory**. The IEEPRE Ukraine 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 2014 to 2016. The 2017 PIR was formatted as a Word document which only provided updates on progress.

94. The basic issue with this rating was related to PIR progress reporting on outputs where there were no corresponding SMART indicators and targets in the PRF; however, for some of the indicators, "soft" targets were given in the RCE Document such as 500 persons to be trained under Output 4.1. Despite the shortcoming of a lack of SMART output level indicators, there were numerous examples of PMU adaptive management, many actions of which were to make up for the shortfall of SMART indicators in the PRF. Examples include:

- Adjustment of outputs under Component 1 from the PRF that follow the Component 1 description of outputs in the RCE document (pages 18 to 21);
- Adjustment of outputs under Component 2 of the PRF that provides clarity to the delivery of pilot projects. This includes the consolidation of 3 outputs (Outputs 2.3, 2.4 and 2.5) into one Output 2.3 entitled "EMS pilot and demonstration projects";
- Expending considerable additional time to screen pilot project candidates, and avoiding potential project partners that were anticipated not to comply with pilot project criteria and conditions for minimum equity on projects.

95. In addition, a mid-term evaluation was conducted for the IEEPRE Ukraine Project in 2014. While the Project received a highly satisfactory assessment in its MTE, recommendations were made to strengthen the mechanisms to ensure that the pilot project successes are disseminated to all levels of society including the end-users, industrial stakeholders and the public. The MTE mentioned that this could be done through public institutions such as schools. It further recommended an increase in the translation capacity of the PMU that would raise the effectiveness of the messaging of the pilot projects successes, as well as UNIDO establishing a UNIDO desk in Ukraine to strengthen its presence or additional cooperation in the Ukraine. UNIDO has positively responded to and implemented these recommendations.

Budgeting and Funding for M&E Activities

96. Budgeting and funding of M&E activities has been rated as **moderately satisfactory**. The M&E budget in the RCE Document was estimated at an indicative amount of US$50,000, considered a normal amount for a project of this size. This amount did not include staff time of the PMU nor did it include the cost of the inception phase of the Project, preparation of PIRs and various technical reports. From information in the RCE Document, only indicative budgeting for the M&E activities was provided that included responsible parties for the activity as well as the frequency of the activity.

97. The Evaluation Team was also able to view annual work plans which provided specific field activities for which UNIDO HQ was to provide funds. This included specific monitoring activities under Project Management such as tracking and reviewing Project activities and implementation progress, preparing detailed monitoring plans, and outsourcing services to monitor specific Project activities.

The rating for M&E implementation is "moderately satisfactory"

3.4 Monitoring Long Term Changes

98. The IEEPRE Ukraine Project was primarily designed to support pilot projects to demonstrate to the agro-food and industrial sector of the feasibility and cost effectiveness of energy savings for their enterprises. With completion of pilot projects, the PMU recruited various local experts to monitor the energy savings of these pilot projects with the intention of disseminating this information to other industrial stakeholders in the Ukraine. In the context of monitoring long term changes of these pilot projects, the Project left behind various design documents containing methodologies to calculate energy savings from these investments. From these actions, it was expected that the industrial enterprise would undertake its own long-term monitoring of energy savings from these investments. In discussion with many of these entities during the mission, many of these industrial entities were understandably motivated based on their own self-interest in knowing how much money was actually saved from these investments. The challenge for the GoU and UNIDO would be accessing this information for the purposes of monitoring sector-wide GHG emission reductions in a competitive business environment where sharing such information amongst private enterprises may be difficult.

99. The Evaluation Team has not observed any training material or project activities that advance the capacities of all stakeholders involved in monitoring long term changes from EE or RE investments in the agro-food sector. This is evidenced by the GHG emission reduction estimates from Para 49 which is calculated using the COMFAR III software from the business plan, and not actual energy savings data from the enterprises. There is also an absence of any reporting format (voluntary or mandatory) by an agro-food SME on their energy consumption. In addition, any reporting format for energy consumption would have to be accepted by the agro-food industrial stakeholder, within a business environment that likely does not want to share energy information with other industrial SMEs.

3.5 Processes affecting achievement of project results

3.5.1 Preparation and readiness / quality at entry

100. The PPG phase of the IEEPRE Ukraine Project was undertaken between August 2009 and December 2010, led by a Project Manager from UNIDO HQ with strong support from IRE. PPG activities included:

- the collection of supplemental data and its analysis. This included an assessment of capacity needs of Ukraine's relevant institutions that manage energy efficiency and renewable energy within the agro-food sector;
- a review of the existing policy and regulatory mechanisms with a strategy for their strengthening;
- outreach to agro-food stakeholders on proposed Project implementation strategy complete with the solicitation of energy saving proposals from industrial SMEs;
- design of specific demonstration projects complete with technical and economic analyses of EE and RE for 20 SMEs.

These activities led to a clear approach for the IEEPRE Ukraine Project design. As such, the preparation and readiness and quality at entry for the Project was assessed as *satisfactory*.

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

3.5.2 Country Ownership

101. Country ownership of the IEEPRE Ukraine Project is strong and reflected in the GoU's strong support of energy efficiency and renewable energy under its Energy Strategy of Ukraine towards 2030 (as adopted in 2006), the Concept Program on Development of Renewable and Alternative Sources of Energy (as adopted in 2007), and its Law on Energy Savings from 1994. These key pieces of legislation have spawned more than 17 draft laws on energy efficiency, energy savings and renewable sources of energy as discussed in detail in Section 2.3.5 in this report.

3.5.3 Stakeholder Involvement

102. Stakeholder engagement on the IEEPRE Ukraine Project activities was highly effective. During the PPG phase of the Project in late 2009, UNIDO was able to consult with all relevant government agencies (including personnel from the SAEE, IRE and the MoAP), professional personnel, and be in contact with more than 50 industrial entities on the Project's solicitation of proposals for business plans for EE and RE for industrial SMEs in the Ukraine. This provided designers of the IEEPRE Ukraine Project with an excellent foundation on which to formulate incremental GEF activities. The quality of these consultations has led to a clear implementation approach of the Project that is further discussed in Section 3.5.8.

103. During implementation of the Project, stakeholder engagement by the PMU represented a challenge, especially with engagement of prospective industrial SMEs to work with on Component 2 pilot projects. According to the PMU, one-on-one visits were arranged to meet with these prospective agro-food SME partners to discuss their plans and to collect information from them to ensure that they comply with pilot project selection criteria. Many of these visits did reveal a number of agro-food SMEs that did not meet these criteria, compounding the work volume of the PMU to meet other agro-food SMEs and meet the targets for 10 pilot projects (in Component 2) and 50 business plans (in Component 3).

104. The Project's involvement in engaging its executing partners was **satisfactory**. Interviews with all 3 executing partners, IRE, SAEE and MoAP revealed frequent communication with the PMU. The focal point personnel with the IRE and MoAP were long-standing contacts with the IEEPRE Ukraine Project since 2011. However, the PMU has reported frequent changes of the SAEE focal point during the 7-year course of Project implementation (they have reported as many as 6 changes of focal points during this period of time).

3.5.4 Financial Planning

105. Financial planning of the IEEPRE Ukraine 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.

106. With the delivery of funds to the PMU in Kiev, a total of 10 missions were made to the Ukraine between 2011 and 2017 to conduct due diligence on the expenditure of the Project funds, and to monitor the progress of pilot project implementation (under Component 2) on co-financing or investment into EE and RE measures for their facilities. While co-financing targets of the IEEPRE Ukraine Project did not meet its targets of US$87 million, the resulting co-financing of US$29.23 million can be deemed satisfactory considering this is a ratio of more than 5:1 for co-financing leverage from GEF funds.

3.5.5 UNIDO Support

107. As GEF's implementing agency, UNIDO had responsibility for timely implementation of the

Project, 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 Ukrainian government and the private industrial SMEs. UNIDO's performance in undertaking these responsibilities was conducted in a manner that was responsive to the requests and needs of the PMU, Government of Ukraine and Ukrainian agro-food industrial stakeholders. The end result of UNIDO's support for the IEEPRE Ukraine Project was that it significantly contributed towards achieving the intended objective level targets and intended outcomes.

108. The participation and reputation of UNIDO was highly valued particularly by industrial stakeholders who partnered with the Project on Component 2. The 6 pilot project stakeholders interviewed on this evaluation, remarked on the value of UNIDO's association with promoting technology neutral energy saving solutions and expressed their support for its continuation. Feedback from other stakeholders through IRE, SAEE and MoAP provided similar positive and complimentary comments on the quality of policy support provided by the IEEPRE Ukraine Project specialists.

109. While UNIDO has been responsive to the needs of the Ukrainian agro-food industrial stakeholders, it cannot be faulted for the loss of pilot projects in Crimea due to force majeure. Notwithstanding, UNIDO has provided credible technical assistance through its provision of international advisors on development of EE and RE investments, and using its extensive industrial experience in several other UNIDO member countries. Based on the successes of the IEEPRE Ukraine Project and its strong network of government and private sector contacts within the Ukraine industrial sector, UNIDO is well-positioned to continue a much-needed follow up project on improving the capacity of local industrial entrepreneurs and increasing access to innovative sources of finance for agro-food industrial stakeholders in the Ukraine.

The rating for UNIDO's support is "satisfactory"

3.5.6 Co-Financing on Project Outcomes and Sustainability

110. Overall IEEPRE Ukraine Project co-financing did not reach its intended levels of US$82.7 million, in part due to an unjustifiably high level of intended co-financing that could not have been a possibly achieved within a period of 5 years. Project co-financing of IEEPRE pilot project investments by more than 16 industrial entities in Component 2 did amount to more than US$13.3 million. Considering the Project was close to achieving its GHG emission reduction targets of 2.2 million tonnes CO_2, the co-financing raised by the Project within Component 2 would appear to be a reasonable amount. The Project also managed in-kind contributions from the Project's executing partners, IRE, SAEE, and MoAP. Co-financing details are provided in Annex 4.

111. Co-financing of the IEEPRE Ukraine Project were likely suppressed by the political events of late 2013 to early 2014, the loss of investor confidence in the Ukraine resulting from the military conflict in 2014 and the subsequent currency devaluation, and substantial increases in the commercial rate for borrowing. In some respects, this lower level of co-financing does provide an indication that agro-food and industrial stakeholders in the Ukraine would sustain further EE and RE investments under the right business conditions, most notably having access to the lower cost of financing.

3.5.7 Delays of Project Outcomes and Sustainability

112. As indicated in Para 79, Project expenditures up to the midpoint (June 2014) of the IEEPRE Ukraine Project was around 52%. Project implementation delays were experienced during the

period of October 2013 to June 2014, causing a slowdown in the pace of EE and RE investment of industrial SMEs. As mentioned in Para 110, the slowdown was a result of currency devaluation and rising costs of borrowing money. These delays, however, have not in the opinion of the Evaluation Team affected the sustainability of the Project, provided industrial SMEs have access to lower cost loans to finance these investments.

3.5.8 Implementation approach

113. The key approach of the IEEPRE Ukraine Project was to develop pilot EE and RE investments within agro-food industrial SMEs for the purposes of showcasing these investments as examples of energy savings in the Ukraine, and building the capacities of relevant institutions, technical and academic specialists, and private industrial businesses to replicate these investments. The implementation approach of the IEEPRE Ukraine Project is somewhat unique from other UNIDO IEE projects globally where the IEEPRE Project places an emphasis on pilot project implementation at its commencement where lessons from these pilot projects can be used for training and capacity building of local energy professionals and others involved in the supply chain and installation of EE and RE equipment. The intention of this approach was to first demonstrate the feasibility of EE and RE investments in the Ukrainian industrial sector, followed by activities that strengthen local capacities and local ownership (using lessons learned from the implemented pilot investments) of all EE and RE initiatives in the Ukrainian industrial sector. 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.

114. The role of day to day management and Project coordination in Kiev was undertaken by the PMU whose office was donated to the Project by IRE. The PMU facilitated close collaboration with SAEE to ensure the best possible coordination and synergies with other ongoing technical assistance initiatives, especially those related to the other donors such as GIZ, IFC, EBRD and EIB.

115. The PMU fulfilled an important role in its role in Component 1 on improving the existing regulatory framework to encourage EE and RE investments. It had initially involved needs assessments of SAEE and MoAP, followed by discussions with UNIDO HQ on recommendations for improving the regulatory framework and the corresponding action plan. The PMU also supported the work of recruiting the regional experience from the Austrian Energy Agency and Adelphi International during the early phases of the Project from 2011 up to 2014 as well as representing SAEE in the preparation of the NREAP as an obligation of its membership to the Energy Community.

116. The PMU also played a central role in the identification of potential partners for pilot projects under Component 2. As mentioned in Para 102, this effort was considerable and consisted of many failed discussions with various potential partners (over 60 agro-food sector stakeholders within the first 2 years of the Project) who did not fully comply with the Project selection criteria for pilot projects to be supported by the GEF grant. It was clear to the Evaluation Team that many of the PMU officers had extensive industrial contacts within their network that facilitated many of these agro-food industrial contacts.

117. In conclusion, the management and coordination of the IEEPRE Ukraine Project has led to the

Project achieving most its intended outcomes, and coming close to the GHG emission reduction target. Achievement of these results is an excellent reflection of the competence of the PMU staff that was supported by UNIDO HQ in providing international inputs and financial support to Ukrainian-based activities. These results were achieved despite the disruptions of the 2013-14 political events in the Ukraine, the subsequent slowdown of the investment climate, and the frequent changing of counterpart staff within the SAEE. Balancing the aforementioned comments, the overall assessment of the Project coordination and management can be assessed as "*satisfactory*".

The rating for Project coordination and management is "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.

118. The UN has a mandate to address human rights and gender equality in all interventions to promote social justice and equality[44]. Since the IEEPRE Ukraine Project was designed as a GEF-4 project at its design stage in 2009-10, no explicit recommendations or requirements for gender mainstreaming or for gender disaggregated targets were required.

119. However, 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 the IEEPRE Ukraine Project only commenced in 2015. The Project made efforts to support gender considerations by sending female officers from the Project to the conference on "Women in Real Sector: Agenda for Ukraine" in May 2015 at the Centre of Resource Efficient and Cleaner Production with the International Finance Corporation (IFC) and UNIDO in Kyiv. The conference was a forum where there were a number of topics promoted including i) a promotion of gender oriented policies as a cross-cutting theme of economic and social development of the European Community; ii) gender equity on labour market as the key to human potential for industry development; iii) opportunities to strengthen gender considerations within the agro-food industrial sector as part of Ukraine`s obligations under the Agreement on Free Trade Zone between Ukraine and the EU; iv) women as change agents (e.g. impact on improving corporate social responsibility and success stories); and v) strengthening institutional basis for gender equity in industry as a way to improve the efficiency.

120. To support gender equality during Project implementation, several principles were set in place including a clear understanding of the importance of achieving intended results on gender issues within Project activities; ensuring equal opportunities for employment of women during the entire duration of the Project; and promoting improvement of women's working conditions.

121. The Project's response to these gender considerations included:

- 40% of PMU staff are women (total PMU staff includes 3 men and 2 women);
- The Project avoids gender discrimination in its consideration of employment of women in all positions;
- Improvement of staff working conditions where a significant portion of the staff are

[44] Guidance Document: Integrating Human Rights and Gender Equality in Evaluations, UN Evaluation Group, Aug 2014, pg 19

women. This would include attraction of agro-food investments that modernizes production processes that provide a safer and environmentally benign work places;

- The women comprising 22.7% of total participants in the Component 4 trainings (41 women out of 180 training participants). In the Ukraine, women are prominent in the positions of Engineer or Energy Specialist positions at Ukrainian enterprises.

The rating for gender mainstreaming is "satisfactory"

3.8 Overall Rating of the IEEPRE Ukraine Project

122. The overall performance of the IEEPRE Ukraine Project is rated as *satisfactory*. An overall summary of these evaluation ratings[45] and findings is provided in Table 15.

Table 1: Summary of Findings and Ratings by Evaluation Criteria for the IEEPRE Ukraine Project

Criterion	Summarized Assessment of the Findings	Rating
Attainment of project objectives and results (overall rating)	Project attained its targets of pilot projects despite the political events and military conflicts during Project execution. Stakeholder reaction to these pilot projects has been favourable but with the high cost of financing still remaining a barrier to scaled-up EE/RE investments	S
Relevance	Government of Ukraine has placed strategic priority on the development of energy efficiency and renewable energy through numerous policies, strategies, programs, and action plans (see Paras 44-45). Project also strongly relevant with GEF-4, SP-2 and SP-6 (see Para 46).	HS
Effectiveness	The volume of EE and RE investments was sufficient to achieve 88% of the targeted GHG emission reductions despite the political events and military conflict from late 2013 to mid-2014, the loss of pilot investments and their GHG emission reductions in Crimea, the resulting increase in interest rates for borrowing and the reduction in investor confidence in EE and RE projects throughout Ukraine's agro-food economy. See Para 68, and Tables 8 and 11.	S
Efficiency	The GEF grant of US$5.156 million is expected to be fully disbursed by 31 December 2018. By this terminal date, the Project is expected to have achieved most of its targets and intended outcomes (see Para 78).	S
Sustainability of project outcomes (overall rating)	The high cost of borrowing in the Ukraine is unaffordable to the majority of entities in the Ukrainian agro-food sector despite widespread enthusiasm for EE and RE investments (Para 81).	MU
Financial Risks	Current operational EE funds in the Ukraine appear to only address the residential sector (Para 86). There is a need for the country to develop other affordable lower interest sources of financing (Para 83).	MU
Socio-political Risks	Likelihood that many agro-food entities are awaiting succession of older and senior managers with younger more progressive managers who would be willing to implement EE and RE investments (Para 85). In addition, the economy of the Ukraine is recovering from the political events of 2013 and 2014 coupled with a slow return of investor confidence (Para 86).	ML

[45] 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)

Criterion	Summarized Assessment of the Findings	Rating
Institutional framework and governance risks	Notwithstanding the existing strong regulatory and policy framework to implement EE and RE measures, piloting of the ESCO modality needs to be demonstrated in the Ukraine (Para 87). In addition, frequent personnel changes within SAEE only serves to weaken coordination mechanisms between industrial SMEs in the Government on implementing EE and RE investments (Para 88)	ML
Environmental risks	General perception within the industrial sector that efficiency of resources consumption should lead to increased profitability and improved environmental conditions (Para 89).	HL
Monitoring and evaluation		
M&E design	Design in RCE document states that M&E was to be conducted "in accordance to established UNIDO and GEF procedures". However, the IEEPRE PRF did not have a complete set of smart indicators at the output level (Para 90).	MU
M&E plan implementation	Reporting in the PIRs was compiled on an annual basis (Para 92), requiring adaptive management to make up for the lack of SMART output level indicators and targets in the PRF (Para 93).	MS
Budgeting and funding for M&E activities	The RCE Document only provided an indicative budget of US$50,000 (Para 95). Annual work plans provided specific project management activities which were used to justify GEF funds being sent from UNIDO HQ to Kiev for field activities (Para 96).	MS
UNIDO specific ratings		
Quality at entry/Preparation and Readiness	Project preparations involved strong support from executing partners, thorough analysis of available information on local capacities and the institutional and regulatory framework, and effective outreach to industrial stakeholders on implementation strategy (Para 99).	S
Implementation Approach	Implementation emphasized an approach to showcase pilot EE and RE investments as examples of energy savings in the Ukraine, followed by capacity building activities for public institutions in the private sector, and replication of these investments. This approach complies with the principles and stated commitments of the Paris Declaration (Para 112).	S
UNIDO Supervision and Backstopping	UNIDO supervision and backstopping for this project resulted in achievement of most of the objective level targets and intended outcomes (Para 106). In addition, the participation of UNIDO on this Project was highly valued by all stakeholders (Para 107).	S
Overall rating	Project was a significant contributor to successful examples of EE and RE investments in the Ukrainian agro-food subsector. Notwithstanding the political events of 2013 and 2014 in the Ukraine, the Project has left more than 50 certified trained persons in EE and RE investments to develop future projects (Para 122). At the EOP, the primary barrier to further EE and RE investments in the Ukraine for the agro-food sector is access to affordable financing (Para 123).	S

4 Conclusions, Lessons Learned, Recommendations

4.1 Conclusions

123. The IEEPRE Ukraine Project was a significant contributor to a list of successfully implemented EE and RE investments in the agro-food subsector. These successfully implemented investments served to boost the awareness and confidence of other industrial SMEs in considering EE and RE measures to reduce their operational costs and increase the competitiveness. However, given the political events of late 2013 to mid-2014 resulting in the devaluation of Ukraine's currency and an increase in the cost of borrowing, the volume of EE and RE investments after 2015 did not substantially increase during Project implementation. The Project does leave a legacy of certified EE and RE experts who will be able to develop future energy savings projects for the agro-food sector of the Ukraine, which should be extended to all private industrial entities. At the conclusion of the IEEPRE Ukraine Project, this pool of local EE and RE expertise has not had opportunities under this Project to apply their knowledge on such investments.

124. The successes of the IEEPRE Ukraine Project also includes the successful demonstration of the feasibility of biofuel production with PE Kilgan in the Ukraine (as mentioned in Para 70 and Table 11). This is a significant achievement for this Project that the EU certification of this plant in November 2018 legitimizes the process and quality of biofuel production in the Ukraine. The involvement of the Project has also demonstrated the importance of the security of supply of feedstock for the production of biodiesel. Notwithstanding that the biofuel entrepreneur now has EU and Ukrainian certification for the quality of biofuel sold and sustained demand for his product in EU countries, further scale-up of biofuel production for use in the Ukrainian agricultural sector will not occur unless actions are taken towards the removal of an excise tax on domestically produced biofuels specifically for use in the Ukraine.

125. The IEEPRE Ukraine Project at its conclusion also leaves financing as a primary barrier to further scale up of EE and RE investments in the agro-food sector of the Ukraine:

- Commercial rates for borrowing are still in the range of 17%, (see Para 50);
- At the time of writing of this evaluation report, the Energy Efficiency Fund (UEEF) was being set up to finance energy efficiency for the residential sector. No such fund exists in the Ukraine for financing EE and RE investments for the industrial sector (Para 83);
- Despite the existence of secondary legislation for ESCOs, there are no energy performance contracts that are active in the industrial sector in the Ukraine (see Para 87).

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 Ukraine, and other main project partners.

126. *Lesson #1: The implementation approach of the IEEPRE Ukraine Project by first implementing pilot projects followed by training can be a more effective tactic convincing the industrial sector to increase its investment towards energy efficiency and renewable energy, on the condition that the cost of financing such investments is affordable*. In comparison with other projects with similar objectives where training and pilot projects are simultaneously implemented at the commencement of a project, this approach by IEEPRE strengthens the content of the training material since lessons learned from implementing the pilot projects can be more effectively

used for teaching trainers and project implementers. This approach was only made possible through the availability of less costly credit (see Table 8 for details). Without the availability of cheaper credit, the buy-in of agro-food enterprises to EE and RE projects of the IEEPRE Ukraine Project likely would have been slower. The effectiveness of the training provided by the Project could not be properly evaluated since trainees did not have the opportunity implement EE and RE investments during implementation of the IEEPRE Ukraine Project using the lessons learned from the training.

127. *Lesson #2: There is a need for long-term donor engagement for results of capacity building activities of this Project to manifest themselves*. Despite the completion of a US$5.1 million grant project to promote EE and RE in the agro-food sector over a 7.5 year period, capacity building is still required for the agro-food and industrial sectors to sustain implementation of measures to reduce their energy costs. The Project has been instrumental in the education of many of agro-food entrepreneurs in the art of preparing business plans and the use of the COMFAR III software for evaluating EE and RE investments. With more than 320 agro-food personnel trained during the Project in the use of renewable energy sources and improvement of energy efficiency, only a small proportion of Ukraine's agro-food and industrial stakeholders have had some exposure to technical assistance for best practices in this discipline with a need in the Ukraine to provide additional energy-related capacity building activities for the remaining stakeholders in these sectors.

128. *Lesson #3: Investments made into the certification of biofuel production processes has been successful in part due to the Project's involvement that addressed barriers such as securing supplies of biomass feedstock for the process, and ensuring there is market demand for biofuel products*. This lesson is addressed to the MoAP who have an interest in the future of scaling-up biodiesel production and reducing operating costs of agricultural enterprises throughout the Ukraine. One of the keys to the success of sustained biodiesel production at PE Kilgan has been the access of the enterprise to a sustained supply of rapeseed available near the production plant throughout the year. This includes the availability of rapeseed year-round since rapeseed can be stored through the winter season. With the demonstrated feasibility of biodiesel production in the Ukraine, the scaling-up of biodiesel usage in Ukrainian agricultural communities and enterprises (to offset the use of imported diesel fuel as mentioned in Para 70) still remains a barrier until the GoU is able to remove an existing excise tax that is imposed on the sale of indigenously sourced biofuels, likely in place to protect fossil fuel enterprises in the Ukraine.

4.3 Recommendations

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

129. *Recommendation #1 (to the IRE and SAEE): Seek the continuation of awareness raising and capacity building for all industrial sector stakeholders*:

- awareness raising needs to be extended to all private industrial entities on the benefits of energy efficiency and renewable energy. The IEEPRE Ukraine Project's awareness raising events have only targeted the largest industrial subsector in the Ukraine, agro-foods. This would address a need identified in Para 122;
- a continuation of capacity building for existing and new experts is required to reinforce the pool of local EE and RE experts to an extent where they may be able to setup their own consultancies and provide technology-neutral EE measures and source EE funds. To a large

extent, this will be addressed by a new GEF-6 project entitled "*Global Cleantech Innovation Programme for SMEs*" or GCIP. GCIP is designed to provide support in the Ukraine for the accelerated adoption of an innovative low carbon growth strategy and mainstreaming of clean technology innovation and entrepreneurship across all economic sectors.

130. *Recommendation #2 (to SAEE, IRE and UNIDO): Continue with efforts to seek less costly sources of financing for the scale-up of EE and RE investments*. With the costs of lending in Ukraine being in the range of 17-25% with no near-term reductions anticipated, there is still an urgent need to improve the access to less costly sources of financing for agro-food industrial SMEs as well as other industrial subsectors. In consideration of the need for billions of US dollars to meet the targets of the NREAP, the GoU needs support to identify other sources and appropriate financial mechanisms to facilitate the scaling-up of industrial low carbon investments. This would address a need identified in Para 123. A suite of financial instruments that need to be examined to achieve this increased access to financing of EE and RE investments include:

- *Energy performance contracting and ESCOs*. The Evaluation Team notes that ESCO secondary legislation exists in the Ukraine. However, the ESCO model needs to be piloted in the public sector with public procurement setting up guarantee funds for fledgling ESCOs (where commercial banks would not venture). In addition, awareness raising is required for industrial SMEs on ESCO services and in building trust between ESCOs and industrial entities on issues such as agreed energy baselines. More work should also be invested into enabling foreign ESCOs to partner with local ESCOs to accelerate the capacity of ESCOs to implement a higher volume of EE and RE investments;

- *On-lending from donor funds*. This is already being implemented through NEFCO that provided credit for a pilot project PJSC "Concern Khlibprom" with GIZ co-financing a study trip to Germany. A continuation of the flow of cheaper capital into the Ukraine for EE and RE investments is required, in greater volumes. This may occur if the political landscape in the Ukraine settles down after the events of 2013 and 2014;

- *Green bonds*. On the basis of two reports from the Project on green bond development in the Ukraine, support is required to implement the proposed actions to reduce perceived risks of any Ukrainian green securities.

The Evaluation is aware of a GEF-7 PIF being prepared for a project on improving access of the industrial sector to green financing. The elements of this PIF are reflected in the aforementioned suite of financing instruments that can be investigated by this project.

131. *Recommendation #3 (to the Ministry of Agrarian Policy and the Ministry of Energy): Continue efforts to mainstream the use of domestically sourced biofuels in the Ukraine*. This would involve:

- discussions with higher level government officials on the removal of an excise tax (25%) which only serves to discourage biofuels production for the agro-food businesses in the Ukraine, places less cost certainty on agricultural businesses, raises the cost of food production in the Ukraine, and raises the threat to national interests in Ukraine's energy security; and

- harmonize emissions and quality requirements for the quality of biofuels production to those changes made to EU legislation. This would include amongst other changes measures to ensure the sustainability of biomass supplies to the biofuels producer, and measures to mitigate impacts of land use changes to crops used for the production of biofuels.

132. *Recommendation 4 (to the GEF, Ministry of Agrarian Policy and UNIDO): Use resources of follow-up projects including a Global Cleantech Innovation Programme (that could be supported by GEF) to extend the benefits of EE and RE technologies to more rural agro-food industries, notably in autonomous energy generation in rural areas*. The only rural-based pilot project from Component 2 was the biofuels project with PE Kilgan (near Lviv). Other concepts that could be presented to GCIP for support to meet MoAP's goals of energy security for rural areas could include:

- a "building integrated solar PV" that would assist farming enterprises in offsetting their electricity costs involving the installation of a roof where PV cells are integrated into roof material over a large farming structure. A pilot project utilizing this design that can successfully demonstrates savings in electricity costs for a farming operation has the potential to create interest, higher demand, and potentially could generate jobs in the Ukraine if the market demand for such a product was sufficient;

- mini-CHPs in de-centralized locations that can provide more reliable sources of rural-based energy supplies. Such an investment will entail challenges including higher capital costs of these plants, security of biomass supply, and the technical capacities of rural-based communities to own and operate such facilities.

133. *Recommendation 5 (to the SAEE): Engage dialogue with the Ministry of Economic Development and Trade to transition the PMU of the IEEPRE Ukraine Project into a facilitation center that can provide guidance to industrial SMEs in reducing their operational energy costs*. While the Project has completed a targeted number of pilot projects to demonstrate energy savings and reduced energy costs for agro-food SMEs, implementing EE and RE investments still remains elusive due to a number of inherent characteristics of SMEs: marginal profits, lack of time for senior managers to consider production improvements through energy efficiency and renewables, and lack of collateral required for accessing loan finance. Considering that 60% of all businesses in the Ukraine are SMEs, a facilitation center that provides access to industrial SMEs to technical and financial advice for implementing EE and RE projects, would be useful. These centers would serve as "one-stop shop" centers that maintain a roster of financial advisors and technical assistance for industrial SMEs.

134. *Recommendation 6 (to SAEE and MoAP): Find donors or resources to continue the updating of the roadmaps for the implementation of energy-efficient measures at agro-food industry enterprises*. The evaluation notes that the system of data collection within the State Statistics Service of Ukraine on which the 9 sectoral roadmaps were developed by the Project, has been lost. Without updated information on the energy costs of production of each subsector, and distribution of energy sources of each subsector, outdated information will lead to faulty implementation strategies for energy savings of each subsector. Updating this information is crucially important to reaching the goals of the NREAP.

135. *Recommendation 7 (to UNIDO, SAEE and MoAP): Future projects and programmes on energy savings for industrial and agro-food enterprises need to include actions that strengthen the monitoring of energy savings from energy efficiency and renewable energy investments by these enterprises*. In reference to Para 97, these future projects or programmes should ensure the monitoring and reporting on the dissemination of documents containing methodologies to calculate energy savings from these investments during the lifetime of the project. If possible, there also needs to be a mechanism in place where these agro-food and industrial entities can confidentially report their energy savings or renewable energy generated to a central entity within SAEE. This can provide national benefits for reporting national GHG emission reductions.

136. *Recommendation 8 (to UNIDO): The design of projects that combine the promotion of both EE and RE as a means of reducing energy costs needs to continue*. This Project was one of the few examples within UNIDO that promoted both EE and RE measures as a means of reducing energy costs to industrial sectors. As mentioned in Recommendation 5, the inherent characteristics of SMEs are marginal profits, lack of time for senior managers to consider production improvements through energy efficiency and renewables, and the lack of collateral required for accessing loan finance; this creates demand for external assistance to industrial SMEs if they are to reduce their energy costs. By allowing these SMEs to consider all options in EE and RE for reducing their energy costs, especially with the falling global prices of solar PV and other RE technologies and rising prices of imported fossil fuels, projects within UNIDO that jointly consider EE and RE options globally will likely have more uptake by industrial SMEs. This will be significant for projects that are funded under GEF-7.

Annex 1. Evaluation ToR

1. Scope and purpose of the evaluation

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

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

The TE should provide an analysis of the attainment of the project objective and the corresponding outputs and outcomes. Through its assessments, the Evaluation Team (ET) should enable the Government, counterparts, 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 shall include reexamination of the relevance of the objectives and other elements of project design according to the project evaluation parameters defined in chapter III below.

The overall purpose of the TE is to assess whether the project has achieved or is likely to achieve its main objective, i.e. the development of a market environment for scaling up EE and enhanced use of EE technologies for fuel switching in the energy intensive manufacturing SMEs in Ukraine (as a basis for promoting their competitiveness) while ensuring an integrated approach for lower carbon intensity and improvement in the local environment, and to what extent the project has also considered sustainability and scaling- up factors for increasing contribution to sustainable results and further impact.

The evaluation has three specific objectives:

(i) Assess the project performance in terms of relevance, effectiveness, efficiency, sustainability and progress to impact;

(ii) Identify key learning to feed into the design and implementation of the forthcoming projects; and

(iii) Develop a series of findings, lessons and recommendations for enhancing the design of new and implementation of ongoing projects by UNIDO.

2. Evaluation approach and methodology

The TE will be conducted in accordance with the UNIDO Evaluation Policy[46] UNEG Norms and Standards for evaluation and the UNIDO Guidelines for the Technical Cooperation Project and Project Cycle[47].

In addition, the GEF Guidelines for GEF Agencies in Conducting Terminal Evaluations, the GEF Monitoring and Evaluation Policy and the GEF Minimum Fiduciary Standards for GEF Implementing and Executing Agencies must to be considered. The evaluation will be carried out as an independent

[46] UNIDO. (2015). Director General's Bulletin: Evaluation Policy (UNIDO/DGB/(M).98/Rev.1)
[47] UNIDO. (2006). Director-General's Administrative Instruction No. 17/Rev.1: Guidelines for the Technical Cooperation Programme and Project Cycle (DGAI.17/Rev.1, 24 August 2006)

in-depth evaluation using a participatory approach whereby all key parties associated with the project will be informed and consulted throughout the evaluation. The evaluation team leader will liaise with the UNIDO Independent Evaluation Division on the conduct of the evaluation and methodological issues.

In line with its objectives, the evaluation will have two main components. The first component focuses on an overall **assessment of performance** of the project, whereas the second one focuses on the **learning** from the successful and unsuccessful practices in project design and implementation.

The evaluation will use a theory of change approach and mixed methods to collect data and information from a range of sources and informants. It will pay attention to triangulating the data and information collected before forming its assessment. This is essential to ensure an evidence-based and credible evaluation, with robust analytical underpinning.

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

In those cases where baseline information for relevant indicators is not available, the evaluation team will aim at establishing a proxy-baseline through recall and secondary information.

3. Data collection methods

The ET will be required to use different methods to ensure that data gathering and analysis deliver evidence-based qualitative and quantitative information, based on diverse sources, as necessary: desk studies and literature review, statistical analysis, individual interviews, focus group meetings/discussions, 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 specific mixed methodological approach will be described in the inception report.

Following are the main instruments for data collection:

(a) **Desk and literature review** of documents related to the project, including but not limited to:

- The original project document, monitoring reports (such as progress and financial reports), mid-term review report, output reports, back-to-office mission report(s), end-of-contract report(s) and relevant correspondence
- Notes from meetings of committees involved in the project

(b) **Stakeholder consultations** will be conducted through structured and semi- structured interviews and focus group discussion. Key stakeholders to be interviewed include:

- UNIDO Management and staff involved in the project; and
- Representatives of donors (for GEF projects, it should include the national GEF focal point) and counterparts

(c) **Field visit** to Ukraine:

- On-site observation of results achieved by the project, including interviews of actual and potential beneficiaries of improved technologies
- Interviews with the relevant UNIDO Country Office(s) representative to the extent that he/she was involved in the project, and the project's management members and the various national [and sub-regional] authorities dealing with project activities as necessary

(d) Other interviews, surveys or document reviews as deemed necessary by the evaluation team

and/or by the Independent Evaluation Division for triangulation purposes

4. Evaluation key questions and criteria

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 key evaluation questions are the following:

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

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

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

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

The evaluation will assess the likelihood of sustainability of the project results after the project completion. The assessment will identify key risks (e.g. in terms of financial, socio- political, institutional and environmental risks) and explain how these risks may affect the continuation of results after the project ends. Table 1-1 below provides the key evaluation criteria to be assessed by the evaluation. The detailed questions to assess each evaluation criterion are in annex 2. The **rating criteria** and table to be used is presented in annex 8.

Table 1-1: Summary of Project evaluation criteria

Index	Evaluation criteria	Mandatory rating
A	**Progress to Impact**	**Yes**
B	**Project design**	**Yes**
1	Overall design	Yes
2	Logframe	Yes
C	**Project performance**	**Yes**
1	Relevance	Yes
2	Effectiveness	Yes
3	Efficiency	Yes
4	Sustainability of benefits	Yes
D	**Cross-cutting performance criteria**	
1	Gender mainstreaming	Yes
2	Environment and socio-economic aspects	
2	M&E: (focus on Monitoring), M&E design, M&E implementation	Yes
3	Results-based Management (RBM)	Yes
E	**Performance of partners**	
1	UNIDO	Yes
2	National counterparts	Yes
3	Donor	Yes
F	**Overall assessment**	Yes

5. Evaluation process

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

- UNIDO Independent Evaluation Division (IED) identifies and selects the Evaluation Team members, in consultation with project manager
- Inception phase
  - ✓ Desk review and data analysis: The evaluation team will review project- related documentation and literature and carry out a data analysis (incl. familiarization with GEF programmes and strategies, and with relevant GEF policies such as those on project cycle, M&E, co-financing, fiduciary standards, gender, and environmental and social safeguards)
  - ✓ Briefing of consultant(s) at UNIDO Headquarters (HQ)
  - ✓ Preparation of inception report: The evaluation team will prepare the inception report providing details on the methodology for the evaluation and include an evaluation matrix with specific issues for the evaluation; the specific site visits will be determined during the inception phase, taking into consideration the findings and recommendations of project progress reports or mid-term reviews.
  - ✓ Interviews, survey
- Field phase
  - ✓ Country field visit(s)
  - ✓ ET Debriefing in the field to project stakeholders
- Reporting phase
  - ✓ After field mission, HQ debriefing with preliminary findings, conclusions and recommendations by the ET leader
  - ✓ Data analysis and draft report writing
  - ✓ Draft report submission
  - ✓ Sharing and factual validation of draft report with stakeholders
  - ✓ Final evaluation report Submission and QA/clearance by IED, and
  - ✓ Two pages summary take-away message
- IED Final report issuance and distribution with the respective management response sheet and further follow-up, and publication of evaluation report in UNIDO intra/internet sites

6. Evaluation team composition

A staff from the UNIDO Independent Evaluation Division will be assigned as Evaluation Manager and will coordinate and provide evaluation backstopping to the evaluation team and ensure the quality of the evaluation. The UNIDO Project Manager and national project teams will act as resourced persons and provide support to the evaluation team and the IED evaluation manager.

The evaluation team will be composed of at least one international evaluation consultant acting as the team leader and one national consultant. The evaluation team members will possess relevant strong experience and skills on evaluation and evaluation management, including social safeguards

and gender. Expertise and experience in the related technical subject of the project is desirable. The evaluation consultants will be contracted by UNIDO.

In some specific cases (e.g. complex projects, regional projects, projects at risk), an IED evaluation officer could be also assigned to be part of the evaluation team and hence participate in the whole conduct as such.

The tasks of each team member are specified in the job descriptions in Annex 3 to these terms of reference.

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

The UNIDO GEF Coordinator and GEF OFP(s) will be briefed on the evaluation and provide support to its conduct. GEF OFP(s) will, where applicable and feasible, also be briefed and debriefed at the start and end of the evaluation mission.

7. Time schedule

The evaluation is scheduled to take place from July/October 2018.

The evaluation field mission is tentatively planned for July/August 2018.

The Draft Evaluation report will be submitted 2 to 4 weeks after the end of the mission. The Final Evaluation report will be submitted 2 weeks after comments received.

8. Evaluation Deliverables

Inception report

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

The Inception Report will focus on the following elements: preliminary project theory model(s); elaboration of evaluation methodology including quantitative and qualitative approaches through an evaluation framework ("evaluation matrix"); division of work between the International Evaluation Consultant and the 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[7].

Evaluation report and review procedures

The draft report will be delivered to UNIDO Independent Evaluation Division (the suggested report outline is in annex 4) and circulated to UNIDO staff and national stakeholders associated with the project for factual validation and comments. Any comments or responses, or feedback on any errors of fact to the draft report provided by the stakeholders will be sent to UNIDO Independent Evaluation Division 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 ET will present its preliminary findings to the local stakeholders at the end of the field visit and take into account their feed-back in preparing the evaluation report. A presentation of preliminary findings will take place at UNIDO HQ after the field mission.

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

Findings, conclusions and recommendations should be presented in a complete, logical and balanced manner. The evaluation report shall be written in English and follow the outline given in annex 4. The ET should submit the final version of the TE report in accordance with UNIDO Independent Evaluation Division standards.

9. Quality assurance

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

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 5. UNIDO's Independent Evaluation Division 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 Independent Evaluation Division, which will issue and circulate it within UNIDO together with a management response sheet, as well as submit to relevant stakeholders as required.

Annex 2. List of Documents Reviewed

Project Documents and Other Relevant Documentation

Annual Project Implementation Report (PIR), UNIDO/PMU, 2015

Annual Project Implementation Report (PIR), UNIDO/PMU, 2016

Analysis of current policy, legislative and regulatory framework in Ukraine on operationalization of policies and laws to scale up energy efficiency and use of renewables in energy intensive industrial sector with specific focus on SMEs, by Olexander Pepelov, 2012

Report Work Stream 1 (Component 1) by Adelphi July 2014

Final Benchmarking Study Report for Component 1 for UNIDO, April 2014

Energy Benchmarking Reports for 9 agro-food subsectors (Component 2) 2013, UNIDO/PMU

Sectoral Energy Efficiency Improvement Roadmap for 9 Industries of the Agro-Industrial Sector of Ukraine (Component 2), 2013, UNIDO/PMU

Scaling-up strategy for the agro-food and other small and medium enterprises (SMEs) in Ukraine (Component 3), 2015, UNIDO/PMU

Best world and European practices for creating of green bond markets (Component 3), 2018, UNIDO/PMU

Development of the draft concept of the green bond market introduction in Ukraine (Component 3), 2018, UNIDO/PMU

Improving energy efficiency and promoting renewable energy for 50 Private Enterprises in Ukraine (Component 3), 2015, UNIDO/PMU

Elaboration of guidebook on energy efficiency and renewable energy technology in various industries (technological aspects) (Component 4), 2016, UNIDO/PMU

Assessment of Current Education Programs on Industrial Applications of Renewable Energy in Ukrainian Universities (Component 4), 2012, UNIDO/PMU

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 ROtl Method and the ROtl Results Score Sheet (UNEP, last updated December 2015)

Annex 3. List of Respondents

Related to UN Agencies

Name	Organisation	Position	Role in IEEPRE Ukraine	Location
Mark DRAECK	UNIDO	Industrial Development Officer, Renewable and Rural Energy Division, Energy Department	IEEPRE Ukraine Project Manager	Vienna, Austria
Viktoriia IAKOVLIEVA	UNIDO	Project Assistant, Renewable and Rural Energy Division, Energy Department	Involved in administrative functions	Vienna, Austria
Onay GEYLAN	UNIDO	Project Assistant, Renewable and Rural Energy Division, Energy Department	Involved in administrative functions	Vienna, Austria
Igor KYRYLCHUK	UNIDO	National Project Coordinator	Lead for field team activities in Ukraine	Kiev, Ukraine
Mykola KOBETS	UNIDO	National Senior Policy Support Expert	Provision of policy assistance to SAEE and MoAP	Kiev, Ukraine
Oleh RADIYCHUK	UNIDO	National Investment Expert	Design and analysis of pilot projects	Kiev, Ukraine
Kateryna PERNATA	UNIDO	National Expert on Communication and Reporting	Analysis of measures to improve access to affordable financing for EE and RE investments	Kiev, Ukraine
Kateryna PASICHNYK	UNIDO	Project Assistant	Administrative functions at field office	Kiev, Ukraine
Olena KUSHNERENKO	UNIDO	Interpreter	Translations of documents and conversations	Kiev, Ukraine

Related to National Agencies

Name	Organisation	Position	Role in IEEPRE Ukraine	Location
Stepan KUDRYA	Institute of Renewable Energy,	Deputy Director	Chair of the Project Steering Committee	Kiev, Ukraine
Oleksandr KYRYCHOK	SAEE	Advisor to the Head of SAEE	Drafting secondary legislation for Law on Energy Savings	Kiev, Ukraine
Maryna MYKOLAYCHUK	International cooperation and EU Integration Office, SAEE	Chief specialist	Drafting secondary legislation for Law on Energy Savings	Kiev, Ukraine
Kudrya STEPAN	Institute of Renewable Energy of the National Academy of Sciences of Ukraine	Director	Research and drafting of policies related to renewable energy, promotional events for renewable energy	Kiev, Ukraine
Volodymyr ZABLOTSKYI	MoAP	Advisor to the Minister of MoAP	Advisor to the Head of Agrarian Union of Ukraine and to IEEPRE on biofuel production from biomass	Kiev, Ukraine

Related to Project beneficiaries

Name	Organisation	Position	Role in IEEPRE Ukraine	Location
Ivan KILGAN	PE "Kilgan" (pilot project)	Owner	Setup of a pilot project for biodiesel production.	Sabir District, Lviv Region, Ukraine
Volodymyr Chernetskiy Bohdan Kozak	TMC Lvivholod LLC	The Board member The owner and President of the enterprise	Setup of pilot project to modernize a commercial bakery to be energy efficient and green.	Lviv, Ukraine
Sergiy Ruban	Director SO “Progress” (pilot project)	Director	Setup of pilot project to modernize cooling system for a cold storage facility.	Kiev, Ukraine
Myhaylo FENYK	Variatsia LLC	Director	Setup of pilot project to modernize a wood processing plant with biomass energy as well as other energy efficiency measures.	Boryspil, Kyiv region
Myhaylo Hanzhuk	Rivnenska fabryka netkanyh materialiv (PJSC)	Chief Engineering Officer	Setup of pilot project to install LED lighting systems for a fabric re-cycling plant	Rivne, Ukraine
Yuriy Pikuta Anatoliy Kalynovych	Pavlivskyy Brewery,	The owner Chief Engineering Officer	Setup of a solar thermal project for a brewery.	Volynska Oblast, Ukraine

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 ($)
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) ($)	Co-Financing ($)	Total ($)
1. Policy and regulatory framework regarding energy management and use of renewable energy revised	508,140	1,265,000	1,773,140
2. 10 Pilot projects, demonstrating the reduced energy costs due to better energy management and use of renewable energy, implemented.	3,209,820	30,930,568	34,140,388
3. Energy intensive SMEs in the Ukraine increase their investment in improved EE and RE Technologies.	519,860	48,270,000	48,789,860
4. Capacity of key players such as senior managers of SMEs, ESCOs and EE & RE technology suppliers to develop and implement energy efficiency projects enhanced	512,860	1,015,000	1,527,860
Project management	405,428	750,000	1,155,428
Total	**5,156,108**	**82,230,568**	**87,386,676**

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

Name of Co-financier (source)	Classification	Type	Amount committed at design ($)	Actual amount realized ($)
Project Government Contribution	Nat'l Gov't	Cash	20,300,000	0
GEF Agency	Impl. Agency	Cash and in kind	250,000	
Private Sector	Private sector	Cash	17,668,768	14,500,000[48]
Private Sector	Private sector	850	12,591,800	850
Institute of Renewable Energy	NGO	250,000	250,000	250,000
NEFCO	Bank	497,000	670,000	497,000
ERSTE Bank	Bank	0	30,000,000	0
Ministry of Agrarian Policy and Food of Ukraine (MoAP)	Nat'l Gov't	150,000	200,000	150,000
State Agency for Efficient Use of Energy Resources (SAEE)	Nat'l Gov't	200,000	200,000	200,000
Private sector - Kyrmpapir	Private sector	3	5	3
		650,289	694,688	650,289
Private sector - OJSC Krymmoloko	Private sector	3	5	3
		1,122,280	3,653,200	1,122,280
Private sector - PJSC Khlibprom	Private sector	50	20	50
		5,000,000	955,723	1,739,263
Private sector - LED lights Projects	Private sector	21	21	21
		2,733,822	1,801,188	2,018,119
Private sector - Variatsiya	Private sector	10	10	10
		1,395,640	1,203,640	1,395,640
Private sector - Pavloskiya brewery	Private sector	5	5	5
		543,376	428,376	543,376
Private sector - PE Kilgan	Private sector	15	10	15
		720,524	570,524	720,524
Private sector - Progres	Private sector	15	15	15
		999,476	807,476	999,476
Private sector - Druzba	Private sector	10	10	10
		462,380	342,379	462,380
Total Co-Financing ($)			**92,587,863**	**29,225,769**

[48] These do not include co-financing of pilot projects under Component 2 but are investments made by various or agro-food entities throughout the Ukraine.

Annex 5. Project Results Framework

Project Strategy		Objectively Verifiable Indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
Objective	Develop a market environment for improved energy efficiencies and enhanced use of renewable energy technologies in energy intensive manufacturing small and medium enterprises (SMEs) in Ukraine	Total CO2eq emission reductions as a result of the investments in industrial energy efficiency Volume of investment mobilized Total energy saved as a result of the project (GWh/yr) Total energy generated by renewable sources as a result of the project (GWh/yr)	Enterprises of agro-food sector started transfer from gas utilization to coal use which significantly increases CO_2 emissions. Investments to agro-food sector are on quite low level (4.7% of total investments in 2000-2007).	2.2 million tonnes (over 10 year lifetimes) by 2015 44 million USD by 2015 20 GWh per year saved by 2015 30 GWh per year by 2015	NAER, Ministry of Agricultural Policy of Ukraine, selected SMEs in agro-food sector, project progress report.	Government of Ukraine has declared a necessity to increase energy efficiency and use of sources of renewable energy which is a basis for risks mitigation connected with this project implementation and achievement of project objectives. Sustained cooperation with Government and stakeholders on defined project tasks will ensure the success on all project stages.
Project component 1. Policy support **Integrating EE and RE priorities into national industrial policies and development programmes on Agro-food industry and SMEs in Ukraine**						

Project Strategy		Objectively Verifiable Indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
Outcome 1 Policy and regulatory framework regarding energy management and use of renewable energy revised,	**Outputs:** • Analysis of the existing policy and regulatory framework regarding energy management and use of renewable energy performed • Recommendations for changing the policy and regulatory framework prepared • Policy incentives and institutional tools to promote EE and RE in SMEs put in place	Number of policy measures and mechanisms introduced by GoU to foster EE / RE applications in SMEs in the industrial sector. Number of pieces of primary or secondary legislation on EE/RE in the industrial sector debated in parliament, enacted by the relevant executive body. Number of national and local development plans that integrate EE/RE objectives	Current legal, institutional and regulatory environment is unsatisfactory.	New, more effective policy measures and mechanisms are introduced. Recommendations for primary and secondary legislation are debated in parliament / enacted by GoU. EE / RE objectives are integrated into national and local development plans	Ministry of Agrarian Policy, NAER, other state agencies, regional governments, project final evaluation report.	Institutional and political barriers can effectively be overcome through cooperation with state agencies and co-ordination activities. Macroeconomic situation worsening. Currently the state reforms and cooperation with the International Monetary Fund help to decrease this risk.
Project component 2. Energy Efficiency and Renewable Energy Interventions						
Outcome 2: 10 Pilot projects, demonstrating the reduced energy costs due to better	**Outputs:** • Sector diagnostic reports on energy consumption prepared • Sector level energy management plans prepared	Convergence with international norms in the energy intensity of selected agro-food and energy intensive SMEs, allowing greater profitability to be	Profitability in the agro-food sector in 2007 was around 4.7% which is considered low. Limited number of	Profitability of enterprises implementing demonstration projects is increased by project completion as a	NAER, Ministry of Agricultural Policy, selected SMEs, project final evaluation	Financial risks (currency devaluation) will be mitigated by planned law adoption that would allow international finance organizations provide loans in local

Project Strategy		Objectively Verifiable Indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
energy management and use of renewable energy, implemented.	• Projects/technologies selected for demonstration • Technology supply chain strengthening • Returns on investments in EE and RE pilot projects demonstrated	achieved Number of energy efficiency / renewable energy projects in the agro-food sector implemented as a result (at least partially) of the demonstration effect achieved through the demonstration projects Number of agro-food and energy intensive SMEs implementing ISO EMS as a result (at least partially) of the demonstration effect achieved through the demonstration project implemented	enterprises in the agro-food sector have implemented energy efficiency projects, often with support from multilateral development banks. 15 SMEs in agro-food industry use RE technologies and processes (11 enterprises use biomass combustion and 5 use biogas equipment). No energy intensive SMEs have adopted energy management systems.	result of adopting EE and RE technologies. 10 energy efficiency / renewable energy / EMS projects implemented, where the impetus for project development can be attributed in part to the demonstration effect achieved through the demonstration projects		currency. This draft law has a support from the National Bank of Ukraine. Technical risks will be mitigated through involvement of international experts and UNIDO's experience in similar projects in other countries.
Project component 3. Scaling up Strategy and Catalyzing Investments						
Outcome 3: Energy intensive SMEs in the	**Outputs:** • Scaling up strategy on EE and RE in energy intensive SMEs prepared and	Level of investments (domestic and foreign) in EE and RE projects in the agro-food sector in	Existing level of investments flow into agro-food industry is quite low (4.7% of	Increased level of domestic and foreign investments to agro-food sector, in	Ministry of Agriculture Policy, selected SMEs, project progress report, project web site.	Worsening of macroeconomic situation, efficient mechanisms of public

Project Strategy		Objectively Verifiable Indicators				
		Indicator (quantified and time-bound)	**Baseline**	**Target**	**Source of verification**	**Risks and Assumptions**
Ukraine increase their investment in improved EE and RE Technologies	operationalized • Technical and financing packages for SMEs developed	general.	total volume of investments).	particular to investments that significantly improve energy efficiency or introduce renewable energy resource utilization.		private partnership.
Project component 4. Capacity Building						
Outcome 4: Capacity of key players such as senior managers of SMEs, ESCOs and EE & RE technology suppliers to develop and implement energy efficiency projects enhanced	**Outputs:** • Key representatives of private and public institutions trained on EE and RE opportunities • Guidebooks on EE and RE for energy intensive SME prepared • Website launched and maintained • Study course on energy management standards developed for 2 selected universities • Best practices disseminated	Number of senior managers of enterprises in the agro-food sector who implement energy efficiency / renewable energy projects or energy management systems as a result of attending training or study tours, using guidebooks, using the website or studying on the university study courses.	Low number of specialists who are aware of EE and RE technologies and the opportunities they present. No guidebooks on energy management for agro-food industry, no study course on EE and RE topics developed and integrated to curriculum.	Raised awareness of climate change mitigation and energy efficiency objectives, capacity built for adoption of EE and RE technologies in energy intensive SMEs in agro-food and other sectors.	Follow-up surveys of training course attendees, participants in study tours, recipients of guidebooks, users of the website and students of the study courses to determine extent to which capacity building resources have changed behaviour. Final project evaluation report, Ministry of Agricultural Policy, National University of Food Technologies, National Technical University “Kyiv Polytechnic Institute”	Sustained cooperation with the universities, international experts, SMEs in agro-food and other energy intensive sectors, mass media.