Terminal Evaluation Review form, GEF Independent Evaluation Office, APR 2016

1. Project Data

Summary project data			
GEF project ID		3935	
GEF Agency project ID		4245	
GEF Replenishment Phase		GEF-4	
Lead GEF Agency (include all for joint projects)		UNDP	
Project name		Improving Energy Efficiency in Buildings	
Country/Countries		Armenia	
Region		Europe and Central Asia	
Focal area		Climate Change	
Operational Program or Strategic Priorities/Objectives		CC-SP1	
Executing agencies involved		Ministry of Nature Protection, Ministry of Urban Development	
NGOs/CBOs involvement		Through membership in project steering committee and cooperation on some specific project activities: Yerevan State University for Architecture and Construction (YSUAC), Builders Union of Armenia (BUA)	
Private sector involvement		As project partners: construction materials testing laboratories, insulation materials producers, real estate brokers, residential building developers, design institutions	
CEO Endorsement (FSP) /Approval date (MSP)		May 7, 2010	
Effectiveness date / project start		July 5, 2010	
Expected date of project completion (at start)		July 2015	
Actual date of project completion		June 30, 2016	
Project Financing			
		At Endorsement (US $M)	**At Completion (US $M)**
Project Preparation Grant	GEF funding	0.05	0.05
	Co-financing	0.05	
GEF Project Grant		1.05	1.05
Co-financing	IA own	0.15	0.15
	Government	2.2	2.2
	Other multi- /bi-laterals		12.1
	Private sector		
	NGOs/CSOs		
Total GEF funding		1.09	1.09
Total Co-financing		2.4	14.5
Total project funding (GEF grant(s) + co-financing)		3.49	15.59
Terminal evaluation/review information			
TE completion date		August 2016	
Author of TE		Adil Lari	
TER completion date		January 19, 2017	
TER prepared by		Mathias Einberger	
TER peer review by (if GEF IEO review)		Molly Watts	

2. Summary of Project Ratings

Criteria	Final PIR	IA Terminal Evaluation	IA Evaluation Office Review	GEF IEO Review
Project Outcomes	S	HS	NR	S
Sustainability of Outcomes		L	NR	L
M&E Design		S	NR	MS
M&E Implementation		S	NR	S
Quality of Implementation		HS	NR	S
Quality of Execution		HS	NR	S
Quality of the Terminal Evaluation Report		-	-	S

3. Project Objectives

3.1 Global Environmental Objectives of the project:

The project "Improving Energy Efficiency in Buildings" had the stated objective of "reduction of greenhouse gas emissions due to improved energy efficiency in the buildings sector in Armenia." (pro-doc p. 21) Since GHGs are global pollutants, the global environmental benefits from significant local GHG reductions anywhere in the world are evident in light of their climate change mitigation potential.

The project's specific approach to focus on the residential building sector does not diminish its global relevance. The residential building sector accounts for about 80% of Armenia's total building stock and represents as much as 88% of non-commercial buildings in Armenia. It also constitutes the largest end-user of energy in Armenia and has exhibited rapid growth in recent years, not least in terms of GHG emissions. (Request for CEO endorsement pp. 4, 8; TE p.8) Estimates at inception of the project's direct and indirect GHG reduction potential ranged from around 406,000 tCO_2e to around 1.35 million tCO_2e. (Request for CEO endorsement pp. 40-41)

3.2 Development Objectives of the project:

The project's global development objective was to reduce emissions from new residential buildings constructed during the project's lifetime by approximately 60,000 tCO_2e, and to reduce the average thermal energy consumption for space heating in new residential buildings from 160 kWh/m^2/year to 96 kWh/m^2/per year. These objectives could also reasonably be expected to have significant social benefits in light of rising natural gas prices for individual space heating, which is highly prevalent in Armenia. (Request for CEO endorsement pp. 8, 21)

The project aimed to achieve its development objectives through four components/outcomes:

Component 1 / Outcome 1: Design and enforcement of new EE building codes and standards – Approximately 200,000m^2 of living space is built/reconstructed that meets or exceeds the standards in new, more efficient building codes

Component 2 / Outcome 2: Quality control, testing and certification of EEE materials and equipment – Improved quality and availability of domestically produced EE materials and products

Component 3 / Outcome 3: Outreach, training, and education – Practicing architects and engineers understand new code and can produce designs and buildings that comply with it

Component 4 / Outcome 4: Piloting integrated building design – Energy and cost-saving potential of integrated building design is demonstrated in one new building

3.3 Were there any **changes** in the Global Environmental Objectives, Development Objectives, or other activities during implementation?

The TE does not note any changes to the global environmental or development objectives.

Some of the targets given under the initial results framework from the project document were revised in terms of expectations and timing. The logframe was reviewed and amended accordingly as a result of the findings of the mid-term evaluation. (TE p. 31)

4. GEF IEO assessment of Outcomes and Sustainability

Please refer to the GEF Terminal Evaluation Review Guidelines for detail on the criteria for ratings.

Relevance can receive either a Satisfactory or Unsatisfactory rating. For Effectiveness and Cost efficiency, a six point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess. Sustainability ratings are assessed on a four-point scale: Likely=no or negligible risk; Moderately Likely=low risk; Moderately Unlikely=substantial risks; Unlikely=high risk. In assessing a Sustainability rating please note if, and to what degree, sustainability of project outcomes is threatened by financial, sociopolitical, institutional/governance, or environmental factors.

Please justify ratings in the space below each box.

4.1 **Relevance**	Rating: Satisfactory

The TE rates the project as relevant and this TER follows its assessment, rating relevance as Satisfactory.

As previously noted, by addressing energy efficiency in buildings, which constitute Armenia's largest energy end-use sector, the project was highly relevant for the GEF-4 Climate Change Focal Area Strategic Program 1: Promoting Energy Efficiency in Residential and Commercial Buildings. The TE also notes that the project, through its four components, successfully addressed several critical barriers to building energy efficiency in Armenia, such as outdated building standards, low enforcement capacity, immature markets for EE products and services, and low capacities in the building sector.

Although explicitly focusing on residential buildings, which as previously noted have a very high share in Armenia's total building stock, the project was also relevant to the non-residential building sector. The EE norm RACN 24-01-2016 enacted in the final weeks of the project under component 1 applies to both residential multi-apartment and public sector buildings. The benefits of components 2 and 3 too, in terms of quality control, testing and certification of EE materials, and in terms of outreach, training and education of architecture students among others, will likely not be confined to residential buildings alone. Finally, among the pilot sites that were added to the initially planned residential building pilot under component 4, there were not only residential buildings but also a school. (TE pp. 9, 41, 43-45)

4.2 **Effectiveness**	Rating: Satisfactory

The project's overall objective was to reduce GHG emissions and energy consumption in the Armenian residential building sector, the achievement of which it sought to measure through two main indicators: 1) the average thermal energy consumption for space heating in new residential buildings, with a baseline of 160 kWh/m2/year and a target of 96 kWh/m2/year, and 2) cumulative CO_2 emission reductions from new residential buildings built during the project's lifetime from a baseline business-as-usual scenario (zero reductions) to 60,000 tCO_2e. (pro-doc p. 22)Overall, the project performed very well, exceeding expectations in some components, but underperforming in others. The TE's assessment of Highly Satisfactory (i.e. no shortcomings) is therefore not shared by this TER, which rates the project's effectiveness in light of the available evidence and the initial results framework as Satisfactory.

The first indicator was adjusted at the mid-term evaluation to a target reduction of 40% (from 185kWh/m^2/year to 111kWh/m^2/year), as the average thermal energy consumption for space heating in new buildings. The TE notes that monitoring data from the eight pilot buildings suggests energy savings in the range of 25-60%, but does not mention how this is reflected in new buildings in Armenia overall. (TE p. 35)

For the second indicator too, the TE speaks of 12,500 tCO_2e reductions realized directly from the eight pilot sites at project completion and 39,000 tCO_2e reductions from the pilots and public sector buildings realized since the end of 2014. Due to the delay in the adoption of the new EE building code (during the last weeks of the project), the direct effects on all new residential buildings in Armenia could not be measured. The TE gives conflicting information on the expected direct post-project reductions of 159,000 tCO_2e at one point and 296,000 tCO_2e at another. (TE pp. 35, 45)

The project aimed to achieve its objective through 4 components/outcomes consisting of 10 intermediary outputs to be measured on the basis of a set of 9 distinct indicators. (Request for CEO endorsement pp. 1, 21-23; pro-doc pp. 23-25)

Component 1: Design and enforcement of new EE building codes and standards
Outcome 1: Approximately 200,000m^2 of living space is built/reconstructed that meets or exceeds the standards in new, more efficient building codes

Output 1.1: New mandatory EE building code

- Indicator 1.1.1: Existence and substance of legally binding codes that mandate an improved level of energy performance in four climate zones of Armenia

Output 1.2: Standards and calculation methodology to assess energy performance in buildings

- Indicator 1.2.1: Standards and methodology for assessing energy performance in buildings

Output 1.3: Institutional structures, staffing, capacities and accountability for agencies in charge of code enforcement

- Indicator 1.3.1: Capacity of the MUD inspectorate and independent technical supervision bodies to implement and check compliance with energy efficiency codes
- Indicator 1.3.2: Integration of EE requirements into state-funded construction and procurement activities

Indicator 1.1.1 was successfully achieved but with substantial delay. Several supporting standards and laws were adopted under the project, but the key technical regulation setting mandatory energy performance standards for new and renovated buildings, the update Intestate Building Code (MSN) 2.04-02-2004 "on the Thermal Protection of Buildings" was greatly delayed, however due to factors mostly outside of the control of the project. Initially it was to be aligned with the EU Energy Performance of Buildings Directive, but this decision was reversed after Armenia's accession to the Eurasian Economic Union in January 2015. Subsequently, MSN 2.04-02-2004 was aligned with current Russian standards. (TE pp. 21, 36)

Indicator 1.2.1 was partially achieved, as national standards for performing energy audits in buildings and guidelines for energy passports were drafted, submitted and enacted by project end, but audits had been carried out under the new methodology and the passports prepared in only 15 buildings, according to the TE. The goal specified in the logframe however envisioned these audits and passports for at least 50% of new and renovated buildings. Although the TE does not mention specifically how many new buildings were constructed and renovated, the stated square footage of new constructions in 2015 of 227,000 makes it doubtful that 15 buildings would constitute 50%. (TE pp. 36-37)

Under indicators 1.3.1 and 1.3.2, the project did increase capacity of the Ministry of Urban Development inspectorate and other independent supervision bodies to implement and enforce the new codes, e.g. through producing and publishing relevant professional literature and including institutional improvements in legislative amendments. However, due to a lack of a timely revised EE building code, the envisaged code enforcement program was not implemented. (TE p. 38)

Component 2: Quality control, testing and certification of EEE materials and equipment

Outcome 2: Improved quality and availability of domestically produced EE materials and products

Output 2.1: Standards for internal QA/QC developed and piloted

- Indicator 2.1.1: Demand for local testing laboratory(ies) testing/certification services

Output 2.2: Testing laboratory for EE products and certification

- Indicator 2.2.1: Increase in share of domestically produced EE materials in the construction market

The project's stated goals for both indicator 2.1.1 and 2.2.1 were clearly surpassed, according to the TE. Instead of enabling at least one laboratory to perform testing and certification of relevant construction materials, the project supported the establishment of two new such labs. While aiming to achieve at least 10-20% local market share for domestically produced EE materials, a corresponding market survey indicated about 45%. (TE p. 40)

Component 3: Outreach, training, and education

Outcome 3: Practicing architects and engineers understand new code and can produce designs and buildings that comply with it

Output 3.1: Modules on EE buildings introduced to universities

- Indicator 3.1.1: Use of Integrated Building Design Approach (IBDA) concepts in new building constructions

Output 3.2: Training courses for architects and engineers on new codes and calculation methodologies

- Indicator 3.2.1: same as 3.1.1

Output 3.3: Outreach and awareness-raising campaign targeting investors and tenants implemented

- Indicator 3.3.1: Rate of application of the energy passport and label system by real estate developers

Component 3 of the project shows an evident disconnect between the established indicators and outputs. While the project seems to have been successful in achieving many outputs that were rather intermediary in nature, it is not clear how much this has contributed to achieving the outcomes to be measured through the established indicators. Under the project, more than 90 students and about 180 sector professionals were trained in IBDA concepts, but despite the target of at least 4-5% of new buildings applying these concepts (indicator 3.1.1/3.2.1), the TE does not indicate that they were actually applied beyond the eight pilot project sites by project completion.

For indicator 3.3.1 too, the TE takes note of several intermediary outputs, including advertisement campaigns and news coverage, but provides no evidence that the final outcomes (at least 10% of new residential buildings marketed with energy passports, majority of real estate professionals aware of EE benefits) were actually achieved as a result. (TE pp. 41-42)

Component 4: Piloting integrated building design

Outcome 4: Energy and cost-saving potential of integrated building design is demonstrated in one new building

Output 4.1: At least one building designed and constructed using an integrated building design approach

- Indicator 4.1.1: Thermal performance of the demonstration building

Output 4.2: Energy saving and GHG reductions in pilot building monitored and reported

- Indicator 4.2.1: same as 4.1.1

For achievement under indicator 4.1.1/4.2.1, the TE provides slightly conflicting information in different sections, with baseline and end-of-project performance in the pilot building in Goris stated as 217 and 78 kWh/m^2/year or 216 and 82 kWh/m^2/year respectively. Regardless, the pilot's performance appears roughly commensurate to the initial goal of 60% improvement vis-à-vis the existing code. The TE however does not provide information in terms of the superior performance in the pilot vis-à-vis the improved code envisaged at 30% at project inception. (TE p. 16, 43)

The TE further notes that by cooperating with local and international partners, the project was able to become involved in further demonstration projects. In addition to the initially planned pilot building in Akhuryan village, the demonstration component was expanded to include a social multi-apartment building in Goris town, a residential building rehabilitation in Avan, an eight-building residential complex in Yerevan, and several others. Based on the success of these pilots, the project managed to leverage additional co-financing, including a follow up 20-year US$120 million project. (TE pp. 28, 43)

4.3 **Efficiency**	Rating: Satisfactory

According to the TE, project co-financing in terms of the actual implementation status has surpassed the initial target 7-fold, at an estimated US$14.45 million up from an initially planned US$2.35 million (excluding PPG). (TE pp. 32-33)

The TE also notes that the project fulfills UNDP/GEF incremental cost criteria, as key project components such as legislative changes, demonstration sites, and training activities would not have been implemented or only much later, without GEF funding. Furthermore, the pilot projects under component 4 have provided verifiable proof of both the effectiveness of EE measures and of their associated energy savings, the replication of which is likely due to supporting policy and additional financing leveraged.

However, the TER must note that the project was delayed by one year vis-à-vis its initial timeline. The TE's efficiency rating of Highly Satisfactory (i.e. no shortcomings) is therefore not shared by the TER. Acknowledging that the US$1,090,450 in GEF funding provided to the project seems to have been a highly cost-effective investment, the TER rates efficiency as Satisfactory.

4.4 **Sustainability**	Rating: Likely

The TE discusses and assesses sustainability along the four dimensions: financial resources, socio-economic, institutional framework and governance, and environmental. It rates sustainability in each dimension (except environmental) as Likely and provides an overall rating of Likely. The TER agrees with the TE's overall assessment of rating sustainability as Likely.

Financial Resources: Though not initially part of the project's design, the success of its demonstration sites under component 4 has led to the 20-year US$ 120 million follow-up project "De-Risking and Scaling-up Investment in Energy Efficient Building Retrofits" financed by the Green Climate Fund and the European Investment Bank. The TE rates sustainability of financial resources as likely and the TER concurs with this assessment. (TE p. 47)

Socio-economic: The TE takes note of a survey conducted by a local NGO early in the project, which found that 40% of tenants in newly built apartments express problems with moisture due to poor insulation and around 30% are dissatisfied with the quality of their windows. Numerous PR activities have been carried out under the project, and together with the demonstration projects have created stronger public awareness of and interest in energy efficiency. The TE rates socio-economic sustainability as Likely and the TER concurs. (TE pp. 47-48)

Institutional Framework and Governance: The TE notes that the most significant direct contribution of the project lies in the resulting clear intention of the Armenian government to strengthen energy efficiency in building construction, as evident from legal measures, regulations, strategy papers, and a nascent monitoring and enforcement effort. (TE p. 48)

Elsewhere the TE however also takes note of a remaining risk, resulting from the delayed implementation of the new EE code, which affects sustainability of the project results. It speaks of weak state mechanisms and enforcement capacity to ensure compliance with the newly passed EE norms post project implementation. The TE notes that further stakeholder commitment will be necessary after the finalization of the project to ensure appropriate enforcement bodies, capacities and protocols are

identified, developed and implemented. (TE p. 22) Yet, the TE does not appear to incorporate this assessment into its rating of sustainability of the institutional framework and governance. The TER therefore disagrees with the TE's Likely rating and rates sustainability along this dimension as Moderately Likely.

Environmental: The TE provides conflicting ratings of environmental sustainability (graphically and in-text) of both Likely and Moderately Likely. At any rate, it does not provide a substantive justification for either assessment. Therefore, and in light of the fact that the most critical component of the project, the new mandatory EE building code under component 1 was not implemented until the very end of the project, the TER marks this aspect of sustainability as Unable to Assess.

The TE also provides an assessment of sustainability for each of the four project components, rating each as Likely. Under component 1, although further institutional capacity building for enforcement is needed, the most important outcome – the adoption of a mandatory EE building code – has been achieved. For component 2, two laboratories for testing and certification of EE materials have been built up and the domestic market for these materials has been growing. In terms of component 3, the TE notes that outreach, training and education was not only carried out during the project, but also has been equipped with institutional backing and long-term strategies to outlast the project duration. For component 4 finally, the demonstration projects are not only a sign of the change initiated by the project, but also have provided hands-on experience to national experts and serve as a frame of reference for local practitioners and University programs. (TE pp. 48-49).

5. Processes and factors affecting attainment of project outcomes

5.1 Co-financing. To what extent was the reported co-financing essential to the achievement of GEF objectives? If there was a difference in the level of expected co-financing and actual co-financing, then what were the reasons for it? Did the extent of materialization of co-financing affect project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

According to the TE, co-financing of the project in terms of the actual implementation status has surpassed the initial target 7-fold, up from a planned US$2.35 million (excluding PPG) to an estimated actual US$14.45 million. (TE pp. 32-33) The TE does not provide a breakdown of this substantial new co-financing by contributor or usage. It is therefore difficult to assess the contribution it had on project outcomes.

5.2 Project extensions and/or delays. If there were delays in project implementation and completion, then what were the reasons for it? Did the delay affect the project's outcomes and/or sustainability? If so, in what ways and through what causal linkages?

A one-year no-cost project extension (to June 30, 2016) was initially proposed at the mid-term evaluation as a means to enable more comprehensive monitoring and evaluation of the demonstration projects. It was approved by the project steering committee in 2015 and effectively proved highly beneficial for the realization of two key project achievements: the development and endorsement of the new EE building code "Thermal Protection of Buildings" and the approval and inception of the US$120

million follow-up project “De-risking and Scaling Up Investment in Energy Efficient Building Retrofits”, both of which were approved in the final weeks of the project (including the extension). (TE pp. 14, 31)

5.3 Country ownership. Assess the extent to which country ownership has affected project outcomes and sustainability? Describe the ways in which it affected outcomes and sustainability, highlighting the causal links:

The TE notes that energy efficiency has clearly become a high priority item to the government and is backed by a legislative framework that includes clear targets, specified in Armenia’s 2010 National Energy Efficiency Action Plan. The strong desire of the Armenian government to implement legislation and other mechanisms to reduce energy consumption in buildings, as well as the government’s importance for project achievements in this regard, are evident since both co-executing agencies were government ministries and able to successfully implement the project. (TE p. 46)

6. Assessment of project’s Monitoring and Evaluation system

Ratings are assessed on a six point scale: Highly Satisfactory=no shortcomings in this M&E component; Satisfactory=minor shortcomings in this M&E component; Moderately Satisfactory=moderate shortcomings in this M&E component; Moderately Unsatisfactory=significant shortcomings in this M&E component; Unsatisfactory=major shortcomings in this M&E component; Highly Unsatisfactory=there were no project M&E systems.

Please justify ratings in the space below each box.

6.1 **M&E Design at entry**	Rating: Moderately Satisfactory

The TE discusses M&E design at entry and M&E implementation in one combined section and provides an overall assessment, rating M&E as Satisfactory.

The TE notes that the project followed standard UNDP M&E procedures. It established a project steering committee as outlined in the project document, which included members from the Ministry of Nature Protection and the Ministry of Urban Development, as well as other ministries and representatives from UNDP, the Yerevan State University for Architecture and Construction, and the Builders Union of Armenia, among others.

An ad-hoc Inter Agency Working Group was also established in November 2010, having a similar composition as the project steering committee (minus UNDP, plus the National Institute of Standards CJSC as the entity tasked with construction in the pilot area). It was to support inter-agency cooperation in developing new EE construction norms and regulations, benefitting the project by enabling regular communication among relevant stakeholders about the proposed legal and regulatory changes. (TE pp. 33-34)

At another point the TE notes, that the logframe, which was used for project management and reporting to UNDP and GEF, adequately facilitated the tracking of implementation targets and was thereby suited for the operational evaluation of project progress, but less so as a tool for adaptive management. This is because it lacked a clear hierarchical structure distinguishing consistently between outputs, outcomes,

impacts, indicators and targets. The TE correctly notes that the results framework of the project document applies the term 'output' loosely to all expected results, indicators and targets, while the indicators and targets generally describe expected outcomes and impact level results. Furthermore, several indicators lacked a clear means for tracking progress with definitive sources of validation (e.g. indicator 3.1.1 and 3.2.1: use of Integrated Building Design Approach concepts in new building constructions). (TE p. 19)

The TE does not appear to consider the weakness of the project's results framework –in terms of a lack of a clear and internally consistent hierarchy as well as SMART indicators conducive of adaptive management – in its evaluation of M&E design at entry. Considering this, the TER rates M&E design at entry as Moderately Satisfactory.

6.2 **M&E Implementation**	Rating: Satisfactory

The TE discusses M&E design at entry and M&E implementation in one combined section and provides an overall assessment, rating M&E as Satisfactory.

The TE notes that the project followed standard UNDP M&E procedures, which it carried out according to GEF and UNDP practice and in line with the M&E plan laid out in the project document. It regularly reported planned and achieved project activities through annual work plans, annual progress reports, and project implementation reports. The project steering committee held annual meetings where it reviewed, discussed and approved work plans, provided recommendations, and was presented with analytical project reports that it also endorsed. A mid-term evaluation took place in 2013 and the terminal evaluation was carried out from February to August 2016. The project regularly reported its results to UNDP and GEF through annual APRs and PIRs. (TE pp. 33-34)

The TE notes elsewhere that the previously mentioned lack of a clear hierarchy from project outputs to expected outcomes and ultimately to overall impacts, meant that problems with the meeting of targets or deadlines were considered in isolation and not in relation to the project's aspired impacts. This was particularly true for the 60,000tCO_2 emission reduction target from new residential buildings to be built during the project's lifetime. Following the mid-term evaluation, the deadlines for several key outcomes (new building codes, audit protocols, passport guidelines, and the code enforcement program) were simply shifted from mid-term to end, without consideration of or compensation for the effects of this shift on the expected project impacts. In the second half of project implementation however, albeit under the one-year no-cost extension, the project team was able to realize these key deliverables, as well as significant additional achievements, which enabled project results of high impact and sustainability. (TE p. 19)

Overall, the TER therefore follows the TE's assessment of Satisfactory M&E implementation.

7. Assessment of project implementation and execution

Quality of Implementation includes the quality of project design, as well as the quality of supervision and assistance provided by implementing agency(s) to execution agencies throughout project implementation. Quality of Execution covers the effectiveness of the executing agency(s) in performing its roles and responsibilities. In both instances, the focus is upon factors that are largely within the control of the respective implementing and executing agency(s). A six point rating scale is used (Highly Satisfactory to Highly Unsatisfactory), or Unable to Assess.

Please justify ratings in the space below each box.

7.1 **Quality of Project Implementation**	Rating: Satisfactory

The TE provides separate discussions and ratings for the implementing agency, the executing agencies, and overall implementation and execution of the project. It rates each as Highly Satisfactory, but provides limited information to justify this highly optimistic assessment (i.e. "had no shortcomings"). The TE notes that the UNDP country office was actively involved in the project steering committee, stakeholder meetings, the inception workshop, and other discussions and negotiations. (TE pp. 34-35)

The MTE rated both management arrangements and implementation approach as Satisfactory but did not provide much detailed information on the specific performance of either the implementing or executing agency. (MTE pp. 14-17) In light of the overall success of the project the TER agrees that project implementation was successful, but the TE's rating as too optimistic in light of the evidence presented. While the project design was strong, there were minor shortcomings, such as the lack of a clear hierarchical structure with distinctions between output, outcome and impact level results, indicators and targets in the logframe. This meant that problems in meeting targets or deadlines were considered in isolation and not in relation to the project's impact targets, particularly CO_2 emission reductions from new residential buildings to be built during the project's lifetime. (TE p. 19) The TER rates quality of implementation as Satisfactory.

7.2 **Quality of Project Execution**	Rating: Satisfactory

The TE provides separate discussions and ratings for the implementing agency, the executing agencies, and overall implementation and execution of the project. It rates each as Highly Satisfactory, but provides limited information to justify this strong assessment. The TE notes that the co-executing agencies were both active, but that the Ministry of Urban Development assumed a leadership role, serving as an effective and efficient partner. (TE pp. 34-35)

The MTE rated management arrangements and implementation approach both as Satisfactory but did not provide much detailed information on the specific performance of either the implementing or executing agency. (MTE pp. 14-17) As noted in the previous section, in light of the overall success of the project the TER agrees that project execution was successful, but absent further information has to employ a more conservative assessment than the TE. The TER rates quality of execution as Satisfactory.

8. Assessment of Project Impacts

Note - In instances where information on any impact related topic is not provided in the terminal evaluations, the reviewer should indicate in the relevant sections below that this is indeed the case and identify the information gaps. When providing information on topics related to impact, please cite the page number of the terminal evaluation from where the information is sourced.

8.1 Environmental Change. Describe the changes in environmental stress and environmental status that occurred by the end of the project. Include both quantitative and qualitative changes documented, sources of information for these changes, and how project activities contributed to or hindered these changes. Also include how contextual factors have contributed to or hindered these changes.

Due to political events beyond the reach of the project (Armenia's shift from the EU to the Eurasian Economic Union in 2014/15), the new mandatory energy efficient building code was substantially delayed. Consequently, energy savings and GHG reductions during the project' lifetime, which according to the TE amount to 39,000 tCO_2e resulting from pilot projects and public sector buildings realized since the end of 2014, are below the 60,000 target defined in the project document. The TE gives conflicting information on the expected direct post-project reductions of 159,000 tCO_2e at one point and 296,000 tCO_2e at another, without detailing the calculation methodology for either. (TE pp. 35, 45)

8.2 Socioeconomic change. Describe any changes in human well-being (income, education, health, community relationships, etc.) that occurred by the end of the project. Include both quantitative and qualitative changes documented, sources of information for these changes, and how project activities contributed to or hindered these changes. Also include how contextual factors have contributed to or hindered these changes.

Before 2008, the growth rate of annual construction volumes was around 12% in Armenia, but annual construction volume decreased by nearly 40% in 2009 because of the global financial crisis. This was acknowledged in the project document, which assumed a post-crisis growth rate of 2% initially which would later rebound to 6%. However, annual new residential construction volumes continued to decline throughout the project, from 520,000m^2 in 2010 to 227,000m^2 in 2015. (TE p. 16)

8.3 Capacity and governance changes. Describe notable changes in capacities and governance that can lead to large-scale action (both mass and legislative) bringing about positive environmental change. "Capacities" include awareness, knowledge, skills, infrastructure, and environmental monitoring systems, among others. "Governance" refers to decision-making processes, structures and systems, including access to and use of information, and thus would include laws, administrative bodies, trust-building and conflict resolution processes, information-sharing systems, etc. Indicate how project activities contributed to/ hindered these changes, as well as how contextual factors have influenced these changes.

a) Capacities

The project was able to showcase various high-profile EE pilot buildings and renovations in both the residential and public sector, which demonstrate cost-effectiveness and comfort, and have shown that improved design can realize savings from 35% to 60%. It also helped create national building energy performance auditing and certification methodologies, helped establish testing and certification for EE construction materials, and increased the market for locally produced insulation materials. Under the project, training curricula and textbooks in integrated building design for building sector professionals were also produced. (TE p. 49)

b) Governance

New EE building codes and supporting legislation, setting mandatory energy performance requirements for new and renovated buildings for the entire building sector, were drafted and adopted under the project. (TE p. 49)

8.4 Unintended impacts. Describe any impacts not targeted by the project, whether positive or negative, affecting either ecological or social aspects. Indicate the factors that contributed to these unintended impacts occurring.

The project managed to leverage considerable and initially unplanned financing for future EE interventions in the Armenian building sector, especially the 20-year US$120million GCF/EIB project supporting EE rehabilitation and an Asian Development Bank loan to renew and build 1,400 schools all over the country, in order for them to live up to stringent seismic and EE standards. (TE p. 49)

8.5 Adoption of GEF initiatives at scale. Identify any initiatives (e.g. technologies, approaches, financing instruments, implementing bodies, legal frameworks, information systems) that have been mainstreamed, replicated and/or scaled up by government and other stakeholders by project end. Include the extent to which this broader adoption has taken place, e.g. if plans and resources have been established but no actual adoption has taken place, or if market change and large-scale environmental benefits have begun to occur. Indicate how project activities and other contextual factors contributed to these taking place. If broader adoption has not taken place as expected, indicate which factors (both project-related and contextual) have hindered this from happening.

Amendments to the RA Law on “Energy Efficiency and Renewable Energy” were passed in the final months of the project. They include the mandatory application of the new EE building standards that were developed under the project to all new buildings and renovations, creating the legal basis for substantial and sustainable direct post-project emission reductions. In 2015 and early 2016, more than 29,000 m^2 of new buildings and renovations conforming to the new EE requirements were commissioned under state investment programs. Furthermore, the ADB has provided a loan to the Armenian government to rehabilitate or replace 1,400 schools throughout the whole country. For 46 and 337 buildings scheduled to be renovated or replaced by 2020 and 2030 respectively, the project team has reminded the government that they will be subject to the amended laws and regulations and prepared designs and calculations that convincingly show the financial benefits of incorporating EE into

these buildings. Finally, a dynamic Armenian building sector has been established, with representatives from the building industry commending the market growth of EE products. (TE pp. 46-47)

9. Lessons and recommendations

9.1 Briefly describe the key lessons, good practices, or approaches mentioned in the terminal evaluation report that could have application for other GEF projects.

- Although the new EE building code was endorsed in the final week of the project and improving such codes is an excellent tool for achieving results in the large volume of buildings necessary for substantial impact, post-project impacts remains highly dependent on the timely implementation of legislation and national building programs. Delays in the endorsement of legislation or implementation of government programs are therefore a common risk in these types of projects.
- Energy efficient rehabilitation of the existing building stock in Armenia is still practically non-existent, due to scarce financing options and a low capacity of building owners and utilities to take out and repay loans. The project's leveraging of the US$120 million 20-year Green Climate Fund/European Investment Bank Project "De-risking and Scaling Up Investment in Energy Efficient Building Retrofits," which addresses EE in existing public and residential building, is all the more important in this respect. Furthermore, the project's focus on developing an EE building code and building local capacity in the Integrated Building Design Approach is a highly effective strategy within the Armenian context. While it may have a limited impact in the short-term due to its relatively long adoption time, its long term potential impact in terms of CO_2 savings is substantial.
- The pilot projects that were designed, realized and monitored under the project have provided verifiable cost savings of EE measures for the Armenian construction market. The use of standard building layouts already developed prior to the project's implementation resulted in many important opportunities for achieving and showcasing the benefits of proven no-cost/low-cost measures not being identified and implemented in the demonstration projects. This lesson does not only apply to this project, but is a general problem applicable to many building sector EE projects setting out to demonstrate the IBDA, but eventually end up merely applying better insulation to standard designs. Although the resulting buildings are more energy efficient, they do not take full advantage of the potential energy and lifecycle cost savings of IBDA.
- An accountable national certification and testing scheme for building materials, components and equipment supports the quality of and consumer confidence in energy efficiency and renewable energy technologies. Material and equipment certification enables planners, investors and consumers to make informed decisions that take into account both up-front costs and long-term savings potentials. Material certification also supports quality control and verification of building code compliance at the construction site.
- Demonstration buildings need to strike a delicate balance between showcasing new technologies and using traditional (i.e. easily replicable) construction methods and practices. For the most part, the building materials and practices used in the demonstration sites were locally sourced, which ensured a good balance of low costs and high replication potential.
  (TE pp. 51-52)

9.2 Briefly describe the recommendations given in the terminal evaluation.

- Based on the success of the project's demonstration buildings, especially the rehabilitation of the residential building in the Avan district of Yerevan, the project has developed and implemented a comprehensive exit strategy in the form of the 20-year US$120 million GCF/EIB project. It will support EE rehabilitation of public and residential buildings in the country, constituting a follow-up project that builds upon and strengthens the long-term impact of this project. The TE recommends that the project team will coordinate the hand-over with relevant stakeholders, in order to identify and train responsible parties for maintaining monitoring, data collection, information dissemination, and enforcement mechanisms developed under the project.
- A transparent methodology has been applied in this project to calculate the energy and GHG savings during the project period, based on the results of the pilot sites and new buildings constructed according to the new building code. These energy and GHG monitoring efforts should continue after project end by a suitable public entity with staff trained by GHG experts from the project.
- The minimum building energy performance requirements set in the new mandatory building code need to be tightened regularly and at least every 5 years. The new regulations form a strong foundation, but compared with international standards, even within the region, there is still substantial potential to further reduce energy consumption from buildings with proven and cost-effective measures.
- The regulations developed under the project are still largely based on prescriptive measures such minimum u-values of external walls, windows, floors and roofs. The transition to performance based codes, based on maximum kWh/m^2/year values, needs further capacity support and development.
- Local building sector experts need further contact with international know-how and best practice. If the local experts and practitioners are given adequate access to state-of-the-art procedures, methodologies and tools, they will apply them. A spreadsheet application for building energy performance calculation and certification, incorporating national climate data, calculation methodologies and code requirements, has been developed and made widely available to students, building professionals and designers.
- The pilot projects have demonstrated the interest of local developers and real estate companies in realizing energy efficient buildings. These professionals should be further supported through outreach, information and administrative incentives.
- Government incentives and financing mechanisms should be developed and implemented to help support public and private sector investments in EE building measures and practices. Cost savings from energy conservation in public facilities often lead to budget reductions in subsequent years, which means national spending is reduced, but that the facility itself rarely benefits directly from the savings. An incentive program should therefore be developed to further motivate public facilities to save energy, helping to ensure sustainable impacts.
- Energy tariffs currently do not support the large-scale uptake of EE and renewable energy measures in the private sector. Low energy costs mean long payback periods for even the most cost-effective EE measures. Tariff structures, possibly in combination with financial incentive programs, should be evaluated based on their potential for increasing private sector investment in these technologies. (TE pp. 50-51)

10. Quality of the Terminal Evaluation Report

A six point rating scale is used for each sub-criteria and overall rating of the terminal evaluation report (Highly Satisfactory to Highly Unsatisfactory)

Criteria	GEF IEO comments	Rating
To what extent does the report contain an assessment of relevant outcomes and impacts of the project and the achievement of the objectives?	The report contains an assessment of the relevant outcomes and impacts of the project, as well as the achievement of its objectives, albeit with occasionally slightly incomplete or inconsistent information.	**S**
To what extent is the report internally consistent, the evidence presented complete and convincing, and ratings well substantiated?	The report is overall, though not completely, internally consistent and while the evidence is mostly complete and convincing, ratings appear inflated.	**MS**
To what extent does the report properly assess project sustainability and/or project exit strategy?	The report assesses the project exit strategy and sustainability along its four dimensions, although the discussion of environmental sustainability could have been stronger and with more supporting evidence.	**S**
To what extent are the lessons learned supported by the evidence presented and are they comprehensive?	The lessons learned are rather comprehensive and supported by the evidence presented in the report.	**S**
Does the report include the actual project costs (total and per activity) and actual co-financing used?	The report includes actual project cost and co-financing totals, but no breakdown by activity or, in the case of the additional co-financing reported, by contributor.	**MS**
Assess the quality of the report's evaluation of project M&E systems:	In discussing the project's M&E system, the report conflated M&E design at start and M&E implementation and did not pay enough attention the initial results framework, leading to a slightly inflated assessment.	**MS**
Overall TE Rating		**S**

11. Note any additional sources of information used in the preparation of the terminal evaluation report (excluding PIRs, TEs, and PADs).