



IMPACT STUDY
on how member States could better use and implement best practices and guidelines developed by UNECE activities in their national and/or sub-national measures to address the issues of energy efficiency in buildings

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Executive summary

Improving energy efficiency in buildings is one of the most cost-effective options for meeting growing energy demand and reducing greenhouse gas emissions in most countries. The project “Enhancing National Capacities to Develop and Implement Energy Efficiency Standards for Buildings in the UNECE Region” has been implemented with the goal to achieve significant change in improving the knowledge of policy makers and experts from UNECE member States on the energy efficiency standards, their enforcement mechanisms and energy efficient technologies in buildings by conducting trainings.

This report analysed the impact of the project “Enhancing National Capacities to Develop and Implement Energy Efficiency Standards for Buildings in the UNECE Region.” To gain insights into the project’s impact and how member States could better use and implement the best practices and guidelines developed by UNECE activities in their national or/and sub-national measures to address the issues of energy efficiency in buildings, both an online questionnaire and in-person interviews were conducted. The analysis of responses delivered valuable results regarding the relevance of the project, its impact, and suggestions for future projects.

This report investigates the project’s impact on the following:

- its gender perspective;
- overall relevance, including its design and its specific activities;
- the extent to which member States implemented the recommendations and best practices, accompanied by examples from respondents’ countries;
- the extent to which the project provided guidance for implementation of recommendations;
- the extent to which the project increased stakeholder capacity to implement the recommendations;
- the remaining challenges of member States to implement the recommendations; and,
- lastly, the extent to which countries implemented recommendations from the cross-country or regional perspective.

The report shows that the project was relevant to achieving its objective. The impact analysis has shown that the project has had a valuable impact on all its key aspects. The expected accomplishments of the project had a positive impact on member States and their national stakeholders to implement the recommendations and best practices.

The analysis depicted that the project had a significant impact on all key areas. First, the impact was on implementation of national laws and policies, meaning that countries either revised existing laws or adopted new laws on energy efficiency in buildings. Second, the impact was on updating national norms and standards. Third, the project led to improved measurements, meaning that countries improved their data

collection and measurement efforts. Fourth, the project countries increased a number of energy audits. Yet, respondents from all countries indicated that there is still a room for improvement. Fifth, the impact was seen on implementation of energy management information systems. And, lastly, the project contributed to awareness-raising. In the longer term, the increased awareness about the importance of energy efficiency translates into the increased investments in retrofits or higher standards for newly constructed buildings.

The second objective of this report was to formulate recommendations for future projects and how member states could better implement the recommendations and best practices. The analysis of the interviews indicated that stakeholders believe that projects should focus on awareness raising and provision of information to the general public to educate about the importance of energy efficiency in buildings. Additionally, more examples should be provided, such as best practices on project implementation, public-private partnerships, as well as practical examples on the implementation of measures and energy saving calculations. Another recommendation was that projects should provide detailed information on energy measurements in accordance with the ISO standards. Respondents suggested working on climate data for monthly and hourly calculations. The analysis has shown that respondents suggest both a regional focus and a country-specific focus of future projects. While the regional focus is good for learning about experiences and best practices, the countries are interested in recommendations that are specific to their national context and infrastructure.

Introduction

The purpose of this study is to evaluate the impact of the extrabudgetary project “Enhancing National Capacities to Develop and Implement Energy Efficiency Standards for Buildings in the UNECE Region.” The project aimed to enhance the capacity of UNECE member States to develop and implement energy efficiency in buildings, with a focus on residential buildings, to reduce greenhouse gas emissions in the UNECE region. The project aimed to accomplish this objective by enhancing the capacity and best-practice guidance to help member States evaluate the most effective policies and enforcement mechanisms, so that they could realise greater energy savings.

The project key activities included:

- i. Conducting a Gap analysis between the performance objectives set forth in the Framework Guidelines for Energy Efficiency Standards in Buildings and current energy efficiency standards and their implementation in the countries of South-Eastern and Eastern Europe, the Caucasus, Central Asia, and in the Russian Federation;
- ii. Developing national studies with a more detailed gap analysis in Armenia, Kyrgyzstan, and the Republic of Moldova;
- iii. Updating a network of experts from public and private sectors on energy efficiency in buildings in the UNECE region and creating a collaborative environment for experts in energy efficiency in buildings;
- iv. Organizing workshops for stakeholders from the energy and housing sectors to validate the gap analysis and launch the regional and national studies;
- v. Organizing national training seminars in Armenia, Kyrgyzstan and the Republic of Moldova on high-performance energy efficiency standards in buildings;
- vi. Conducting impact study on how member States could better use and implement best practices and guidelines developed by ECE activities in their national or/and sub-national measures to address the issues of energy efficiency in buildings (which will be delivered with this report).

The expected accomplishments of the project included (i) improved knowledge of advanced energy efficiency standards in buildings in the UNECE region by UNECE member States; (ii) creation of an up-to-date network of experts from public and private sectors on energy efficiency in buildings in the UNECE region; (iii) strengthened capacity of national authorities, building sector professionals, homeowner associations and other relevant stakeholders to develop and implement advanced energy efficiency standards in buildings and introduce energy efficient technologies at the national and sub-national levels. A review of the status of these expected accomplishments is presented in Chapter 3: Findings.

The project impact is evidenced by conducting an impact study on how member States use and implement best practices and guidelines provided by ECE activities in their national or/and sub-national measures to address the issues of energy efficiency in buildings.

Methodology

Qualitative research has been conducted in order to discover the impact of the project. This chapter describes the research method applied. The research approach included a two-step process. First, an online questionnaire was sent out to gain the first insights into the project performance and its impact. Second, semi-structured interviews were conducted with key stakeholders to gain more in-depth insights into the impact of the project.

This chapter is structured as follows:

- the overall key evaluation questions elaborated
- the questionnaire described in more details
- information about the conducted interviews provided
- the standards and code of ethics discussed
- the limitations of the method outlined.

Key questions

This study is focused on four main criteria, namely relevance, efficiency, effectiveness and impact.

The overall question of relevance is whether the project was relevant to the objective of UNECE to support member States in improving their national energy efficiency in buildings. This was mainly addressed by the online questionnaire.

The question of effectiveness addressed whether the project was effective in achieving its expected results. This was evaluated based on the expected accomplishments of the project, namely (i) the improved knowledge of advanced energy efficiency standards in buildings in the ECE region by ECE member states; (ii) the enhanced and up-to-date network of experts from public and private sectors on energy efficiency in buildings in the ECE region; and (iii) the achievement that at least three countries used and implemented best practices and guidelines provided by ECE in their national and/or sub-national measures to address the issues of energy efficiency in buildings.

Efficiency is evidenced by the achievement of project objectives within the budget and the planned timeframe.

The impact is assessed with this impact study. The question of impact focuses on how the project strengthened the capacity of UNECE member States to implement the recommendations and best practices developed by UNECE in the framework of the project.

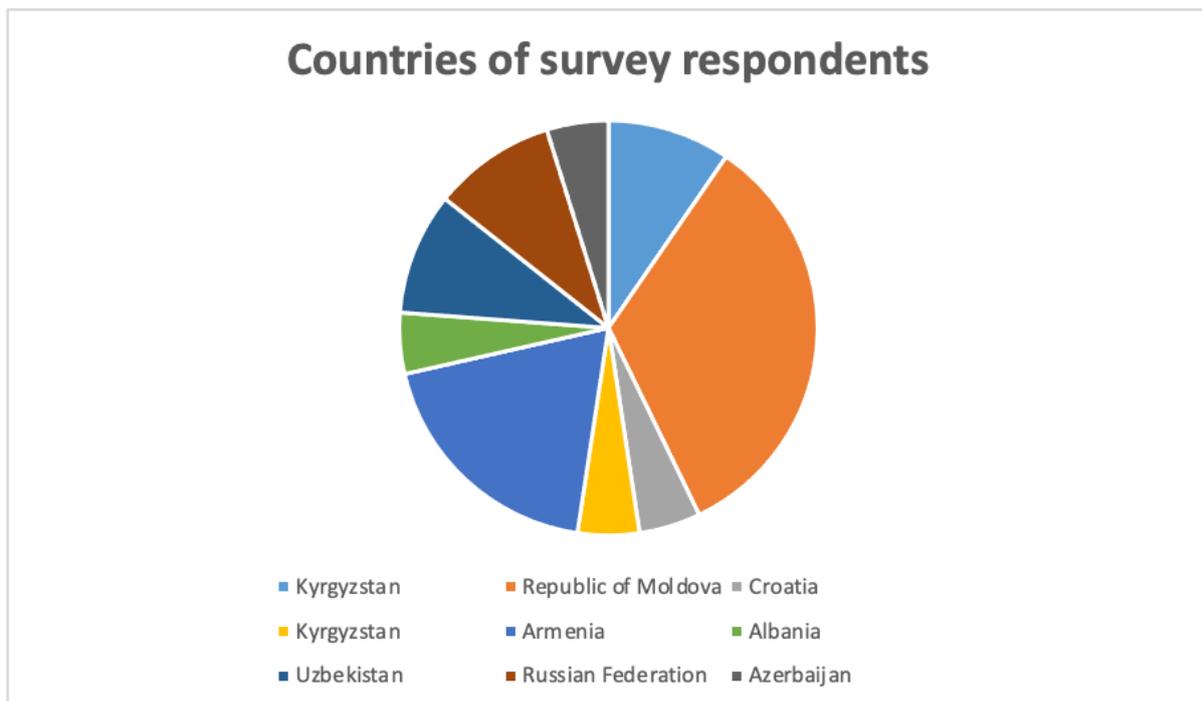
To answer all four elements, a mixed-method approach and a range of data collection techniques have been applied. The two key methods, an online survey and in-person interviews, are described below.

Survey

To gather data about the project impact, an online survey was sent out to all stakeholders of the project. Total of 22 responses to the survey were received. The constructs in the questionnaire were measured using a 5-point Likert scale for most questions and a 10-point Likert scale for two questions. Further, open-ended questions asking respondents about their opinion were included. This ensured that both a quantitative comparison between project tools and more detailed, unstructured insights into the project were included. The questionnaire was sent by e-mail, and participants had two weeks to respond to the survey on a voluntary basis. The questionnaire is included in this report in Annex.

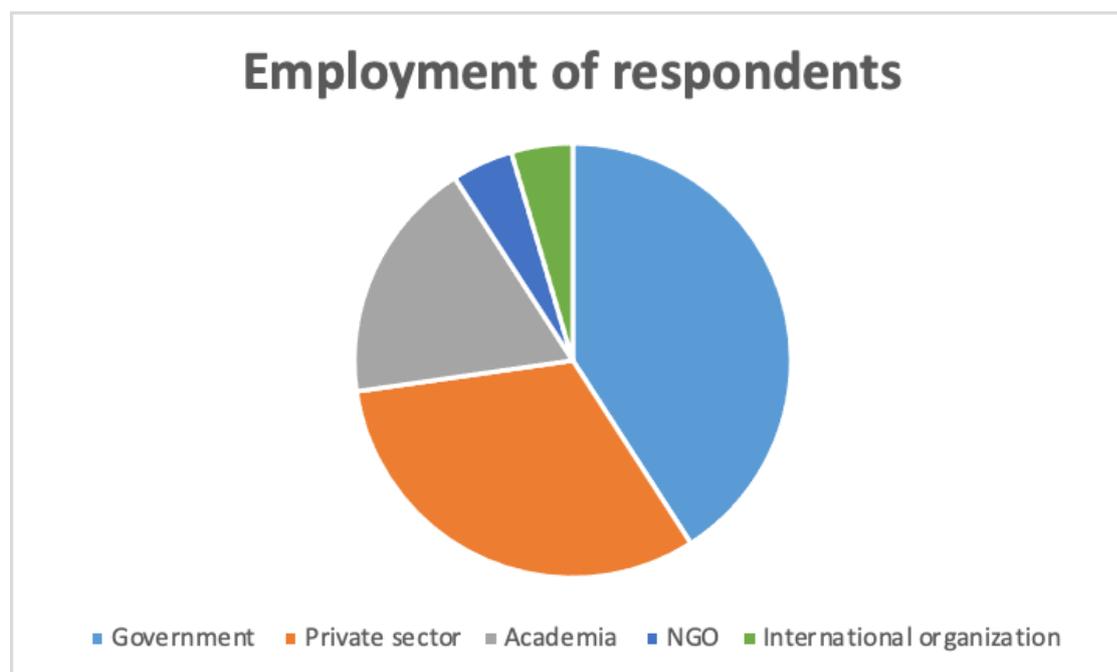
It is crucial to ensure that the sample is diverse in terms of country of origin and occupation. To safeguard this, the respondents were asked to indicate some personal information. Respondents from different countries and different occupations were included. Thus, the sample was unbiased and provided insights into the broad perspectives of stakeholders. The results show that the criteria of a diverse sample have been achieved. Figure 1 presents the distribution of countries of survey respondents.

Figure 1. Countries of survey respondents



Additionally, it was important to ensure that respondents came from a diverse pool of occupations. Thus, respondents were requested to indicate their current employment. The results show that the criteria of a diverse sample in terms of occupation is secured. Figure 2 represents the distribution of employment of respondents.

Figure 2. Employment of survey respondents



Additionally, to evaluate the national training seminars, this report is adopting the results from training evaluation questionnaires conducted at each national training. The questionnaire requested participants to indicate their perspective of the delivered national training course. Specifically, the trainees were asked to provide their evaluation of organisational issues, the quality of training and self-assessment of own capacity showing their understanding of topics covered by the training. Participants of the national trainings were asked to fill in a questionnaire at the end of the second day of the training to have a trainees' perspective of the delivered national trainings. There were nine (9) questionnaires received from the participants in Armenia, twenty-one (21) in Kyrgyzstan and thirty (30) in the Republic of Moldova.

The data received from the trainees and more details can be found in the report "National training seminars on municipal energy management, energy management information system, measurement, reporting and verification in the building sector in the three selected UNECE member States (Armenia, Kyrgyzstan, and the Republic of Moldova)".¹

Interviews

Due to the time and resource intensity that comes along with qualitative research, a small-N approach was considered most suitable. This approach aims to perform a cross-case comparison, gaining insights from a small number of respondents from a diverse sample. Interviews were chosen as the second step of the research method because they provide context, information and opinions about the research topic under study. The data are not quantifiable, yet they provide a rich understanding of the mechanisms and the impact of the project that is analysed. The interviews were semi-structured, meaning that a combination of closed- and open-ended questions and follow-up questions were included. This method allowed for flexibility in the interview,

¹ The report is available at: <https://unece.org/sites/default/files/2022-03/Final%20Report.pdf>

thereby encouraging in-depth answers from interviewees while still being attentive to the interview structure. Each interviewee in a category was asked the same questions, following the interview scheme. This allowed for a reliable comparison between the results of separate interviews.

Two distinct semi-structured interview questionnaires were prepared (see Annex: Interview questions). The first category was for government representatives, focusing on broader insights into the project impact on the specific country. The second category, for consultants and experts in the area of energy efficiency in buildings, focused on a more detailed and more technical questions about the project activities and the implementation of recommendations and best practices.

Semi-structured interviews were conducted during a three-day period from 9 to 11 March 2022 in Yerevan, Armenia. In total, 11 interviews have been conducted. The respondents were participants of the conference “Unveiling Market Opportunities for Boosting Residential Energy Efficiency and Alleviating Energy Poverty” and workshop “Best practices to address the issues of energy efficiency in buildings and their implementation in the UNECE member States.”

The interviews were structured in a way to gain both more depth and breadth of the impact discovery. First, the interviews aimed to gain deeper insights into the key topics identified through the survey analysis. And second, the questions were formulated to go beyond the topics of the survey and gain additional insights. Specifically, the interviews focused on six main topics (see Annex: Interview questions):

1. Implementation of recommendations and best practices in member States to address the issues of energy efficiency in buildings;
2. Extent to which recommendations provide further guidance to countries on the topic of energy efficiency in buildings;
3. Impact of the project on the capacity of stakeholders to implement the recommendations and improve the energy efficiency standards in buildings;
4. Obstacles or challenges that countries experience in the implementation of recommendations on a national or local level and how UNECE can support efforts to overcome those obstacles;
5. Evidence or interest to address the recommendations from a cross-country or regional cooperation perspective and the associated challenges; and
6. Recommendations that interviewees have for future projects by UNECE and what could be done so countries can better use and implement the recommendations developed by UNECE.

Ethics

The survey and the interviews were conducted by independent individuals who have not involved in the project implementation. This ensured that the research was non-biased. Further, it ensures that interview environment was relaxed, and that the interviewees felt comfortable answering the questions honestly and to the best of their ability. Gender aspects were addressed throughout the research process with appropriate questions.

Limitations

Even though due diligence has been performed to ensure that results are valid, the methodology includes some limitations. The first limitation is regarding the sample. Only a limited sample could be achieved in both the survey and the interviews. The in-person interviews were limited to the pool of the subject-matter experts. At the same time, the focus of the interviews was to gain in-depth insights into the project impact, therefore the smaller number of detailed interviews was sufficient for the purpose of this impact discovery.

Another limitation is due to the fact that there was no preliminary analysis or assessment conducted to analyse the accomplishments in the area of energy efficiency in buildings in the member States before the project implementation. Therefore, measuring the project impact on each member State was limited.

Further limitation is caused by the timing of this impact study. The survey and the interviews took place immediately after the project was finished, thus limiting the possibility to measure the impact in terms of implemented recommendations. Many of the recommendations and best practices need longer-term adaptation by national governments in their legal frameworks and strategies. Therefore, measuring the impact in terms of the number of implemented recommendations is impossible in the short-term. Nevertheless, both the survey and the interviews asked experts to indicate to what extent they perceive that the recommendations will be implemented in the future and to what extent the process of implementation has started. This, together with some examples of recommendations that have already been implemented, allowed a good indication of the impact. Further, the impact of this project can be assessed not only in terms of the number of recommendations implemented but also in terms of support provided to stakeholders to implement recommendations in the future and their enhanced knowledge and capacity to do so.

Findings

This chapter presents the results of the online survey and the interviews. The chapter highlights the main findings, divided into several key areas:

- Insights into the gender perspective of the project;
- Relevance of the project, including its design and its specific activities;
- Extent to which member States implemented the recommendations and best practices, accompanied by examples from respondents' countries;
- Extent to which the project provided guidance for implementation of recommendations;
- Extent to which the project increased stakeholder capacity to implement the recommendations;
- Remaining challenges of member States to implement the recommendations;
- Extent to which countries implemented recommendations from the cross-country or regional perspective.

Gender perspective

UNECE aligns its work with the 2030 Agenda for Sustainable Development. The Sustainable Development Goal (SDG) 5 concerns gender equality and women empowerment. Even though the active promotion of gender perspectives was not a primary objective of the project, the project aimed to create a supportive environment for expert participation of all genders.

The survey asked respondents to what extent they believe that the project activities advocate for gender equality. On a scale from one (very low) to five (very high), the average score was 3.7, indicating that respondents did perceive that gender equality was advocated.

Furthermore, participation of women in workshops serves as a good indicator of support in achieving the gender equality. The online Workshop on Energy Efficiency Standards in Buildings and their Implementation in the UNECE region on 9 April 2021 included 68 participants, of which 24 women were women (35 per cent). In the Workshop on Regional and National Studies on a Gap Analysis between the Performance Objectives of the Framework Guidelines for Energy Efficiency Standards in Buildings and Implementation of Current Building Energy Efficiency Standards, which was held on 20 September 2021, 162 experts participated, of which 34 were women (20 per cent). The Workshop on Best practices to Address the Issues of Energy Efficiency in Buildings and their Implementation in the UNECE member States on 11 March 2022, was attended by 64 participants, of which 28 were women (43 per cent).

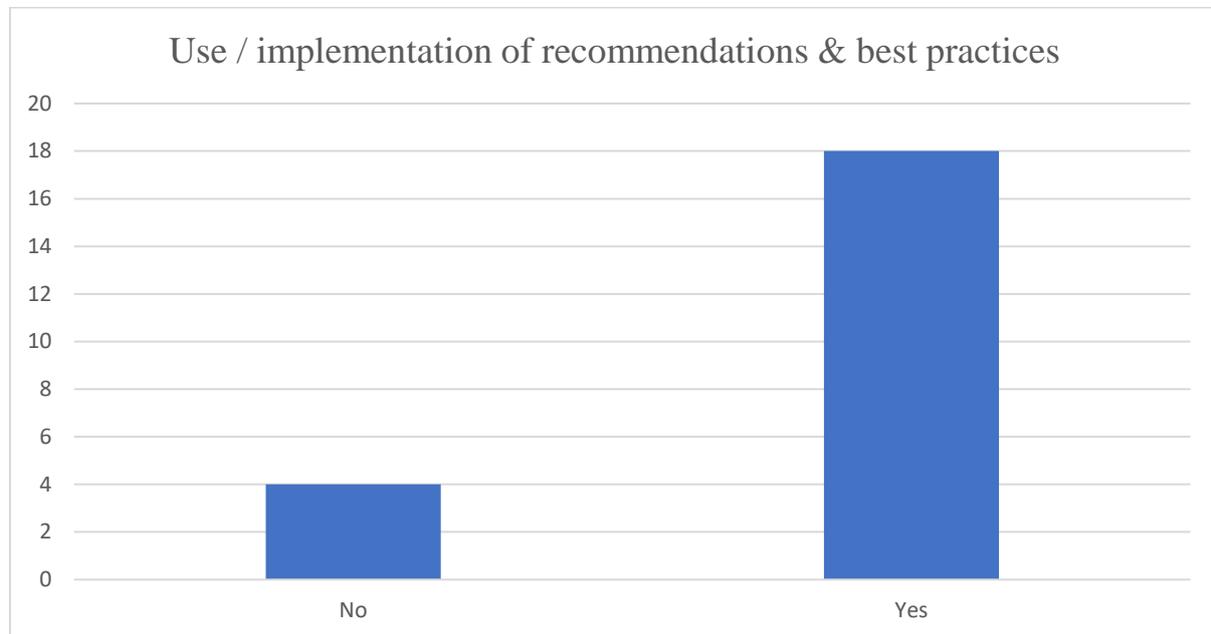
These numbers show that participation of women in the workshops was lower than that of men. Taking into consideration that women are a minority in the energy sector, the numbers are not surprising. Together with the high average score on the survey question regarding gender equality, the figures are appropriate to conclude that the project performed well in terms of supporting the gender equality. Nevertheless, more efforts should be made to ensure equal opportunities for participation of men and women in the future activities.

Relevance of project activities

As a first point of the impact discovery, the survey asked respondents to indicate whether their country implemented and uses the recommendations and best practices from the regional study with Gap Analysis and national studies. The results show that more than 80 per cent of respondents indicated that their country implemented the recommendations and best practices from regional and national studies. Figure 3 depicts the responses.

The survey asked respondents to indicate, on a 10-point Likert scale, how likely they believe it is that their country will implement the recommendations in the future. The average response, on a scale from 1 to 10, was 6.95, indicating that, overall, respondents are moderately confident about the future implementation of recommendations and best practices.

Figure 3. Use and implementation of recommendations and best practices



Additionally, respondents were asked to indicate their perception of how likely they believe it is that recommendations and best practices will sustain in the future. The average response was 7.5, which means that respondents are confident that the implemented recommendations and best practices will sustain in the future.

To assess the key aspects of project impact, the survey asked respondents to answer a number of questions regarding the relevance, effectiveness and impact on a 5-point Likert scale. The average result of each question is presented in Table 1.

Table 1. Average score of project design

Category	Average score
To what extent did the project activities advocate for gender equality?	3.7
To what extent did the project consider the specific needs of your country?	4.0

*1= very low, 2=low, 3=neutral, 4=high, 5=very high

The survey also asked respondents to indicate their perception of the project relevance. The results are summarized in Table 2.

Table 2. Average scores on project relevance

Category	Average score
Overall, to what extent does the project support your country in improving EE in buildings?	3.9
How relevant was the project to the priorities and needs of your country?	4.0
How relevant was the project for the implementation of recommendations from the regional and national studies to address the issues of EE in buildings?	4.15
To what extent do you believe that your country will benefit from the developed training materials?	3.9
To what extent did the project provide further guidance to your country on the topic of EE in buildings?	3.95

*1= very low, 2=low, 3=neutral, 4=high, 5=very high

The survey aimed to get an overall sense and the first insight into the impact of the project. For this, two questions regarding the overall impact and achievement of objectives were asked. The results are presented in Table 3.

Table 3. Average scores of overall project impact and achievement of the main objective

Category	Average score
How appropriate was the project design and the implementation of the project for meeting the project's objective?	3.9
Overall, to what extent have the project activities been appropriate for generating the expected effects?	3.8

*1= very low, 2=low, 3=neutral, 4=high, 5=very high

In the last part, the survey asked respondents to indicate their opinion about the relevance of specific project activities on the individual knowledge of energy efficiency standards, their enforcement mechanisms and energy efficient technologies in buildings (Table 4).

Table 4. Average score of project activities

Category	Average score
Regional study with gap analysis	3.76
Network of experts	3.78
National studies	3.83
Workshop to validate the Gap Analysis, online, 9 April 2021	3.85
Workshop on Regional and National Studies on the Gap Analysis, Geneva, 20 September 2021	3.85

*1= very low, 2=low, 3=neutral, 4=high, 5=very high

Additionally, to evaluate the national training seminars, the project conducted an evaluation of all national training seminars. The report “National training seminars on municipal energy management, energy management information system, measurement, reporting and verification in the building sector in the three selected UNECE member States (Armenia, Kyrgyzstan, and the Republic of Moldova)” performed an analysis of all national trainings held within the frame of the project.

Participants evaluated each training session. The overall average score of all the sessions is very good in Armenia (4.4) and Kyrgyzstan (4.0) and excellent in the Republic of Moldova (4.7). The evaluation of the sessions and the average can be found in the Table 5 below.

Table 5. Evaluation of national trainings

	Armenia	Kyrgyzstan	Moldova	AVE-RAGE
Quality of session 1 “Introduction to energy management and monitoring, reporting and verification in the buildings sector”	4.3	3.8	4.7	4.3
Quality of session 2 “Institutional, organizational and legal aspects of energy management and monitoring, reporting and verification at the global and EU level”	4.5	4.2	4.7	4.5
Quality of session 3 “Municipal energy management as part of the national monitoring, reporting and verification system”	4.2	4.0	4.7	4.3
Quality of session 4 “Energy management information system and examples of energy management system tools”	4.3	4.0	4.7	4.3
Quality of session 5 “Energy audits procedure of buildings and multicriteria analysis”	4.6	4.0	4.7	4.4

Quality of session 6 “Best practices of funding possibilities for energy efficiency measures in buildings”	4.2	4.1	4.8	4.4
AVERAGE	4.4	4.0	4.7	4.4

Additionally, as mentioned above, the survey also included several open-ended questions, asking respondents to elaborate on specific topics. Based on those questions, qualitative data regarding the impact of the study were collected to get a broad overview of the key aspects of the impact. A key insight regarding the impact was the question of which activities respondents perceived as particularly good. Among all respondents, the following key topics were identified:

- Several respondents indicated that sharing of knowledge and applied best practices was helpful. Respondents also indicated that shared knowledge from other countries helped to apply similar best practices. Sharing of knowledge between neighbouring countries was indicated as particularly helpful. Learning from other countries that have implemented similar practices gives the advantage of not repeating the same mistakes and implementing the practices that worked successfully in a neighbouring country.
- The activity that respondents identified as particularly good was the Regional Study with the Gap analysis. Learning about the practices from countries of the same region has two benefits. First, it serves as an intrinsic motivation to apply similar practices and standards to keep up with countries in the region. Second, countries from the same region are exposed to a similar environment with a similar infrastructure, meaning that the practices from neighbouring countries are especially relevant.
- Respondents indicated that the project workshops were particularly relevant because they provided possibility to exchange experiences between countries.
- Respondents named the need for energy efficiency in buildings as a key benefit that the project promoted. In many countries, lack of awareness about the topic is a crucial issue.

Overall, the main theme that was identified in the survey responses was the focus on regional activities. Respondents see the sharing of knowledge and best practices within the region through different activities, such as trainings, studies, and workshops, as an element that is particularly helpful for addressing the issue of energy efficiency in buildings.

Going more into details, the survey asked respondents to elaborate on the materialized impact that the project had on member States. Since the project has been completed very recently, the specific observable benefits were expected to be limited. Nevertheless, respondents indicated several activities that have been undertaken in their country to use and implement the recommendations. Overall, the responses can be grouped into several main categories:

- **Implementation of national laws and policies:** countries either revised existing laws or implemented new laws on energy efficiency in buildings. Additionally, normative documents and national energy strategies were updated.

- **National norms and standards:** countries have updated several normative documents and revised national standards on energy efficiency in buildings. Specifically, the regional and national studies have focused the attention of decision-makers on the gaps in neighbouring countries, motivating them to update the standards to reflect the level of efficiency for both existing and new buildings in the countries.
- **Improved measurements:** following the project participation, countries improved their data collection and measurement efforts as well as measured building energy performance in accordance with ISO standards.
- **Increased energy audits:** more audits have been performed following the project implementation. Yet, respondents from all countries indicated that there is still a room for improvement, specifically in terms of the number of audits performed and the relevant standards.
- **Energy management information systems:** some respondents indicated that their countries have implemented the energy management information systems.
- **Awareness-raising:** respondents indicated that seminars held in their countries increased awareness about the topic of energy efficiency in buildings. Further, through awareness-raising campaigns and marketing, the public was informed about the importance of energy efficiency. In the longer term, this translates into the increased investments in retrofits or higher standards for newly constructed buildings. Educating homeowners about the benefits of investing in energy efficient retrofits of existing buildings or the construction of new buildings according to the high performance standards is crucial to saving energy in the long term.

The last main insight gained from the responses was regarding **recommendations for future projects**. The survey included an open-ended question for respondents to provide their suggestions on how future projects could help member States better implement the recommendations and best practices developed by UNECE. The responses to the survey have been analysed and can be clustered into several overarching suggestions:

- The projects should focus their efforts on providing information to the general public to raise awareness about the topic and the importance of energy efficiency in buildings.
- More examples should be provided in the project activities, such as best practices of project implementation, public-private partnerships, as well as practical examples on the implementation of measures and energy saving calculations. Sharing of experiences and best practices among countries raises the effectiveness of the implementation of energy efficiency measures since mistakes that have been made by neighbouring countries will not be repeated, and efforts can be focused on practices that have proven successful in other countries.
- The project should provide detailed information regarding measurements according to the ISO standards. Respondents suggested working on climate data for monthly and hourly calculations.
- There was a suggestion to adopt regional focus. This means that projects should develop activities that are applicable to specific regions, giving the opportunity to

make cross-country comparisons. The benefits are, as mentioned above, that countries can adopt successful practices and examples from neighbouring countries in their own country, preventing to repeat the same mistakes. As a result, countries can implement measures more effectively and efficiently. Additionally, the comparison between countries in the region serves as motivation for countries to keep up with the standards of their neighbouring countries, leading to improved energy efficiency standards at both national and regional levels.

- At the same time, here was a suggestion to adopt a country-specific focus. Analysis has shown that respondents desire both a regional focus and a country-specific focus. While the regional focus is good for learning about experiences and best practices, countries are interested in recommendations that are specific to their national context and infrastructure.
- Respondents suggested performing an analysis of the project results. Specifically, they suggested presenting a summary of the project results in a separate report. This aspect is covered by this impact discovery report, which analyses the impact and the specific results of the project.

Implementation of recommendations and best practices

Overall, the interviews have shown that member States regarded the recommendations and best practices developed by UNECE as very helpful and that countries have undergone efforts to implement them. It was evident that all countries recognize the importance of energy efficiency in buildings and the pressing need to implement the recommendations and best practices. Similar to the results from the survey (see section 3.1), the countries have indicated several measures that have been implemented at the national or local levels to improve energy efficiency standards in buildings.

The first key evidence is the implementation of national laws and policies regarding energy efficiency in buildings. Countries implemented laws on energy efficiency in buildings, laws on energy audits and energy performance, implementation of the EU directives on energy efficiency. For example, Albania adopted several by-laws implementing the 2016 Law on Energy Performance in Buildings, including the methods for calculating and setting minimum energy performance requirements and certification of buildings. Georgia also works on harmonizing the national legislation with the EU directives. Armenia adopted new energy management systems and implemented ISO standards. Specifically, Armenia translated the ISO standards into the local language and registered them as Armenian national standards. The country also developed energy efficiency standards based on adjustments to the EU standards, and those standards were fully adopted by January 2022. These standards will be mandatory for all entities engaged in planning and construction work. As another example, the Republic of Moldova started to update the energy efficiency laws based on the EU directives. Kyrgyzstan worked on the legal framework and started implementing practical steps to address the requirements set in the relevant laws. Kyrgyzstan also certified 20 energy auditors to assess the energy efficiency in buildings and issue the certifications. The construction companies are required to engage energy auditors to certify the newly constructed buildings. Even though a lot

of progress has been made in all countries, it is still a long process, and national systems are slow to absorb the changes.

The interviews showed that countries are engaged in implementing and updating the building codes. Yet, interviewees indicated the remaining room for improvement, especially since buildings codes are not updated frequently enough. In Armenia, for example, the energy measurements of building codes do not account for cooling or hot water since the system is decentralised in the country. The process is going in the right direction to also include cooling and lighting into the building codes, but it will take time. Also, other countries, like North Macedonia and the Republic of Moldova, indicated that the work on building certification is ongoing but that the process is not finalized yet. Interviewees voiced the fact that improvement of energy efficiency in buildings is a long process and that continuous efforts are required for ensuring it.

“Projects like this are valuable, but only if organizations like UNECE engage in continuous efforts to support member States in their work on energy efficiency in buildings.” – indicated an interviewee.

The countries engaged in efforts to raise awareness about the importance of energy saving and energy efficiency in buildings. On one hand, they informed decision- and policy makers about the need to improve legislative framework and update the norms and standards frequently. On the other hand, they also promote the need to invest in energy efficiency in existing buildings through retrofits. For example, awareness-raising activities in Armenia are implemented through extensive campaigns on energy efficiency in buildings and through engaging influencers and other famous characters and opinion makers. Also, through movies and banners, Armenia engaged in active efforts to communicate the benefits of investing in energy efficiency in buildings, such as the percentage of energy saved and the adhering cost savings. In Kyrgyzstan, active sharing of knowledge and promotion of the importance of energy efficiency in buildings have been an outcome that can be attributed to the project.

Participants were also asked how exactly the project was helping the countries to implement the recommendations and best practices. One aspect was that the project, through the workshops and trainings, provided benefits beyond the technical training of participants. The project also offered a platform for communication among experts. The interviewees emphasized the benefit of having an opportunity to exchange information and engage in discussions among experts within the framework of the project, especially after the Covid-19 crisis. Knowledgeable experts facilitated discussions on a detailed level during the project events.

Provision of guidance

The other key focus of the interviews was to gain insights into how the recommendations provided guidance to countries on the topic of energy efficiency in buildings. Interviewees indicated that a key aspect of providing guidance was done through the regional study with Gap Analysis, national studies and national trainings. National trainings presented the necessary steps that countries need to take in order to improve energy efficiency in buildings. They provided knowledge and expertise gained from countries that are more developed in the area of energy efficiency in buildings, helped other countries to bring that knowledge back to their national decision- and policy makers. Furthermore, the Regional Study with Gap Analysis was

mentioned as an essential tool that showed a need of boosting transition in the energy sector and communicated the urgency that energy efficiency should be a focus of national and local efforts. Sharing of best practices, including on data collection, monitoring and verification, energy audits and implementation of specific measures, has provided valuable guidance to the project stakeholders. Consequently, this provides a value added, especially in the long term. Sharing of knowledge and recommendations, together with the success factors, has proven to be a key activity of the project that provides guidance to member States.

Nevertheless, interviewees indicated that there is still a room for improvement. Not all decision makers and stakeholders are aware of the recommendations from regional and national studies. This shows that more efforts should be focused on communicating the recommendations developed by UNECE and raising awareness about the project and its benefits for member States. An important suggestion was to increase the outreach of the project, so that all government officials are aware of the reports and studies and get familiar with the recommendations and best practices. Interviewees also demonstrated that even if the capacity in the ministries and policy making departments remains low at the current stage, increasing the awareness on importance of energy efficiency in buildings will help in the long term. Availability of the analytical reports and studies will help, especially when capacity of stakeholders in the governments increases in the future. Thus benefits of the project will also materialise in the longer term.

Capacity of stakeholders

The key impact of the project is in difference that it made to the capacity of stakeholders to implement recommendations from the regional and national studies and to improve the standards for energy efficiency in buildings. The interviewees expressed that sharing of knowledge was the most important aspect. The project helped stakeholders to become familiar with the experiences of retrofitting buildings in other countries, especially neighbouring ones that have already gone through the transition.

The project activities helped member States to get a clear vision of the gaps in the legislative framework and identify areas where national efforts should be focused for further development. It presented to countries where they are lagging behind other countries in the region. Cooperation with other countries leads to the progress and makes energy efficiency efforts more “efficient” saving both costs and time. Countries within the same sub-region have significant overlaps in the infrastructure and current standards of buildings, and thus also similarities in the obstacles to achieving energy efficiency in buildings.

“Joining efforts on a cross-country basis through exchanging knowledge and experiences saves time and resources.” – mentioned an interviewee.

The project demonstrated to stakeholders that they need to be more active in their efforts to improve energy efficiency and that they need to increase awareness in their countries. The workshops were a key activity to engage all relevant stakeholders in discussions and exchange of information. Thus, interviewees expressed their desire to have more projects like this to help setting the national targets and continue work on achieving these targets.

Obstacles and challenges

While the project benefits, especially in terms of support for the implementation of recommendations and best practices, have been clearly demonstrated by interviewees, several obstacles remain. Respondents have indicated a variety of obstacles that member States experience in implementing the recommendations and best practices. Since there have been vast overlaps in the responses of interviewees from different countries, the insights were grouped as follows:

The first obstacle to achieving energy efficiency in member States is the continuously low level of energy prices. Due to low energy prices, consumers have a low incentive to invest in measures that improve energy efficiency in buildings. While the upfront investments for retrofits are relatively high, and the payback period is long, the consumers are sceptical about implementing energy efficiency measures. Additionally, the topic of energy efficiency and its importance suffers from low awareness in some member States. Not only the public, but also policy makers, often disregard the importance of energy efficiency. Consumers have a lack of understanding of the importance of energy efficiency in buildings. Especially private homeowners with low income do not understand the payback period and the principle of investment paying off in the long term. Generally, people with low income are focused on the present and short-term benefits, and they are reluctant to invest a large amount of money when they expect to receive a payoff only in several years. Therefore, it is crucial to raise awareness about the topic of energy efficiency not only among decision-makers but also among the public. Especially the long-term benefits must be communicated through easily understandable information, so that private homeowners are incentivised to engage in building retrofits and owners constructing new buildings are encouraged to implement measures to improve energy efficiency.

Also, on the side of policy making, several obstacles were identified. A key aspect is a legislative framework. Updating and enforcing legislation is a complicated and lengthy process, therefore some countries have outdated laws and regulations. Even if the legislative framework is up to date and includes laws that require high standards of energy efficiency in buildings, a lack of human capital impedes the implementation. Some countries do not have an implementing institution for the developed measures and norms. So even though the laws are in place, the enforcement is lagging. An example is the lack of energy auditors. Even if a country has strict regulations and building codes, the lack of energy auditors impeded the enforcement and implementation of standards. Thus, member States need to have the national independent agencies that ensure compliance with the adopted standards and regulations.

The third obstacle that many interviewees mentioned is lack of experience of national stakeholders. In some countries, the national stakeholders have not gathered any experience in energy efficiency in buildings. Yet, this is where the UNECE project was mentioned as an enormous help. Provision of information and the platform for learning about best practices from other countries was identified as a significant benefit.

The fourth key challenge is lack of funds. Energy efficiency retrofits require large upfront investments. Most interviewees indicated that lack of financing is a key obstacle

to improving energy efficiency. To overcome this obstacle, it is crucial to provide dedicated loans with low interest rates.

Nevertheless, respondents were optimistic and indicated that the improvement of energy efficiency is possible. It requires an up-to-date legislative framework and frequent monitoring, increased awareness, communication to the public and provision of funding through loans.

Interviewees further highlighted that improving energy efficiency is a gradual process. Especially in the countries of the former Soviet Union, many buildings have been built without consideration for energy efficiency. Thus, starting with smaller steps, such as the installation of double glass windows and then improving the energy efficiency standards, can provide a basis to achieve enormous improvements in energy efficiency. Creation of an online database of energy efficient technologies would provide private homeowners and construction companies with the necessary information.

Cross-country and regional cooperation

As mentioned beforehand, a key topic that emerged in the analysis of interviews was the need for and benefits of regional cooperation. All respondents answered that their countries are eager to find successful examples from neighbouring countries that are more experienced in energy efficiency improvements. This can be done either from the more experienced countries in the region or from the countries with similar infrastructure. A key strategy to achieve this is through the implementation of joint projects, including meetings, workshops and trainings for stakeholders from different countries.

Respondents have indicated several examples of cross-country and regional cooperation that are already in place. The first was the UNECE project on enhancing energy efficiency standards for buildings. The Energy Community was named as an example of regional cooperation helping countries to learn about the best practices from the more experienced countries. Also, the European Regional Development Fund was indicated as an example of regional cooperation to implement projects and connect neighbouring countries.

Conclusions

The project has had a valuable impact on all its key aspects. In particular, the project was relevant in achieving the UNECE's objective to support member States in improving energy efficiency in buildings at the national level. The overall project's relevance, but also relevance of its individual activities, were rated high among respondents.

The project was effective in achieving its expected accomplishments. All expected accomplishments have been achieved. The knowledge of stakeholders on energy efficiency standards in buildings was improved. The collaborative environment for experts was established. And, lastly, the capacity of all stakeholders to develop and implement advanced energy efficiency standards in buildings and introduce relevant technologies was enhanced.

The project was efficient since all activities have been implemented in the planned timeframe and within the budget.

The results of this impact assessment have shown that the project has had a considerable impact in many aspects. First and foremost, the project was valuable in supporting the national efforts of member States to implement the recommendations and best practices through improving the knowledge of stakeholders and enhancing their capacity. Following the project, the member States have started to implement the recommendations developed by UNECE in the framework of the project at the national and/or sub-national level.

In summary, this report concludes that the project had a very positive impact on member States' energy efficiency in buildings.

Recommendations for future projects

A key theme that emerged continuously across most interviews was the adoption of a regional focus. Designing projects with a focus on a specific sub-region, such as Central Asia or the Western Balkans, contains considerable benefits. Implementing projects with a regional focus has advantage of sharing knowledge of more experienced countries. In the framework of such projects the best practices and experiences from neighbouring countries can be shared with less experienced countries. Due to the similarities in infrastructure and the institutional background of countries within the same region, the best practices can relatively easily be adjusted and adopted. As a result, the countries can implement successful practices without having to repeat the same mistakes.

Future projects with regional focus should include a role for national consultants who can adjust recommendations to the country-specific context. This will ensure that recommendations are both feasible and suitable to the specific country.

More case studies were suggested for inclusion into future projects. Learning about the successful cases from other countries provides knowledge that can be implemented in another country.

A key suggestion for future projects also included the need to focus on awareness-raising and provision of information. As mentioned in Section 3.6, the low awareness of decision makers and the public is a fundamental challenge in improving energy

efficiency in buildings. Therefore, future projects should take this into consideration and include substantial awareness-raising initiatives. The focus can be on communicating the benefits of investing in energy efficiency measures. Showing the benefits of building retrofits in terms of energy- and cost savings provides incentives to the public to improve energy efficiency in residential buildings.

However, it is only beneficial in combination with available financing. For this, loans with low interest rates should be available. Interviewees suggested supporting public-private cooperation with banks in order to provide the necessary financing.

Another suggestion was to provide information and support regarding community planning or neighbourhood planning for the private building retrofits. Fostering collaboration among private homeowners, especially in multi-apartment residential buildings, can increase the efficiency and effectiveness of retrofits through bundling of efforts.

Another suggestion for future projects is to focus efforts to provide training and education. Trainings on energy efficiency should be provided in universities to promote importance of energy efficiency and the newest technologies to improve energy efficiency in buildings. On the other hand, the trainings are required through workshops and national or regional trainings, such as the ones provided by UNECE in the framework of the current project. Another suggested possibility is to organize Hard Talks to discuss energy efficiency in buildings and its related institutional and legislative environment and available technologies.

Annexes

Annex I. Survey questionnaire

Dear participant,

First of all, thank you very much for participating in this short survey. We would like you to respond to the survey as UNECE is conducting the impact study for the project “Enhancing national capacities to develop and implement energy efficiency standards for buildings in the UNECE region”. It will only take around 10 minutes and will help gain valuable insights into the project. All answers that are provided will be treated confidentially. Survey responses will be presented in aggregated form without personal attribution. Please read all questions carefully and answer to the best of your ability.

Objective of this survey is to obtain information that will serve as a basis for analysis of accomplishments, limitations, and lessons learned, translating into insights on how member States could better use and implement best practices and guidelines developed by the project implementation in their national and/or sub-national measures to address the issues of energy efficiency in buildings.

UNECE is an implementing agency for the project (duration 01 July 2020 - 31 March 2022). The project aims to enhance the capacity of the UNECE member States to develop and implement energy efficiency in buildings, with a focus on residential buildings. The project implemented most of its activities. A study on gap analysis between the performance objectives set forth in the Framework Guidelines for Energy Efficiency Standards in Buildings and current energy efficiency standards and their implementation in the countries of South-Eastern and Eastern Europe, the Caucasus, Central Asia, and in the Russian Federation has been conducted. The findings and recommendations from this regional study were discussed at the Workshop for stakeholders from the energy and housing sectors to validate the gap analysis on 9 April 2021. Three national studies (in Armenia, Kyrgyzstan and the Republic of Moldova) with a more detailed gap analysis have also been developed. The country-specific recommendations from those studies were discussed at the Workshop for stakeholders from the energy and housing sectors on 20 September 2021. The project established a Collaborative Environment for Experts on Energy Efficiency in Buildings in the UNECE region and updated the network of experts from public and private sectors on energy efficiency in buildings. In the period of October 2021-January 2022, the national training seminars on high-performance energy efficiency standards in buildings were organized in Armenia, Kyrgyzstan and the Republic of Moldova. Information on all project activities is available at:

<https://unece.org/sustainable-energy/regional-advisory-services/about-project>

1. Please indicate your name and surname

2. What is your gender?

- Female
- Male
- Other
- Prefer not to answer

3. Please state the country where you are from

- Albania
- Armenia
- Belarus
- Bosnia and Herzegovina
- Georgia
- Kazakhstan
- Kyrgyzstan
- Montenegro
- Moldova
- North Macedonia
- Russian Federation
- Serbia
- Tajikistan
- Turkmenistan
- Ukraine
- Uzbekistan

4. Please choose the category of your employment

- Government
- International organization
- Private sector
- Academia

5. Please specify precisely your current employer

6. Please state what your job title is

7. In which project activities did you participate?

- National training seminars on high-performance energy efficiency standards in buildings
- Workshops on regional and national studies on implementation of energy efficiency standards in buildings
- Network of experts from public and private sectors on energy efficiency in buildings in the UNECE region
- Contribution to gap analysis between the performance objectives set forth in the Framework Guidelines for Energy Efficiency Standards in Buildings and current energy efficiency standards and their implementation in the countries of South-Eastern and Eastern Europe, the Caucasus, Central Asia, and in the Russian Federation
- Contribution to national studies with a more detailed gap analysis between the performance objectives of the Framework Guidelines for Energy Efficiency Standards in Buildings and implementation of current building energy efficiency standards

8. Did your country use and/or implement recommendations and best practices from the regional and national studies developed by UNECE in their national and/or sub-national measures to address the issues of energy efficiency in buildings?
- Yes
 - No
 - I do not know

9. How likely do you believe that your country will be implementing recommendations from the regional and national studies developed by UNECE in the future?

0	1	2	3	4	5	6	7	8	9	10
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Not at all likely
Extremely likely

10. How likely do you believe that these results will sustain in the future?

0	1	2	3	4	5	6	7	8	9	10
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Not at all likely
Extremely likely

11. Project design

	Very Low	Low	Neutral	High	Very High
To what extent did activities of the UNECE project advocate for gender equality?	<input type="radio"/>				
To what extent did the project take into account the specific needs of your country?	<input type="radio"/>				

12. What could have been done better in the design of the project?

13. Project relevance

	Very Low	Low	Neutral	High	Very High
Overall, to what extent do you believe that the project supports your country in improving energy efficiency in buildings?	<input type="radio"/>				
How relevant was the project to the priorities and needs of your country?	<input type="radio"/>				
How relevant was the project for implementation of recommendations from the regional and national studies in the national and/or subnational measures to address the issues of energy efficiency in buildings?	<input type="radio"/>				
To what extent do you believe that your country will benefit from the developed training materials?	<input type="radio"/>				
To what extent does it provide further guidance to your country on the topic of energy efficiency in buildings?	<input type="radio"/>				

14. What could have been done better in the project?

15. Overall impact and achievement of main objective

	Very Low	Low	Neutral	High	Very High
How appropriate was the project design and implementation for meeting the project's objective?	<input type="radio"/>				
Overall, to what extent have the project activities been appropriate for generating the expected effects?	<input type="radio"/>				

16. Project activities: please rate the relevance for each project activity on your knowledge of energy efficiency standards, their enforcement mechanisms and energy efficient technologies in buildings?

	Very Low	Low	Neutral	High	Very High	I did not participate
Regional study with gap analysis	<input type="radio"/>					
Network of experts	<input type="radio"/>					
National studies	<input type="radio"/>					
Workshop on Regional and National Studies on the Gap Analysis (20.09.2021)	<input type="radio"/>					
Workshop to validate the gap analysis (09.04.2021)	<input type="radio"/>					
National training seminar in Yerevan, Armenia: 25-26 October 2021	<input type="radio"/>					
National training seminar in Kyrgyzstan, 29-30 November 2021	<input type="radio"/>					
National training seminar in the Republic of Moldova: 20-21 January 2022	<input type="radio"/>					

17. Which activities did you find particularly good, and why?

18. What could have been done better, and why?

19. Did the national training seminars and workshops improve your knowledge of advanced building methods?

- Yes
- No
- Maybe
- Not applicable

20. Please briefly describe the areas for which the training was helpful

21. Please briefly describe what could have been done better during the national training seminars

22. Which activities have been undertaken in your country to use and implement recommendations developed by UNECE in the national and/or sub-national measures to address the issues of energy efficiency in buildings?

23. Is there anything else you would like to mention regarding the impact of the project?

Annex II: Interview questions

General questions to government representatives or other stakeholders:

1. Does your country use and/or implement recommendations and best practices to address the issues of energy efficiency in buildings?
2. To what extent do recommendations provide further guidance to your country on the topic of energy efficiency in buildings? Please elaborate. (Why? How?)
3. What difference has the project made to capacity of stakeholders to implement the recommendations and improve standards for EE in buildings?
4. Are there any challenges (at legal/policy level, institutional level and individual capacity level) associated with implementing the recommendations at the national and/or local levels? If yes, how the UNECE can support you in this regard?
5. Is there any evidence or interest to address the recommendations from the cross-country /regional cooperation perspective? If yes, could you please share some details and advise on the associated challenges?
6. What recommendations do you have for future projects national and/or regional) by ECE? What could be done so countries can better use and implement the recommendations developed by ECE?

Questions to experts and consultants:

1. Did your country use and/or implement the recommendations and best practices to address the issues of energy efficiency in buildings? (Policy level, institutional level, individual level?) If yes, could you please provide some examples?
2. How, exactly, did the project initiate or contribute to this change? What actions have been taken by the country to ensure implement the recommendations?
3. What difference has the project made to the capacity of stakeholders to implement the recommendations and improve standards for EE in buildings? For example, were you able to apply the information (received within the project framework) in your work? Did it lead to come changes at the institutional level (introduction of new guidelines, change in business processes, adoption of new legal acts, etc.)? Could you please provide examples?
4. Are there any challenges (at legal/policy level, institutional level and individual capacity level) associated with implementing the recommendations at the national and/or local levels? If yes, how the UNECE can support you in this regard?
5. Is there any evidence or interest to address the recommendations from the cross-country /regional cooperation perspective? If yes, could you please share some details and advise on the associated challenges?
6. What recommendations do you have for future projects (national and/or regional) by ECE?