Technical Assistance Closure Report

Objective of the technical assistance (TA) Closure Report:

- To communicate publicly in one document a summary of progress made and lessons learned during the TA towards the anticipated impact (sections 1-4).
- To document qualitative and quantitative data collected during TA, for use in donor and UN reporting (Annex 1).

Steps for completing the TA closure report:

1. The lead TA implementer submits the closure report at the end of the technical assistance as a final deliverable. The TA closure report will capture outputs, outcomes and impacts of all activities conducted under the TA. Please copy and summarise relevant material from previous TA outputs/deliverables and the Response Plan, as relevant.
2. A CTCN Manager will review and revise the closure report before final approval by the CTCN Deputy Director.

Important note on public and internal use of the closure report:
Once approved by the CTCN Deputy Director, the TA closure report will be a public document available on the CTCN website www.ctc-n.org. Selected content will be used for targeted communication activities. Annex 2 is for internal use only and will not be publicly available.

Closure Report for CTCN Technical Assistance

1. Basic information

Title of response plan	Develop revised national building codes with enhanced energy efficiency parameters for existing and new public and residential buildings in the Kyrgyz Republic
Technical assistance reference number	RFP NUMBER: 3100004641
Country / countries	Kyrgyz Republic
NDE organisation	Climate Finance Center
NDE focal point	Mr. Ruslan Iliasov
NDE contact information	iliasovruslann@gmail.com
Proponent focal point and organisation	Climate Finance Centre (CFC) of the Kyrgyz Republic
Designer of the response plan	Ms. Nurzat Abdyrasulova
Implementer(s) of technical assistance	Civic Foundation Unison
Beneficiaries	State Agency for Architecture, Construction and Housing (Gosstroy) under the Cabinet of the Ministers of Kyrgyz Republic
Sector(s) addressed	Infrastructure and Urban Planning\Building Codes
Technologies supported	General Planning Solutions
Implementation start date	15/June/2021
Implementation end date	30/December/2022
Total budget for implementation	USD 248,400
Description of delivered outputs and products as well as the activities undertaken to achieve them. In doing so, review the log frame of the original response plan and refer to it as appropriate	Three national building codes for new and existing public and residential buildings that include revised parameters to improve the energy efficiency of boiler installations, HVAC systems as well building envelops of multicompartment residential buildings.
Methodologies applied to produce outputs and products	- Multi-stakeholder working group established to revise three building codes - Conducted desk review to analyze international best practices and gaps in SNiPs - Conducted public consultations to gather feedback on revised codes.
Reference to knowledge resources	The team utilized the following TEC knowledge products: • Global Impact Reports on building impact assessment and broader energy efficiency

	• Climate Smart Cooling Solutions for Sustainable Buildings (presentations and proceedings from TEC events) • Integrating gender considerations (presentations and proceedings from TEC capacity building events). *Link to TEC knowledge database:* *https://unfccc.int/ttclear/tec/documents.html*
Deviations	Additional time was required to complete the TA, leading to a three-month extension of support until December 30, 2022
Anticipated follow-up activities and next steps	After completion of the Technical Assistance, the Gosstroy is planning to: • Follow up with the relevant authorities to ensure and facilitate the practical implementation of the revised building codes. • Form a sufficient number of energy auditors specialized in the building sector. • Put in place relevant communication materials and disseminate knowledge and requirements related to the revised building codes among relevant stakeholders. Potential future activities include: • A socio-economic analysis of the actions proposed; • The realization of an GHG inventory detailing the emissions reduction that could be achieved by each action. • Knowledge dissemination and capacity building of the stakeholders engaged in implementing the revision of the building codes. This could include builders and construction companies • The development of a methodology and logistical apparatus for enforcing the building energy codes • The development of creative financing mechanisms • An analysis of the ESCOs potential in Kyrgyz

2. Lessons learned

	Lessons learned	**Recommendations**
Lessons learned from the CTCN TA process *Describe lessons learned from following the steps of the TA process and*	Lessons learned: • Engage with stakeholders early in	Challenges: • Managing resistance to change

interacting with the CTCN Secretariat. What were the challenges and essential factors contributing to successful implementation Essential factor of the successful implantation were the effective	the design and planning stage • Understand all stakeholder requirements • Collaboration and teamwork: • Apply long-term thinking:	• Managing Limited resources Essential Factors: 1. Strong leadership and good communication is essential for successfully engaging with Gosstroy 2. Establishing clear goals and objectives for the engagement 3. Providing incentives for stakeholders to support and participate in the cost reduction 4. Being flexible and open to new ideas and approaches 5. Continuous improvement is key to the success of cost reduction through stakeholder engagement,
Lessons learned related to climate technology transfer	*NA*	*NA*

3. Illustration of the TA and photos

The photos below in the Figure 1 and Figure 2 broadly illustrate the process of the Technical Assistance. Whereas the Power Point slides include brief narratives and photos of the whole process. Finally, selected photos of the TA and a short Power Point presentation are placed at Google Drive and can be downloaded from https://drive.google.com/drive/folders/1kL3jngU9fFFx9rI7iMUJEj2xG_ypHJUQ

Figure 1: The workshop for policy makers and implementing agencies, December 22, 2022

Figure 2: Awareness raising workshop conducted on September 13-14, 2022.

4. Impact Statement

Challenge	The majority of public buildings in Kyrgyz Republic were built during the Soviet era, around 35-75 years ago, and have not undergone any renovations. This has resulted in the building fabric and infrastructure being in very poor condition with excessive normative energy consumption, reaching over 300 kWh/M^2 in many instances. Consequently, these buildings operate severely under-heated resulting in inadequate public service delivery in schools, hospitals and community sectors. The construction norms from these buildings originate from the 'SNiP building code (Construction Norms and Regulations)' from the times of Soviet Union. Many components in 'SNiP' are outdated and there is an urgent need to install the best available technologies and materials in both the building design and operation.
CTCN Assistance	The CTCN-assisted Assignment seeks to aid Kyrgyzstan in developing three building codes that focus on critical regulatory provisions for incorporating advanced energy

	efficiency in new construction and upgrading existing buildings, specifically addressing: • Boiler installations • Heating, ventilation, and air conditioning (HVAC) systems • Energy consumption and performance in multi-unit residential buildings.

Anticipated impact	The revised building codes aim to regulate energy consumption in all new and existing public and residential buildings by setting mandatory minimum energy performance standards. This technical assistance (TA) is expected to have significant economic, social, and environmental benefits. The introduction of these codes is expected to improve building energy performance by 40 to 60% compared to current regulations. The following impact indicators will be measured:
	
	• I.1.A: Anticipated metric tons of CO2 equivalent (tCO2e) emissions reduced or avoided as a result of CTCN TA, broken down by annual and life of project, including:
	  • Annual carbon emission reductions in tonnes of CO2 per year
	  • Lifetime carbon emission reductions in tonnes of CO2 over the lifetime of the project
	• I.1.C: Anticipated number of beneficiaries as a result of the TA, measured in the number of citizens who will benefit from improved living conditions.

Co-benefits: Achieved or anticipated co-benefits from the TA	In addition to the key impact indicators mentioned above, the TA is expected to deliver significant co-benefits. The team plans to evaluate and quantify the following: Environmental Co-Benefits: • Annual final energy savings in [GJ per year] • Annual primary energy savings in [GJ per year] • Total primary energy savings over the lifetime in [GJ] • Annual reduction in air pollution in [tonnes of PM2.5 per year] • Total air pollution reduction over the lifetime in [tonnes of PM2.5] Social Co-Benefits: • Job creation in local communities [Jobs per year]

	Economic Co-Benefits: • Annual savings for homeowners from reduced energy bills in [USD per year]
Gender aspects of the TA	The Technical Assistance was not supported by gender analysis. However, the consultant took into account the importance of including women and youth in the Kyrgyz population, who make up 50.2% and 25.7% respectively. This is crucial for ensuring fair and just gender balance and inclusive dialogue during public consultation and stakeholder engagement. The aim was to have at least 30% of the committee members be women, as they are more deeply affected by the quality of indoor environments in buildings. This is significant because energy efficiency provisions impact the thermal comfort of indoor spaces, which women and children are more likely to be exposed to as they are often involved in home-based activities.
Anticipated contribution to NDC	Key actions in Kyrgyzstan's NDC (2022): Action 1.1: Reduction of coal use by switching to gas in households and boiler houses, as part of Objective 1 to reduce GHG emissions in the energy sector. Objective 1.7: Energy Efficiency, to implement a set of actions in buildings or related to energy efficiency improvements of building services, including: • Action 1.7.1: Scaling-up installation of energy-efficient stoves in households • Action 1.7.2: Energy efficiency improvement of small-size boilers and fuel switch from coal • Action 1.7.3: Construction of new energy-efficient buildings • Action 1.7.4: Energy efficiency improvements in existing buildings The cumulative impact of these actions is expected to reach 4.4 million tCO2 per year by 2025 and 7.4 million tCO2 per year by 2030, representing 85% and 78% respectively by 2025 and 2030
The narrative story	In 2012, the Kyrgyz government passed the Energy Performance in Buildings Law (EPB), which is aligned with the European Union's Energy Performance of Buildings Directive (EPBD). The law aims to regulate energy consumption in buildings by establishing

	minimum energy efficiency requirements for new constructions and retrofits in existing buildings. However, due to insufficient institutional capacity and a lack of political will, provisions in this law have not been effectively enforced. In response, the European Bank for Reconstruction and Development (EBRD) has provided technical assistance (TA) to increase energy efficiency in buildings. The TA has supported the development of sub-law regulations for Energy Certification of Buildings, Regular Inspection of Boilers and Heating Systems, and the establishment of the State Energy Register, as well as the accreditation of independent specialists for Energy Certification of Buildings. The TA also supported the revision of the Thermal Protection of Buildings (SNiP 23-01:2013) code. However, despite multiple attempts, other building codes have yet to be revised. The Roadmap for Implementation of Energy Efficiency in Public Buildings, supported by the EBRD and the World Bank, identifies legislative challenges, capacity and knowledge limitations, institutional, financial, and technological barriers as major obstacles to implementing the EPB law. The current TA aims to help the country overcome these barriers and develop revised national building codes with enhanced energy performance standards for heating, ventilation, and air conditioning systems (HVAC), hot water systems (boiler installations), and building envelopes for multicompartment residential buildings. The building codes will cover five categories of buildings, including residential family buildings, residential multicompartment buildings, administrative buildings, schools, and kindergartens, as specified in the Energy Certification of Buildings regulation adopted in 2012. The TA will help the Kyrgyz Republic address the barriers to energy efficiency, promote sustainable energy use, and contribute to climate change mitigation and adaptation. Additionally, it will enhance institutional capacity and knowledge, improve energy security, and support the country's economic development
Contribution to SDGs A complete list of SDGs and their targets is available here:	The current TA is poised to have a significant impact on several Sustainable Development Goals (SDGs) as improving buildings and the indoor environment they provide affects all aspects of human life and economic

	activities. The team has identified three SDGs where a direct and substantial impact is expected: **SDG11: Make human settlements inclusive, safe, resilient and sustainable**: Buildings play a critical role in human settlements as they provide shelter and an enabling environment for all human and economic activities. The TA will impact all building categories, including residential, public, commercial, and buildings used for production and services, with the goal of making buildings more energy efficient and climate resilient. By improving energy efficiency, building services will also become more reliable and less susceptible to interruptions in external resource supplies. Additionally, the improvement of energy efficiency goes hand in hand with an improvement in health and safety standards, making buildings more reliable from an operational perspective, contributing to making settlements more sustainable **SDG12: Ensure sustainable consumption and production patterns**: Energy efficiency in buildings means effectively achieving the same or better indoor environment with lower energy use. This has a direct impact on promoting sustainable consumption and production patterns, which is the goal of SDG12. The improvement of energy efficiency in buildings and building services contributes to reducing resource waste and promoting sustainable use of resources, leading to a more sustainable future. **SDG13: Take urgent action to combat climate change and its impact**: Buildings are the largest energy end-use consumers globally, consuming almost 40% of the world's energy. These structures house human and economic activities and maintain an enabling environment through heating, cooling, air quality, water supply, lighting, and visual comfort. The transition to more energy-efficient buildings will result in direct reductions in emissions, as well as indirect reductions from lower energy generation and distribution. It is estimated that over 50 to 60% of building energy can be saved in a cost-effective manner, leading to a reduction of over 25% of global CO2 emissions.

Annex 1 Technical assistance data collection

A. Output and outcome indicators

Indicator	Quantitative value	Qualitative description
Total number of events organized by proponents and implementing partners	*2*	The Technical Assistance team organized two events, including Kick Off and Closure public seminar with presentation of the final results of the project
Number of participants in events organized by proponents and implementing partners	*112*	48 participants at the Kick Off meeting and 64 participants of Closure seminar
a) Number of men	*67*	*60% from the total number of participants*
b) Number of women	*45*	*40% from the total number of participants*
Number of climate technology RD&D[1] related events	5	Within the TA, the Unison Group conducted five events on revising the building codes
Number of participants in climate technology RD&D events	110	Working Group members from Gosstroy, intendent experts, experts of Unison Group and AVOK
a) Number of men	67	*61% from the total number of participants*
b) Number of women	43	*39% from the total number of participants*
Number of training organized by proponents and implementing partners	2	*List the title of the training sessions and capacity strengthening activities* On September 13-14, 2022 the TA team conducted a training and master-class for stakeholders on: • Energy efficient norms in the building codes of KR; • Design of engineering systems of buildings; • Relationship between engineering and building architecture; • Alternative sources; etc.
Number of participants in trainings organized by proponents and implementing partners	43	*Including government, provide sector representatives from business associations, design institutes, independent experts and NGOs*
a) Number of men	20	*47% from the total number of participants*
b) Number of women	23	*53% from the total number of participants*

[1] Research, Development, and Demonstration

Total number of institutions trained	30	*Including government, provide sector representatives from business associations, design institutes and NGOs*
a) Governmental (national or subnational)	5	*1.* Gosstroy; *2.* State Design Institute for Urban Planning and Architecture; *3.* Department of State Expertise; *4.* Ministry of Emergency Situations of KR; *5.* State Institute of Seismic Construction and Engineering Design;
b) Private sector (bank, corporation, etc.)	*20*	*List the name of organisations trained here* *1.* Ltd 'Eco-Service'; *2.* Ltd 'Ventservice'; *3.* OJSC 'Promproject'; *4.* OJSC 'BishkekKurulush'; *5.* Ltd 'Termoflex'; *6.* Ltd 'Promgradstroy'; *7.* Ltd 'Kolizei'; *8.* Ltd 'AsiaBotterBuild'; *9.* Ltd 'Kerege'; *10.* Ltd 'Arlan'; *11.* Ltd 'Tomel'; *12.* Ltd 'GarantProject' *13.* Ltd 'OrgTechStroy'; *14.* Ltd 'Ereken Group'; *15.* Ltd 'AkTulpar; *16.* Ltd 'EmarkStroy' *17.* Ltd 'GorProject' *18.* Ltd 'TurpanStroy' *19.* Ltd 'ExpoStroy' *20.* Ltd 'Biast';
c) Nongovernmental (NGO, University, etc.)	*5*	*1.* University (KSUCTA) *2.* Business Association "Construction Union" *3.* Business Association "Union of Architects" *4.* Business Association "ZIA" *5.* Association "Green Alliance of Kyrgyzstan"
Percentage of participants reporting satisfaction with CTCN training (from CTCN training feedback form)		*Satisfied= 4+ on 5-pt scale*
Percentage of participants reporting increased knowledge, capacity and/or understanding as a result of CTCN training (from CTCN training feedback form)		*Increased knowledge, capacity and/or understanding= 4+ on 5-pt scale*

a) Percentage of men		
b) Percentage of women		
Total number of deliverables produced during the assistance (excluding mission, progress and internal reports)	*18*	1. Monitoring & Evaluation, Impact Statement and Implementation Plan; 2. Mapping stakeholders and establishing a stakeholder working group; 3. Inception workshop report; 4. TA coordination mechanism established and inclusive stakeholder working group formed; 5. Technological diagnosis of most suitable international best practices in building codes for HVAC, boiler installations and multicompartment residential buildings; 6. Gap analysis in the existing national policies, laws, regulations and guidelines related to energy efficiency in buildings; 7. Gap analysis of the three selected building codes; 8. First drafts of the three building codes for HVAC, boiler installations and multicompartment residential buildings; 9. Stakeholder meeting report and revisited first drafts of the three building codes 10. Approved version of the Building Code "Boilers' 11. Approved version of Building Code "Heating, Ventilation & Cooling'; 12. Draft of Building Code "Multicompartment Residential Buildings, or building envelop; 13. Database of most relevant clean energy technologies and building materials to be deployed in public and residential buildings; 14. Methodology on assessing the energy performance baseline of existing buildings in the country; 15. Report on the training for policy makers and implementing agencies; 16. A user manual on revised building codes;

		17. Report on the awareness raising seminar on gains from increasing energy efficiency in existing buildings; 18. Technical Assistance Closure Report
a) Number of communication materials, including news releases, newsletters, articles, presentations, social media postings, etc.	*6*	List of communications: 1. Social Media (in Russian): a. 6 posts in the Facebook of Unison b. 6 posts in the Instagram of Unison 2. News releases (in Russian): a. 18 articles in 7 media portals; b. 5 TV airings through national and regional channels: i. Piramida TV ii. Piatyi Kanal iii. Mir24TV
b) Number of tools and technical documents strengthened, revised or developed	*3*	List the name of the documents 1. Construction Norm of KR 41-03:2022 "Boiler Installations". 2. Construction Norm of KR 41- 04:2022 "Heating, Ventilation and Air Conditioning (HVAC)"; 3. Multicompartment Residential Buildings, or building envelop;
c) Number of other information materials strengthened, revised or created (For example training and workshop reports, Power Points, exercise docs etc.)	*9*	*List the name of the documents* 1. User's manual on the revised building code and regulation CN KR 41 - 04:2022 "Heating, ventilation and air conditioning"; 2. User's manual on the revised building code and regulation CN KR 41 - 03:2022 "Boiler Installations"; 3. PowerPoint 'Alternative sources'; 4. PowerPoint 'Air conditioning system'; 5. PowerPoint 'Heating system'; 6. PowerPoint 'Smoke protection system of the building' 7. PowerPoint 'Technological diagnostics of the most appropriate best international practices in building codes for HVAC, boiler plants and multi-apartment residential buildings'; 8. PowerPoint 'Gap analysis of existing national policies, laws, regulations and guidelines related to energy efficiency in buildings'; *9.* PowerPoint 'Proposed structure for selected building codes and regulations.

Total number of policies, strategies, plans, laws, agreements or regulations supported by the assistance	*2*	• CN KR 41 - 04:2022 "Heating, ventilation and air conditioning"; • CN KR 41 - 03:2022 "Boiler Installations";
a) Adaptation related		*List the type and name of documents supported:* See c)
b) Mitigation related		See c)
c) Both adaptation- and mitigation related	2	• Building Code of the Kyrgyz Republic CN KR 41-03:2022 “Boiler Installations’; • Building code of the Kyrgyz Republic CN KR 41-04:2022 “Heating, ventilation and air conditioning";
Anticipated number of policies, strategies, plans, laws, agreements or regulations proposed, adopted or implemented as a result of the TA	1	A new national building code draft is developed within the Technical Assistance
a) Adaptation related		See c)
b) Mitigation related		See c)
c) Both adaptation- and mitigation related	1	• Draft of the Building Code “Multicompartment Residential Buildings, or building envelop”;
Anticipated number of technologies transferred or deployed as a result of CTCN support	*N/A*	*<u>Instruction</u>: List the type of technologies supported by this assistance. Technologies must be identified from the CTCN taxonomy of climate sectors and technologies (download in pdf format and choose from column C): https://www.ctc-n.org/resources/ctcn-taxonomy*
Anticipated number of collaborations facilitated or enabled as a result of technical assistance	*N/A*	
a) Number of South-South collaborations		*List the names of the organisations (excluding the CTCN or TA implementers)*
b) Number of RD&D collaborations		*List the names of the organisations (excluding the CTCN or TA implementers)*
c) Number of private sector collaborations		*List the names of the organisations (excluding the CTCN or TA implementers)*
Number of countries with strengthened National System of Innovation as a result of CTCN support		*List names of countries*
Insert any additional indicators here		

B. Core impact indicators

Please fill in the tables for anticipated impacts of the CTCN assistance. Every technical assistance should contribute to at least one of the indicators below. For guidance on how to report on core indicators see the 'M&E Guidance Document for TA Implementers'.

Core indicator 1	**Anticipated metric tons of CO_2 equivalent (CO_2e) emissions reduced or avoided as a result of CTCN TA** *(Excel calculation is enclosed)*	
	Anticipated metric tons of CO_2e reduced or avoided as a result of the TA **on annual basis**	Anticipated metric tons of CO_2e reduced or avoided as a result of the TA **in total**
Quantitative value *(emissions reductions)*	• 0.20million tonnes of CO2 by 2025 • 0.48 million tonnes of CO2 by 2030	• 4.52 million tonnes of CO2 by 2025 over lifetime of energy efficiency improvements introduced • 10.94 million tonnes of CO2 by 2030 over lifetime of energy efficiency improvements introduced
Unit	Million tCO_2e	Million tCO_2e
GHG assessment boundary (project emissions) Identify expected post-TA activities, associated effects and assess boundary for quantification of GHG emission reductions	Reducing emissions each year is achieved through the implementation of sustainable energy measures, such as increased energy efficiency and the use of renewable energy sources, in both new construction projects that exceed current technical standards and in existing buildings undergoing renovation or retrofitting. These measures include enhancing building insulation, upgrading HVAC systems to be more efficient, and incorporating on-site renewable energy sources. Emissions reductions are calculated cumulatively by adding the projected emissions for each year to the reductions achieved in previous years since the adoption of new standards in 2023 and up until 2030. It is expected that the standards will be updated once again by 2030, and the impact of these future requirements will be evaluated at that time	Emission reductions are calculated similarly to the annual carbon reductions but take into account the expected average lifespan of 25 years for sustainable energy improvements facilitated by the adoption of new standards.

Baseline emissions Describe baseline scenario, baseline candidates, emission factors and emissions calculated	Baseline emissions are defined as cumulative emissions expected to be generated by buildings without implementation of improvements suggested by the new standards over the assessment period (2023-2030). That means emissions from all new constructions over assessment period at the level currently required by existing national regulations, and from existing buildings at their current levels with expected renovation rates but without accounting for improvements and techniques suggested by the new standards. In order to assess emission reductions as an outcome of introduction of the new standards we assume that renovation of existing buildings under baseline scenario will continue with the same rate since there are multiple other drivers which trigger decision by homeowners to renovate their properties. We also assume that under baseline scenario some of these renovations or home improvements will encompass energy efficiency improvements, but at impacts lower than the one if measures and techniques as suggested by the new standards are implemented. We assume that without enforcement of the new standards, the energy efficiency impacts of such common practice renovations will be at about 50% as compared with the level which is expected to be achieved by new standards. Emission factors used, quantity of building stock and fuel mix are the same as for Project scenario calculations and as described above. Resulting baseline emissions are as follows: Annual emissions, Mt CO2/year: • By 2025: 61.79 • By 2030: 60.93 Cumulative emissions, Mt CO2: • By 2025: 185.61 • By 2030: 492.24
Methodology Explain the method or process of verifying the indicator and how data was gathered	The calculation of CO2 emission reductions in Kyrgyzstan buildings was a multi-step process that involved the following steps: - Gathering data: The process started by gathering data from open sources, including national statistics on new construction and renovation rates, levels of national energy performance standards, and reference levels from national regulations. - Projections: The reductions were estimated based on projections for new construction and retrofits until 2030, taking into account GDP growth forecasts from the World Bank and Asian Development Bank for 2023. - Energy savings: The expected energy savings were estimated using data from Unison's energy audits for various programs, including public buildings supported by the World Bank and buildings participating in the KyrSEFF program of the EBRD. - Consideration of uncertainties: Due to uncertainties in the scale and type of renovations, availability and affordability of sustainable

	energy technologies, the expected energy savings and CO2 reductions were based on conservative assumptions. - Fuel mix improvements: The calculation of carbon reductions took into account the anticipated improvement in the national fuel mix through the reduction of coal and oil use and an increase in the use of electricity and gas, with the average carbon factor for the fuel mix assumed to improve from 2023 to 2030. The average carbon factor for the fuel mix was assumed to improve from 0.253 kgCO2/kWh in 2023 to 0.209 by 2030. - Realistic but conservative: The calculation of carbon reductions was considered to be realistic but conservative, taking into account the current market conditions and level of supporting policies for decarbonization. - The methodology was designed to estimate the impact of sustainable energy improvements on CO2 emission reductions in buildings in Kyrgyzstan. The impact depended on market conditions and policies, with a faster rate of decarbonization potentially leading to higher reduction.
Assumptions Describe assumptions made during calculation and quantification of GHG reductions	The following key assumptions were made for the calculation of GHG reduction impacts: • Adoption of sustainable energy techniques: The assumption was made that sustainable energy techniques, as suggested by new regulations, would be introduced in **all** new construction and major retrofits or renovations of residential, public, and commercial buildings from 2023 onwards. This would cover 10.74 million m2 of gross building area of new construction and 21.89 million m2 of gross building area of retrofitted or renovated existing buildings by 2030. • Construction and renovation rate: The rate of construction and expected renovations or retrofits was assumed to follow the trend from the past 6 years (2016 to 2021), as recorded by national statistics, with a slight acceleration for the period after 2026, when an economic recovery is expected. The GDP growth was based on the Asian Development Bank's forecasts for 2023 (3.5%) with a higher growth expected for the period 2026-28 (3.6%) and up to 3.8% for the period 2029-2030. These were conservative assumptions taking into account that the global post-Covid recovery could speed up by the end of the decade and current political crises could be resolved by then. • Demographic and urbanization trends are forecast to persist, with an expected annual population growth rate stable at approximately 2%. While demographic growth may slow in the long-term, beyond 2030, it is not likely to significantly affect construction rates • Expected average impact of sustainable energy techniques if applied is conservatively assessed at 20% for new constructions and at 27% for

	renovation or retrofits. This level stands at 2/3 at the level of expected impacts suggested by experts and is roughly half of what has been documented by projects implemented by current international development programs. We consider these conservative assumptions as justified as enforcement is quite low in Kyrgyzstan, and b) not all measures, which are economically justified get implemented. There are a number of factors that limit the implementation of recommended technical solutions, including: o The additional cost of "green" buildings - low affordability for cost-optimal technical solutions o information asymmetries, where all the benefits are not counted with priority given to short paybacks o Capacity and knowledge constraints among builders and construction companies o Lack of supporting financial products or government support programs • The impact of energy savings was assessed based on the condition that all buildings adhered to national regulations for thermal comfort. Further details were provided in the section that elaborated on the baseline conditions and boundaries. • The distribution of new construction among the three major market segments of residential, public, and commercial buildings is expected to follow the current trend with approximately 85% being single-family homes, 13% being multi-family apartment buildings, and 2% being public and commercial buildings. Similarly, the split of renovations or retrofits is anticipated to reflect current statistics with approximately 84% being single-family homes, 12% being multi-family apartment buildings, and 4% being public and commercial buildings. • The national fuel mix for buildings adheres to the statistics provided by the International Energy Agency (IEA) for 2021, which show an average carbon factor of 0.253 kgCO2/kWh. As decarbonization efforts progress, the carbon factor is expected to improve to 0.209 kgCO2/kWh by 2030. The anticipated changes in the national fuel mix predict a decrease in coal use from 17.7% to approximately 10% (mainly in rural areas), a drop in heating oil use from 44.6% to 15%, an increase in gas use from 4.7% to around 35%, and an increase in electricity use from 32.9% to around 40%. These figures also account for district heating systems using specific fuels in urban areas.

Core indicator 2	Anticipated increased economic, health, well-being, infrastructure and built environment, and ecosystems resilience to climate change impacts as a result of technical assistance
Infrastructure and built environment Anticipated increased infrastructure resilience (avoided/mitigated climate induced damages and strengthened physical assets)	The new building regulations established under the Project consider provisions for enhanced building adaptability and climate resilience, both in the design stage and during retrofits. Buildings have a lifespan that extends beyond a single human generation, making it impossible to predict all potential activities and uses over its entire life. A building may undergo numerous changes in function over its lifetime and even if it is used for the same purpose, such as an office, the nature of office work may evolve. The COVID-19 pandemic and its restrictions on access to traditional workplaces highlight the importance of buildings that can adapt to changing circumstances. A building that is designed to accommodate a variety of different activities over its lifespan and can be easily adapted to changing activity patterns or to accommodate entirely different uses, such as residential or retail, is more valuable to both its occupants and owners. Adaptable interiors are critical for businesses facing uncertainty and that follow shifting markets. For optimal building adaptability and climate resilience, it is crucial for designers to consider how a building will change and perform over time from the beginning stages of its concept development. Buildings that lack adaptability will quickly become obsolete and a waste of resources, whereas buildings that allow for changes in their systems or components will have a lighter impact on future resource use and provide greater value for future generations. The specific technologies that are appropriate for changes in building use and occupancy include: • CO2 controlled ventilation systems that adjust fan speeds according to occupancy • HVAC zone controls • CO2 controlled ventilation systems that adjust fan speeds according to occupancy • Instantaneous DHW systems that do not have hot water storage tanks • Occupancy and vacancy sensors that automatically switches lights on or off • Technology that automatically closing shades and drapes Climate adaptability is also an important consideration. The more self-sufficient a building is in terms of energy, water, and other utilities, the better. As resources may become scarce in the future, excessive internal demand could become difficult or costly to meet. The design should take into account potential

	future climate risks, such as increased precipitation causing floods, heat waves and dry spells causing wildfires, and higher summer temperatures requiring effective cooling systems. Façades and roofs must also be securely anchored to withstand stronger winds. Designing a building with future-proof considerations will reduce its exposure to future regulatory changes, maintain its functionality, and preserve its value.
Ecosystems and biodiversity Anticipated increased ecosystem resilience (areas with increased resistance to climate-induced disturbances and with improved recovery rates)	The adoption of new energy performance standards developed by the Project will have a beneficial impact on the environment and biodiversity by reducing air pollution from heating sources. This is especially crucial for heating systems relying on coal or oil. By mandating higher efficiency levels and improving building insulation, energy consumption can be reduced by 30% to 60%, leading to fewer emissions and cleaner air. Additionally, the implementation of these stricter standards will encourage the use of cleaner fuels, such as heat pumps, gas, and district heating systems, instead of traditional coal-fired stoves commonly used in Kyrgyz households. The resulting decrease in air pollution will improve local ecosystems and contribute to their restoration.
Economic Anticipated increased economic resilience (e.g. less reliance on vulnerable economic sectors or diversification of livelihood)	Cumulative economic impact out of implementation of the new standards developed by the Project is stemming from the following: • Reduced energy bills by building occupants. Taking into account the number of new constructions, which will apply the new standards as well as retrofit and renovation of existing buildings, annual energy savings are expected to reach 3,000 TJ by 2025 or 8,320 TJ by 2030. Applying World's average electricity prices for residential customers (IEA, 2021[2]), adapted to expected inflation rate of 8% by 2025 and by 6% further on until 2030, that would mean saving of USD 140.4 million per annum by 2025 or USD 521.6 million per annum by 2030. • Increase property value. The application of the new standards is expected to affect about 274,260 residential properties by 2025. We assume that: improved energy performance of buildings, ability to provide a better thermal comfort at lower costs, and a better visual appearance of renovated/refurbished

[2] IEA, energy statistics, 2021: https://www.iea.org/data-and-statistics/data-tools/energy-prices-data-explorer

	buildings will have a net positive impact on property value at a very conservative rate of 6%. That would mean about USD 1,050 million by 2030. • If the expected carbon reductions were monetized, using all market mechanisms for carbon trading, then the economic benefits amount to USD 26.3 million using the shadow carbon price suggested by the World Bank by 2030 (average level of 60 USD per tonne considered[3]). • All energy efficiency improvements are typically of smaller-size and undertaken very often by a local labor force. We estimate that implementation of the new regulations will require at least 88,100 of local full-time jobs per year[4], which would be a contribution of USD 1,585.8 million to the local economy at community level[5]; • Other macro-economic benefits, which however would be difficult to quantify will include reduced energy dependency since most of the fossil fuels used in buildings for heating are imported from abroad;
Health and wellbeing Anticipated increased health and wellbeing of target group (e.g. improved basic health, water and food security)	Indoor environment quality is an important aspect of the green building concept. People typically spend about 90% of their life in buildings, and the quality of the indoor environment directly affects their health. New regulations suggested by the Project aim to reduce exposure of building occupants to indoor pollution and hence protect their health and well-being. Indoor pollution can come from a variety of sources, including combustible materials like oil, gas, coal, wood, building materials, and furnishings (such as paints, sidings, and preservatives). Asbestos, volatile fiber-containing materials, cooling systems, humidification devices, and inadequate insulation can also lead to exposure to harmful mold and fungi, impacting the health and well-being of building occupants. Generally, indoor pollution encompasses chemical contamination, combustion products, biological contamination, and other indoor contaminants. It is important to understand and address

[3] E3G: https://www.e3g.org/metrics_methods/shadow-carbon-pricing/
[4] Reference benchmarks based on IEA data: https://www.iea.org/reports/energy-efficiency-2020/energy-efficiency-jobs-and-the-recovery
[5] Based on local market data for 2022

	these sources of indoor pollution in order to maintain healthy indoor environments. • **Chemical contamination:** These include sources of pollution like adhesives, carpeting, upholstery, manufactured wood products, and cleaning agents that emit volatile organic compounds (VOCs), including formaldehyde. Research shows that some VOCs can cause chronic and acute health problems at high concentrations, and some are known carcinogens. Pressed wood products made for indoor use include: particleboard (used as subflooring and shelving, and in cabinetry and furniture); hardwood plywood panelling (used for decorative wall covering and in cabinets and furniture); and medium density fibreboard (used for drawer fronts, cabinets, and furniture tops). Although formaldehyde is present in both types of resins, pressed woods that contain PF (phenol formaldehyde) resin generally emit formaldehyde at considerably lower rates than those containing UF (urea formaldehyde) resin. • **Combustion products** such as carbon monoxide, nitrogen dioxide, as well as respirable particles, can come from unvented oil or gas space heaters, woodstoves, fireplaces and gas stoves. These are the most lethal indoor contaminants when combustion processes in indoor boilers and stoves are incomplete; fumes leak from old chimneys where masonry has deteriorated, or from flues as the result of backdraft in adverse wind conditions. In order to prevent such contamination, it is recommended to strictly follow all service and maintenance procedures recommended by the manufacturer, including those specifying how frequently to change filters in combustion appliances. Proper maintenance is important even for new furnaces because they can also corrode and leak combustion gases including carbon monoxide. In addition, current use of coal for heating purposes exposes building occupants to toxic effect of burning coal for heating in Kyrgyz homes. According to the UNEP[6] "Air pollution is by far the most important cause for pollution-related deaths in the Kyrgyz Republic,

[6] UNEP, 2022: https://www.unep.org/news-and-stories/press-release/unep-sounds-alarm-air-quality-kyrgyz-capital

	accounting for 4,000 premature deaths in 2016". Heavy dependence on coal means that the Kyrgyz capital experiences severe and hazardous air pollution comparable to, and sometimes worse than, megacities such as New Delhi. Bishkek ranks as second in the world for air pollution. • **Biological contamination** includes bacteria, moulds, fungi, viruses, pet hair and saliva, house dust mites, cockroaches, and pollen. There are many sources of these pollutants. Pollens originate from plants; viruses are transmitted by people and animals; bacteria are carried by people, animals, and soil and plant debris; and household pets are sources of saliva and animal hair. Contaminated central air filtering systems or dump condensation on colder surfaces can become a breeding ground for mould, mildew, and other sources of biological contaminants which are then distributed throughout the house. • **Other indoor contaminants from construction materials:** other contaminants like lead, asbestos or other fibre-volatile materials, excessive humidity, etc. Asbestos is a mineral fibre that has been used commonly in a variety of building construction materials for insulation and as a fire-retardant. European regulations have banned asbestos-containing products for construction. Today, asbestos is most commonly found in older homes, in pipe and furnace insulation materials, shingles, millboard, textured paints and other coating materials, and floor tiles. Elevated concentrations of airborne asbestos can occur after asbestos-containing materials are disturbed by cutting, sanding or other renovation activities. Improper attempts to remove these materials can release asbestos fibres into the air in homes, increasing asbestos levels and endangering people. • **Excessive humidity** is also counted among indoor pollutants. A comfort level of indoor humidity lies in the range of 40%–65%, which encourages only low concentrations of biological contamination (bacteria, viruses, moulds and fungi). Higher levels of relative humidity stimulate the growth of biological contamination, while very low levels expose the human body to the negative effects of chemical contamination and can also stimulate the growth of particular viruses.

Core indicator 3	Anticipated number of direct and indirect beneficiaries as a result of the TA	
	Quantitative value	**Means of verification**
Total beneficiaries	*1,264,000*	This refers to the count of building users who reside or utilize facilities in either newly constructed or renovated structures where sustainable energy upgrades have been implemented. The total may fluctuate based on the projected rate of new construction or retrofitting by 2030, subject to compliance with new standards. The accuracy of this number can be confirmed using national building sector statistics in 2031.
Number of adaptation beneficiaries	821,600	We assume that about 60% of expected total number of beneficiaries (and all of them benefitting from climate mitigation benefits) will experience the benefits of improved climate resilience. This encompasses implementation of measures related to better thermal protection, reducing vulnerability of buildings to increased heat stress, improved resilience of energy supply from public infrastructure exposed to climate hazards (e.g. power or water shortages, interruptions, etc), better thermal comfort in areas exposed to heat waves or extreme winter or summer temperatures, which can exposed capacity of the building or building services to maintain enabling indoor comfort environment. The majority of the climate mitigation measures will have a positive adaptation benefit too. However, as climate vulnerability and exposure to climate hazards is location or context specific, and not all stakeholders might implement the full set of cost-optimal measures as suggested by the new standards, we assume a conservative rate of 60% of beneficiaries benefitting from improved climate adaptation qualities of underlying building infrastructure. This number is based on the set of typical climate improvement measures implemented by market stakeholders with support from Kyrseff programme[7].
Number of mitigation beneficiaries	1,264,000	The number of mitigation beneficiaries is equal to the total number of beneficiaries, as the improvements outlined in the new standards will result in a net positive climate mitigation impact for every building where they are applied, whether it is newly built or undergoing renovation or retrofitting.

[7] Kyrseff statistics: https://www.kyrseff.kg/?lang=en

		Not all of the climate mitigation beneficiaries will experience improved **climate resilience**, as some of the measures outlined in the new standards may only have **climate mitigation** benefits. For example, energy efficiency improvements may not enhance the overall climate resilience quality of buildings or building services or address the specific climate hazards that these structures are exposed to.

Core indicator 4	**Anticipated amount of funding/investment leveraged (USD) as a result of TA (disaggregated by public, private, national, and international sources, as well as between anticipated/confirmed funding)**			
	Quantitative value confirmed *in USD*	**Quantitative value anticipated** *in USD*	**Qualitative description** *List the institutions, timelines, and description or title of the investment*	**Methods** *Describe methods used for quantification of funds leveraged*
Total funding	*NA*	*Total number in USD (numerals only, no rounding or abbreviations)*		
Anticipated amount of public funding mobilised from national/domestic sources	NA		This amount could be determined and confirmed only after the new standards are introduced, reviewed by designated national agencies in charge of setting up any national support schemes	Based on funding approved and/or confirmed by designated agencies or institutions in support of activities suggested by the new standards.
Anticipated amount of public funding mobilised from international/ regional sources	TBD	USD 250 million The estimated sum of USD 250 million is based on previous investments made over the last 5 years by international	This amount could be determined and confirmed only after the new standards are introduced, reviewed by international development agencies,	Based on funding approved and/or confirmed by designated agencies

		development organizations and multinational development banks towards climate action in the building industry. These initiatives include the World Bank's $46 million public building retrofit program, the $50 million development project in Batken region, EBRD's Kyrseff III with $50 million, IFC's $44 million Housing Market program, as well as multiple smaller initiatives backed by organizations such as USAID, Switch Asia, GIZ, and other development agencies.	multinational development banks and any other international programmes (e.g. UNEP, UNDP, etc) in charge of setting up any support initiatives.	or institutions in support of activities suggested by the new standards.
Anticipated amount of private funding mobilised from national/domestic sources	TBD	**USD 4,700 million** This is the amount expected to be spent by private investors on sustainable energy techniques, following action recommended by the new standards. We assume that private sources will cover at least 80% from the total implementation costs of these sustainable energy measures by 2030. Part of these costs will be covered by final beneficiaries themselves, while another part might be borrowed from local financing institutions.	Amount of funding confirmed from private sources for implementation of climate actions suggested by the new standards can be confirmed only ex-post, and as reported by national statistics over the past years.	Based on reports captured by national statistics on investments undertaken for new construction and renovation or retrofit of existing buildings.

Anticipated amount of private funds mobilised from international/regional sources	TBD	**USD 587 million** We assume that at least 10% from the overall investment costs associated with implementation of sustainable energy techniques suggested by the new standards by 2030. These investments will cover investment costs from private international developers, private equity funds or similar for commercial real estate or residential complexes (mostly in Bishkek and potentially some other major cities too)	This amount could be determined and confirmed only after the new standards are introduced, reviewed by relevant private funding institutions or corporates which might be interested to support climate actions in the building sector	Based on funding approved and/or confirmed by relevant private funding institutions in support of activities suggested by the new standards.

Annex 2 (for internal use – to be filled in by the CTCN)

CTCN evaluation

This section will be completed by the relevant CTCN Technology Manager.

- Evaluation of the timeliness of the TA implementation as measured against the timeline included in the response plan;
- Evaluation of TA quality as defined in the response plan;
- Overall performance of the Implementers;
- Overall engagement of the NDE and Proponent;
- Lessons learned on the CTCN process and steps taken by the CTCN to improve.