TERMINAL EVALUATION

of the UNDP/GEF Full-Size Project

Final

Green Urban Lighting, Armenia

GEF Project ID: 4742, UNDP Project ID (PIMS): 4669

This Terminal Evaluation Report was prepared for the UNDP CO Armenia by:

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Profile of the evaluator

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Abbreviations and acronyms

ADB	Asian Development Bank
APR	Annual Project Review
ATDF	Armenia Territorial Development Fund
AUA	American University of Armenia
AWP	Annual Work Plan
CDR	Combined Delivery Reports
CFL	Compact Fluorescent Lamp
CO	UNDP Country Office
CP	UNDP Country Programme
CPAP	UNDP Country Programme Action Plan
EBRD	European Bank for Reconstruction and Development
EE	Energy efficiency
EOP	End of Project
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	Greenhouse Gas
GUL	Green Urban Lighting
HPS	High-Pressure Sodium (lamps)
IR	Inception Report
LED	Light Emitting Diode
MinEconomy	Ministry of Economic Development and Investments of RA
MinEnergy	Ministry of Energy Infrastructures and Natural Resources of RA
MNP	Ministry of Nature Protection of Republic of Armenia
MTAD	Ministry of Territorial Administration and Development of RA
MTE	Mid-Term Evaluation (equivalent to MTR)
MTR	Midterm Review (equivalent to MTE)
NGO	Non-Government Organization
NPUA	National Polytechnic University of Armenia
PB	Project Board
PDF	Project Development Facility
PIMS	Project Information Management System (UNDP GEF)
PIR	Project Implementation Review
PIU	Project Implementation Unit
ProDoc	Project Document
RA	Republic of Armenia
R2E2 Fund	Armenia Renewable Resources and Energy Efficiency Fund
RTA	UNDP Regional Technical Advisor
TE	Terminal Evaluation
ToR	Terms of Reference
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

1. Executive summary

Table 1: Overview of the project identification

Project Summary Table				
Project title:	Green Urban Lighting, Armenia			
GEF Project ID	4742	Financing	At endorsement (mil USD)	At TE – June 2018 (mil USD)
UNDP Project ID	4669	GEF:	1.6	1.579
Country	Armenia	IA/EA own: cash In-kind	0.12 1.0	0.107 0.3[1]
Region	Europe and Central Asia	Government: In-kind	0.32	0.316
Focal Area	Climate Change	Local administration:	7.055	7.416
FA Objectives, (OP/SP):	CCM-2 Outcome 2.1 Appropriate policy, legal and regulatory frameworks adopted and enforced Outcome 2.2 Sustainable financing and delivery mechanisms established and operational	Other: grants: credit: Total co-financing:	0 0 8.495	12.626 21.060 42.526
Executing Agency	Ministry of Nature Protection of the Republic of Armenia	Total Project Costs:	10.095	44.126
Other Partners Involved	Yerevan Municipality, other partner municipalities	ProDoc Signature:		November 15, 2013
		(Operational) Closing Date:	Proposed: November 2017	Actual: November 2018

There are no doubts that by the end of the Project, in November 2018, GEF budget, UNDP cash budget, and governmental in-kind budget will be fully spent.

Table 2: Key project milestones

	Originally expected date	Actual date
PIF Approval date		January 4, 2012
CEO endorsement/approval		August 19, 2013

[1] In addition to cash and in-kind co-financing, UNDP also facilitated financing and implemented three lighting projects (Tavush "Bright Border", SGP, GCF-Kindergartens) of 0.555 mil USD reported in "Other Grants" co-financing.

Agency approval date		November 8, 2013
Implementation start	2013	November 15, 2013
Inception workshop	2014	January 15, 2014
Midterm evaluation completion	2015	June 30, 2016
Terminal evaluation completion	2017	July, 2018
Project completion	November, 2017	November 2018

Table 3: Overview of budgeted and actual financial sources spent by end of June 2018

	Budgeted in Project Document	**Actual as of TE in June 2018**
GEF financing:	**1,600,000 USD**	**1,579,261 USD**
Other:	**8,495,000 USD**	**41,826,000 USD**
Cash total:	*7,175,000 USD*	*41,209,000 USD*
- *IE/EA own*	*120,000 USD*	*106,794 USD*
- *Local administration*	*7,055,000 USD*	*7,416,000 USD*
- *Other grant*		*12,626,000 USD*
- *Other credit*		*21,060,000 USD*
In-kind total:	*1,320,000 USD*	*616,000 USD*
- *IE/EA in kind*	*1,000,000 USD*	*300,000 USD*
- *Government*	*320,000 USD*	*316,000 USD*
Total project costs:	**10,095,000 USD**	**43,405,261USD**

As of mid of June 2018, in total 1.579 mil USD have been spent, i.e. 99% of the GEF budget of 1.6 mil USD.

1.1 Brief description of project

The UNDP-supported GEF-financed project "Green Urban Lighting in Armenia" (further referred to as the "Project", or "GUL project") was developed with an overarching goal to save energy and to reduce emissions of greenhouse gases by increasing energy efficiency of municipal lighting in the cities of Armenia via implementation of municipal investment programs and national policies.

The Project was designed in compliance with the national priorities to strengthen the economic and energy independence of the Republic of Armenia by promoting resources efficient and climate resilient growth.

The GUL project was designed in four interrelated components:

1. Municipal energy audits and technical capacity-building;
2. Demonstration projects;
3. Replication via municipal lighting programs and associated financial instruments;
4. National policies, codes, and standards on lighting.

Collectively, these components seek to put in place cornerstone policy instruments at both the municipal and national level, supported by technical, policy-related, educational, and financial measures to raise capacity, reduce investor risk, and help assure successful implementation.

These activities were designed to contribute to UNDP's goal of increasing access to sustainable energy services by introducing regulatory and institutions frameworks, promoting technology transfer, expanding renewable energy practices and applying Clean Development Mechanisms under the Kyoto Protocol.

The Project was designed to be implemented in four years (November 2013 – November 2017) with a total GEF budget of 1.6 mil USD. One-year no-cost extension was approved in mid 2017 and the Project is scheduled to terminate by November 2018.

The project has been implemented by the Ministry of Nature Protection (MNP) following UNDP's National Implementation Modality (NIM). UNDP serves as the GEF Agency for this project. The Municipality of Yerevan and other municipalities in Armenia are the main beneficiaries and implementing partners.

1.2 Project results and terminal evaluation rating

The Green Urban Lighting project in Armenia was very successful, and it served as a catalyst in facilitating lighting market transformation towards higher energy efficiency and lower GHG emissions, primarily in the public sector, but in private sectors as well.

The Minister of Nature Protection rated this UNDP-supported GEF-financed Green Urban Lighting Project as one of the best donor-funded projects ever implemented in Armenia.

The Project reached and overcame project objective targets of direct and indirect energy and GHG emission savings and delivered highly satisfactory results in each of four project outcomes that include:

- Municipal energy audits and technical capacity-building
- Demonstration projects
- Replication via municipal lighting programs and associated financial instruments;
- National policies, codes, and standards on lighting

The overall project results rating is Highly Satisfactory.

There are two key factors that made this project so successful:

- Highly professional project team with up-to-date expertise in energy efficient technologies, policies and finance
- Very appropriate timing of the Project implementation

Development activities and market interventions financed by GEF and other international donors are typically project based and last usually few years (4 to 6 years max). During the implementation period, project teams develop their expertise, but after projects are closed, this expertise often disappears and project experts leave for new jobs.

This is not the case of UNDP Armenia, and its Climate Change Programme. UNDP Armenia has been successful in overcoming this negative effect of time-bound, single project-based financial support. UNDP Armenia has developed and has been implementing a series of energy efficiency projects that are complementary and follow one after another. Thus, it was successful in maintaining a stable team of core in-house experts in energy efficiency that share their expertise among different energy efficiency projects over time.

Summary of terminal evaluation ratings are shown in Table 4.

Table 4: Terminal evaluation rating

Criteria	Rating						Comments
	HS	S	MS	MU	U	HU	
1. Monitoring and Evaluation							
M&E design at entry	**HS**						
M&E plan implementation	**HS**						
Overall quality of M&E	**HS**						
2. IA & EA Execution							
Quality of UNDP implementation	**HS**						
Quality of execution – Executing Agency	**HS**						
Overall quality of implementation/execution	**HS**						
3. Assessment of Outcomes							
Relevance	**Relevant**						
Effectiveness	**HS**						
Efficiency	**HS**						
Overall quality of project outcomes	**HS**						

HS – Highly Satisfactory, S – Satisfactory, MS – Moderately Satisfactory, MU – Moderately Unsatisfactory, U – Unsatisfactory, HU – Highly Unsatisfactory
Relevance: R – Relevant, NR – Not Relevant

6. Sustainability	L	ML	MU	U	Comments
Financial resources	**L**				
Socio-political	**L**				
Institutional framework and governance	**L**				
Environmental	**L**				
Overall likelihood of sustainability	**L**				

Sustainability: L – Likely, ML - Moderately Likely, MU - Moderately Unlikely, U – Unlikely

4. Impact	S	M	N	Comments
Environmental status improvement	**S**			
Environmental stress reduction	**S**			
Progress towards stress/status	**S**			
Impact	**S**			

Impact: S – Significant, M – Minimal, N - Negligible

	HS	S	MS	MU	U	HU	Comments
Overall Project Results	**HS**						

HS – Highly Satisfactory, S – Satisfactory, MS – Moderately Satisfactory, MU – Moderately Unsatisfactory, U – Unsatisfactory, HU – Highly Unsatisfactory

1.3 Lessons Learned and Recommendations

This Green Urban Lighting Project in Armenia may serve in several aspects as an example of lessons learned and best practices to be shared across other UNDP projects and countries of operation.

1.3.1 **Lessons learned**

1. **UNDP in-house expertise is maintained and shared across multiple projects**

   UNDP CO Armenia implemented a successful strategy how to maintain developed in-house expertise in energy efficiency by developing and implementing a series of follow-up energy efficiency projects in different sectors.

2. **Benefits of experience sharing across similar projects in the region**

   The Project benefitted from sharing experience across similar projects being implemented in other countries of the region. The support and effective regional coordination of the UNDP RTA in developing similar projects in the region is a critical success factor.

3. **Appropriate timing of implementation of demand-driven project is a key to success**

   Appropriate timing of project implementation, reflecting real local demand for project services, and affordability to finance locally replications that reflects actual level of economic development and financial capacity of municipalities, is a critical factor for project success, its impact and sustainability. Demand-driven projects deliver better and sustainable results rather than just replication of supply-driven projects mechanically replicating projects across countries.

4. **Large number of small demonstration projects support dissemination and replication**

   Large number of small demonstration projects implemented across the country supported awareness rising, experience sharing and dissemination, and replication of projects.

5. **Revolving funds as an off-budget account are transparent and simple**

   Revolving funds established as a separate municipal off-budget account, and not institutionalized as a stand-alone organization, are easy to implement, inexpensive and transparent.

6. **Project deliverables published on-line even after Project termination**

   Publication of all key project deliverables on a web site of a local institution, rather than on a web site of a time-bound project only, supports information dissemination and guarantees sustainable access to information even in a long-term after project termination.

7. **LED lighting is a mature and affordable technology, easy to install, with large and quick financial and environmental benefits that helps to "sell" energy efficiency to decision makers**

   Energy efficient street lighting, and especially LED, is a modern technology with a nice design, it is highly visible to all citizens, it is already relatively inexpensive and

affordable technology with a short payback, quickly to install and easily to measure benefits, and it has significant financial and GHG emission savings. Well-designed street lighting projects became a symbol of modernization, and of improved quality and quantity of street illumination, and significantly reduced energy consumption and GHG emissions (by 69%). Thus, the Project was very popular with all citizens and municipal decision makers, and it helped to raise awareness and to promote and adopt energy efficiency to municipal decision makers not only as an environmental concept, but also as a cost-effective modernization tool with real and visible benefits.

8. Cost-effective project management

Project management costs reached only 6% of the GEF budget. UNDP co-financing of 120,000 USD was used for additional project management costs. Total project management costs reached only 12% of combined UNDP-GEF budget of 1.720 mil USD spent over a period of 5 years of project implementation, and with 50% of GEF funds being spent for demonstration projects.

Cost-effective project management was based on long-term but part-time employment of relatively small project team of experts and staff, who shared their full work load with other UNDP energy efficiency projects. Other local and few international short-term experts were contracted on an ad-hoc basis.

This project management arrangement proved to be very cost-effective, but in the same time it supported development and maintaining of UNDP in-house expertise in energy efficiency.

1.3.2 Recommendations

Project Team:

1. Lessons Learned Report to be disseminated and published on-line

The project team is expected and is planning to develop and publish the Lessons Learned Report by the end of the project.

The Project has developed extensive expertise in energy efficient lighting, including significant technical expertise. This experience is not only country-specific but it might help also project developers when developing energy efficient lighting projects internationally.

The project team is thus encouraged to include into the Lessons Learned Report also the technical experience gained during project implementation and include as appendix, or refer to the web link for download, also specific technical guides, textbooks and other deliverables developed by the Project, and to publish the Report on the www.nature-ic.am web site.

The Project is also encouraged to offer links to their web page and Lessons Learned Report also to other energy efficient lighting initiatives internationally.

2. Certification of the light testing laboratory

The Project and the municipal owned Yerevan Illumination Company CJSC are planning to have accredited the photometric testing laboratory operated by the Yerevan Illumination Company CJSC. International accreditation would increase international credibility of the testing laboratory and would allow the Yerevan

Illumination Company to offer its services in photometric testing of luminaires internationally as well, and thus to maximize utilization of the laboratory equipment that was financed from the GEF budget.

The UNDP Project team is encouraged to facilitate the accreditation and to support it with any remaining GEF budget resources available.

UNDP:

3. **Replicate best practices in maintaining developed in-house expertise across follow-up projects and in regional cooperation in other countries of operation**

   Several UNDP country offices in the region implemented similar strategy as the UNDP CO in Armenia in maintaining the developed in-house expertise by sharing its experts across multiple follow-up similar projects implemented in different sectors. However, this practice is not yet shared by all UNDP country offices. Some of them loose their experts and expertise developed after project termination.

   Effectiveness of regional cooperation among similar UNDP projects depends primarily on activities of UNDP CO and its project teams, and support from the UNDP RTA, as well as on similar projects being implemented in parallel in the region.

   UNDP and its regional headquarters and RTAs are encouraged to replicate and adopt the practice of maintaining in-house expertise across all countries of their operation, and to facilitate effective regional cooperation and experience sharing where appropriate.

2. Introduction

2.1 Purpose of the evaluation

This terminal evaluation was performed at the request of UNDP (the GEF Agency) as a standard mandatory requirement for all UNDP-supported GEF-financed projects. The terminal evaluation mission took place in Armenia, on June 11-16, 2018, the draft Terminal Evaluation Report was submitted in June 2018, and the final TE Report in July 2018.

The objective of this evaluation is to assess achievements of project's objectives, affecting factors, broader project impact and a contribution to the general goal/strategy, and a project partnership strategy. It also provides a basis for learning and accountability for managers and stakeholders and for providing recommendations and lessons learned which can be applied to the design of future relevant UNDP projects.

The 2012 UNDP "Project-Level Evaluation - Guidance for Conducting Terminal Evaluations of UNDP-Supported, GEF-Financed Projects" specifies five complementary evaluation purposes of UNDP-supported GEF-financed projects:

- To promote accountability and transparency, and to assess and disclose the extent of project accomplishments.
- To synthesize lessons that can help to improve the selection, design and implementation of future GEF financed UNDP activities.
- To provide feedback on issues that are recurrent across the UNDP portfolio and need attention, and on improvements regarding previously identified issues.
- To contribute to the overall assessment of results in achieving GEF strategic objectives aimed at global environmental benefit.
- To gauge the extent of project convergence with other UN and UNDP priorities, including harmonization with other UN Development Assistance Framework (UNDAF) and UNDP Country Programme Action Plan (CPAP) outcomes and outputs.

2.2 Scope and methodology of the evaluation

The methodology used for the project terminal evaluation is based on the 2012 UNDP "Project-Level Evaluation - Guidance for Conducting Terminal Evaluations of UNDP-Supported, GEF-Financed Projects", and it includes following key parts:

I. Project documents review prior to the evaluation mission and development and submission for approval of the Terminal Evaluation Inception Report
II. Evaluation mission and on-site visits, interviews with project management, UNDP CO, project implementing partners, representatives of the government, steering committee/project board, project beneficiaries, and other relevant stakeholders and independent experts
III. Presentation of preliminary findings to UNDP CO representatives and feedback
IV. Drafting of the terminal evaluation report, ad-hoc clarification of collected information and collection of additional information if needed
V. Circulation of the draft terminal evaluation report for review and comments
VI. Finalizing the terminal evaluation report, incorporation of comments received

The terminal evaluation methodology follows the standard evaluation methodology of UNDP-supported GEF-financed projects and it combines review of project documents and files, project deliverables, interviews with relevant stakeholders, analysis of gathered information, presentation of preliminary findings and conclusions at the end of the TE mission, drafting of the TE report, and incorporation of comments received into the final TE report.

The challenge of an external evaluation is always a proper assessment and a good understanding of the local situation and of the local development context, and especially of its evolvement over the project implementation period. The most important source of information are interviews with local stakeholders.

A proper selection of interviewed persons is critical for an ability to get an appropriate and full picture of project implementation. Thus, it was important to have an opportunity to interview project stakeholders with different background and representing different stakeholders/interests in the Project, including governmental representatives, municipalities, other project beneficiaries, universities and lighting industry representatives.

Information and data collection methodology used for the Terminal Evaluation was based primarily on relevant document analysis, situation analysis based on information collected from open sources, own on-site findings and from interviews held with project stakeholders during the TE mission. This methodology combines both, primarily the hard-fact quantitative data, supplemented also with soft-fact qualitative data, and information provided by interviewed individuals. The major underlying assumption and challenge of data collection, is that the information collected is properly verified and interpreted by the TE evaluator, and that in result the information used is unbiased. To minimize the risk of misinterpretation, internal verification of data collected has been implemented (information cross-checked across different sources), and a three-step process of both data and findings external validation has been implemented that includes feedback from diverse interviewed parties/project stakeholders, the project team, and UNDP CO.

SWOT analysis of data collection method used:

Strengths: All relevant available sources of information are utilized, including quantitative and qualitative data, and hard-fact and soft-fact data (including information provided by individuals representing diverse interests and different levels of unbiasedness)

Weaknesses: Reliability of information provided differ by source (accuracy, unbiasedness based on diverse experience and interest of individual information providers, …)

Opportunities: Reliability of information collected and interpreted in the TE can be verified internally and validated externally.

Threats: Risk of data and information misinterpretation due to lack of understanding of local development context.

2.3 Evaluation criteria

The following key evaluation criteria have been used in the terminal evaluation according to the 2012 UNDP "Project-Level Evaluation - Guidance for Conducting Terminal Evaluations of UNDP-Supported GEF-Financed Projects"[2]:

- *Relevance*
  The extent to which the activity is suited to local and national development priorities and organizational policies, including changes over time, and the extent to which the project is in line with the GEF Operational Programs or the strategic priorities under which the project was funded.
- *Effectiveness*
  The extent to which project objective has been achieved or how likely it is to be achieved.
- *Efficiency*
  Cost-effectiveness of funds spent to reach project objectives and results and the extent to which results have been delivered with the least costly resources possible.
- *Results*
  The positive and negative, foreseen and unforeseen changes to and effects produced by a development intervention. In GEF terms, results include direct project outputs, short to medium-term outcomes, and longer term impact including global environmental benefits, replication effects and other local effects.
- *Sustainability*
  The likely ability of an intervention to continue to deliver benefits for an extended period of time after project completion (includes environmental, financial, social-political, and institutional framework and governance sustainability).
- *Impact*
  The impact criteria includes environmental status improvement, environmental stress reduction and progress towards environmental status improvement and stress reduction.

2.4 Structure of the evaluation report

This terminal evaluation report follows the structure specified in the "Project-Level Evaluation, Guidance for Conducting Terminal Evaluations of UNDP-Supported GEF-Financed Projects", UNDP 2012.

The terminal evaluation report includes:

- Executive Summary
- Introduction
- Project description and development context
- Findings – project design/formulation, project implementation and project results
- Conclusions, recommendations and lessons learned
- Annexes

[2] "Project-Level Evaluation - Guidance for Conducting Terminal Evaluations of UNDP-Supported GEF-Financed Projects", UNDP, 2012, Box 3: UNDP Evaluation Criteria, page 15,

3. Project description and development context

3.1 Project development context

The development of the Green Urban Lighting project in Armenia reflected following key factors:

- Affordable and significant technical potential to save energy in Armenian municipalities and in residential sector
- Low level and quality of street illumination, limited knowledge of and experience with new energy efficient lighting based on LED technology
- Emerging but underdeveloped financial capacity of Armenian municipalities to finance and implement street lighting reconstructions
- Commitment of municipal decision makers to modernize and extend street lighting
- Commitment of policy makers at a national level to improve street lighting as expressed in national energy efficiency policies and action plans
- Intention to modernize street lighting was in line with international environmental commitments of Armenia and policies of international donors

The UNDP-supported GEF-financed Green Urban Lighting project in Armenia was developed concurrently with similar street lighting projects in Ukraine, Russia and Kazakhstan, which allowed experience sharing across countries with similar historical background.

The Project Document identified that lighting is the second largest source of municipal GHG emissions in Armenia (after heating), accounting for about one-third of municipalities' GHG emissions and up to 50 percent of their electricity bill. As per the ProDoc, urban lighting costs of Armenian municipalities account for more than US $5 million per annum (power costs and maintenance). Municipal lighting in the capital city of Yerevan accounts for the largest consumption in the country: 90% of all urban lighting energy use nationwide, or about 56,000 MWh/year. At the same time, there is considerable technical potential for cost-effective efficiency improvements in public lighting in Yerevan and in other Armenian cities. Street lighting power use in Yerevan is 1.3-1.5 times higher than the average street lighting power consumption in European cities and towns. Most of street lighting (some 80%) in Armenia used high pressure sodium lamps prior to the Project implementation, and ca 13% mercury lamps. CFLs represented 5% of street lighting stock and LEDs were negligible (110 pieces). The total installed capacity of street lighting in Armenia was 19 MW, of which 15 MW in Yerevan. Some smaller streets and small villages have no street lighting at all. With few exceptions, the technical quality of street lighting in use was rather low.

Yerevan and several other cities planned for street lighting modernization and extension to provide street lighting in unlit streets.

The 2007 National Program on Energy Savings and Renewable Energy and a 2010 Action Plan emphasize the importance of energy efficiency for Armenia. The National Program notes lighting as one of eight priority areas for energy saving, and identifies reduction of electricity consumption over a 10-year period through introduction of energy efficient lamps in lighting systems as a key energy-saving target (475 million kWh). The National Energy Efficiency Action Plan (2010) also considers street lighting as a priority in the public and private service sectors.

3.2 Project start and its duration

Project note received by GEF:	December 1, 2011
Project Preparation Grant approved by GEF:	May 17, 2012
Project Concept approved:	February 1, 2012
Project Document approved for implementation:	August 19, 2013
Project Document signed:	November 15, 2013
Project duration:	4 years (48 months)
Original operational closing date:	November 2017
No-cost extension till:	November 2018 (one-year no-cost extension)
Actual project duration:	5 years (60 months)

3.3 Problems that the project sought to address

The baseline situation in Armenia was characterized by high energy intensity of street/public lighting, low-quality lighting performance of existing street lighting (insufficient illumination and poor light distribution), low-quality technical design and installation of street lighting, and low-quality of lighting sources used. At the Project launch, due to low demand, there was rather limited choice of good quality energy efficient lighting products available on the local market.

The Project Document identified four specific problems/barriers to be addressed by project components:

- Lack of information and awareness
- Low technical capacity
- Lack of available financing for urban lighting
- Absence of sufficient energy efficiency policy and regulations for public lighting

Street lighting is typically owned and operated directly by municipalities, in some cases (Yerevan) it is operated by a dedicated service organization owned by a municipality. Municipalities lacked expertise in technical design, implementation, and in financial performance of energy efficient lighting upgrades, especially in smaller municipalities. The concept of energy efficiency was often misinterpreted, replacing existing lamps with lamps of lower capacity and lower luminous efficacy, which lead to lower energy consumption at a cost of insufficient level of street illumination.

Despite, or because of relatively high operational costs of street lighting (electricity costs and maintenance), municipalities with tight budgets and lots of urgent priorities could only hardly afford to finance street lighting reconstructions/modernization to higher energy efficiency standard.

3.4 Immediate and development objectives of the project

The overarching goal of the UNDP-supported GEF-financed project is to save energy and to reduce emissions of greenhouse gases by increasing energy efficiency of lighting in the cities of Armenia via the implementation of municipal investment programs and national policies.

The project was designed to contribute to achieving of the Country Programme Outcome as defined in CPAP: 4.1.5 Innovative policies and practices for environmentally sound, energy efficient technologies and cleaner production developed and implemented, and with CP indicators: number of laws and legal acts promoting energy efficiency adapted; number of initiatives promoting energy efficiency developed and implemented; and number of environmental rating and labeling practices introduced.

The Project Document defined the project objective: "to remove barriers to energy-efficient lighting in Armenia, by means of technical assessment, facilitation of financing, and development and implementation of municipal programs and national policy".

3.5 Baseline indicators and expected results

The Project Document specified in total 10 baseline indicators and 16 end-of-project (EOP) targets for project objective and four project outcomes.

As per recommendations of the Inception Report, several revisions to the LogFrame were introduced – see Chapter 4.1.3 Log-frame analysis for more details. No additional changes to the LogFrame were introduced at the Midterm Review.

Following is an overview of project objective and outcome indicators and EOP targets, both as per Project Document, and the final version as per Inception Report revision. The ~~crossed text~~ is original wording as per ProDoc, deleted as per the Inception Report. Text in yellow is a new and final wording introduced as per recommendations of the Inception Report.

Expected results include:

Project objective: **To remove barriers to energy-efficient lighting in Armenia, by means of technical assessment, facilitation of financing, and development and implementation of municipal programs and national policy**

Project objective indicator:

- Quantity of energy saved and GHG emissions avoided

EOP Targets:

- *Direct energy savings of ~~1.4~~ 1.2 GWh per year from demonstration projects (~~560~~ 474 tonnes of CO2 emissions)*
- *~~Ind~~Direct energy savings of 20 GWh per year from replication of demonstration projects via municipal programs (8000 tonnes of CO2 emissions)*

- *Indirect energy savings of 125 GWh per year from implementation of national lighting policy (50,000 tonnes of CO2 emissions)*

Outcome 1: Municipal energy audits and technical capacity-building

Indicators and targets:

- Methodology for energy/lighting audit

MT Target: By the project midterm the methodology will be established and shared with municipalities

- Number of municipal lighting systems energy audits conducted

EOP Target: At least 10 comprehensive audits of public lighting (including pilots) completed in Yerevan and other cities (including baseline analysis and recommendations for improvement)

- Number of specialists and agency representatives trained

EOP Target: ~~Training on EE lighting delivered to specialists and agency representatives in Yerevan and at least 10 other cities~~
At least 20 specialists from private sector and municipalities are trained on EE lighting and energy audit

- Public media exposure

EOP Target: Media releases on outcomes of each pilot. Awareness raising materials available for general public

Outcome 2: Demonstration projects
Pilot projects yield cost-effective energy savings, raising the confidence and capacity of investors and decision-makers about EE lighting

Indicators and targets:

- Efficiency and energy savings of installed EE lighting

EOP Targets: At least five demonstration projects ~~completed, covering various technologies including LEDs, and various applications including both street lighting and buildings~~ on a number of efficient lighting technologies completed for indoor, outdoor and street lighting.
Direct energy savings of up to ~~1.4~~ 0.95 GWh per year by completion of all pilots (subject to final selection of pilot size and technologies)

- Share of LED in demo-projects

EOP Targets: 100% LED for ~~new~~ outdoor (park) and indoor lighting
~~5%~~ 40% LED ~~for outdoor lighting retrofits~~ included in street lighting pilots

Outcome 3: Replication via municipal programs and associated financial instruments
Municipal lighting programs lead to widespread deployment of EE lighting and associated energy savings

Indicators and targets:

- ~~Adoption and financing of~~ municipal programs for EE public lighting

EOP Targets: *Municipality of Yerevan develops and adopts program for upgrades of municipal lighting, ~~with secured financing~~*
Similar programs are adopted in ~~at least five~~ other cities of Armenia

- Energy savings from these programs

EOP Target: *Savings of 20 GWh per year from municipal lighting programs*

- Financial commitments for energy-efficient municipal lighting

EOP Target: *US $10 million for energy-efficient municipal lighting secured*
Establishment of financing mechanisms for Yerevan and other municipalities (e.g. revolving fund) from savings achieved from piloted EE measures.
Support in preparation of funding proposals (including tenders for ESCOs) for cities of Armenia

Outcome 4: **National policies, codes, and standards on lighting**
New national policies mandate significantly greater energy efficiency and ensure product quality for lighting, particularly in residential buildings

Indicators and targets:

- ~~Adoption and entry into force of phase-out of conventional incandescent lighting~~
- Existence of regulations that mandate improved energy efficiency of lighting products and installations, including codes, standards, and procurement rules

EOP Target: *Proposed improvement to existing legislation addressing minimum energy performance requirements for lighting appliances*
A national phase-out plan of conventional incandescent lighting is adopted ~~and enters into force~~
~~Lamps with at least 25 percent greater luminous efficacy replace conventional incandescents according to the timetables of the adopted phase-out~~

- Adoption and implementation of other needed policies to promote EE lighting in various areas, including codes, standards, and procurement rules

EOP Target: *Other adopted policies and standards ~~support the phase-out~~*
New criteria (including performance and life cycle costs) for incorporation in state procurement procedures for lighting applications are developed

3.6 Main Stakeholders

Main project stakeholders identified in the Project Document and their assumed role in the GUL project are specified in Table 5.

Table 5: Project Partners, Roles, and Areas of Collaboration

Partner	Joint and complementary activities
Ministry of Nature Protection	• Coordination and supervision of project implementation in accordance with UNDP and GEF procedures • Evaluation of GHG mitigation potential of the project (including demonstration projects) and its further replication • Development and adoption of regulations for environmentally safe collection and disposal of used lighting equipment
Municipality of Yerevan	• Energy audit of selected areas for assessment of baseline situation and upgrade potential (partly in the framework of the technical assistance project to be supported by the Austrian Bank). Assessment of technical condition of the system, and optimization opportunities for identification of the energy efficiency measures with highest reduction potential. • Design, implementation and monitoring of demonstration projects on EE public lighting in Yerevan. • Design and implementation of municipal plans and financing applications for comprehensive lighting upgrades in city networks • Training of the staff of the Yerevan Illumination Company.
Ministry of Energy Infrastructures and Natural Resources	• Technical analysis, justification, policy development and adoption of provisions for a phase-out of conventional incandescent lighting • Oversight of development of technical standards for lighting products, including harmonization with relevant EU standards • Development of procurement rules for EE lighting
Committee of Urban Development	• Review and revision of the building code on artificial and natural lighting
National Institute of Standards	• Development of technical standards for lighting products.
State Engineering University of Armenia	• Testing and certification of lighting products in accordance with technical standards • Education, training and awareness raising events.
Scientific Research Institute of Energy of Armenia	• Education, training and awareness raising events.

In Addition to Yerevan, also other municipalities were expected, although not specified in the Project Document, to serve as project partners for implementation of pilot projects and development and application of the revolving fund. Yerevan, Spitak and Sevan municipalities confirmed co-financing commitment in their letters attached to the Project Document.

4. Findings

4.1 Project design and formulation

The project document is clearly formulated and logically structured. It provides a thorough information and situation analysis, and it clearly defines in detail project implementation strategy; it defines project results framework, time-bound budget and work plan, management arrangements and monitoring framework and evaluation plan including its budget, and it explains policy and regulatory context. The project design provides all necessary and relevant information.

Annexes to the Project Document include among others Risk Log, expected responsibilities of Project Board and National Director, TOR of key personnel, letters confirming co-financing commitment of the main project stakeholders, i.e. of the Ministry of Nature Protection, Yerevan, Spitak, and Sevan municipalities, UNDP, US AID and the local Ararat Bank.

The Project Document did not address any specific gender issues.

4.1.1 **Project relevance**

The Project was designed in compliance with the national priorities to strengthen the economic and energy independence of the Republic of Armenia by promoting resources efficient and climate resilient growth. The Project design is highly relevant with national policies and priorities, as well as with national and municipal development plans developed before and during the Project implementation period, namely with the Law on Energy Saving and Renewable Energy (2004), National Program for Energy Saving and Renewable Energy (2007) with assessment of energy efficiency and renewable potential, National Energy Efficiency Action Plan (2010), and the decision of the Government of the Republic of Armenia "On implementation of energy saving and energy efficiency improvement measures in facilities being constructed (reconstructed, renovated) under the state funding (adopted by the Government on December 25, 2014). At the Project development phase, first activities focused on energy efficiency upgrades of street lighting have been launched in parallel in Armenia (The World Bank Energy Efficiency Project in Armenia, implemented by the R2E2 Fund was launched in 2012 and it includes a component on public lighting).

The Yerevan Illumination Company (YIC), municipal company operating public lighting in Yerevan, has elaborated a development program for 2013-2016 with total costs of about US $7.2 million, mainly focused on lighting of unlit streets. YIC has also begun initial field comparisons of 150W and 250W high-pressure sodium (HPS) street lighting lamps and fixtures of various product lines. The test is aimed to measure various parameters of street lighting equipment, specifically luminance of the street area.

Joint UNDP and Yerevan Municipality initiative "Beautiful Yerevan" has been implementing infrastructure upgrade projects including public lighting in selected public areas with a focus on creation of "green" jobs and promotion of efficient lighting technologies, worth US $1.0 million for a 3-year period.

New urban development projects also include construction of new streets, underpasses, and parking areas. In 2013-2014, the cost for the lighting component of those projects, which planned for high-pressure sodium lamps, was around US$ 0.32 million.

The four-year development program of the town of Sevan included plans for installation of lighting in a new park, as well as modernization of street lighting over 900 meters of roads. The municipal budget for these efforts was about US $500,000, plus $25,000 from the municipal budget for other new lighting in 2013 alone.

The town of Spitak has included plans for modernization and extension of the urban lighting system in 2013-16 as part of its development program. The preliminary budget for this work was about US $30,000, which the town was seeking from international financial institutions. In addition, the town has allocated about $22,500 of its own budget funds for street lighting, which includes modernization as well as routine operation and maintenance.

In 2012, the NGO "Counterpart International Armenia" provided US $95,000 towards the installation of new street lighting systems in four urban and 10 rural communities.

4.1.2 **Project implementation approach**

The Project strategy is structured in four components and outcomes, with several outputs within each project outcome, and it includes:

- Street lighting energy audits and capacity-building
- Demonstration projects
- Financial and institutional mechanisms for replication
- National policies, codes and standards

The first component was designed to raise awareness and develop and strengthen local capacity in designing efficient, good quality urban lighting.

Demonstration projects apply the "learning by doing" approach. In addition to that, implemented demonstration projects generate cash savings for project replications by municipalities, improve quality of urban lighting, reduce greenhouse emissions and last but not least, modernized street/urban lighting is very visible and utilizes new, modern and "nice looking" technology. Efficient street lighting thus helps to "sell" energy efficiency to both, municipal decision makers and general public as a win-win solution.

National policies and standards facilitate adoption of energy efficient lighting technology.

Project strategy and implementation approach is structured into following components, outcomes and outputs:

Component 1: Knowledge and capacities for urban green lighting

Outcome 1: Municipal energy audits and technical capacity-building

Output 1.1: Audits of public lighting systems

Output 1.2: Study tour

Output 1.3: Technical training and capacity building

Output 1.4: Increased awareness and support among the general public

Component 2: Pilot urban green lighting projects

Outcome 2: Demonstration projects

Output 2.1: Design, completion, and documentation of demonstration projects on street lighting

Output 2.2: Design, completion, and documentation of demonstration project in municipal public buildings

Output 2.3: Design, completion, and documentation of demonstration project on lighting of outdoor spaces

Component 3: Financial and institutional mechanisms for scaling up municipal EE lighting programs

Outcome 3: Replication via municipal programs and associated financial instruments

Output 3.1: Support for private, international, and innovative municipal financing for EE urban lighting programs

Output 3.2: Development and approval of the city-wide program in Yerevan

Output 3.3: Facilitation of analogous programs in other cities

Component 4: National policies, codes, and standards on EE lighting

Outcome 4: National policies, codes, and standards on lighting

Output 4.1: Phase-out of incandescent lighting and/or other major national policies on EE lighting

Output 4.2: Development and adoption of new standards

Output 4.3: Development and adoption of new rules for state agencies on procurement of energy-efficient lighting.

4.1.3 **Log-frame analysis**

The logical framework/results matrix specified in the ProDoc was, with a few reservations, well-defined and logically structured. It specifies indicators, baselines, end-of-project targets, source of verification and risks and assumptions for the project objective and each of project outcomes. The LogFrame is not overwhelmed with excessive number of indicators and targets, and thus it clearly reflects project achievements. In total, the results framework includes less than 20 targets that all comply in principle with SMART requirements: SMART – Specific, Measurable, Achievable, Relevant and Time-bound.

In two cases, the target definition is not specific enough in quantitative terms.

The new target introduced as per recommendations of the Inception Report "Media releases on outcomes of each pilot. Awareness raising materials available for general public" does not specify the required number of media releases/awareness rising materials, although the specific number might be just a formal indicators/target. On the other hand more complex media outreach impact

indicator/target would be very difficult to measure. Also the target "Similar programs are adopted in other cities of Armenia" does not specify the required number of programs/cities.

The Project Document includes only end-of-project targets. The Inception Report added one midterm target.

According to recommendations of the Inception Report, the LogFrame has been slightly changed, and some targets were revised and replaced or added.

Main changes to LogFrame targets include:

- Slightly decreased target of direct energy and emission savings (from 1.4 to 1.2 GWh/year)
- Increased target of LED technology share in street lighting pilots (from 5% to 40%)

These changes were introduced based on consultations with the Yerevan city municipality during an inception phase. It was identified that LED-based street lighting is considered as a priority technology to be tested under the pilot projects. In particular, the Municipality proposed to implement a LED-based street lighting demonstration project on one of the major avenues involving about 884 fixtures. Given the reduced number of fixtures affordable within the budget due to the higher capital cost of LED lighting technologies, the initially estimated direct energy saving from implementation of pilot projects was revised and reduced accordingly: from 1.4 GWh/y to 1.2 GWh/y. [3]

Newly adopted targets as per the Inception Report include:

- Midterm target – development of methodology of street lighting energy audit
- New indicator and target on awareness rising and media releases on results of pilot projects
- Establishment of revolving fund in municipalities
- New criteria on performance and life-cycle costs of lighting applications for incorporation in state procurement rules

The Midterm Review did not introduce any changes to the LogFrame.

4.1.4 **Assumptions and risks**

Assumptions and risks were specified in the LogFrame for the project objective and each project outcome, and they include timely adoption of municipal programs and national policies, that require sufficient political will and financing available.

The Project Document specified three main risks in the Risk Log, including financial, political and strategic one, as well as their impact and probability, counter measures/management response, owner and status/updates. Main risks identified in the ProDoc include:

- Financing for demonstration projects and/or municipal programs proves to be unavailable (probability P=2, impact I=4)
- Proposed policy changes are not adopted or not sufficiently enforced (P=3, I=3)
- Inadequate project implementation and coordination with other initiatives (P=2, I=2)

[3] Inception Report "Green Urban Lighting", UNDP, February 2014

Scale used for rating from 1 to 5: 1 – low, 5 - high

Inception Report did not introduce any new risk nor changed the risk analysis. The Midterm Review updated the rating of risks (slightly decreased probability of two risks) and introduced two new socio-economic risks, and two new environmental risks.

Newly included risks as per MTR:

Socio-economic risk:

- Stakeholder ownership and public/stakeholder awareness are not being sustained after project finalization (P=2, I=5)
- Knowledge and capacity requirements for municipal specialists remain low (P=3, I=4)

Environmental:

- Indirect Energy savings and GHG emission reductions achieved through replicative actions are not materializing (P=3, I=4)
- Missing strategy for environmentally safe collection and disposal of used mercury-containing lighting equipment (P=3, I=3)

Risks identified in the ProDoc and MTR sufficiently cover all main project related risks, properly rate risk probability and impact and specify risk mitigation strategies.

4.1.5 **Planned stakeholder participation**

The Project Document specified key project implementation partners and stakeholders and their responsibilities and areas of collaboration with the Project, see Chapter 3.6 Main Stakeholders3.6.

Key Project stakeholders identified in the ProDoc, include:

- Ministry of Nature Protection
- Ministry of Energy and Natural Resources
- Ministry of Territorial Administration and Development
- Municipality of Yerevan
- Yerevan Illumination Company CJSC
- Other municipalities, including Spitak, Sevan
- Ararat Bank
- National Institute of Standards
- State Engineering University of Armenia
- Scientific Research Institute of Energy

Planned stakeholder participation included all relevant project partners at the governmental and municipal level, as well as relevant state agencies, universities, and research institutions.

4.1.6 Linkages between the project and other interventions within the sector

The Green Urban Lighting Project has been developed as a third in a row of UNDP-supported GEF-financed project in Armenia targeting energy efficiency. The GUL project is complementary to the previous ones that included the full-sized project "Improving Energy Efficiency of Municipal Heating and Hot Water Supply" (2005-2012), and "Improving Energy Efficiency in Buildings" (2010-2016).

Since 2012, the Renewable Resources and Energy Efficiency Fund of Armenia (R2E2 Fund) was managing World Bank- and GEF-financed "Armenia Energy Efficiency Project" that steer the World Bank funds as loans to public entities for reducing energy consumption in public and municipal buildings, and in street lighting as well. The 10 mil USD project provided preferential loan facility (with 2.5% interest and 10 years loan maturity). The focus of the World Bank/GEF/R2E2 project is much broader than of the GUL project, and although it includes also component on street and indoor lighting, its main focus is on larger energy efficiency building reconstructions, such as military facilities, and other public facilities such as Puppet Theater and Slavic University.[4]

EBRD has implemented Armenian Sustainable Energy Finance Facility (ArmSEFF, 2010-2013) that provided debt financing through local banks for energy efficiency improvements and renewable energy utilization for private businesses, and a follow-up Caucasus Sustainable Energy Finance Facility providing finance through local banks also to residential sector. Although lighting is an eligible technology, the finance facility serves mostly commercial/private business sectors.

4.1.7 UNDP comparative advantage

UNDP has a demonstrated administrative and project management capacity to implement energy efficiency projects, it is a neutral GEF implementing agency. UNDP has a substantial in-country and regional expertise and experience from implementing similar energy efficient lighting projects in other countries of operation in the region of Europe and CIS countries (Slovakia, Ukraine, Russia, Kazakhstan).

UNDP Armenia has successfully implemented two GEF-financed energy efficiency projects (Improving Energy Efficiency of Municipal Heating and Hot Water Supply, and Improving Energy Efficiency in Buildings), and it has established effective cooperation scheme with the government and municipalities, as well as with relevant state agencies, with expert community and NGOs in Armenia.

Through implementation of a series of energy efficiency projects, UNDP CO Armenia and its Climate Change Programme has developed in-house expertise in energy efficiency that is shared with new projects as well.

4.1.8 Replication approach and sustainability

Replication and long-term self-sustainability compose a cornerstone of the project strategy outlined in the Project Document. All four project components have been designed to support post-project

[4] The World Bank/R2E2 project implemented less energy efficient HPS lighting technology, and mayors in cities with pilot projects supported by the R2E2 Fund often reported low quality and level of street illumination. The GUL projects, on the other hand, implemented the most energy efficient technology available on the market (LEDs), and paid a special attention to a good quality lighting design, with sufficient and good quality street illumination.

replication, including local capacity strengthening, learning by doing/pilot projects, and policies and standards. One of four project components is fully dedicated to replication: Component 3 - Replication via municipal lighting programs and associated financial instruments.

The core of the replication strategy is establishment and funding of a financial mechanism – revolving fund to finance energy efficiency lighting projects in municipalities, and municipal plans/programs to continue urban lighting retrofits.

4.1.9 **Management arrangements**

The Project was designed to be implemented by the Ministry of Nature Protection (MNP) following UNDP's National Implementation Modality (NIM). As the national authorized body for UNFCCC implementation in Armenia, MNP has coordinated UNDP-supported GEF-financed climate change program since 1997 and it was designed to be responsible for the overall management and supervision of the Project. MNP has served already as an implementing agency for two UNDP-supported GEF-financed energy efficiency projects. The Ministry of Nature Protection appointed a National Project Director who served as the Focal Point of the Government of Armenia for the Project, and as a Chairperson of the Project Board in the same time.

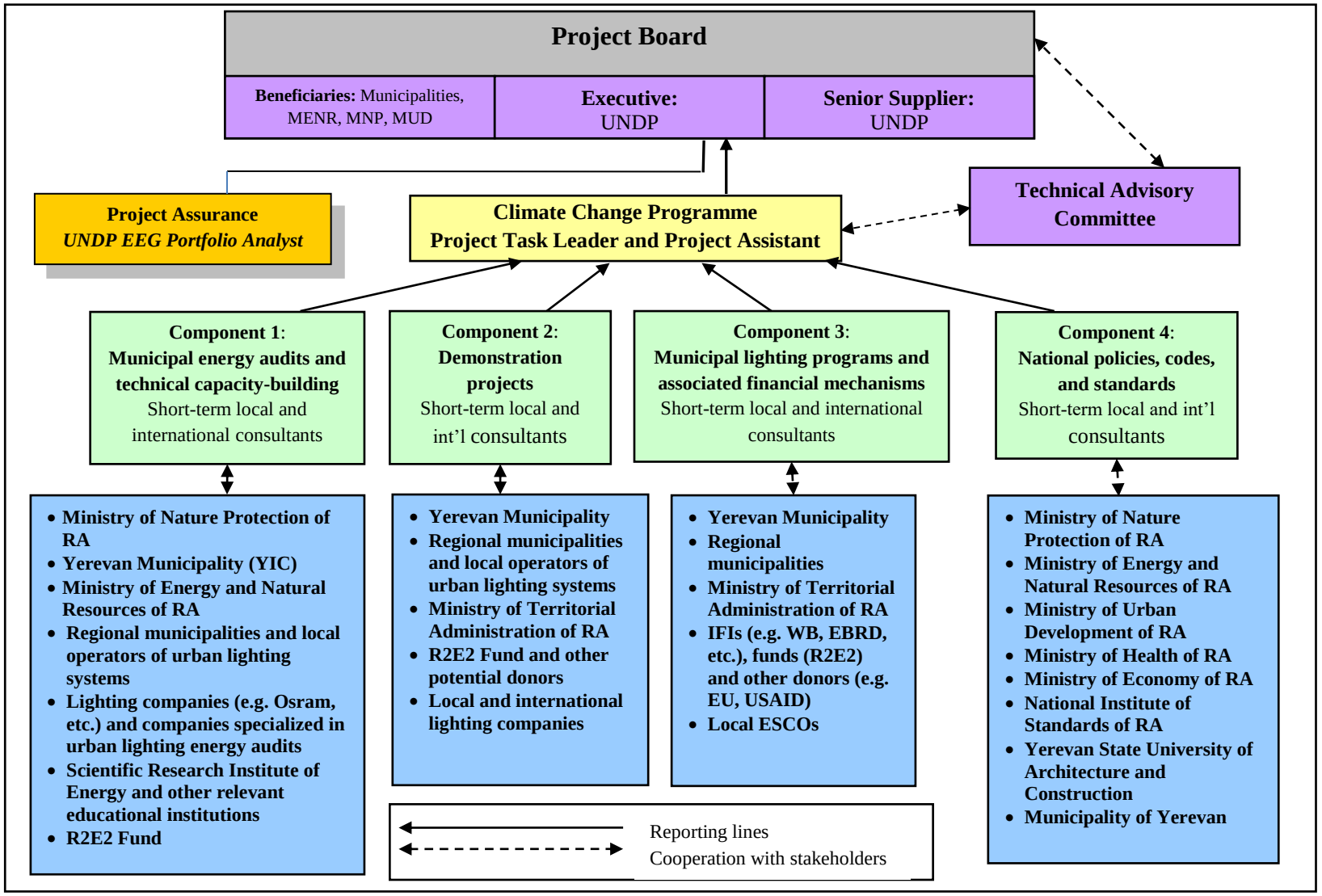
The Project Board was designed to consist of the UNDP Environment Governance Portfolio National Director; a representative of the Government and implementing partner, the Ministry of Nature Protection; a focal person nominated from the municipality of Yerevan as main project beneficiary and second implementing partner; and a senior representative of UNDP.

The Technical Advisory Committee was designed to comprise representatives of various other interested public and private agencies. The Ministry of Energy and Natural Resources, Ministry of Urban Development, Ministry of Territorial Administration, Ministry of Economy, Ministry of Nature Protection, the R2E2 Fund, the Scientific Research Institute of Energy, National Institute for Standards of RA and the Yerevan State University of Architecture and Construction were planned to be invited to nominate representatives to the Technical Advisory Committee.

The day-to-day implementation of the project was designed to be carried out through the well-established UNDP Climate Change Program Unit coordinated by and located at the MNP.

A full time Task Leader (TL) technical expert was designed to be fully responsible for the direct project execution and management, including coordination of all project activities, under the supervision of the Climate Change Program Coordinator. Project team consisting of part-time national and short-term international experts, was designed to work on specific tasks under each project component.

Figure 1: Project Implementation Structure as per ProDoc



4.1.10 **Lessons learned from other relevant projects**

The GUL project was developed after two previous energy efficiency projects have been successfully implemented in Armenia (Improving Energy Efficiency of Municipal Heating and Hot Water Supply, and Improving Energy Efficiency in Buildings). The GUL project thus benefited from country-specific experience gained when implementing these two energy efficiency projects in Armenia.

The GUL project in Armenia was not the first UNDP-supported GEF-financed energy efficiency lighting project in Europe and CIS region. The first public/street lighting project in this region was implemented in Slovakia in 2005 – 2011. Further efficient lighting projects have been developed and launched in Russia (2010), Ukraine (2011), and Kazakhstan (2012). The GUL project benefited especially from the other three efficient lighting projects under implementation in the CIS region. Project Managers of these three lighting projects have participated at the Inception Workshop of the GUL project and shared experience from their project implementation. The GUL project cooperated also with other lighting experts from these countries and from Belarus, who shared their experience also from implementation of their national projects.

4.2 Project Implementation

4.2.1 Project implementation and adaptive management

The Project was implemented in-line with the project strategy and a work plan outlined in the Project Document and adjusted according with revisions recommended by the Inception Report and the Midterm Review, where appropriate. The Midterm Review included 18 recommendations, of which all but one were implemented. MTR recommendation B.1 to extend the scope of the Project from lighting to all energy forms and energy efficiency opportunities in buildings and to develop detail energy audits for several typical building representatives was not implemented by this project, because it was addressed already by other projects, including the UNDP-supported GEF-financed project Energy Efficiency in Buildings, and the World Bank/R2E2 Energy Efficiency Project.

The project was implemented in a flexible, results-oriented way. It implemented adaptive management in a very effective and flexible way, reflecting development of local situation at a national and municipal levels, actual development of the lighting market in Armenia, and needs and opportunities that arose during project implementation period.

Main adopted changes include:

- 100% focus on installation of LEDs
- No CFLs installed with the project support
- Municipal Financial Working Groups were established to oversee performance of revolving funds in addition to a national Technical Working Group
- Energy audit extended to a specific municipal lighting audit with more detailed focus on design of good quality lighting services (quality of illumination), and quality of luminaires (including but not limited to white light appearance, Color Rendering Index - CRI, lamp efficacy, lumen depreciation)
- Testing laboratory established for testing light and energy parameters of light sources
- Direct savings target of 1.4 GWh/year was downscaled to 1.2 GWh because of LED technology has matured already enough and became a priority option for municipalities. However LEDs still had a higher investment costs and thus lower number of light upgrades was estimated to be able to finance and implement with a given budget, and thus the target was reduced.
- Expert trainings and especially awareness raising activities were implemented in an unusually extensive scope and well documented online on the web site of the Climate Change Unit of the Ministry of Nature Protection.
- Loans from local banks for funding energy efficient lighting retrofits were not developed due to restrictions on municipal debt financing, instead a factoring scheme was developed and shared with the R2E2 Fund for implementation
- No-cost extension of one year was implemented as per MTR recommendation in order to keep control of the monitoring of disbursements/replenishments of the municipal revolving funds and impacts of improved legislation on urban and indoor lighting systems.

- Life-cycle criteria was not developed for public procurement, because it was redundant due to decreasing costs of LED and full competiveness of LED technology combined with introduced minimum energy performance requirements
- Ban of incandescent lamps in public procurement has been adopted. Due to fast market transformation from incandescent lamps to LEDs, there is no urgent need to extend the ban of incandescent lamps in residential sector and neither a political will to do so at this time, also because of impact of higher purchase costs on low-income households.

4.2.2 **Partnerships arrangements**

The Project worked with all relevant local and international stakeholders. Main project partners included:

- National government
- Municipalities
- Local expert community, state agencies and educational institutions
- LED technology suppliers
- International experts
- NGOs

Overview of project partners and their role in the Project/responsibility:

- Ministry of Nature Protection – implementing partner
- Ministry of Energy and Natural Resources - legislation
- Ministry of Territorial Administration and Development – rural development and financing
- R2E2 Fund – manager of the World Bank/GEF Energy Efficiency Project providing loans to municipalities for energy efficient retrofits of public facilities, including lighting
- EBRD – loan for reconstruction of street lighting at 28 main roads in Yerevan
- ADB – loan for re/construction of north-south highway, including street lighting
- Municipality of Yerevan – main project partner for implementation of demonstration projects
- Municipalities of Abovyan, Alaverdi, Akhtala, Aparan, Ararat, Dilijan, Gavar, Goris, Gyumri, Kajaran, Kapan, Masis, Meghri, Sevan, Spitak, Stepanavan, Talin, Vanadzor, Vayk – demonstration projects, urban lighting audits
- Yerevan Illumination Company CJSC – operator of municipal lighting in Yerevan
- National Institute of Standards – development of technical standards
- Scientific Research Institute of Energy
- National Polytechnic University of Armenia – stand with different lighting sources
- American University of Armenia (AUA) – development of the "Lighting Technologies for Engineers and Architects" textbook with 7 teaching modules
- Economic Development and Research Center – residential energy consumption survey
- Shincertificate LLC
- Schréder and other international and local suppliers of lighting equipment – study tour, workshops and trainings, testing of luminaires

- Center for Light Emitting Diode and Optic-Electronic Technologies of the National Academy of Sciences of Belarus – workshops, technical training
- Russian Lighting Research Institute named after S.I. Vavilov – workshops, technical training
- Design for Lighting LTD, UK
- CivilNet (private foundation)
- G2iA (NGO)

4.2.3 **Monitoring and evaluation**

The Project Document described in detail necessary monitoring framework and evaluation procedures, as required for all UNDP-supported GEF-financed projects.

Specifically, it drafted a Monitoring and Evaluation Work Plan that identified responsible parties for M&E activities, including Inception Workshop and Report, GHG emission monitoring (baseline and results) in-line with GEF-STAP (Scientific and Technical Advisory Panel) methodology, monitoring, reporting and verification of Project Progress and Performance, APR/PIR, annual Project Board meetings, quarterly Periodic Status Reports, Midterm Review, Terminal Evaluation, Terminal Lessons Learned Report, Audit, visits to field sites/project demonstration sites. For each M&E activity responsible parties have been specified, appropriate indicative budget allocated, and time-frame specified.

According to the M&E plan, key parties responsible for performing project monitoring and evaluation included Project Coordinator/Manager, UNDP Country Office, UNDP-GEF Regional Technical Advisor, international and local experts/consultants.

Nor the Inception Report neither the Midterm review suggested any revisions to the Monitoring and Evaluation Plan.

The project was subject to standard UNDP monitoring and evaluation procedures. Crucial tools used for monitoring and evaluation included the log-frame, Inception Workshop and Inception Report, Mid-Term Review and Terminal Evaluation, Project Board meetings, and standard UNDP and GEF planning and reporting tools with quarterly and annual frequency, including risk logs in Atlas, GEF tracking tool, Standard Progress Reports (SPR) twice a year, Annual Work Plans (AWP), Annual Project Review/Performance Report (APR), Project Implementation Review (PIR).

Project implementation has been regularly reviewed by Project Board meetings held once a year (with one exception). Project Board meetings were held on December 18, 2014, November 28, 2016, and December 19, 2017. However the Project Coordinator met with the National Project Director and Chair of the Project Board frequently on an ad hoc basis several times a year.

The inception phase begun in November 2013 at the launch of the Project, Inception Workshop was held on January 15, 2014, and the Inception Report was finalized in February, 2014.

The final Mid-Term Evaluation report was submitted on June 8, 2016, 2.5 years after the Project start.

The budget for monitoring and evaluation was sufficiently designed to include 61,000 USD as of ProDoc.

Appropriate adaptive management has been implemented in response to monitoring and evaluation performed.

Monitoring and evaluation was properly designed, the rating of the M&E design is Highly Satisfactory.

4.2.4 Feedback from M&E activities used for adaptive management

Feedback from M&E activities, namely revised work plan and LogFrame of the Inception Report, and recommendations of the MTR were taken into account and implemented in the next phase of project implementation, where appropriate. Feedback from annual PIRs was implemented in following implementation period and annual work plans.

Specifically, the MTR included eighteen specific recommendations in six chapters, including recommendation for each project component, for project implementation/adaptive management, and for project sustainability. The project management response fully endorsed implementation of the MTR recommendations, and the MTR recommendations have been implemented with one exception. MTR recommendation B.1 to extend the scope of the Project from lighting to all energy efficiency opportunities in buildings and to develop detail energy audits for several typical building representatives was not implemented by this project, because it was addressed already by other projects, including the UNDP-supported GEF-financed project Energy Efficiency in Buildings, and the World Bank/R2E2 Energy Efficiency Project. For more details of MTR recommendations, see Chapter 4.2.1.

Based on the MTR recommendation, one-year no-cost extension till November 2018 was approved in 2017 (Request for extension on May 5, 2017).

Quality of M&E plan implementation is rated Highly Satisfactory.
Overall quality of monitoring and evaluation implementation is rated Highly Satisfactory.

4.2.5 Financial planning and management

The GEF budget of 1.6 mil USD as of the project document is shown in Table 6. UNDP budget used for management costs and its spending is shown in Table 7 and Table 9.

Table 6: GEF Project Budget as of Project Document [USD]

Year	1	2	3	4	Total	
Outcome 1	70,500	121,500	32,500	23,500	**248,000**	15%
Outcome 2	138,000	324,000	226,000	62,000	**750,000**	47%
Outcome 3	34,500	128,000	82,500	53,000	**298,000**	19%
Outcome 4	27,500	78,000	65,500	28,000	**199,000**	12%
Management	26,500	26,500	26,500	25,500	**105,000**	7%
Total	**297,000**	**678,000**	**433,000**	**192,000**	**1,600,000**	100%
	19%	42%	27%	12%	100%	

Table 7: UNDP and GEF Management and Total Budget as of Project Document [USD]

UNDP Management	15,000	42,000	16,000	47,000	**120,000**	7%
GEF+UNDP Management	41,500	68,500	42,500	72,500	**225,000**	13%
Total GEF+UNDP	312,000	720,000	449,000	239,000	**1,720,000**	100%

The Table 8 shows annual project expenditures charged to the GEF budget by project outcomes for each year of project implementation period as reported in Combined Delivery Reports.

Table 8: GEF expenditures by project outcomes and years (CDR) [USD] as of June 14, 2018

	2014	2015	2016	2017	6/2018	Total	% of total	% of budget line
Outcome 1	48,931	65,078	46,761	67,827	15,272	**243,870**	16%	98%
Outcome 2	322,024	123,147	228,161	93,865	27,788	**794,986**	50%	106%
Outcome 3	27,649	34,533	119,933	50,714	43,064	**275,893**	18%	93%
Outcome 4	30,853	35,773	51,068	33,794	12,462	**163,950**	10%	82%
Management	15,057	13,479	25,780	19,136	27,111	**100,563**	6%	96%
Total	**444,514**	**272,010**	**471,703**	**265,337**	**125,670**	**1,579,261**	100%	99%
% of GEF budget	28%	17%	29%	17%	8%	99%		

Actual project expenditures very closely follow budgeted amounts in each of the budget line (outcome).

Half of GEF project budget (47%) was designed to be spent on Outcome 2 – demonstration projects, and exactly 50% of total project expenditures were spent on demonstration projects/Outcome 2.

Table 9: UNDP and GEF Management Expenditures [USD]

	2014	2015	2016	2017	6/2018	Total	% of total GEF + UNDP budget	% of budget line
UNDP Management	10,579	16,157	34,618	32,267	13,173	**106,794**	6.2%	89%
GEF Management	15,057	13,479	25,780	19,136	27,111	**100,563**	5.9%	96%
Total Management	25,636	29,636	60,398	51,403	40,284	**207,357**	12%	92%

GEF management expenditures as of mid June, 2018 represent 6% of total project budget. Total management expenditures, including UNDP management costs, represent 12% of combined GEF + UNDP budget. This illustrates very good cost-effectiveness of project management. All project team members served (except for the Task Leader at the beginning of the Project) under a part-time contract.

The Project implemented standard financial controls and timely flow of payments.

The Project was subject to a complex audit. The audit expressed minor formal comments (regarding working hours timesheets reporting, and micro-procurement of goods of value lower than 100 USD), and no comments whatsoever on financial reporting and management.

4.2.6 Co-financing and in-kind contributions

Table 10: Financial Planning and Co-Financing as of June 2018

Co-financing (Type/Source)	UNDP own Financing (mill US$)		Government (mill US$)		Other Sources (mill US$)		Total Financing (mill US$)		Total Disbursement (mill US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants	0.120	0.107	7.055	7.416		12.626[5]	7.175	20.149	7.175	20.149
Credits						21.060		21.060		21.060
In-kind support	1.000	0.300	0.320	0.316			1.320	0.616	1.320	0.616
Other										
Total	**1.120**	**0.407**	**7.375**	**7.732**		**33.686**	**8.495**	**41.826**	**8.495**	**41.826**

[5] Includes co-financing from other UNDP implemented projects of 0.555 mil USD, including SGP (see next page)

Table 11: Summary of co-financing

	Investment in lighting system energy efficiency	*Investment thousand USD*
1	**EBRD credit Yerevan**	
	EBRD credit	4 000
	E5P grant (1,9M Euro)	2 204
	City/Government (800,000+380,000 Euro)	1 369
2	**EBRD credit Gyumri,**	
	EBRD credit	14 600
	E5P grant	7 300
	Government	4 768
	TA	1 940
3	**Vivacell village lights**	
	Rural community support	593
4	**Bright border**	
	Bright border (indoor)	34
5	**UNDP**	
	Tavush project, Tourism street + indoor for bright boarder	157
	Small Grants Programme	367
	Kindergartens - GCF	31
6	**Cities**	
	In parallel to project from own or other sources	
	Kajaran	6.3
	Spitak	1.2
	Aparan (86x125 + 19000)	29
7	**ADB credit roads**	
	Yerevan city	690.3
	Highways (3000x 300 + 3000x290)	1 770
8	**Yerevan City**	
	New streets (Babajanyan, Shirak, Sheram) (300x300)	90
	New streets (Beyrut) (21x 290; 29x300; 29x150)	22.8
	Parks (central park Mashtots to tunnels), malls streets etc	556
	TOTAL	**40 528.6**

4.2.7 Management by UNDP and implementing partner

The Project was managed according to the planned management scheme specified in the Project Document, see Chapter 4.1.9 and Figure 1: Project Implementation Structure as per ProDoc.

The Project was implemented by the Ministry of Nature Protection (MNP) following UNDP's National Implementation Modality (NIM) under the supervision of the Minister of Nature Protection (as of 2018 Mr. Erik Grigoryan, Minister), who serves also as a UN FCCC focal point and GEF national focal point, and as a National Project Director and Chair of the Project Board.

The Project team is supervised by Ms. Diana Harutyunyan, the UNDP Climate Change Programme Coordinator at the Ministry of Nature Protection.

The liaison between the Project management, the Climate Change Programme Coordinator and the National Project Director was very effective, allowing for ad hoc informal meetings whenever required.

Mr. Artem Kharazyan served as a full-time Task Leader responsible for operational project management. Since mid 2015, when he left for another job, the duties of the Task Leader are performed by Ms. Diana Harutyunyan, the UNDP Climate Change Programme Coordinator.

The project team consists of a pool of five long-term part-time and 12 short-term local experts. All project experts have developed their expertise in lighting and belong to best local experts in lighting technology.

The Project implementation was supported by five international consultants. Especially, the high professional profile and expertise in efficient lighting of two international consultants hired at the beginning of the Project, helped the Project to establish a very high professional level and credibility when liaising with expert community locally and internationally, including lighting manufactures and suppliers.

The project expert team was supported by two part-time back-office personnel, Ms. Marianna Arzangulyan, Administrative Assistant, and Ms. Rubina Stepanyan, Financial Assistant, and a part-time monitoring expert and driver, Mr. Vahan Mardirossian.

Table 12: List of Experts of the "Green Urban Lighting" Project

#	*Name*	*Position*
	Long-term Experts	
1.	Artem Kharazyan	Senior Expert on Energy Efficiency
2.	Armen Gulkanyan	Local Expert on Energy Efficient Lighting Market and Technologies
3.	Karen Sargsyan	Local Expert on Lighting System Energy Audit (technical and supervision)
4.	Hovhannes Nunyan	Local Expert on Economic Assessment and Financial Mechanisms
5.	Arthur Tsughunyan	Local Expert on Energy Auditing and Evaluation of the Energy Efficiency Potential
	International Experts	
6.	Steven Coyne, Australia	International Expert on Energy Efficient Lighting for the Project's Inception Phase
7.	John Rands, GB	Consultant on Roadway Tunnel Illumination Systems

8.	Vesa Rutanen, Finland	International Expert on Energy Efficiency (consultancy on municipal EE lighting measures and programs and overall implementation of the project)
9.	Anatoli Shevchenko	Project Manager of the UNDP-supported GEF-financed lighting project in Russia
10.	Andrey Dodonov	Russian Trust-Fund Lighting Expert on Demand, Russia
11.	Andreas Karner, Austria	Independent International Expert on Mid-term Evaluation
12.	Jiří Zeman, Czech Republic	Independent International Expert on Terminal Evaluation
		Short-term Experts
13.	Tigran Sekoyan	Local Expert on Energy Audit of Lighting Systems and Buildings (methodology and assessment)
14.	Svetlana Galoyan	Local Expert on Energy Efficiency Aspects in Residential Sector
15.	Apres Nazaryan	Architect-Constructor
16.	Gevorg Nazaryan	Local Expert on Codes and Standards («Artificial and Natural Lighting» RACN)
17.	Vladislav Harutyunyan	Local Expert on Municipal Energy Efficient Lighting Demonstration Projects
18.	Artak Ambaryan	Local Expert on Development of Teaching Modules on Light and Energy Efficient Lighting Technologies
19.	Vardan Ghazaryan	Local Expert on Municipal Lighting Program Development
20.	Arpine Ghshyan	Local Expert on Legal Issues
21.	Ovsanna Karapetyan	Local Expert on Codes and Standards («Artificial and Natural Lighting» RACN)
22.	Arsen Karapetyan	Local Expert on Codes and Standards
23.	Nazineh Khalafyan	Local Expert on Public Outreach
24.	Gurgen Khostikyan	Local Expert on Education and Capacity Building

UNDP Armenia was successful in developing and implementing a series of energy efficiency projects that complement to each other in both, the subject and implementation period. These projects include GEF-financed "Improving Energy Efficiency of Municipal Heating and Hot Water Supply" project, "Improving Energy Efficiency in Buildings" project, "Regulatory Framework to Promote Energy Efficiency in the Countries of Euroasian Economic Union", a regional project financed by the Trust Fund for Development of the Russian Federation and UNDP, and "De-risking and Scaling-up Investment in Energy Efficient Building Retrofits" GCF financed project. UNDP CO used this strategy to develop and maintain a strong in-house expertise of project team experts who work (in some cases on a part-time basis) continually on these energy efficiency projects.

By adopting this strategy, UNDP CO avoided a typical problem of project-based time-limited financial support provided by international donors (including GEF) to individual development interventions/projects (usually for 4 - 6 years maximum). This discrete, project-based financing often leads to loss of expertise generated during project implementation due to experts leaving for other jobs after projects' terminations.

UNDP Country Office monitors the implementation of Project, reviews project implementation progress, and ensures proper use of GEF funds.

UNDP CO provided effective support to the project implementation team. UNDP CO support included also appropriate risk management and candor reporting such as PIR, and an effective support in implementation of an adaptive management in response to both project implementation challenges and opportunities.

The management of the Project team, of the implementing agency and the executing agency, and their coordination and overall quality of implementation and execution are all rated Highly Satisfactory.

4.3 Results

4.3.1 **Overall results and attainment of objectives**

Project objective and outcome level results and rating are summarized in Table 13: Project results and achievements as per LogFrame targets below.

The Project has achieved all objective and outcome level targets, and in most cases the target was significantly exceeded. Only one target has not been fully achieved: the universal incandescent phase-out plan including residential sector was not developed because of lack of political will. However, market data show that the market has evolved quickly towards energy efficient lighting with LEDs being the dominant technology sold, and incandescents representing only ca 15% of sales. Effective ban of incandescent lamps has been implemented through updated legislation and technical standard with minimum energy performance requirements for public procurement.

The Project has implemented a number of additional activities and produced deliverables supporting its objective that are not included in the LogFrame results matrix. Main project events implemented and deliverables published are listed at the end of this Chapter.

Project results including rating are summarized in Table 13: Project results and achievements as per LogFrame targets.

Rating used:

HS – Highly Satisfactory, S – Satisfactory, MS – Moderately Satisfactory, MU – Moderately Unsatisfactory, U – Unsatisfactory, HU – Highly Unsatisfactory

Table 13: Project results and achievements as per LogFrame targets

Project Strategy	Indicator	Baseline	End of Project Target	Achievements	Rating	Justification for Rating
Project Objective: To remove barriers to energy-efficient lighting in Armenia, by means of technical assessment, facilitation of financing, and development and implementation of municipal programs and national policy	Quantity of energy saved and GHG emissions avoided	Street lighting: 40 GWh of electricity consumed for street lighting in 2011, accounting for about 16,000 tons of CO_2 emissions. Average fixture power consumption is 210 W in 2011. Residential lighting: 550 GWh consumed for residential lighting in 2011, accounting for about 220,000 tons of CO_2 emissions.	Direct energy savings of 1.2 GWh per year[6] from demonstration projects (474 tons of CO_2 emissions)	1.564 GWh/year and 625 tCO_2 annual emission reductions in 2018 from demonstration projects	**HS**	Includes only savings from first demonstration projects in municipalities financed from the GEF Project budget without other projects implemented with funding from revolving funds. Energy and GHG savings based on a methodology "Calculating Greenhouse Gas Benefits of the Global Environment Facility Energy Efficiency Projects, GEF STAP, 2013", and a spreadsheet "GEF EE Tool v 1.0", input data and assumptions as per project monitoring. The target was achieved at 130%.
			Direct energy savings of 20 GWh per year from replication of demonstration projects via municipal programs (8000 tons of CO_2 emissions).	20.56 GWh/year and 8.234 tCO_2 annual emission reductions from replication via municipal programs utilizing revolving fund	**HS**	Includes savings from implemented replication projects financed from revolving funds and by other donors (EBRD, ADB, ATDF) over the project influence period. Revolving funds were financed only from savings from the first demonstration GEF financed pilot projects, without any additional external funding. The target was achieved at 103%. Average savings per lighting installation reached 69% of original energy consumption and GHG emissions.
			Indirect energy savings of 125 GWh per year from implementation of	188.2 GWH/year and 75,284 tCO2 annual emission reductions in 2018 from policy implementation	**HS**	Indirect savings reflect adoption of national lighting policy, i.e. adoption of minimum energy performance standard of lighting appliances compulsory for public sector. The target was achieved at 150%.

[6] Note that all LogFrame direct and indirect energy and GHG emission reductions targets are expressed in **annual** savings. Thus, achievement is reported also in annual savings. Lifetime savings are 20 times higher (with 20 years lifetime of LED technology).

Project Strategy	Indicator	Baseline	End of Project Target	Achievements	Rating	Justification for Rating
			national lighting policy (50,000 tons of CO_2 emissions)			
Outcome 1: Municipal energy audits, technical capacity-building and awareness raising	Methodology for energy/lighting audit Number of municipal lighting systems energy audits conducted Number of specialists and agency representatives trained Public media exposure	Lack of methodology for assessing energy efficiency in lighting Municipalities are not aware of energy saving potential in lighting sector No specialized training or training materials on EE lighting is offered in Armenia Limited broadcasting of information on EE lighting	By the project mid-term methodology established	Methodology designed, applied & verified in first street lighting energy audits	**HS**	Methodology Guide on Street Lighting Audit published. Review of sample of street lighting energy audits. The target was achieved.
			At least 10 comprehensive audits of public lighting (including pilots) completed in Yerevan and other cities (including baseline analysis and recommendations for improvement)	In total 46 lighting energy audits (38 street lighting, 8 indoor) completed in Yerevan and 19 other cities plus two villages (Abovyan, Alaverdi, Akhtala, Aparan, Ararat, Dilijan, Gavar, Goris, Gyumri, Kajaran, Kapan, Masis, Meghri, Sevan, Spitak, Stepanavan, Talin, Vanadzor, Vayk)	**HS**	Review of street lighting energy audits, interviews with municipalities. Target was achieved and exceeded more than 4-times.
			At least 20 specialists from private sector and municipalities are trained on EE lighting and energy audit	More than 200 specialists from municipalities, ministries, design and construction institutions were trained in municipal lighting system technologies, lighting standards, lighting	**HS**	Review of project deliverables, list of trainings and participation lists. The target was achieved and 10x exceeded.

Project Strategy	Indicator	Baseline	End of Project Target	Achievements	Rating	Justification for Rating
				system testing, tunnel lighting specifics.		
			Media releases on outcomes of each pilot. Awareness raising materials available for general public	More than 170 media releases, published in printed media, and broadcasted on TV coverage, including a 17 minute reportage on project results and spots on pilot project results. 3400 participants joined the "Green Lighting Week" awareness rising event held in 2017, information materials and CFLs disseminated, "Lighting Technologies for Engineers and Architects" textbook developed, classes and competition in 5 high school, publications available on www.nature-ic.am	**HS**	The target was not specific in terms of concrete number of media releases, and information materials. The achievement is well documented and it is exceptionally rich in terms of number of media releases published, and size of targeted audience/number of participants of awareness rising campaigns and information dissemination activities. The achievement significantly exceeded expectations.

Project Strategy	Indicator	Baseline	End of Project Target	Achievements	Rating	Justification for Rating
Outcome 2 Demonstration projects: *Pilot projects yield cost-effective energy savings, raising the confidence of investors and decision-makers about EE lighting*	Efficiency and energy savings of installed EE lighting Share of LED in demo-projects	The majority of fixtures in municipal outdoor lighting sector incorporate inefficient 250W HPS lamps or 400W mercury-vapor lamps. The indoor lighting sector is dominated by inefficient incandescent lamps and fluorescent tubes.	At least five demonstration projects on a number of efficient lighting technologies completed for indoor, outdoor and street lighting.	34 outdoor and street lighting, and 8 indoor efficient lighting projects completed with GEF and revolving funds financing. Additional dozens of supported projects implemented with other financing (EBRD, ADB, Vivacell, UNDP SGP, GCF, and additional projects in Yerevan, Spitak, Kajaran, Aparan.	**HS**	Review of demonstration project files, site visits to demonstration projects, interviews with municipalities. Achievement exceeded target 8+ times.
			Direct energy savings of up to 0.95 GWh per year by completion of all pilots (subject to final selection of pilot size and technologies)	1.564 GWh/year and 625 tCO_2 annual emission reductions in 2018 from demonstration projects	**HS**	Refers/related to the first project objective indicator/target. The target was achieved at 165%.
			100% LED for outdoor (park) and indoor lighting pilots	100% of LED luminaries applied in outdoor and indoor pilot projects	**HS**	Only LED technology was implemented in all GEF supported projects including projects financed from revolving funds. The target was achieved.
			40% LED included in street lighting pilots	100% of LED luminaries applied in street lighting pilot projects	**HS**	Only LED technology was implemented in all GEF supported projects including projects financed from revolving funds. The target was achieved at 250%.

Project Strategy	Indicator	Baseline	End of Project Target	Achievements	Rating	Justification for Rating
Outcome 3 Replication via municipal programs and associated financial instruments: *Municipal lighting programs lead to widespread deployment of EE lighting and associated energy savings*	Municipal programs for EE public lighting	Municipal programs for EE public lighting are desired but not comprehensively designed, financed, nor implemented	Municipality of Yerevan develops and adopts program for upgrades of municipal lighting	Yerevan street lighting program developed (with 18.5 GWh savings), feasibility study of street lighting retrofit in 28 main roads for EBRD 7 mil USD financing, Yerevan Sustainable Energy Action Plan with a section on street lighting adopted in 2016	**HS**	Interviews with municipalities, review of project deliverables. 4 projects were replicated in Yerevan with financing from revolving fund, feasibility studies and programs developed for further municipal lighting programs, the municipality of Yerevan is fully dedicated to continue municipal lighting energy efficiency retrofits in their facilities. The target was achieved.
			Similar programs are adopted in other cities of Armenia	Municipal lighting upgrade programs developed in other 11 municipalities, of which in 9 towns (Abovyan, Alaverdi, Ararat town, Ararat village, Gavar, Kajaran, Kapan, Spitak, Stepanavan) replication projects financed from revolving funds completed, and in Goris and Sevan programs developed.	**HS**	Interviews with municipalities. Programs developed, adopted and replication projects implemented. The target was achieved.
	Energy savings of these programs		Savings of 20 GWh per year from municipal lighting programs	20.56 GWh/year and 8.234 tCO_2 annual emission reductions from replication via	**HS**	Replication of the second project objective indicator/target. The target was achieved at 103%.

Project Strategy	Indicator	Baseline	End of Project Target	Achievements	Rating	Justification for Rating
				municipal programs utilizing revolving fund		
	Financial commitments for energy-efficient municipal lighting		US $10 million for energy-efficient municipal lighting secured	40.2 mil USD secured from EBRD (Yerevan, Gyumri), ADB, Bright Border Initiative donors, SGP, GCF kindergartens, municipal budget. ATDF budget planned to be increased to 8.3 mil USD for municipal infrastructure reconstruction (main demand for street lighting retrofits)	**HS**	Overview of co-financing. Target was achieved at 402%.
			Establishment of financing mechanisms for Yerevan (e.g. revolving fund) from savings achieved from piloted EE measures.	Revolving fund established and operational in Yerevan and in 8 other cities (Abovyan, Alaverdi, Ararat, Gavar, Kajaran, Kapan, Spitak, Stepanavan) and in one village (Ararat).	**HS**	Review of project deliverables, site visits and interviews with municipalities. Target was achieved and exceeded.
			Support in preparation of funding proposals (including tenders for ESCOs) for cities of Armenia	Technical assistance provided for design and tenders of street lighting upgrades in follow up projects financed from revolving	**HS**	Review of project deliverables. No tenders for ESCos prepared, due to the fact that there are no ESCos operational in street lighting market. Target was achieved.

Project Strategy	Indicator	Baseline	End of Project Target	Achievements	Rating	Justification for Rating
				funds and for additional projects in Yerevan and other municipalities.		
Outcome 4 National policies, codes, and standards on lighting: *New national policies mandate significantly greater energy efficiency and ensure product quality for lighting, particularly in residential buildings*	Existence of regulations that mandate improved energy efficiency of lighting products and installations including codes, standards, and procurement rules	There is no regulation on energy performance of lighting products in Armenia	Proposed improvement to existing legislation addressing minimum energy performance requirements for lighting appliances	Amendment to the Law on "On renewable energy and energy savings" adopted in May 2016, introduced energy labeling procedure, outlined procedures for recycling of hazardous substances from energy efficiency equipment, and requires all state funded re/constructions of lighting systems to comply with minimum energy performance requirements.	**HS**	Review of the RE and EE Law. Target was achieved.
			A national phase-out plan of conventional incandescent lighting is adopted	National phase-out plan implemented for public facilities (see above target achievement). Universal ban of incandescent lamps for other sectors (residential) not adopted due to lack of political will. However, the market has evolved	**S**	Target was achieved for public facilities (purchases financed by the state/municipalities), and a universal phase-out of incandescent lamps is supported by the fast market transformation towards LED technology.

Project Strategy	Indicator	Baseline	End of Project Target	Achievements	Rating	Justification for Rating
				quickly, with LEDs representing majority of sales, and incandescent lamps represent only ca 15% of sales in 2018.		
	Adoption and implementation of other needed policies to promote EE lighting in various areas, including codes, standards, and procurement rules		Other adopted policies and supporting standards	Technical standard RA CN 22-03-2017 "Natural and Artificial Lighting" revised to include minimal energy performance standards required for lighting, adopted in 2017	**HS**	Review of the technical standard, minimum energy performance requirements for street lighting 45-60 W/m^2 Lx. Target was achieved.
			New criteria (including performance and life cycle costs) for incorporation in state procurement procedures for lighting applications are developed	Minimum energy performance requirement of lighting is binding for state procurement as of the 2016 revision of the RE and EE Law, green procurement guide developed.	**HS**	Life-cycle analysis and criteria is unnecessary, since standard investment costs criteria combined with mandatory minimum energy performance standard in state procurement is sufficient for selection of high efficient lighting technologies, with LED being the preferred option usually selected by municipalities already. The goal of the target was achieved.

Indicator Assessment Key

Green = Targets Achieved	Yellow = Target not achieved, minor shortcoming	Red = Target not achived, important shortcoming

MTR suggested another specific tasks of the project to be performed within the scope of the fourth outcome, also it was not included into the MTR recommendations specifically – a proposal of the national regulations for environmentally safe collection, transportation, recycling and disposal of used mercury-containing lighting equipment.

The Project team prepared a report on experience with and regulation on CFL recycling and mercury collection applied in Russia and Kazakhstan, submitted it to the MNP and organized a meeting with the First Deputy Minister of Nature Protection, National Focal Point for Basel Convention and a Head of Hazardous Waste Department, Head of Division of Waste Inventory, Identification and Technology Research, and "Waste Research Center" SNCO.

The position of the MNP was that hazardous and mercury-containing waste regulations and action plan have to be implemented after Minamata convention will be ratified. In 2017 the Law of the Republic of Armenia "On Ratification of Minamata Convention on Mercury" (No. HO-130-N of October 6, 2017) was adopted, and on December 13, 2017, the Government of Armenia deposited it for ratification. In its 2018 legislative plan, the Government of Armenia plans to adopt three new regulations on hazardous waste, including Requirements for handling of mercury-containing wastes, Requirements for handling of used tires, and Requirements for handling of lead-containing wastes.

Additional implemented project activities, trainings, study tours, and deliverables are listed below:

Trainings, workshops, study-tours, and public awareness rising activities delivered

Year 2018 (total 33 participants in 1 event)

- A workshop on "Modelling, design and estimation of lighting systems" led by the project's technical experts was held on March 16. (33 participants)

Year 2017 (total 3,748 participants in 9 events)

- Financial assistance was rendered and a presentation was delivered at "Protect Yerevan from Air Pollution" event held in the frames of Climathon Yerevan event of Copernicus Climathon movement held on October 27. (about 50 participants)
- "Green Lighting Week" awareness raising campaign on energy saving and environmentally sound lighting solutions was developed and implemented from October 23 to 27 by the contractor "Proper Company" LLC. The campaign featured a series of high-pitched events and distribution of information and sample LED lamps in selected spots in Yerevan city. (about 3400 participants)
- Financial assistance was rendered and a presentation was delivered at World Standards Day celebration in Armenia, organized jointly with National Institute of Standards on October 18 to highlight, express and elicit the islands of smartness currently present in Armenia. The event featured award ceremony for pioneering efforts in introducing and consistently applying energy efficient solutions. (about 60 participants)

- A round table-discussion on ensuring availability and applicability of relevant methods and techniques for upgrading street lighting systems was led by International Consultant of the Project, Mr. Anatoli Shevchenko on September 12; (18 participants)
- Financial assistance was rendered and a presentation was delivered at an international workshop organized by State Urban Development Committee jointly with UNECE and held in Yerevan city on September 11. Recommendations of the Country Profile on Housing and Land Management for Armenia and possibilities of their implementation as well as the results of Goris Smart City Profile were discussed within the workshop; (about 100 participants)
- Seminar on upgraded buildings codes as relevant to energy efficiency, in particular, "Thermal Protection of Buildings" RACN 24-01-2016 and "Artificial and Natural Lighting" RACN 22-03-2017 was organized for engineers of "Armenia International Airlines" CJSC on August 25; (12 participants)
- Training for urban communities of the RA, financial structures, academia and educational institutions was organized jointly with Community Association of Armenia on July 6 and 7. This training on "Basics of Energy Management, Design Features of Modern Lighting Systems, and Green Procurement Opportunities" was led by UNDP International expert with extensive experience in the sector Mr. Andrey Dodonov. (36 participants)
- Seminar on "Introduction of Contemporary Energy Efficient Norms and Standards in the Lighting Sector of Armenia" was organized on April 19 and led by UNDP Expert Anatoli Shevchenko. (22 participants)
- The project results were presented during Energy Week 2017 annual series of events organized by Armenia R2E2 Fund from January 25 to 27. (about 50 participants)

Year 2016 (total 352 participants in 8 events)

- The project supported participation of UNDP Sustainable Growth & Resilience portfolio analyst in UNDP-EIB workshop for the National Designated Authorities of the Green Climate Fund in Luxembourg on December 6, 2016. (1 participant)
- Schréder company with support of UNDP Armenia organized a workshop on "Modern approaches and organizational forms for improving energy efficiency in municipal lighting" on November 30, 2016. (55 participants)
- The project supported participation of its experts and stakeholders in V International Energy Efficiency and Energy Development Forum (ENES) organized by UNDP Russia in Moscow from November 22 to 25, 2016. (6 participants)
- The project supported participation of its stakeholder state agencies and partner municipalities in a study-tour organized "Building energy efficiency in the North-West of Russia" UNDP-GEF project and held in Moscow, Saint-Petersburg and Pskov from August 29 to September 03, 2016. (6 participants)
- The project took part in a study tour organized at the Center for light emitting diode and optic-electronic technologies of the National Academy of Sciences of Belarus from May 25 to 28, 2016, for investigation of working procedures for photometric laboratory and testing two samples of street luminaires. (1 participant)
- The Project's International Consultant lead a workshop "Design and Implementation of Energy Efficient Lighting of Road Tunnels" on April 20, 2016. The consultant developed "Guide to the Lighting of Road Tunnels in Armenia" that features the most relevant solutions in the sector. (27 participants)

- For consultation purposes, the project invited experts of Russian Lighting Research Institute after S. I. Vavilov (VNISI), who, in particular, presented relevant developments as per legal regulation of lighting sector within the workshop on "Modern lighting, lighting norms and standards, measuring equipment" held on February 19, 2016. (56 participants)
- To raise awareness among secondary and high school students, the project organized lectures on energy saving in lighting in schools named after Anania Shirakaci, Mkhitar Sebastaci and Hunan Avetisyan, Quant lyceum, and Physics and Mathematics specialized school named after A. Shahinyan in January and February. (about 200 participants)

Year 2015 (total 337 participants in 9 events)

- Publications "Reference book on acting organizations and rendered services in the lighting sector of Armenia" and "LED Road Lighting Design Manual" were presented to a broader audience during "Energy Efficient Lighting for Communities" workshop held on November 19. (64 participants)
- The project participated in the conference "Energy efficient lighting: problems and prospects of development of lighting industry in Kazakhstan" in Astana, Kazakhstan, on November 18. (1 participant)
- The project was represented during "Inter Light 2015" Moscow exhibition and took part in seminars organized in the frame of exhibition as well as meeting with the head of "Transforming the Market for Efficient Lighting" UNDP-GEF Project from November 9 to 14. (2 participants)
- The project took part in the paired events in Astana, Kazakhstan: "Promotion of Design and Construction of Energy Efficient Residential Buildings in Kazakhstan" on November 4 and "Transition to Low-carbon Urban Development: Global Trends and Prospects for Kazakhstan and Central Asia" on November 5 and 6. (1 participant)
- Study tour for key sector actors on advanced technologies in urban lighting was organized jointly by UNDP Armenia and Schréder company with visits to the company's testing and design hub in Belgium and production premises in Spain, as well as to municipality of el Sol were full replacement of the LED luminaries is done, from 27 to 30 October 2015. (6 participants)
- The project was represented during World Environment Day event organized by the Ministry of Nature Protection and held in a park in Yerevan on June 5. (about 200 participants)
- Seminar on "Technical regulation of lighting devices' application in the frames of Customs Union and issues of establishment of national testing laboratory" was held by specialists of the Center of LED and optoelectronic technologies of National Academy of Sciences of Belarus on March 24. (42 participants)
- The project took part in the Steering Committee meeting of "Transforming the market for efficient lighting" project – a similar UNDP project in Russia on March 4. (1 participant)
- Within the relevant demonstration project, training was conducted for the respective staff of Yerevan city Municipality on proper installation and operation of LED luminaries by an expert of the Schrëder company, with support and participation of the project's experts on February 3 and 4. (about 20 participants)

Year 2014 (total 161 participants in 4 events)

- Project experts represented the project in Astana, Kazakhstan, on October 21 and 22, in the international conference on "Energy Efficient Lighting: Problems and Perspectives of Lighting Engineering Sector in Kazakhstan". (1 participant)
- The Project's activities and achievements were presented within the series of events held during Energy Week 2014 organized in Yerevan on July 2-3. (about 50 participants)
- Workshop on Strategic and Programmatic Issues was held under leadership of UNDP Regional Technical Adviser on January 16. A particular emphasis was put on the project's logical framework adjustment as per the necessary revisions. (16 participants)
- The Inception seminar with participation of the key stakeholders, representatives of UNDP Regional Center and similar UNDP projects in other CIS countries, experts and project team members was held on January 15. The International expert shared the main trends in lighting sector and presents the most applicable technologies considering the Armenian project objective and sector targeted. The participants expressed their willingness to support the project's activities. (94 participants)

Total number of participants: 4,598

Interviewed Project stakeholders highlighted high technical quality of workshops and trainings delivered and excellent expertise of international experts delivering presentations on lighting.

List of key publications, excluding factsheets and leaflets

Published as hard copies

Construction norms "Artificial and Natural Lighting" RACN 22-03-2017 (developed in the frames of UNDP-GEF/00074869 project)

"Green Lighting" bilingual textbook (to drafted, be published by the end of the Project)

"LED Road Lighting Design Manual" (translated into Armenian and published)

"Reference book on acting organizations and rendered services in the lighting sector of Armenia" (developed and published in both languages)

"Road Tunnel Lighting Guide" (developed for Armenian circumstances, translated into Armenian and published)

Published online

"Green City Concept in Yerevan households" public perception research report, developed by MPG CJSC (upcoming)

Yerevan Sustainable Energy Development Action Plan, developed by Foundation to Save Energy

"Residential energy consumption survey", developed by Economic Development and Research Center (EDRC)

All project on-line deliverables are available at http://www.nature-ic.am/en/projects/Green-Urban-Lighting/3 .

Overall quality of project results and attainment to objectives is rated Highly Satisfactory.

4.3.2 Relevance

The relevance of the Project has been demonstrated by adoption of municipal development policies/plans and programs that prioritize municipal energy efficient lighting upgrades (see for example Yerevan Annual Development Plan 2016, 2017, 2018, Yerevan Sustainable Energy Action Plan, Yerevan Green City Action Plan).

The project relevance is not documented only by adopted municipal policies and plans, but primarily by actual replication of energy efficiency street lighting retrofit projects across municipalities in Armenia with financing from newly established municipal revolving funds, municipal budgets, and also from other external sources (EBRD and ADB loans, grants of Armenian Territorial Development Fund, and from local and international donors).

The best evidence of project relevance is that energy efficiency retrofits of public lighting became a political priority of municipal decision makers across the country.

Project relevance is rated Relevant.

4.3.3 Effectiveness of project implementation

Effectiveness of project implementation evaluates an extent to which an objective has been achieved.

The project goal to save energy and to reduce emissions of greenhouse gases by increasing energy efficiency of lighting in the cities of Armenia via the implementation of municipal investment programs and national policies and the project objective to remove barriers to energy-efficient lighting in Armenia by means of technical assessment, facilitation of financing, and development and implementation of municipal programs and national policy, and all its direct and indirect energy and GHG emission savings targets have been fully achieved and exceeded. Average savings per lighting installation reached 69% of original energy consumption and GHG emissions.

More importantly, the Project facilitated transformation of the lighting market, both in public and private sectors, with modern energy efficient LED technology being the primary new technology used in public lighting retrofits as well as in new private installations. Sales of incandescent lights dropped already to ca 15% of total sales.

Effectiveness of project implementation is rated Highly Satisfactory.

4.3.4 Efficiency (cost-effectiveness) of project implementation

UNDP defines project efficiency (cost-effectiveness or efficacy) as an extent to which results have been delivered with the least costly resources possible.

50% of the total GEF budget of 1.6 mil USD was used for financing of new LED luminaires in pilot public lighting retrofit projects, co-financed from municipalities (municipalities financed installation works, and pole reconstruction/replacement where needed). Savings generated from implemented projects were used for financing of municipal revolving funds and for replication of first demonstration GEF-financed projects. In addition to that, 40+ mil USD have been mobilized in Armenia from international and local sources for financing additional energy efficiency lighting projects.

The Project has achieved 84,143 tCO_2 of combined direct and indirect annual GHG emission reductions, with 20 years lifetime of LED lighting technology, it is an equivalent of 1.683 mil tCO_2 of combined direct and indirect lifetime GHG emission reductions. With 1.6 mil USD GEF funding, this means the costs of 0.95 USD/tCO_2 of lifetime GHG emission reductions.

Project management costs charged to the GEF budget reached 6% of the GEF budget of 1.6 mil USD, and total project management costs reached 12% of the combined UNDP+GEF budget of 1,72 mil USD.

The cost-efficiency of project implementation is rated Highly Satisfactory.

4.3.5 Country ownership

This Project can serve as a good example of a full and effective country ownership: it was designed fully in line with national development and environmental priorities of Armenia. The Government, and especially municipalities, demonstrated full and effective support to Project implementation and demonstrated commitment for successful project replications. Additional funding of 40+ mil USD has been mobilized during project implementation period for replication of additional energy efficiency lighting projects in Armenia.

4.3.6 Mainstreaming and gender equality

Project objectives and outcomes are fully in line with UNDP country program strategies and GEF conventions, namely with the UN Development Assistance Framework (UNDAF) Outcome "Environment and disaster risk reduction is integrated into national and local development frameworks", UNDP Strategic Plan Environment and Sustainable Development Primary Outcome: Mainstreaming environment and energy, UNDP Country Programme Action Plan (CPAP) Output 4.1.5 "Innovative policies and practices for environmentally sound, energy efficient technologies and cleaner production developed and implemented", and Country

Programme (CP) Outcome: 4.1 "Armenia is better able to address key environmental challenges including climate change and natural resource sustainable management.

In addition to environmental and resource/energy sustainability, the Project directly supported also four Sustainable Development Goals: Affordable and Clean Energy, Industry, Innovation and Infrastructure, Sustainable Cities and Communities, and Climate Action.

Energy efficient street lighting re/construction became a priority of adopted municipal development plans and policies/action plans.

The project implementation did not address gender issues specifically. Municipal lighting decisions are made by elected city council representatives regardless of their sex. However, the project does have an implicit gender impact. Properly designed and implemented new efficient street and public lighting installations provide better quality and quantity of street and public areas illumination. Since women and elderly people are typically more vulnerable as potential targets of street crime, and better lit public areas reduce risks of street crime, women and elderly people benefit more from efficient lighting also in terms of increased safety and security in public areas.

The Project did address specifically school children and organized awareness rising information campaign, delivered presentations on efficient lighting to school classes, and organized competition for school children on efficient lighting design at home and schools, and the winners received compact fluorescent lamps.

4.3.7 **Prospects of sustainability**

4.3.7.1 Financial risks

The Project was successful in mobilizing municipal co-financing for pilot and demonstration projects. In case of street lighting, in the first pilot projects, the GEF Project financed up to 100% costs of new LED luminaires, and municipalities typically financed installation works. Following demonstration projects financed by municipal revolving funds received smaller or no financial support from the Project, with the share of GEF Project funding decreasing from ca 50% to 0% in a second and third project replication.

Total costs of implemented pilots in street lighting and replications financed from revolving funds in particular municipality (up to 3 replications in Yerevan) were 1.2 mil USD, of which 53% were financed from the Project budget, and 47% from revolving funds and municipal budgets.

Municipalities are fully dedicated to continue financing energy efficiency public lighting retrofits utilizing both, their revolving funds as well as financing from their municipal budget.

ADB has prepared a 48.6 mil USD loan for the 60 mil USD Sustainable Urban Development Investment Program that includes energy efficient street lighting component (ca 2 mil USD). EBRD provides 4 mil USD credit combined with E5P grant financing of 2.2 mil USD for modernization of street lighting at 28 main streets in Yerevan, and a 28 mil USD project in Gyumri. Armenian Territorial Development Fund is preparing 8 mil USD funding for municipal infrastructure modernization, with a main demand from municipalities being energy efficient public lighting.

Financial risks for future replication of street/public lighting projects have been assessed to be low.

Prospects of financial resources sustainability is rated Likely.

4.3.7.2 Socio-Political Risks

Social-political and economic risks having potential impact on project results sustainability include social and political acceptance of energy efficient lighting technology, dedication to invest into and finance energy efficiency lighting retrofits, financial affordability related with economic development and financial situation of municipalities and a country as a whole, and of private and residential sectors.

All municipal decision makers interviewed during site visits as well as governmental decision makers expressed their full dedication to continue implementing street and public lighting retrofits in the future, using primarily or solely LED technology. LED luminaires have already the largest share on sales of light bulbs in retail shops. LED technology is generally considered to be energy efficient, reliable, and financially affordable for most of customers.

The socio-political/economic risk to project sustainability is negligible.

The socio-political/economic sustainability is rated Likely.

4.3.7.3 Institutional Framework and Governance Risks

Municipalities and experts have been trained in good quality design of energy efficient public lighting and green procurement reflecting minimal energy performance requirements for lighting. Municipalities have gained their hands-on expertise implementing public lighting pilot projects and projects funded with their own funding from revolving funds and from municipal budget. Municipalities who implemented their pilot/demonstration projects share their experience with other neighboring municipalities. Municipalities and the Government of Armenia included public lighting retrofits into their development programs and action plans, including support funding from the Ministry of Territorial Development/Armenian Territorial Development Fund.

Institutional framework and governance risks are negligible.

Institutional framework and governance sustainability is rated Likely.

4.3.7.4 Environmental Risks

The Project reflected the demand of municipalities and focused solely on LED technology. No CFLs have been installed with the support of the Project. LED lighting is already a standard preferred technology used by municipalities (and in other sectors) for new installations/retrofits. High mercury content CFLs are no more imported into the country. CFLs represent already minor and decreasing share of total luminaires' sales, with growing majority being LEDs. In

contrast with CFLs, LED technology does not include any hazardous substances that would pose an environmental risk.

Environmental sustainability is rated Likely.

Overall prospects of sustainability of delivered project results are rated to be Likely.

4.3.8 **Catalytic Role**

The Project served as a real catalyst in mainstreaming affordable and sustainable energy efficient street lighting retrofits across municipalities in Armenia.

In addition to capacity development in design, financing, procurement and implementation of efficient street lighting and development and adoption of minimum energy performance standards for lighting appliances, the Project supported implementation of 27 pilot projects in street lighting and indoor lighting in public facilities, and replicated 15 projects financed from energy savings collected in municipal revolving funds, in total in 16 municipalities and 2 villages across the country. The focus on smaller projects implemented in a larger number of municipalities, as well as extensive public awareness rising activities helped to establish LED technology as a new standard for lighting retrofits in Armenia. LED technology represents already the largest share in lighting luminaires sold locally. The leading retail shop visited during the TE mission sells only LEDs, they have few remaining CFLs on stock for sale, and no incandescent lights whatsoever on sale. Corporate and private business investors and inhabitants gained their confidence in LED technology thanks to the Project achievements and highly visible demonstration projects implemented across the country, and replicate the project and install LEDs themselves in their facilities.

Mr. Grigor Boshyan, Deputy Mayor, Gavar municipality summarized the role of the GUL Project: *"This project exceeded our expectations. It made a real change and initiated a momentum in efficient lighting. It was a catalyst of energy efficiency. Nowadays, we are replicating LED lighting projects by ourselves, and we are developing photovoltaics project and a solar farm."*

Ms. Anahit Gyulazyan, Head of Administration, Spitak municipality: *"The GUL Project had a trigger effect. It made us thinking of energy efficiency also in other projects… It was a real catalyst of energy efficient lighting. We have now entrepreneurs and mayors of neighboring municipalities coming to us for advice. And they implement energy efficient lighting themselves."*

4.3.9 **Project Impact**

Project impact evaluates impact on environmental status improvement and environmental stress reduction.

Environmental status improvement was not subject to monitoring and evaluation, because GHG emission reductions have a global impact on climate change and impact of individual project cannot be properly monitored.

Environmental stress reduction correlates with GHG emission reductions. Combined direct and indirect GHG emission reductions are: 84,143 tCO_2 per year, i.e. an equivalent of 1.683 mil tCO_2 of combined direct and indirect lifetime GHG emission reductions.

Because of the nature of the Project and its project objective focused on GHG emission reductions, both progress towards environmental stress and status are positive, although not exactly enumerated.

However, the Project has also other significant impact, in addition to environmental impact.

In comparison with similar countries in the region, and even with some more economically developed/rich countries, Armenia has witnessed rapid transformation of its lighting market towards modern and energy efficient lighting luminaires based on LED technology, both in street lighting and indoor-lighting. As described above, LED technology dominates nowadays the sales of lighting appliances in Armenia, even without general ban on incandescent lights.

Although it is difficult to attribute exact numbers to the share and impact of the Project on this market transformation, and to identify and quantify exactly individual drivers for this market transformation, it is clear that the Project had a significant and dominant impact on this market transformation. Several project stakeholders highlighted that it was the GUL Project that generated confidence in Armenia in energy efficient LED technology as a mature and affordable lighting technology.

In addition to Project results, including its public awareness rising activities, the following factors facilitated widespread adoption of energy efficient lighting and lighting market transformation (including also very visible retail sector):

- Street lighting retrofits are highly visible to all citizens
- Properly designed new energy efficient street lighting provides better quality and better quantity of street illumination
- Lighting based on new energy efficient technologies/LEDs has typically a nice design and it is a symbol of economic development and modernization

A critical factor that had a decisive influence on project impact was a proper timing of this Project, when demand for and supply of modern energy efficient lighting/LED technologies perfectly matched. Should the same Project be implemented few years earlier or later, the market would be underdeveloped, or well-developed already, in terms of both, ability and willingness of municipalities to prioritize and finance lighting retrofits, and in terms of technical and financial maturity/affordability of LED technology. And the same project would have much less significant impact.

The project impact rating is Significant.

5. Conclusions, Lessons Learned and Recommendations

"One of the best donor-funded projects ever implemented in Armenia"

Mr. Eric Grigoryan, Minister
Ministry of Nature Protection

"There is no other more successful international project in Armenia"

Mr. Lernik Nalbandyan, Deputy Mayor
Abovyan municipality

The Green Urban Lighting project in Armenia was very successful, and it served as a catalyst facilitating lighting market transformation towards higher energy efficiency and lower GHG emissions, primarily in the public sector, but in private sectors as well.

The overall project rating is Highly Satisfactory.

The Project delivered highly satisfactory results in each of four project outcomes, namely in:

- Municipal energy audits and technical capacity-building
- Demonstration projects
- Replication via municipal lighting programs and associated financial instruments;
- National policies, codes, and standards on lighting

The Project reached and overcame targets of direct and indirect energy and GHG emission savings, and it developed and delivered among others:

- 46 municipal public lighting energy audits in 19 cities and 2 villages
- Developed and strengthened capacity of municipalities in design and procurement of good quality and energy efficient street and indoor lighting, more than 200 specialists were trained
- 19 energy efficient street lighting pilot projects implemented in 16 municipalities and two villages, and 8 indoor energy efficiency lighting retrofits in three cities
- Facilitated establishment of municipal revolving funds that were used for collection of savings from implemented pilot projects and financing of replication projects - additional energy efficiency modernization of municipal lighting in 9 municipalities and 1 village
- 11 revolving funds have been established, funded from the collected energy and maintenance cost savings from pilot projects, and the savings were used for financing of 15 replication projects.
- Municipal revolving funds were replicated by municipalities for collection of savings from other projects and further re-investment
- Lighting norm/technical standard was updated to include minimum energy performance standard (45-60 W/m^{2}Lx for street lighting), Renewable Energy and Energy Efficiency Law and procurement rules have been revised to make these minimum energy performance requirements binding for projects financed from state/public budgets
- Average energy and GHG emission savings reached 69% per lighting fixture/luminaire

In addition to planned results, the Project implemented a series of numerous media outreach activities (170 media releases plus TV broadcastings), and high-impact awareness rising

activities with a combined participation of 4000+ participants (Green Lighting Week, replacement campaign exchanging incandescent light bulbs for CFLs, presentations and competition for school children on efficient lighting, bilingual textbook for engineers and architects on efficient lighting, …). For details see the List of Publications and Trainings and Public Awareness Rising Activities in Chapter 4.3.1.

There are two key factors that made this project so successful:

- Highly professional project team with up-to-date expertise in energy efficient technologies, policies and finance
- Very appropriate timing of the Project implementation

Appropriate timing is critical for any development assistance and market intervention. In this case, it combined two factors:

- Economic development in Armenia reached the phase when municipalities became financially mature enough to be able and willing to finance street lighting retrofits, there was a real demand for services offered by the Project as demonstrated by replication of energy efficient lighting projects financed by municipalities.
- Modern energy efficient lighting technology based on LED (Light Emitting Diodes) matured enough both in technical and financial terms, and LED costs became affordable and competitive, taken into account their performance, and have short payback and generated significant financial and GHG emission savings.

Should the Project be implemented several years earlier or later, its development and lighting market transformation impacts would be significantly limited.

Development activities and market interventions financed by GEF and other international donors are typically project based and last usually few years (4 to 6 years max). During the implementation period, project teams develop their expertise, but after projects are closed, this expertise often disappears and project experts leave for new jobs.

This is not the case of UNDP Armenia, and its Climate Change Programme. UNDP Armenia has been successful in overcoming this negative effect of time-bound, single project-based support. UNDP Armenia has developed and has been implementing a series of energy efficiency projects that are complementary and follow one after another. Thus, UNDP was successful in maintaining a stable team of core in-house experts in energy efficiency that learn and share their expertise among different energy efficiency projects over time.

Summary of terminal evaluation ratings are shown in Table 14.

Table 14: Terminal evaluation rating

Criteria	Rating						Comments
	HS	S	MS	MU	U	HU	
4. Monitoring and Evaluation							
M&E design at entry	**HS**						
M&E plan implementation	**HS**						
Overall quality of M&E	**HS**						
5. IA & EA Execution							
Quality of UNDP implementation	**HS**						

Quality of execution – Executing Agency	**HS**						
Overall quality of implementation/execution	**HS**						
6. Assessment of Outcomes							
Relevance	**Relevant**						
Effectiveness	**HS**						
Efficiency	**HS**						
Overall quality of project outcomes	**HS**						

HS – Highly Satisfactory, S – Satisfactory, MS – Moderately Satisfactory, MU – Moderately Unsatisfactory, U – Unsatisfactory, HU – Highly Unsatisfactory
Relevance: R – Relevant, NR – Not Relevant

6. Sustainability	L	ML	MU	U	Comments
Financial resources	**L**				
Socio-political	**L**				
Institutional framework and governance	**L**				
Environmental	**L**				
Overall likelihood of sustainability	**L**				

Sustainability: L – Likely, ML - Moderately Likely, MU - Moderately Unlikely, U – Unlikely

5. Impact	S	M	N	Comments
Environmental status improvement	**S**			
Environmental stress reduction	**S**			
Progress towards stress/status	**S**			
Impact	**S**			

Impact: S – Significant, M – Minimal, N - Negligible

	HS	S	MS	MU	U	HU	Comments
Overall Project Results	**HS**						

HS – Highly Satisfactory, S – Satisfactory, MS – Moderately Satisfactory, MU – Moderately Unsatisfactory, U – Unsatisfactory, HU – Highly Unsatisfactory

5.1 Lessons Learned and Recommendations

This Green Urban Lighting Project in Armenia may serve in several aspects as an example of lessons learned and best practices to be shared across other UNDP projects and countries of operation.

5.1.1 **Lessons learned**

1. **UNDP in-house expertise is maintained and shared across multiple projects**

   UNDP CO Armenia implemented a successful strategy how to maintain developed in-house expertise in energy efficiency by developing and implementing a series of follow-up energy efficiency projects in different sectors.

2. **Benefits of experience sharing across similar projects in the region**

   The Project benefitted from sharing experience across similar projects being implemented in other countries of the region. The support and effective regional

coordination of the UNDP RTA in developing similar projects in the region is a critical success factor.

3. **Appropriate timing of implementation of demand-driven project is a key to success**

   Appropriate timing of project implementation, reflecting real local demand for project services, and affordability to finance locally replications that reflects actual level of economic development and financial capacity of municipalities, is a critical factor for project success, its impact and sustainability. Demand-driven projects deliver better and sustainable results rather than just replication of supply-driven projects mechanically replicating projects across countries.

4. **Large number of small demonstration projects support dissemination and replication**

   Large number of small demonstration projects implemented across the country supported awareness rising, experience sharing and dissemination, and replication of projects

5. **Revolving funds as an off-budget account are transparent and simple**

   Revolving funds established as a separate municipal off-budget account, and not institutionalized as a stand-alone organization, are easy to implement, inexpensive and transparent

6. **Project deliverables published on-line even after Project termination**

   Publication of all key project deliverables on a web site of a local institution, rather than on a web site of a time-bound project only, supports information dissemination and guarantees sustainable access to information even in a long-term after project termination

7. **LED lighting is a mature and affordable technology, easy to install, with large and quick financial and environmental benefits that helps to "sell" energy efficiency to decision makers**

   Energy efficient street lighting, and especially LED, is a modern technology with a nice design, it is highly visible to all citizens, it is already relatively inexpensive and affordable technology with a short payback, quickly to install and easily to measure benefits, and it has significant financial and GHG emission savings. Well-designed street lighting projects became a symbol of modernization, and of improved quality and quantity of street illumination, and significantly reduced energy consumption and GHG emissions (by 69%). Thus, the Project was very popular with all citizens and municipal decision makers, and it helped to raise awareness and to promote and adopt energy efficiency to municipal decision makers not only as an environmental concept, but also as a cost-effective modernization tool with real and visible benefits.

8. **Cost-effective project management**

   Project management costs reached only 6% of the GEF budget. UNDP co-financing of 120,000 USD was used for additional project management costs. Total project management costs reached only 12% of combined UNDP-GEF budget of 1.720 mil USD spent over a period of 5 years of project implementation, and with 50% of GEF funds being spent for demonstration projects.

Cost-effective project management was based on long-term but part-time employment of relatively small project team of experts and staff, who shared their full work load with other UNDP energy efficiency projects. Other local and few international short-term experts were contracted on an ad-hoc basis.

This project management arrangement proved to be very cost-effective, but in the same time it supported development and maintaining of UNDP in-house expertise in energy efficiency.

5.1.2 **Recommendations**

Project Team:

1. **Lessons Learned Report to be disseminated and published on-line**

   The project team is expected and is planning to develop and publish the Lessons Learned Report by the end of the project.

   The Project has developed extensive expertise in energy efficient lighting, including significant technical expertise. This experience is not only country-specific but it might help also project developers when developing energy efficient lighting projects internationally.

   The project team is thus encouraged to include into the Lessons Learned Report also the technical experience gained during project implementation and include as appendix, or refer to the web link for download, also specific technical guides, textbooks and other deliverables developed by the Project, and to publish the Report on the www.nature-ic.am web site.

   The Project is also encouraged to offer links to their web page and Lessons Learned Report also to other energy efficient lighting initiatives internationally.

2. **Certification of the light testing laboratory**

   The Project and the municipal owned Yerevan Illumination Company CJSC are planning to have accredited the photometric testing laboratory operated by the Yerevan Illumination Company CJSC. International accreditation would increase international credibility of the testing laboratory and would allow the Yerevan Illumination Company to offer its services in photometric testing of luminaires internationally as well, and thus to maximize utilization of the laboratory equipment that was financed from the GEF budget.

   The UNDP Project team is encouraged to facilitate the accreditation and to support it with any remaining GEF budget resources available.

UNDP:

3. **Replicate best practices in maintaining developed in-house expertise across follow-up projects and in regional cooperation in other countries of operation**

   Several UNDP country offices in the region implemented similar strategy as the UNDP CO in Armenia in maintaining the developed in-house expertise by sharing its experts across multiple follow-up similar projects implemented in

different sectors. However, this practice is not yet shared by all UNDP country offices. Some of them loose their experts and expertise developed after project termination.

Effectiveness of regional cooperation among similar UNDP projects depends primarily on activities of UNDP CO and its project teams, and support from the UNDP RTA, as well as on similar projects being implemented in parallel in the region.

UNDP and its regional headquarters and RTAs are encouraged to replicate and adopt the practice of maintaining in-house expertise across all countries of their operation, and to facilitate effective regional cooperation and experience sharing where appropriate.

6. Annexes

Annex 1: Evaluation mission itinerary

MISSION AGENDA

In-country mission of **Mr. Jiří Zeman,** International Consultant for Terminal Evaluation,

for the UNDP-GEF Terminal Review (TR) of the full-sized project titled "Green Urban Lighting" UNDP-GEF/00074869-00087057 (PIMS#4669)

(11-16 June 2018)

Mission Purpose:

- Meetings and interviews at UNDP CO, Project Team, Project Implementing Partner and Responsible Parties, and Project partners.
- Field missions to cities and communities: meetings and interviews with demo project sites' responsible persons, constructor companies and local self-government authorities.

Time	Venue	Purpose	Participants
11 June 2018 – Monday, meetings with partners			
11:00 – 13:00	Climate Change Programme office (Ministry. of Nature Protection room #533)	• Briefing meeting with project team • Sharing additional information • Presentation of the project reports and documentation • Discussion (update) of the mission agenda (if needed)	• Mr. Armen Martirosyan, UNDP Sustainable Growth & Resilience Portfolio Manager • Ms. Diana Harutyunyan, UNDP CC Program Coordinator • Mr. Armen Gulkanyan, Project Expert • Mr. Artem Kharazyan, Project Expert • Mr. Artur Tsughunyan, Project Expert • Ms. Marianna Arzangulyan, Expert Team Assistant

Time	Venue	Purpose	Participants
13:00 – 14:00	Lunch		
14:00 – 15:00	Ministry of Nature Protection of RA	• Meeting with UNFCCC Focal Point/responsible department	• Mr. Erik Grigoryan, Minister of Nature Protection, UNFCCC Focal Point, GEF National Focal Point • Ms. Asya Muradyan, Head of Division of protection policy of climate change and atmosphere at Department of Environment Protection Policy • Ms. Ruzanna Grigoryan, Head of International Cooperation Department • Translator
15:30 – 16:30	R2E2 Fund	• Activities of and cooperation with the state R2E2 Fund	• Mr. Ruben Gevotgyan, Director • Mr. Hrant Ter-Gabrielyan, Head of Engineering Technical Group
17:00-17:30	Ministry of Territorial Administration and Development of RA	• Stakeholder Ministry	• Ms. Narine Avetyan, Head of Department • Mr. Armen Gulkanyan, Project Expert • Translator
17:00 – 18:30	Break		
19:00 – 19:30	Yerevan Zoological Garden	• Visit the project demo sites for assessment of the lighting system improvement	• Mr. Ruben Khachatryan, Director • Ms. Armen Gulkanyan, Project Expert
20:00 – 21:30	Yerevan Isakov - Victory Bridge - Mashtots Avenue and Abovyan city – Yerevanyan Street	• Visit the project demo sites for assessment of the lighting system improvement	• Ms. Artyom Kharazyan • Ms. Armen Gulkanyan, Project Expert • Mr. Vladislav Harutyunyan, Chief Engineer of Yerevan Municipal Illumination CJSC • Mr. Vahan Mardirossian, Monitor
12 June 2018 – Tuesday, meetings with partners			
09:30 – 10:00	Climate Change Programme office	• Sharing additional information • Discussion (update) of the mission agenda (if needed)	• Ms. Diana Harutyunyan, UNDP CC Program Coordinator • Mr. Armen Gulkanyan, Project Expert
10:00 – 11:00	Yerevan Municipal Illumination Company CJSC	• Meeting with main beneficiary, discussion on demo projects, revolving fund, city light system improvement plans	• Mr. Vardan Gabrielyan, Director • Mr. Vladislav Harutyunyan, Chief Engineer • Mr. Armen Gulkanyan, Project Expert • Translator

Time	Venue	Purpose	Participants
11:30 – 13:00	Yerevan Municipality, indoor lighting demo project tour in the building and Yerevan History Museum	• Meeting with Project Implementing Partner	• Mr. Kamo Areyan, First Deputy Mayor • Mr. Tigran Sargsyan, Head of Investment and Projects Department • Ms. Nune Sakanyan, Head of the Unit of Coordination of International Investment Projects • Ms. Diana Harutyunyan, UNDP CC Program Coordinator • Translator
13:00 – 14:00	Lunch		
14:30 – 15:15	Testing laboratory of established in Yerevan Illumination Company, Komitas str. Office	• Visit to the lighting fixtures testing laboratory	• Mr. Vladislav Harutyunyan, Chief Engineer, Yerevan Municipal Illumination Company CJSC • Mr. Armen Gulkanyan, Project Expert • Translator
15:30 – 17:00	National Institute of Standards of the Ministry of the Economy and investments	• Assessment of cooperation status and needs related to the adoption of lighting sector EE standards	• Mr. Artak Shahbazyan, Acting Director • Mr. Gevorg Nazaryan, Deputy Director • Mr. Armen Gulkanyan, Project Expert • Translator
17:15 – 18:00	Ministry of Energy and Natural Resources of RA	• Stakeholder Ministry	• Mr. Hayk Badalyan, Head of Energy Department • Ms. Diana Harutyunyan, UNDP CC Program Coordinator • Mr. Armen Gulkanyan, Project Expert • Translator
13 June 2018 – Wednesday, demo site visits			
09:00 – 20:00	Gavar town, Stepanavan town, Spitak town, Aparan town	• Presentation of demo project results • Meeting with Gavar town Deputy Mayor • Meeting with Stepanavan town Mayor • Meeting with Spitak town Mayor	• Mr. Armen Gulkanyan, Expert • Mr. Vahan Mardirossian, Monitor • Translator
14 June 2018 – Thursday, demo site visits			

Time	Venue	Purpose	Participants
09:00 – 13:00	Masis town, Ararat town, Ararat village, Avshar village	• Presentation of demo project results • Meeting with Ararat town Mayor	• Mr. Armen Gulkanyan, Project Expert • Mr. Vahan Mardirossian, Monitor • Translator
13:00 – 14:00	Lunch		
14:15 – 15:30	Yerevan Polytechnic University	• Meeting with Project partner ("Green Lighting" bilingual textbook incorporation into the curricula)	• Mr. Gurgen Khostikyan, Head of Power Engineering Department, Institute of Energy and Electrical Engineering, National Polytechnic University of Armenia • Mr. Armen Gulkanyan, Project Expert • Translator
16:00 – 16:45	American University of Armenia	• Meeting with Project partner ("Green Lighting" bilingual textbook production and publication)	• Mr. Artak Hambaryan, Associated Director Engineering Research Center, American University of Armenia • Mr. Vardan Ghazaryan, Project Expert
17:00 – 17:30	UNDP CO	• De-briefing meeting • Main conclusions from MTE mission • Timeline and next steps	• Mr. Armen Martirosyan, UNDP Sustainable Growth & Resilience Portfolio Manager • Ms. Diana Harutyunyan, UNDP CC Program Coordinator
15 June 2018 – Friday, Yerevan demo projects, wrap up			
09:30 – 10:00	Climate Change Programme office (Ministry. of Nature Protection room #533)	• Briefing meeting with project team • Sharing additional information • Presentation of the project reports and documentation	• Ms. Diana Harutyunyan, UNDP CC Progam Coordinator • Mr. Armen Gulkanyan, Expert • Mr. Artem Kharazyan, Expert • Mr. Artur Tsughunyan, Expert • Ms. Marianna Arzangulyan, Expert Team Assistant
10:15 – 11:00	"Electrika" LLC	• Meeting with local supplier	• Mr. Hovhannes Shahinyan, director • Mr. Armen Gulkanyan, project experts • Translator
13:00 – 14:00	Lunch		
16:00 – 16:30	UNDP Armenia	• Meeting with Sustainable Growth & Resilience portfolio	• Mr. Armen Martirosyan, UNDP Sustainable Growth & Resilience Portfolio Manager • Ms. Diana Harutyunyan, UNDP CC Program Coordinator
16 June 2018 – Saturday			
Early morning		Departure	

Annex 2: List of persons interviewed

UNDP:

Mr. Armen Martirosyan, UNDP Sustainable Growth & Resilience Portfolio Manager

Ms. Diana Harutyunyan, UNDP CC Program Coordinator

Mr. Armen Gulkanyan, Project Expert

Mr. Artem Kharazyan, Project Expert

Mr. Artur Tsughunyan, Project Expert

Ms. Marianna Arzangulyan, Expert Team Assistant

Ms. Rubina Stepanyan, Financial Assistant

Mr. Vahan Mardirossian, Monitor

Ministry of Nature Protection

Mr. Erik Grigoryan, Minister of Nature Protection, UNFCCC Focal Point, GEF National Focal Point, Chairperson of the Project Board

Ms. Asya Muradyan, Head of Division of Climate Change and Atmosphere Policy at Department of Environment Protection Policy

Ms. Ruzanna Grigoryan, Head of International Cooperation Department

Ministry of Territorial Administration and Development

Ms. Narine Avetyan, Head of Territorial Investment Policy and Infrastructure Development Department

Ministry of Energy and Natural Resources

Mr. Hayk Badalyan, Head of Energy Department

National Institute of Standards of the Ministry of the Economy and Investments

Mr. Artak Shahbazyan, Acting Director

Mr. Gevorg Nazaryan, Deputy Director

Renewable Resources and Energy Efficiency Fund

Mr. Ruben Gevotgyan, Director

Mr. Hrant Ter-Gabrielyan, Head of Engineering Technical Group

Yerevan Municipality

Mr. Kamo Areyan, First Deputy Mayor

Mr. Tigran Sargsyan, Head of Investment and Projects Department

Ms. Nune Sakanyan, Head of the Unit of Coordination of International Investment Projects

Yerevan Municipal Illumination Company CJSC

Mr. Vardan Gabrielyan, Director

Mr. Vladislav Harutyunyan, Chief Engineer

Yerevan Zoological Garden

Mr. Ruben Khachatryan, Director

Municipalities in

Abovyan, Gavar, Stepanavan, Spitak, Aparan, Masis, Ararat town and village, Avshar

Mayors, Deputy Mayors, Head of Technical Departments

Mr. Lernik Nalbandyan, Deputy Mayor of Abovyan

Mr. Mikayel Gharakeshishyan, Mayor of Stepanavan

National Polytechnic University of Armenia

Mr. Gurgen Khostikyan, Head of Power Engineering Department, Institute of Energy and Electrical Engineering,

American University of Armenia

Dr. Artak Hambaryan, Assistant Professor, Associated Director Engineering Research Center

Mr. Vardan Ghazaryan, Project Expert

“Electrika” LLC, lighting wholesale and retail

Mr. Hovhannes Shahinyan, director

Annex 3: List of documents reviewed

General documentation

- UNDP Programme and Operations Policies and Procedures
- Project-Level Evaluation, Guidance for Conducting Terminal Evaluations of UNDP-Supported, GEF-Financed Projects, UNDP, 2012
- GEF Monitoring and Evaluation Policy
- GEF Guidelines for Conducting Terminal Evaluations
- GEF focal area strategic program objectives
- UNDP Development Assistance Framework
- UNDP Country Program Document
- UNDP Country Program Action Plan

Project documentation

- Project Identification Form
- Project Document
- Inception Report
- Midterm Review
- Annual Work Plans
- Annual Project Implementation Reports/Standard Progress Reports
- Project Implementation Review reports
- Project risk log
- Project tracking tool
- Combined Delivery Reports
- GEF Operational Quarterly Reports
- Project Board Meeting minutes
- Management response to MTE

Other relevant documents

- Co-financing letters
- Street lighting/energy audits
- Project deliverables, including demonstration project fact sheets, manuals/guides, technical standard, Amendment to the RE and EE Law, market surveys, videos on project results, presentations, …
- Project web page at http://www.nature-ic.am/en/projects/Green-Urban-Lighting/3

Annex 4: Evaluation Consultant Code of Conduct and Agreement Form

Evaluators:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study imitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System

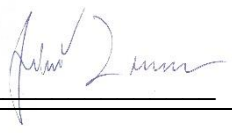
Name of Consultant: Jiří Zeman

Name of Consultancy Organization (where relevant)**:** _____

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at *Prague* on June 7, 2018

Signature: _____



Annex 5: Terminal Evaluation Questions/Matrix

Evaluative Criteria Questions	Indicators	Sources	Methodology
Relevance: How does the project relate to the main objectives of the GEF focal area, and to the environment and development priorities at the local, regional and national levels?			
• How well does the project align with evolving GEF focal area priorities through GEF 4 5 and 6?	• Extent to which UNFCCC and related GEF priorities and areas of work incorporated	• Project documents • National policies and strategies to implement the UNFCCC, or related to energy more generally. • Project partners • Project beneficiaries	•
• How well does the project support the National Climate Change Strategy? Are there linkages with other strategic documents, such as National Development Strategy, INDCs?	• Degree to which the project supports national environmental objectives		
• Is the project aligned with other donor and Government programmes and projects? Is the project country driven?	• Degree of coherence between the project and nationals priorities, policies and strategies		
• Does the project adequately take into account the national realities, both in terms of institutional and policy frameworks in its design and implementation?	• Adequacy of project design and implementation to national realities and existing capacities		
• Have implementation strategies been appropriate (is the logframe logical and complete)?	• Degree to which the project supports objectives of Government energy strategies		
• Was the project responsive to threats and opportunities that emerged during the course of the project?	• Level of adaptive management related to emerging trends		
• Did the project address the needs of target beneficiaries and other stakeholders? Was it inclusive? Were beneficiaries and other stakeholders effectively engaged in implementation?	• Degree to which the project supports local aspirations • Degree to which the project meets stakeholder expectations •		
• Has the experience of the project provided relevant lessons for other future projects targeted at similar objectives?	• Extent to which of lessons learned relating to all facets of the project are documented		

Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved?			
• How well has the project performed against its indicators and targets?	• Extent to which milestones and targets are achieved as laid out in the logframe and monitoring plan	• Project reports • Minutes of Project and Steering Committee Meetings • Local partners and beneficiaries • Project risks log	•
• Which have been the key factors leading to project achievements?	• Achievement of milestones and targets as laid out in the logframe and monitoring plan		
• To what extent can observed results be attributed to the project or not (enabling environment for SHPV, level of uptake of SHP, etc.)? In this respect have there been notable changes in the enabling environment for the project?	• Extent of change to the enabling environment		
• Has the project failed in any respect? What changes could have been made (if any) to the design or implementation of the project in order to improve the achievement of the expected results?	• Evidence of adaptive management and/or early application of lessons learned		
• How has the project contributed to raising capacity of local stakeholders to address aims of the project or of Government?	• Extent of support from local stakeholders		
• What are the views of stakeholders on the implementation and activities of the project? Are there activities missing from the implementation?	• Extent to which stakeholders are actively participating in the project or • Extent to which beneficiaries were engaged in implementation and monitoring of the project		
• How well were risks, assumptions and impact drivers managed? What was the quality of risk mitigation strategies developed? Were these sufficient? Are there clear strategies for risk mitigation related to long-term sustainability of the project?	• Extent to which project has responded to identified and emerging risks (particularly risks of low participation due to perceived needs for immediate action rather than planning) • Level of attention paid to up-dating risks log		
Efficiency: Was the project implemented efficiently, in-line with international and national norms and standards?			
• Financial efficiency: • Were the accounting and financial systems in place adequate for project management and producing accurate and timely financial information?	• Extent to which funds have been converted into outcomes as per the expectations of the ProDoc	• Project financial records • Project audit reports	•

• Have funds been available and transferred efficiently (from donor to project to contractors) to address the project purpose, outputs and planned activities? • Were funds used correctly – explain any over- or under-expenditures? • Were financial resources utilized efficiently (converted into outcomes)? Could financial resources have been used more efficiently? • Were issues raised in audit reports and how efficiently were they addressed? • Was project implementation as cost effective as originally proposed (planned vs. actual) • Did the leveraging of funds (co-financing) happen as planned?	• Level of transparency in the use of funds • Level of satisfaction of partners and beneficiaries in the use of funds • Timely delivery of funds, mitigation of bottlenecks. • Coordination and synergies of project funds and co-financing	• Project work plans and reports	
• Implementation efficiency (including monitoring): • Was the project implemented as planned, including the proportion of activities in work plans implemented? • Has monitoring data been collected as planned, analyzed and used to inform project planning? • Has project implementation been responsive to issues arising (e.g. from monitoring or from interactions with stakeholders)? • What learning processes have been put in place and who has benefitted (e.g. training, exchanges with related projects, overseas study visits) and how has this influenced project outcomes? • Were progress reports produced accurately and timely, and did they respond to reporting requirements including adaptive management changes? • Did the project experience any capacity gaps (e.g. staffing gaps)? • Has internal and external communication been effective and efficient? • How efficiently have resources and back-up been provided by donors, including quality assurance by UNDP?	• Extent to which project activities were conducted on time • Extent to which project delivery matched the expectation of the ProDoc and the expectations of partners • Level of satisfaction expressed by partners in the responsiveness (adaptive management) of the project • Level of satisfaction expressed by project team in regard to UNDP back-stopping	• Project work plans and reports • Local partners	•
• Efficiency of partnership arrangements for the project • To what extent were partnerships/linkages between institutions/ organizations/private sector encouraged and supported? • Which partnerships/linkages were facilitated? Which ones can be considered sustainable? • What was the level of efficiency of cooperation and collaboration arrangements? • Which methods were successful or not and why?	• Extent to which project partners committed time and resources to the project • Extent of commitment of partners to take over project activities	• Project work plans and reports • Local partners	•

Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?			
• Is the social, legal and political environment conducive to sustainability?	• Extent of supportive policies	• Steering Committee minutes • Local partners and beneficiaries	•
• Are there early signs of activities being taken up by project partners, and plans being developed to sustain them?	• Extent to which partners are considering post-project actions		
• Have partners and stakeholders successfully enhanced their capacities and do they have the required resources to make use of these capacities?	• Extent to which partners and stakeholders are applying new ideas outside of the immediate project context		
• Does the project have a clear exit strategy or transformational strategy?	• Intent to follow-up on the project (on the part of Government and stakeholders) • To what extent has the exit strategy been implemented		
Impact: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and/or improved ecological status?			
• What impact has the project had on policy, legal and institutional frameworks relating to uptake of renewable energy?	• Evidence of uptake of new technologies • Extent to which national strategic planning supports project interventions	• Project reports • Minutes of Steering Committee meetings • Local partners and beneficiaries	•
• What impacts has the project had or is it likely to have on people in the project area in terms of cost-savings, income generating opportunities, etc.?	• Level of satisfaction of project interventions expressed by beneficiaries		
• Has the project had any impact on gender equality and economic empowerment for women and other marginalized groups? Was it intended to?	• Evidence of gender equity in project interventions such as trainings, installed SHP systems and rebates.		
• What lessons can be learned from the project regarding efficiency? Could the project have more efficiently carried out implementation (in terms of management structures and procedures, partnerships arrangements etc.)?	• Level of satisfaction in project implementation arrangements • Suggestions put forward by partners for possible improvement		

Annex 6: Terminal evaluation TOR

TERMINAL EVALUATION TERMS OF REFERENCE

INTRODUCTION

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP support GEF financed projects are required to undergo a terminal evaluation (TE) upon completion of implementation. These terms of reference (TOR) sets out the expectations for a Terminal Evaluation (TE) of the *"Green Urban Lighting"* UNDP-GEF Project (PIMS #4669) under implementation by UNDP Armenia CO.

The essentials of the project to be evaluated are as follows:

PROJECT SUMMARY TABLE

Project Title:	Green Urban Lighting			
GEF Project ID:	4742		*at endorsement (Million US$)*	*at completion (Million US$)*
UNDP Project ID:	4669	GEF financing (in cash):	1.6	1.6
Country:	Armenia	Government (in kind):	0.32	0.32
		IA/EA own (in cash):	0.12	0.12
		IA/EA (in kind):	1.0	1.0
		Local Administration (in cash):	7.055	9.17
Region:	Europe and Central Asia			
Focal Area:	Climate Change			
FA Objectives, (OP/SP):	CCM-2 *Outcome 2.1* Appropriate policy, legal and regulatory frameworks adopted and enforced- *Outcome 2.2* Sustainable financing and delivery mechanisms established and operational	Total co-financing:	8.495	9.17
Executing Agency:	Ministry of Nature Protection of the Republic of Armenia	Total Project Cost:	10.095	11.89
Other Partners involved:	Yerevan Municipality, other partner municipalities	ProDoc Signature (date project began):		15 November 2013
		(Operational) Closing Date:	Proposed: November 2017	Actual: November 2018

OBJECTIVE AND SCOPE

The "Green Urban Lighting" project was designed to save energy and to reduce emissions of greenhouse gases by increasing energy efficiency of municipal lighting in the cities of Armenia via implementation of municipal investment programs and national policies. The project is in compliance with the national priorities to strengthen the economic and energy independence of the Republic of Armenia by promoting resources efficient and climate resilient growth. Collectively, these components contribute to putting in place cornerstone policy instruments at both the municipal and national level, supported by technical, policy-related, educational, and financial measures to raise capacity, reduce investor risk, and help assure successful implementation. These activities contribute to UNDP's goal of increasing access to sustainable energy services by introducing regulatory and institutions frameworks, promoting technology transfer.

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

The objectives of the evaluation are to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

EVALUATION APPROACH AND METHOD

An overall approach and method[7] for conducting project terminal evaluations of UNDP supported GEF financed projects has developed over time. The evaluator is expected to frame the evaluation effort using the criteria of **relevance, effectiveness, efficiency, sustainability, and impact,** as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. A set of questions covering each of these criteria have been drafted and are included with this TOR (Annex C). The evaluator is expected to amend, complete and submit this matrix as part of an evaluation inception report, and shall include it as an annex to the final report.

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluator is expected to follow a participatory and consultative approach ensuring close engagement with government counterparts, in particular the GEF operational focal point, UNDP Country Office, project team, UNDP GEF Technical Adviser based in the region and key stakeholders. The evaluator is expected to conduct a field mission to *Yerevan, Armenia,* including the project sites in selected partner towns. Interviews will be held with the following organizations and individuals at a minimum: Ministry of Nature Protection, State Urban Development Committee, Municipality of Yerevan, other selected partner municipalities, Yerevan Municipal Illumination CJSC, Armenian Territorial Development Fund.

The evaluator will review all relevant sources of information, such as the project document, project reports – including Annual APR/PIR, project budget revisions, midterm review, progress reports, GEF focal area tracking tools, project files, national strategic and legal documents, and any other materials that the evaluator considers useful for this evidence-based assessment. A list of documents that the project team will provide to the evaluator for review is included in Annex B of this Terms of Reference.

EVALUATION CRITERIA & RATINGS

An assessment of project performance will be carried out, based against expectations set out in the Project Logical Framework/Results Framework (see Annex A), which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: **relevance, effectiveness, efficiency, sustainability and impact.** Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary. The obligatory rating scales are included in Annex D.

[7] For additional information on methods, see the Handbook on Planning, Monitoring and Evaluating for Development Results, Chapter 7, pg. 163

Evaluation Ratings:			
1. Monitoring and Evaluation	***rating***	**2. IA& EA Execution**	***rating***
M&E design at entry		Quality of UNDP Implementation	
M&E Plan Implementation		Quality of Execution - Executing Agency	
Overall quality of M&E		Overall quality of Implementation / Execution	
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental :	
		Overall likelihood of sustainability:	
			rating
Environmental Status Improvement			
Environmental Status Reduction			
Progress towards status change			

PROJECT FINANCE / COFINANCE

The Evaluation will assess the key financial aspects of the project, including the extent of co-financing planned and realized. Project cost and funding data will be required, including annual expenditures. Variances between planned and actual expenditures will need to be assessed and explained. Results from recent financial audits, as available, should be taken into consideration. The evaluator(s) will receive assistance from the Country Office (CO) and Project Team to obtain financial data in order to complete the co-financing table below, which will be included in the terminal evaluation report.

Co-financing (type/source)	UNDP own financing (mill. US$)		Government (mill. US$)		Partner Agencies (mill. US$)		Total (mill. US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants								
Loans/Concessions								
• In-kind support								
• Other								
Totals								

MAINSTREAMING

UNDP supported GEF financed projects are key components in UNDP country programming, as well as regional and global programmes. The evaluation will assess the extent to which the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

IMPACT

The evaluator will assess the extent to which the project is achieving impacts or progressing towards the achievement of impacts. Key findings that should be brought out in the evaluations include whether the project

has demonstrated: a) verifiable improvements in ecological status, b) verifiable reductions in stress on ecological systems, and/or c) demonstrated progress towards these impact achievements.[8]

CONCLUSIONS, RECOMMENDATIONS & LESSONS

The evaluation report must include a chapter providing a set of **conclusions**, **recommendations** and **lessons**.

IMPLEMENTATION ARRANGEMENTS

The principal responsibility for managing this evaluation resides with the UNDP CO in Armenia. The UNDP CO will contract the evaluator and ensure the timely provision of per diems and travel arrangements within the country for the evaluation team. The Project Team will be responsible for liaising with the evaluators to set up stakeholder interviews, arrange field visits, coordinate with the Government, provide interpreter for full period of the mission, and transportation support for demonstration sites visits, etc.

EVALUATION TIMEFRAME

The total duration of the evaluation will be *20* days within 3 months according to the following plan:

Activity	Timing	Completion Date
Preparation	*4* days *(recommended: 2-4)*	*May 2018*
Evaluation Mission	*7* days (*r: 7-15)*	*June 2018*
Draft Evaluation Report	*7* days (*r: 5-10*)	*July 2018*
Final Report	*2* days *(r: 1-2*)	*August 2018*

EVALUATION DELIVERABLES

The evaluation team is expected to deliver the following:

Deliverable	Content	Timing	Responsibilities
Inception Report	Evaluator provides clarifications on timing and method	No later than 2 weeks before the evaluation mission.	Evaluator submits to UNDP CO
Presentation	Initial Findings	End of evaluation mission	To project management, UNDP CO
Draft Final Report	Full report, (per annexed template) with annexes	Within 3 weeks of the evaluation mission	Sent to CO, reviewed by RTA, PCU, GEF OFPs
Final Report*	Revised report	Within 1 week of receiving UNDP comments on draft	Sent to CO for uploading to UNDP ERC.

*When submitting the final evaluation report, the evaluator is required also to provide an 'audit trail', detailing how all received comments have (and have not) been addressed in the final evaluation report (*Annex H*).

EVALUATORS COMPETENCIES AND QUALIFICATION REQUIREMENTS

[8] A useful tool for gauging progress to impact is the Review of Outcomes to Impacts (ROtI) method developed by the GEF Evaluation Office: ROTI Handbook 2009

The evaluator shall have prior experience in evaluating similar projects. Experience with GEF financed projects is an advantage. The evaluator selected should not have participated in the project preparation and/or implementation and should not have conflict of interest with project related activities.

The evaluator must present the following qualifications:

- Education: advanced university degree in energy, environment, economics, climate change or similar;
- Minimum *10* years of relevant professional experience, including minimum 5 years of experience in monitoring and evaluation of similar projects;
- Proven experience in UNDP-GEF projects evaluation is required;
- Knowledge of UNDP and GEF procedures and requirements;
- Previous experience with results-based monitoring and evaluation methodologies;
- Technical knowledge in the targeted focal areas: Energy Efficiency in Lighting Systems, Energy Conservation; Lighting sector regulatory framework;
- Knowledge of the CIS, Eastern Europe lighting sector specifics;
- Fluency in English is required (written and oral), knowledge of Russian is an asset.

EVALUATOR ETHICS

Evaluator will be held to the highest ethical standards and is required to sign a Code of Conduct (Annex E) upon acceptance of the assignment. UNDP evaluations are conducted in accordance with the principles outlined in the UNEG 'Ethical Guidelines for Evaluations'

PAYMENT MODALITIES AND SPECIFICATIONS

%	Milestone
60%	Following submission and approval of the 1st draft terminal evaluation report
40%	Following submission and approval (UNDP-CO and UNDP RTA) of the final terminal evaluation report

APPLICATION PROCESS

Applicants are requested to apply online (indicate the site, such as http://jobs.undp.org, etc.) by (date). Individual consultants are invited to submit applications together with their CV for these positions. The application should contain a current and complete C.V. in English (with indication of the e-mail and phone contact. The application should contain a brief description of the work approach and a proposed methodology for the assignment. Shortlisted candidates will be requested to submit a price offer indicating the total cost of the assignment (including daily fee, per diem and travel costs).

UNDP applies a fair and transparent selection process that will take into account the competencies/skills of the applicants as well as their financial proposals. Qualified women and members of social minorities are encouraged to apply.

Criteria for evaluation of the proposal

Only those applications which are responsive and compliant will be evaluated. Offers will be evaluated according to the Combined Scoring method – where the educational background and experience on similar assignments will be weighted at 70% and the price proposal will weigh as 30% of the total scoring. The applicant receiving the Highest Combined Score that has also accepted UNDP's General Terms and Conditions will be awarded the contract.

Only candidates obtaining a maximum of 70% of the total technical points would be considered for the Financial Evaluation.

ANNEX A: PROJECT LOGICAL FRAMEWORK

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Project Objective To remove barriers to energy-efficient lighting in Armenia, by means of technical assessment, facilitation of financing, and development and implementation of municipal programs and national policy	Quantity of energy saved and GHG emissions avoided	Street lighting: 40 GWh of electricity consumed for street lighting in 2011, accounting for about 16,000 tons of CO_2 emissions. Average fixture power consumption is 210W in 2011. Residential lighting: 550 GWh consumed for residential lighting in 2011, accounting for about 220,000 tons of CO_2 emissions.	Direct energy savings of 1.2 GWh per year from demonstration projects (474 tonnes of CO_2 emissions) Direct energy savings of 20 GWh per year from replication of demonstration projects via municipal programs (8000 tonnes of CO_2 emissions). Indirect energy savings of 125 GWh per year from implementation of national lighting policy (50,000 tonnes of CO_2 emissions)	Municipality data Pilot project monitoring reports. Audit reports	Achievement of these targets depends on adoption and timely implementation of municipal programs and national policies, which in turn require sufficient political will and financing.
Outcome 1 Municipal energy audits, technical capacity-building and awareness raising	Methodology for energy/lighting audit Number of municipal lighting systems energy audits conducted Number of specialists and agency representatives trained Public media exposure	Lack of methodology for assessing energy efficiency in lighting Municipalities are not aware of energy saving potential in lighting sector No specialized training or training materials on EE lighting is offered in Armenia	By the project midterm methodology established At least 10 comprehensive audits of public lighting (including pilots) completed in Yerevan and other cities At least 20 specialists from private sector and municipalities are trained on EE lighting and energy audit Media releases on outcomes of each pilot. Awareness raising materials available for general public	Project annual reports Audit reports Project annual reports Public outreach materials and publications Project web-site	Not observed

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
		Limited broadcasting of information on EE lighting			
Outcome 2 Demonstration projects *Pilot projects yield cost-effective energy savings, raising the confidence of investors and decision-makers about EE lighting*	Efficiency and energy savings of installed EE lighting Share of LED in demo-projects	The majority of fixtures in municipal outdoor lighting sector incorporate inefficient 250W HPS lamps or 400W mercury-vapor lamps. The indoor lighting sector is dominated by inefficient incandescent lamps and fluorescent tubes.	At least five demonstration projects on a number of efficient lighting technologies completed for indoor, outdoor and street lighting. Direct energy savings of up to 0.95 GWh per year by completion of all pilots (subject to final selection of pilot size and technologies) 100% LED for outdoor (park) and indoor lighting pilots 40% LED included in street lighting pilots	Project reports and audits	Fulfillment of the target will depend on planning (e.g. final selection of pilot size and technologies), financing, and implementation according to strict timetables agreed upon by the project and its partners.
Outcome 3 Replication via municipal programs and associated financial instruments *Municipal lighting programs lead to widespread deployment of EE lighting and associated energy savings*	Municipal programs for EE public lighting Financial commitments for energy-efficient municipal lighting	Municipal programs for EE public lighting are desired but not comprehensively designed, financed, nor implemented	Municipality of Yerevan develops and adopts program for upgrades of municipal lighting Similar programs are adopted in other cities of Armenia Establishment of financing mechanism for Yerevan (e.g. revolving fund) Support in preparation of funding proposals (including tenders for ESCOs) for cities of Armenia	Municipal plans on EE lighting upgrades Established separate account/budget line in Yerevan Lighting Company for funding of EE lighting projects/upgrades. Number of investment proposals applied for funding	Adoption of municipal programs requires sufficient funds from municipal budgets and/or public and private sources of financing
Outcome 4	Existence of regulations that	There is no regulation on energy	Proposed improvement to existing Law on Energy Efficiency	Revised legal and normative documents	Adoption of national policy requires sufficient political

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
National policies, codes, and standards on lighting *New national policies mandate significantly greater energy efficiency and ensure product quality for lighting, particularly in residential buildings*	mandate improved energy efficiency of lighting products and installations	performance of lighting products in Armenia	addressing minimum energy performance requirements for lighting appliances A national phase-out plan of conventional incandescent lighting is adopted Other adopted policies and standards supporting the phase-out New criteria (including performance and life cycle costs) for incorporation in state procurement procedures for lighting applications are developed	National program on phase out of incandescent lighting Technical specifications for ensuring MEPS for public procurement of lighting equipment	will and addressing of stakeholder concerns about lighting quality, cost to consumers, and mercury containment.

ANNEX B: LIST OF DOCUMENTS TO BE REVIEWED BY THE EVALUATOR

- GEF Project Information Form (PIF), Project Document, and Log Frame Analysis (LFA)
- Project Inception Report
- Implementing/Executing partner arrangements
- List and contact details for project staff, key project stakeholders, including Project Board, and other partners to be consulted
- Project sites, highlighting suggested visits
- Mid Term Review (MTR) Report
- Annual Project Implementation (APR/PIR) Reports
- Project budget and financial data
- Project Tracking Tool, at baseline, at mid-term, and at terminal points
- UNDP Development Assistance Framework (UNDAF)
- UNDP Country Programme Document (CPD)
- UNDP Country Programme Action Plan (CPAP)
- GEF focal area strategic program objectives

ANNEX C: EVALUATION QUESTIONS

This is a generic list, to be further detailed with more specific questions by CO and UNDP GEF Technical Adviser based on the particulars of the project.

Evaluative Criteria Questions	Indicators	Sources	Methodology
Relevance: How does the project relate to the main objectives of the GEF focal area, and to the environment and development priorities at the local, regional and national levels?			
•	•	•	•
•	•	•	•
•	•	•	•
Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved?			
•	•	•	•
•	•	•	•
•	•	•	•
Efficiency: Was the project implemented efficiently, in-line with international and national norms and standards?			
•	•	•	•
•	•	•	•
•	•	•	•
Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?			
•	•	•	•
•	•	•	•
•	•	•	•
Impact: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental stress and/or improved ecological status?			
•	•	•	•
•	•	•	•

ANNEX D: RATING SCALES

Ratings for Outcomes, Effectiveness, Efficiency, M&E, I&E Execution	***Sustainability ratings:***	***Relevance ratings***
6. Highly Satisfactory (HS): no shortcomings 5. Satisfactory (S): minor shortcomings 4. Moderately Satisfactory (MS) 3. Moderately Unsatisfactory (MU): significant shortcomings 2. Unsatisfactory (U): major problems 1. Highly Unsatisfactory (HU): severe problems	4. Likely (L): negligible risks to sustainability 3. Moderately Likely (ML):moderate risks 2. Moderately Unlikely (MU): significant risks 1. Unlikely (U): severe risks	2. Relevant (R) 1. Not relevant (NR) ***Impact Ratings:*** 3. Significant (S) 2. Minimal (M) 1. Negligible (N)
Additional ratings where relevant: Not Applicable (N/A) Unable to Assess (U/A		

ANNEX E: EVALUATION CONSULTANT CODE OF CONDUCT AND AGREEMENT FORM

Evaluators:

8. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
9. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
10. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals, and must balance an evaluation of management functions with this general principle.
11. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
12. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
13. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study imitations, findings and recommendations.
14. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

Evaluation Consultant Agreement Form[9]

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: _____

Name of Consultancy Organization (where relevant)**:** _____

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at *place* on *date*

Signature: _____

[9] www.unevaluation.org/unegcodeofconduct

ANNEX F: EVALUATION REPORT OUTLINE[10]

i. Opening page:
- Title of UNDP supported GEF financed project
- UNDP and GEF project ID#s.
- Evaluation time frame and date of evaluation report
- Region and countries included in the project
- GEF Operational Program/Strategic Program
- Implementing Partner and other project partners
- Evaluation team members
- Acknowledgements

ii. Executive Summary
- Project Summary Table
- Project Description (brief)
- Evaluation Rating Table
- Summary of conclusions, recommendations and lessons

iii. Acronyms and Abbreviations

(See: UNDP Editorial Manual[11])

1. Introduction
- Purpose of the evaluation
- Scope & Methodology
- Structure of the evaluation report

2. Project description and development context
- Project start and duration
- Problems that the project sought to address
- Immediate and development objectives of the project
- Baseline Indicators established
- Main stakeholders
- Expected Results

3. Findings

(In addition to a descriptive assessment, all criteria marked with (*) must be rated[12])

3.1 Project Design / Formulation
- Analysis of LFA/Results Framework (Project logic /strategy; Indicators)
- Assumptions and Risks
- Lessons from other relevant projects (e.g., same focal area) incorporated into project design
- Planned stakeholder participation
- Replication approach
- UNDP comparative advantage
- Linkages between project and other interventions within the sector
- Management arrangements

3.2 Project Implementation
- Adaptive management (changes to the project design and project outputs during implementation)
- Partnership arrangements (with relevant stakeholders involved in the country/region)

[10]The Report length should not exceed *40* pages in total (not including annexes).

[11] UNDP Style Manual, Office of Communications, Partnerships Bureau, updated November 2008

[12] Using a six-point rating scale: 6: Highly Satisfactory, 5: Satisfactory, 4: Marginally Satisfactory, 3: Marginally Unsatisfactory, 2: Unsatisfactory and 1: Highly Unsatisfactory, see section 3.5, page 37 for ratings explanations.

- Feedback from M&E activities used for adaptive management
- Project Finance:
- Monitoring and evaluation: design at entry and implementation (*)
- UNDP and Implementing Partner implementation / execution (*) coordination, and operational issues

3.3 Project Results

- Overall results (attainment of objectives) (*)
- Relevance(*)
- Effectiveness & Efficiency (*)
- Country ownership
- Mainstreaming
- Sustainability (*)
- Impact

4. Conclusions, Recommendations & Lessons

- Corrective actions for the design, implementation, monitoring and evaluation of the project
- Actions to follow up or reinforce initial benefits from the project
- Proposals for future directions underlining main objectives
- Best and worst practices in addressing issues relating to relevance, performance and success

5. Annexes

- ToR
- Itinerary
- List of persons interviewed
- Summary of field visits
- List of documents reviewed
- Evaluation Question Matrix
- Questionnaire used and summary of results
- Evaluation Consultant Agreement Form

ANNEX G: EVALUATION REPORT CLEARANCE FORM

(to be completed by CO and UNDP GEF Technical Adviser based in the region and included in the final document)

Evaluation Report Reviewed and Cleared by

UNDP Country Office

Name: _____

Signature: _____ Date: _____

UNDP GEF RTA

Name: _____

Signature: _____ Date: _____

ANNEX H: TE REPORT AUDIT TRAIL

The following is a template for the evaluator to show how the received comments on the draft TE report have (or have not) been incorporated into the final TE report. This audit trail should be included as an annex in the final TE report.

To the comments received on (*date*) from the Terminal Evaluation of Improving Energy Efficiency in Buildings (UNDP PIMS #4669)

The following comments were provided in track changes to the draft Terminal Evaluation report; they are referenced by institution ("Author" column) and track change comment number ("#" column):

Author	#	Para No./ comment location	Comment/Feedback on the draft TE report	TE team response and actions taken