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Enhancing Sustainable Consumption and Production Tools and a Circular Economy in Kyrgyzstan:

Approach in the Building Sector with a Focus on Energy Efficiency

2022

Acknowledgement

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Author: Nurzat Abdyrasulova, Founder and Chief Executive Officer, Unison Group

Supervision and Coordination: Anna Soltysik-Pawlic (Delegation of the European Union to Kyrgyzstan); Zinaida Fadeeva, The European Union, The SWITCH-Asia Programme; Arab Hoballah and Zulfira Zikrina (SWITCH-Asia SCP Facility)

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CONTENT

LIST OF FIGURES AND TABLES

LIST OF ACRONYMS

BREEAM	Building Research Establishment Environmental Assessment Method
CDW	Construction and Demolition Waste
CEM	Cement
CO_2	Carbon dioxide
EBRD	European Bank for Reconstruction and Development
EDGE	Excellence in Design for Greater Efficiencies
EE	Energy Efficiency
EEEF	European Energy Efficiency Fund
EEFIG	Energy Efficiency Financial Institutions Group
EN	European Norms
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Contract
EPD	Environmental Product Declaration
ESA	Energy Service Agreement
ESCO	Energy Service Company
EU	European Union
GBC	Green Building Council
GHG	Greenhouse Gas
GIFA	Gross internal floor area
Gosstroy	State Agency for Architecture, Construction, Housing, and Communal Services under the Government of the Kyrgyz Republic
GPP	Green Public Procurement
HLPF	High-level Political Forum
HVAC	Heating Ventilation and Air-Conditioning
ICN	Interstate Construction Norms
IEA	International Energy Agency
IFC	International Financial Corporation
IPCC	Intergovernmental Panel for Climate Change
KyrSEFF	Kyrgyz Sustainable Energy Financing Facility
kWh	Kilowatt hour
kWp	Kilowatt Peak Power Capacity
kWth	Kilowatt Thermal Capacity
LCA	Lifecycle Assessment
LEED	Leadership for Energy and Environmental Design
LEPB	Law on Energy Performance of Buildings
NGO	Non-governmental Organisation
NFRD	Non-Financial Reporting Directive
NZEB	Nearly Zero Energy Buildings
RE: FIT	UK National Energy Performance Contracting Framework

SCIESU	State Energy and Subsoil Use under the Government of the Kyrgyz Republic
SCP	Sustainable Consumption and Production
SDG	Sustainable Development Goal
SFDR	Sustainability-related disclosures in the financial services regulation
SME	Small and medium enterprises
SNiP	Building standards and technical rules (Строительные нормы и правила: СНиП)
SWOT	Strengths weaknesses opportunities and threads analyses
PV	Photovoltaic
TEG	Technical Expert Group
UK	United Kingdom
UN	United Nations
USA	United States of America
VAT	Value added tax
VNR	Voluntary National Review
WBCSD	World Council for Sustainable Development
WGBC	World Green Building Council

FOREWORD

Dear Reader,

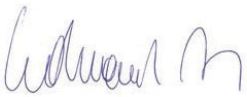
Kyrgyzstan is subject to one of the most vulnerable climate change impacts in Central Asia and climate-related risks threaten peace, security and the overall development of the country in the short and long term. Therefore, the transition towards green and climate resilient economy where resources are used in a way that does not undermine future development but instead creates new opportunities for larger number of people is key for sustainable development of Kyrgyzstan.

This is why the EU has been supporting the country in such green transition in line with the EU Green Deal initiative, which aims to support the transition towards a green economy, promote jobs, growth and sustainable development while maintaining climate neutrality and environmental sustainability.

Since 2013, the EU grant funding available under the KyrSEFF programme incentivises investments of commercial businesses and private households in energy and water efficiency. Also, regional EU SWITCH-Asia programme, that was extended to Central Asia in 2019, funds pilot projects to help companies adopt cleaner technologies and more sustainable industrial practices and provides technical support to strengthen the implementation of sustainable consumption and production policies at the national level.

The present Report has been developed in the framework of such technical support made available to Kyrgyzstan under the EU SWITCH-Asia programme with the objective to provide an overview of the current state of the building sector in Kyrgyzstan in terms of energy efficiency. The Report provides also a set of important recommendations and suggestions for enhancing energy efficiency, as well as other sustainable consumption and consumption concepts in the building sector. If taken on board, such recommendations can significantly contribute to the transition of Kyrgyzstan towards a green and climate resilient economy.

I wish you pleasant reading of the Report.



Eduard Auer
Ambassador to the European Union Delegation to the Kyrgyz Republic

FOREWORD

Dear Reader,

The concept of "*Kyrgyzstan is a Green Economy Country*" was adopted by Jogorku Kenesh on 28 June 2018 (No 2532-VI) and provided the basis for the development of the *Green Economy Development Programme* for the period 2019-2023. Seven priorities within the Programme were identified: green energy, green agriculture, low carbon transport, green industry, sustainable tourism, green cities, waste management. This is a unique opportunity to integrate SCP principles and Circular Economy approaches into national policies and sectoral plans, support the implementation of the seven priorities and the achievement of the Sustainable Development Goals in Kyrgyzstan.

Kyrgyzstan has actively participated in global sustainable development processes and has developed its first Voluntary National Review (VNR) for the 2020 High-level Political Forum (HLPF). Government has introduced various policies on promotion of the green economy principles in the Kyrgyz Republic, aiming at realizing SDGs through implementation of sustainable consumption and production (SCP) approach for mid-term and long-term policy.

Integrating SCP and Circular Economy approaches, in particular in the building sector, in delivering the Green Economy policy, are considered as a priority, for which the EU SWITCH-Asia is providing valuable support. The objective is to promote SCP implementation in Kyrgyzstan by enhancing SCP and Circular Economy approach in the building sector with a focus on energy efficiency. Intensive use of natural resources for buildings and construction in Kyrgyzstan makes a significant contribution to economic growth in the short term, yet it is important to understand that in the long term it will lead to significant negative consequences if sustainable business model across the value chain is not adopted in time.

This sustainable consumption and production (SCP) report was prepared with the support of the Sustainable Consumption and Production Facility (SCP Facility) of the EU SWITCH-Asia Programme. The report analyses all policies, legal and regulatory documents related to SCP in buildings and construction sector and furthermore describes comprehensive stakeholder groups and as well as international best practices. Kyrgyzstan does not have a stand-alone national action plan and a roadmap on SCP yet. Therefore, this Report could be used as the basis for preparing the SCP roadmap and particularly the action and capacity development plan aimed at raising awareness of the stakeholders and the public.

We express our deep gratitude to the SCP Facility team of the EU SWITCH-Asia Programme and to all those who have helped in the preparation to the Enhancing Sustainable Consumption and Production Tools and Circular Economy Approach in the Building Sector Report.

Mr. Daniar Imanaliev
The First Vice-Minister of the Ministry of Economy and Finance of the Kyrgyz Republic, and SWITCH Asia SCP Facility National Focal Point

EXECUTIVE SUMMARY

SWITCH-Asia is the largest Sustainable Consumption and Production (SCP) programme supported by the European Union, involving 24 countries in Southeast Asia, South Asia, Central Asia, Mongolia and China. In line with the priorities of the European Green Deal, the programme aims to promote sustainable and inclusive growth in Asia, decoupling it from environmental degradation and supporting Asian countries in their transition towards a low-carbon, resource-efficient and a more circular economy while contributing to poverty reduction. The programme promotes mainstreaming sustainable consumption and production in relevant national policies, and supports the transition towards a green economy, poverty reduction and climate-change mitigation.

The objective of this assignment is to promote SCP implementation in Kyrgyzstan by enhancing SCP tools and the circular economy approach in the building sector, with a focus on energy efficiency.

The built-environment sector has a vital role to play in responding to the climate emergency. Buildings are currently responsible for around half[1] of global final energy consumption, and therefore decarbonisation of this sector is one of the most cost-effective ways to mitigate the worst effects of climate breakdown. In addition more than half of global raw materials are used in buildings and other structures, and 35% of total generated waste is produced by construction and demolition. Construction thus leaves a major environmental footprint, generating around 39% of global carbon emissions. This includes 28% of CO_2 emissions at the operational stage, and another 11% of embodied carbon resulting from the energy used to produce the materials and in the constructions themselves.

According to the report of the United Nations Intergovernmental Panel for Climate Change (IPPC), humankind will need to dramatically reduce global carbon emissions associated with building construction, use and deconstruction by about 80–90% by 2050 to limit global warming to 1.5 ºC. At the same time, global building stock is expected to double by 2050. Given that buildings are expected to deliver more and better in terms of indoor comfort, convenience and entertainment, emissions will only increase if no action is taken to reduce their carbon intensity. The expert community agrees that decarbonising buildings is one of the most cost-effective ways to mitigate the worst effects of the looming climate breakdown.[2]

This Report provides an overview of the current situation in the building sector in Kyrgyzstan, elaborating on lessons learned from international best practices, and then offers recommendations applicable to further market development of the building sector and an integration of a circular economy approach, with a focus on energy efficiency.

More specifically, this Report provides a summary analysis of the following activities conducted during the assignment.

- A review of the building sector in Kyrgyzstan forms **Chapter 1**, with a focus on the residential-market segment, because this sector is the most dynamic, with the highest growth rate reflecting both positive demographic development and a trend towards rapid urbanisation. The residential sector encompasses over 75% of building stock by size, and even more by the number of buildings, which is why any measures targeting SCP, particularly energy efficiency in the residential sector, will have the largest quantitative impact here. The share of public and commercial buildings is almost equal in terms of the size of the building stock, but the number of commercial buildings is growing more quickly as a result of undersupply in the past, hence new market opportunities in construction are more relevant for commercial buildings. Conversely, renovation of existing buildings is more relevant for the public-building segment. Chapter 1 covers a market overview of both new construction and the renovation of existing buildings, elaborating on market barriers and exploring how these barriers and gaps affect each of the three major market segments: residential, public and commercial buildings. General market barriers and some of the lessons learned from the residential sector are also largely applicable to most other buildings, whether commercial or public. Yet public buildings are affected by additional barriers including the public ownership of the assets as well as a lack of direct commercial drivers behind any renovation efforts.

- **Chapter 2** provides an overview of the existing institutional framework, along with the roles and responsibilities of different national and international counterparts who can potentially support the implementation of SCP practices

1 This includes the energy consumption of building services during their operational stage (at about 40%) and over 10% of energy consumption for upfront energy use (embodied energy in building materials, transportation and construction process) as well as the energy required for demolition at the end of the building's lifecycle. World Green Building Council, Advancing Net Zero, 2019.
2 https://www.worldgbc.org/news-media/plgbc-presents-whole-life-carbon-roadmap-poland

in buildings and construction. This chapter elaborates on the key initiatives and commitments of these counterparts on the topic.

- A review of existing policies, energy efficiency regulations and associated institutional arrangements at the national level in relation to SCP and the Green Economy in general are provided in **Chapter 3**. Here, opportunities for improving the existing policy and regulatory framework are identified, taking into account the best international practices and possible adjustments necessary for the local context.

  Recommendations are offered with an indicative timeframe for integration into Kyrgyz policy and the country's regulatory framework. These recommendations are based upon due consideration of the existing conditions as well as the priorities and lessons learned from best international practices. Within this frame of reference, the recommendations were allocated into this timeframe:

  - Short-term: 2022–2023
  - Medium-term: 2023–2025
  - Longer-term: after 2025

  It is clear that Kyrgyzstan will need to dedicate substantial efforts to update its policy and regulatory framework if the market is expected to follow a path to decarbonisation. Here, EU legislation can provide a useful and comprehensive model for developing relevant policy and regulations. In so doing, some policy instruments could be mirrored and thus implemented within the short term, more specifically as they to certain provisions in these EU directives: the Building Directive, the Energy Efficiency Directive and the Ecodesign Directive. This applies, for example, to the introduction of criteria for:

  - nearly zero energy buildings (NZEB);
  - cost-optimal levels for energy efficiency requirements;
  - complements for the minimum energy efficiency requirements;
  - introduction of energy performance requirements for technical systems and energy consuming equipment; and
  - integration of these in some EU-like Green Public Procurement (GPP) rules.

  Other recommendations might require more time to allow monitoring of the lessons learned from more developed markets before similar provisions are integrated into national policy and the regulatory framework, as for example:

  - policy and regulations aiming at net-zero carbon performance of buildings and the introduction of circular economy considerations, by reflecting on lessons learned and positive experience from the implementation of EU legislation;
  - policy and regulations aimed at supporting better waste management, reuse and recycling of construction materials and construction & demolition waste (CDW);
  - stricter criteria for market access of energy-consuming products in line with provisions of the EcoDesign Regulations, as amended by the EU;
  - legislation introducing climate disclosure and reporting provisions; and
  - legislation regulating the 'Do No Significant Harm' principle for all economic activities including buildings and construction, in compliance with provisions of the EU taxonomy for sustainable activities.

  Further details on all recommendations suggested are provided in Table 3 on page 33.

- **Chapter 4** elaborates on the market conditions for the implementation of SCP and energy efficient materials and technologies. Fragmentation in the value chain and a high dependency on subcontracting are key challenges for the reduction of embodied carbon and the effective use of construction and demolition waste (CDW) in the construction sector. This in turn leads to cost-driven sub-optimisation between parties for each transaction, which increases the risk of overlooking environmental impacts. Additionally, less developed markets like those in Central Asia (including Kyrgyzstan) currently lack skills and experience with respect to embodied carbon and material efficiency. To successfully improve environmental performance, the investor and/or developer should set targets and establish optimisation and enforcement mechanisms from the outset.

  There are significant opportunities for the sector here: material-efficiency measures reduce capital costs, Life-Cycle design reduces lifecycle costs, and the solutions required for embodied-carbon reduction are available today.

The key message for developing SCP opportunities in the Kyrgyz market is that such development is still in its infancy, and there are fast-growing opportunities specifically in the introduction of energy efficiency. Currently, this objective is achievable mainly using imported goods, with few goods available from domestic manufacturers. Even though almost all the modern technologies are available, such as ground and air heat pumps combined with solar collectors, the problem is that there are only a limited number of suppliers. This situation does not stimulate competition, thus market prices may be higher than in Europe for some technologies or materials. There is an adequate range in terms of quality, characteristics and price, and consumers can find a product depending on their affordability. As is commonplace, quality rises with price. However, without proper regulatory and institutional support, there are risks associated with any further development of the market for transitioning to decarbonisation and alignment with the Paris Agreement. An overview of the best international SCP practices in the construction-materials industry is provided in the following chapter (5), with recommendations for practical actions applicable in the context of market development in the Kyrgyz Republic. Key conclusions drawn from this market overview can be summarised thus:

- Current construction practices do not take into consideration either resource efficiency or circular economy concepts. The only positive practice here is the wide use of mudbricks, typically used in rural areas for the construction of family houses.
- There are no attempts at reuse or recycling of construction and demolition waste.
- The current supply of technologies and materials is not sufficient to cover broader building renovation efforts.
- Existing supply chains have limited capacity and a limited number of suppliers.
- There are no quality controls over imports of materials and technologies, which potentially leaves room for the import of substandard and low-performing technologies.
- Renovation programmes need to consider broadening existing supply chains and involving a wider spectrum of suppliers, while using stricter controls for market access. Otherwise scaling up investments in renovation will result in a shortage of materials and technologies or respectively higher prices and lower cost efficiency for building renovation programmes.
- Any further policy amendments or changes to the regulatory framework will need to consider market transition to decarbonisation across the entire value chain. Relevant legislation needs to be amended taking into account lessons learned from practical implementation in more developed markets (i.e. the EU).

- **Chapter 5** provides an overview of the relevant international best practices along with pilot initiatives implemented in more developed markets. Specific attention is paid to those initiatives that could be used as a model for pilot and demonstration activities in Kyrgyzstan at present. The Advancing Net Zero project by the World Green Building Council federates efforts from national green building councils, which are also active in Eastern Europe and the Central Asia region. For the EU as well as for countries in Central Asia, the European Commission's Level(s) initiative, or more specifically its underlying standards, provides a very useful and comprehensive methodology and template for the implementation and reporting of SCP in buildings. Carbon Heroes Benchmark Program is a benchmarking programme focused on material efficiency and the reduction of embodied carbon and energy, which could also be adapted for use in the Central Asian context. Other examples of international best practice which could be useful in the context of Central Asia and in Kyrgyzstan are provided. Because the EU Level(s) is probably the most comprehensive initiative with very clear environmental indicators, further details are provided in Annex A, 'Level(s) initiative – the European framework for sustainable buildings and introduction of circular economy concepts'.

- Continuing the reasoning set out above, **Chapter 6** discusses in detail the practical measures and recommendations specifically applicable to public buildings. Selected and applicable international best practice models and instruments to support renovation of public buildings are presented within a SWOT-analysis framework. The following models were found to be applicable to the market conditions of Kyrgyzstan:

  - **Dedicated credit lines** provided by local financing institutions, which could be complemented by technical assistance for final beneficiaries and potentially grant support at a level sufficient to trigger high-impact and high-energy performance renovations.
  - **Risk-sharing facilities**, where national or international institutions provide risk-sharing support for high-impact projects that implement SCP techniques and, in particular, energy and resource-efficiency considerations. Risk sharing would reduce uncertainties or hazards for the financing institutions and allow lower transaction costs for projects complying with certain environmental and sustainability criteria.
  - **Energy performance contracting with private-service contractors**, who can implement ambitious renovation projects upon guarantees of achieving a good level of energy savings and/or carbon reductions. Energy performance contracting is a contractual arrangement between a host beneficiary and the provider of an energy-efficiency improvement measure, which is verified and monitored during the entire term of the contract. In this

model, investments (e.g. work, supply or service) in the project are paid for within the context of a contractually agreed level of energy efficiency improvements or other agreed energy performance criteria such as financial savings. Repayments are conducted from the savings achieved over a fixed-contract period. Such a model is applicable for implementation of advanced energy-efficient solutions. Such off-the-balance-sheet financing through third parties addresses the problems of limited balance sheets in local municipalities, higher levels of debt, or budgetary restrictions, as well as lower in-house capacity to implement energy efficiency techniques.

- **On-bill repayment** schemes are a mechanism used to improve the credit worthiness (or seniority) of energy efficiency investments by incorporating repayment within the existing payment collection system of utility bills or the tax authorities.
- **The Energy Service Agreement (ESA)** is a 'pay-for-performance' service contract between a third-party investor and an asset owner to deliver energy savings as a service. The ESA is in some ways an evolution of the traditional shared-savings model, provided through Energy Performance Contracts (EPCs), but it is structured more like a Power Purchase Agreement (PPA) and used more frequently by actors present in the mainstream energy markets. A third-party investor and an asset owner enter into an ESA contract (typically for 10 years) where the asset owner agrees to pay their historical utility bills to the third party. An upfront 'access fee' or an ongoing utility bill discount may also be paid to the asset owner as an incentive. The third party invests in money-saving, energy-efficient opportunities and owns and operates the energy equipment to provide 'energy services' to the asset/building.
- A **public Energy Service Company (ESCO)** is a special purpose publicly owned company designed to manage energy efficiency investments and to deliver guaranteed savings to a host and counterparty to an EPC. This is set up with public funds in order to accelerate the implementation of EPCs in sectors and regions where the private sector offer is not sufficient. Public ESCOs can also reduce the cost of financing by aggregating specific credit lines, public grants and other incentives especially if the public body establishing it provides a guarantee or capital to deliver a strong credit rating.
- **Factoring and forfeiting** are financing instruments where an entity sells its accounts receivable (usually invoices) to a third party (called a factor) at a discount. In energy efficiency terms a factoring fund for EPCs would purchase funded EPCs from their originators (usually ESCOs) at a discount, freeing up the balance sheet of the originators to originate more EPCs. As the risk of under-performance of an EPC is more likely to occur at the beginning of the contract, these 'de-risked' contracts become a safer income stream which can be assigned (transferred) to a factoring fund. 'Forfeiting' arrangements are common practices in more developed EPC markets (e.g. Germany) and leasing (in the form of sale and lease-back) can also be an option if the contracts are adapted. Once active, such a fund could help establish standard legal and financial arrangements in the EPCs and then aggregate receivables into securities which can be sold in the form of bonds to institutional investors, once critical mass is reached (estimated at €150 million). A factoring fund may need public equity to speed its launch into the market; however, it could also involve private equity and debt, if the public sector takes the first-loss risk or requires a lower return on equity.

The Report explains these applicable models and instruments as described above and provides the following information for each of them:

- Best practice examples
- Advantages
- Weaknesses
- Main obstacles preventing from wider scale implementation
- What is needed to roll out these instruments in the conditions of Kyrgyzstan

The key findings, conclusions and recommendations from the sector analyses are summarised in **Annex B**, 'Guidelines for Enhancing Energy Efficiency in the Building Sector'. These guidelines outline the key gaps and barriers that prevent the mainstreaming and scaling up of energy efficiency in buildings, and then provide a list of practical recommendations. These recommendations distinguish between the different types of potential actions suggested for policy reform and changes to the regulatory framework. Concrete measures include addressing capacity constraints and information asymmetries, introducing dedicated financing instruments, and resolving any other market bottlenecks. These guidelines also provide an indicative timetable that reflects the sequence of actions and their priority.

In addition, the guidelines provide suggestions for further analytical work, which would need to be conducted in order to support or facilitate amendments of existing legislation. Such analysis would also apply to pilot and demonstration projects, which, together with analysis of legislation, could verify the concepts specifically associated with circular economy considerations.

BACKGROUND

Many developing countries in Asia and Central Asia are undergoing rapid industrial transformation, which in turn is significantly deteriorating the environment. Activities in the industrial sector, such as the burning of fossil fuels, contribute to increases in greenhouse gas emissions and waste, affecting climate change and provoking natural disasters. Changing production and consumption patterns, along with decoupling economic growth from environmental degradation and natural resource depletion are urgent challenges. For this reason, the European Commission (EC) launched the SWITCH-Asia – Promoting Sustainable Consumption and Production (SCP) programme in 2007.

SWITCH-Asia is the largest SCP programme supported by the European Union, and it involves 24 countries in Southeast Asia, South Asia, Central Asia, Mongolia and China. In line with the priorities of the European Green Deal, the programme aims to promote sustainable and inclusive growth in Asia, decoupling it from environmental degradation and supporting Asian countries in their transition towards a low-carbon, resource-efficient and a more circular economy, and contributing to poverty reduction as well. The programme promotes mainstreaming sustainable consumption and production in relevant national policies and supports the transition towards a green economy, poverty reduction and climate-change mitigation.

The second phase of SWITCH-Asia was launched in 2018, and in July 2019 the programme was extended to five Central Asian countries: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. The last call for proposals was launched in 2019, and 23 new grant projects were awarded, out of which seven, focused on the tourism, agri-food and textile sectors, were awarded to the Central Asian region.

Through a combination of grant-funded projects and networking, the programme is expected to achieve:

i. A higher use of environmentally friendly technologies and practices by businesses
ii. Changes in consumer behaviour to less damaging consumption patterns
iii. A better policy dialogue on SCP at national and regional levels in Asia, eventually with a common platform to promote SCP
iv. The initiation of active and continuous dialogues on SCP priorities and needs at national, regional and international levels through sharing and learning
v. The development of effective economic instruments that will enhance SCP

The EC established the SWITCH-Asia SCP Facility in 2017 in Bangkok, Thailand, to better facilitate coordination and implementation and to function as a backbone for the SWITCH-Asia Programme, thus providing a single platform for all SWITCH-Asia projects to maximise their results, further promote SCP policies and principles, and support the delivery of Sustainable Development Goals (SDGs). The Regional Central Asia office is located in Almaty, Kazakhstan and provides liaison between the Central Asia Region and the head office in Bangkok. Activities at the regional level are focused on supporting the countries covered under the SWITCH-Asia Programme through the following actions:

- Mainstreaming SCP into national policies to promote the implementation of green economy strategies and concepts
- Raising awareness among all stakeholders via outreach efforts
- Promoting best practices to ensure future sustained improvements in SCP patterns
- Building capacity of government officials and other key stakeholders
- Enhancing dialogue on local and regional SCP priorities
- Enabling adoption of cleaner technologies and practices – particularly by micro-, small- and medium-sized enterprises (MSMEs)

Intensive use of natural resources in Kyrgyzstan certainly makes a significant contribution to economic growth in the short term, yet it is important to understand that in the long term such use will lead to significant negative consequences, including widespread poverty and poor health caused by polluted air, poor quality drinking water, and shortages of food and energy.

Kyrgyzstan participated in global sustainable development processes and developed its first Voluntary National Review (VNR) for the 2020 High-level Political Forum (HLPF). The government has introduced various policies to promote green economy principles in the Kyrgyz Republic, aimed at realising SDGs through the implementation of the SCP approach for medium- and long-term policy.

In the Kyrgyz Republic, the green economy is defined as an economy that results in improved human well-being and social equity, while significantly reducing environmental risks, preserving and increasing natural capital, effectively using resources and stimulating the conservation of the country's natural ecosystems. Under a green economy, growth in income and employment is driven by public and private investment to reduce carbon emissions and pollution, create green jobs, and improve the efficiency of energy use, resources and ecosystem services.

The concept of 'Kyrgyzstan is a Green Economy Country' was adopted by the Jogorku Kenesh on 28 June 2018 (No 2532-VI), and this led to the development of the Green Economy Development Programme for the implementation of the Green Economy for the period 2019–2023. Seven priorities were identified within this programme: green energy, green agriculture, low carbon transport, green industry, sustainable tourism, green cities, and waste management. This presents a unique opportunity to integrate SCP principles and circular economy approaches into national policies and sectoral plans, and the achievement of the SDGs in Kyrgyzstan.

Integrating SCP and circular economy approaches into the delivery of the Green Economy policy, specifically in the building sector, is considered a priority for which EU-SWITCH-Asia is providing support. The objective here is to promote SCP implementation in Kyrgyzstan by enhancing SCP and a circular economy approach in the building sector with a focus on energy efficiency.

Originally, SCP was defined in 1994 by the Oslo Symposium as 'the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations' (source: https://sustainabledevelopment.un.org/topics/sustainableconsumptionandproduction).

More recently, with the development of a policy framework focused on sustainability and environmental protection, this definition has broadened and evolved. While SCP may be open to interpretation, certain overarching concepts weave together broad areas of consensus to establish a holistic approach that transcends regions and activity sectors. Sustainable consumption and production signifies systemic change, it proposes decoupling economic growth from environmental degradation and applying a life-cycle thinking approach, taking into account all phases of resource use to do more and better with less. Only by paying attention to both sides of the equation – consumption and production – will the kind of transformative change that is needed become possible. This is the concept of SCP embedded in the EU Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy.[3]

Thus a green building which accommodates SCP principles is a building that, in its design, construction or operation, reduces or eliminates negative repercussions, and that can create positive effects on climate and the natural environment. Green buildings preserve precious natural resources and improve the quality of life. There are several features which can make a building 'green' or 'sustainable'. These include:

- Efficient use of energy, water and other resources
- Use of renewable energy, such as solar energy
- Pollution and waste reduction measures, and the enabling of re-use and recycling
- Good indoor environmental air quality
- Use of materials that are non-toxic, ethically produced and sustainable
- Consideration of the environment in design, construction and operation
- Consideration of the quality of life of occupants in design, construction and operation
- Design that enables adaptation to a changing environment

Any building can be a green building, whether it's a home, office, school, hospital, community centre, or any other type of structure, provided it includes the features listed above. However, it is worth noting that not all green buildings are – and need to be – the same. Different countries and regions have a variety of characteristics such as distinctive climatic conditions, unique cultures and traditions, diverse building types of different ages, or wide-ranging environmental, economic and social priorities – all of which shape their approach to green and more, sustainable building.

3 EU Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy COM (2008) 397 final.

OVERVIEW

Kyrgyzstan is considered as one of the most vulnerable countries to climate change in Eastern Europe and Central Asia. Kyrgyzstan's land area is 90% mountainous, and more than 60% of the population live in rural areas. Poverty is a major issue in Kyrgyzstan, with more than 30% of the population living below the poverty line. Climate change affects the most vulnerable communities in the country, making their situation even more challenging.[4]

As is the case with most countries, historically the development of the Kyrgyz Republic was aimed at achieving economic growth, mainly through the intensive and irrational use of natural resources. This depletion of natural capital due to active exploitation has been exacerbated by poor management that prevents ecosystems from recovering. In recent years it has become clear that methods of economic growth such as those in Kyrgyzstan, without due consideration for environmental and social factors, pose a serious threat to both current and future generations.

The landmark 2018 special report from the United Nations Intergovernmental Panel on Climate Change (IPCC 2018 report), Global Warming of 1.5 ºC, presented a stark picture of the dramatically different world we will inhabit if average global temperatures rise by 2 ºC compared to the 1.5 ºC scenario. The catastrophic breakdown of climate associated with the difference between these two scenarios is likely to result in entire eco-systems being destroyed. And the global negative effect of additional heating and cooling demand to the economy is expected to increase fourfold by the end of the century. The consequences will be long lasting and, in some cases, irreversible. This emergency calls for urgent action now to radically transform current unsustainable models of consumption. The built environment sector has a vital role to play in responding to the climate emergency. With buildings currently responsible for over one-third of global carbon emissions, decarbonising the sector is one of the most cost-effective ways to mitigate the worst effects of climate breakdown. In addition, more than half of global raw materials are used in buildings and broader construction, and 35% of total generated waste comes from construction and demolition. Thus, buildings produce a major environmental footprint, generating almost 40% of global carbon emissions, including 28% of CO_2 emissions at the operational stage and another 11% of embodied carbon resulting from the energy used to produce materials and in the construction itself.[5]

Thus according to the IPPC 2018 report, we will need to dramatically reduce carbon emissions associated with building construction, use and deconstruction by 80–90% by the year 2050 to limit global warming to 1.5 ºC. At the same time, global building stock is expected to double by 2050. Given that buildings are expected to deliver more and better in terms of indoor comfort, convenience and entertainment, emissions will only increase if no action is taken to reduce their carbon intensity. The expert community agrees that decarbonising buildings is one of the most cost-effective ways to mitigate the worst effects of the looming climate breakdown.

Decarbonising buildings applies equally to residential, public and commercial non-residential buildings. For instance, the International Tourism Partnership's *Hotel Global Decarbonisation Report*[6] concludes that 'to keep pace, the global hotel industry will need to reduce its greenhouse gas (GHG) emissions per room per year by 66% from 2010 levels by 2030, and 90% by 2050.' The International Energy Agency's (IEA) Energy Technology Perspective 2017 also provides information on the overall building sector.

Some 65% of the European building stock was built before 1980, and around 97% of the EU's buildings must be upgraded to achieve the 2050 decarbonisation goal, but only 0.4–1.2% are renovated each year. Accelerating the low renovation rate to a minimum 5% (from the present <1.2%) and transitioning to new construction to conform to nearly zero energy requirements (NZEB) will clearly require scaling up both financing and the supply of technologies. Research here suggests that the supply of basic technologies related to improving carbon performance of buildings will require an increase of supply by a factor of 2 to 3 times that of present levels. The technologies with a low market penetration will become mandatory if NZEB requirements are to be achieved. The supply rate needs to be increased by a factor of 8 to 10 compared with the current market supply.

4 The National Statistic Committee of the Kyrgyz Republic, Kyrgyzstan in Digits, www.stat.kg
5 WorldGBC, Bringing Embodies Carbon Up-front, 2019
6 International Tourism Partnership: Hotel Global Decarbonisation Report, 2017

The European regulatory framework on energy and resource efficiency for energy performance of buildings is arguably one of the most complex and comprehensive set of such regulations. Therefore, it has been used as a model for designing the current legislation on energy efficiency of buildings in Kyrgyzstan. It is thus important to follow further developments in European legislation, where it broadens the scope from energy efficiency to wider environmental and sustainability considerations, including the integration of SCP practices and circular economy concerns in buildings.

This assignment will review the current situation of the building sector in Kyrgyzstan, draw on applicable lessons learned from international best-practice experience, and suggest recommendations applicable to the market development of the building sector in Kyrgyzstan.

This report provides a summary analysis on enhancing tools for supporting the introduction of SCP and circular economy concepts in buildings. It focuses on understanding the landscape of existing policies, energy efficiency regulations, and institutional arrangements at the national level related to SCP and Green Economy in the Kyrgyz Republic. It provides a general overview of the SCP practices in the construction-materials industry established in the Kyrgyz Republic, outlining the most relevant improvements that can be implemented within this local context. This report also identifies gaps and barriers in the current legal framework on energy efficiency in public buildings, based on international best SCP practices and provides recommendations on measures for improving the capacity of small- and medium-sized enterprises (SMEs) in energy efficiency.

1. KYRGYZSTAN BUILDING SECTOR OVERVIEW

This chapter reviews the Kyrgyz building sector with an emphasis on residential building, which constitutes by far the largest market for energy efficiency investments in buildings. In addition, market opportunities are identified as well as gaps and barriers which at present act to constrain these opportunities. These gaps and barriers are of a very complex nature and encompass a wide field of activity: policy and regulatory, institutional and financing, capacity constraints and information asymmetries, as well as others. Specific recommendations to address these gaps and barriers are suggested in Chapter 3, section 3.3 (Recommendations for amendment of policy and regulatory framework), Chapter 5, section 5.3 (Recommendations for implementations in the Kyrgyz Republic) and Chapter 6, Practical measures for the implementation of energy efficiency in public buildings.

The Kyrgyzstan building sector comprises three different market segments, and each of these differ by building typology, technology complexity, ownership, size and the level of opportunities for energy efficiency renovation:

- Residential buildings,
- Public buildings, and
- Commercial buildings.

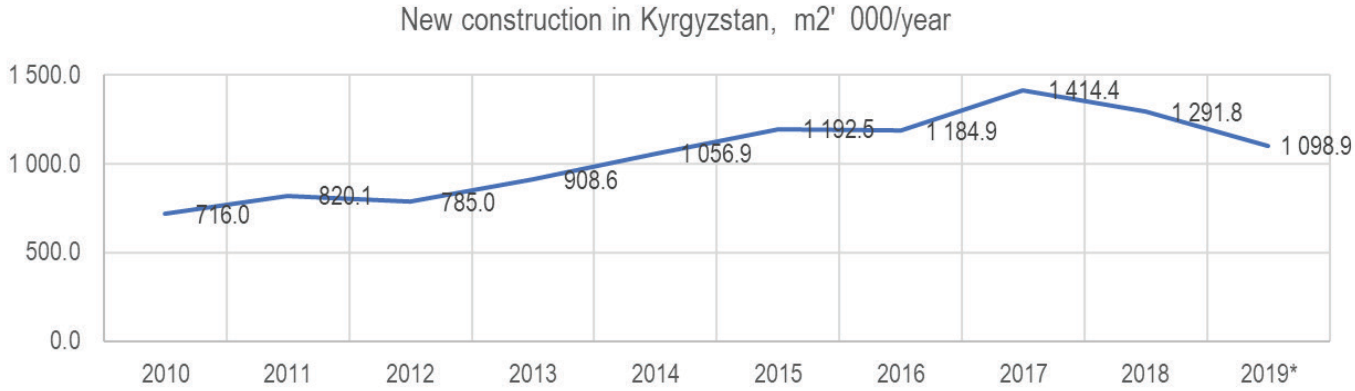
Of the three market segments, statistical data are available only for residential buildings. However, even these data are incomplete due to inconsistencies specific to rural areas and because of the growing amount of informal housing in suburban areas. With the focus here on SCP and in particular energy efficiency, and the fact that residential buildings comprise over 75–80% of the building stock by quantity, we have concentrated in this chapter on residential buildings as they constitute by far the dominant opportunity for introduction of SCP practices. There are few if any public buildings under construction at present. Yet there are a significant number that require energy efficiency retrofitting. While important, this is still a smaller subset within the SCP area of engagement. More information on energy efficiency retrofitting of public buildings will be provided in Chapter 6.

Commercial buildings constitute a small but dynamic market from an SCP point of view. It is estimated here that the commercial stock of buildings at present to be less than 10% of the overall building stock in terms of gross building area. This number is growing fast, however, and might well double over the next 20 years with the growth of the service sector, and conditional on positive economic development in the country. A detailed assessment of commercial buildings is outside the scope of this Report, as it would require further extensive research, but could be provided in an additional assignment.

1.1. New construction of residential buildings

According to data from the Kyrgyz Republic National Statistical Institute, the total housing stock of the Kyrgyz Republic is 83,574,000 m², of which 98.2% is privately owned. In the period from 2010–2019, 10,821,000 m² were commissioned[7], with an average annual value of 1,000,000 m², and annual growth from 0.8%–1.24% of the total building stock (see Figure 1).

Figure 1. New construction of residential buildings in Kyrgyzstan, 2010-2019



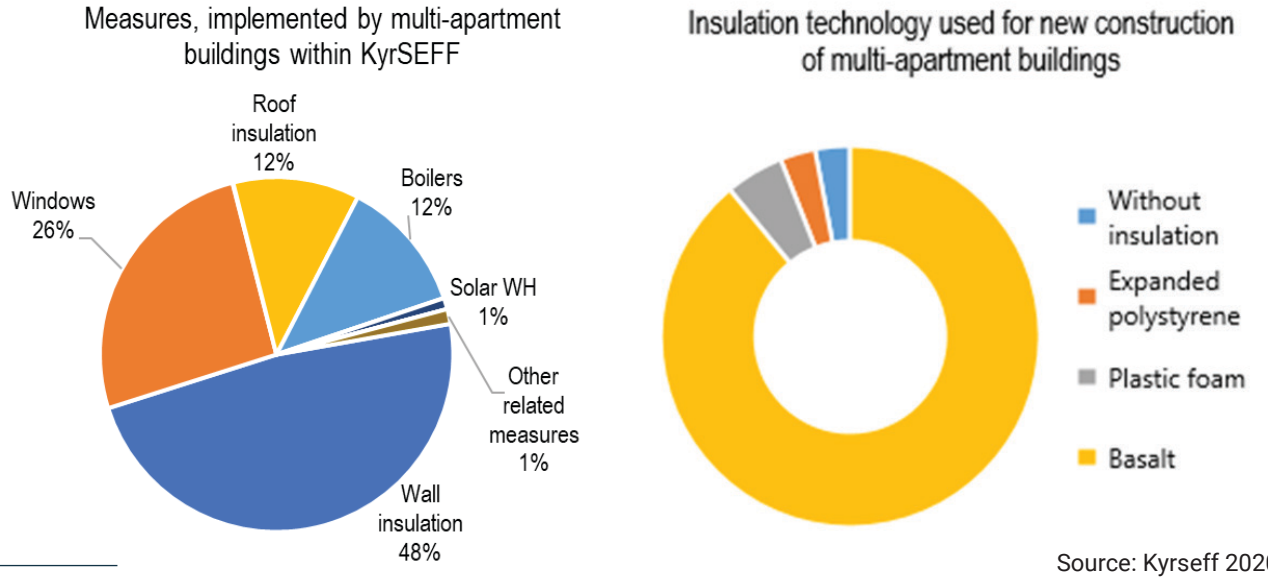
Source: National statistics, Kyrgyzstan 2010–2019

Official statistics on the share of apartment buildings and single-family dwellings are lacking. There are also no data on the implementation of legislation on minimum energy-efficiency requirements. A programme from the Kyrgyz Sustainable Energy Financing Facility (KyrSEFF) has collected data[8] on the construction of family and apartment buildings, which show that

- over 60% of projects at the dwelling level and 99% of projects at the building level are new construction projects, and
- total floor area of the residential sector participating in the financing programme is about 370,000 m², of which 220,000 m² is new construction. Compared to the level of housing construction in the country, the share of buildings constructed with financing support from the KyrSEFF programme in accordance with national energy efficiency requirements will be about 3% of the annual value.[9]

According to KyrSEFF information, from the short survey conducted in 2019 with 40 large construction companies, 97% of buildings are insulated, mainly with mineral wool slabs (89% of buildings) for 65 apartment complexes. The thickness of the thermal insulation varies from 3 cm to 10 cm, and the inclusion of additional thermal insulation does not affect the apartment price for the end customer. Construction companies use such building insulation as a competitive advantage in their marketing campaigns (see Figure 2).

Figure 2. Implementation of energy efficiency measures in residential buildings (Kyrgyzstan)

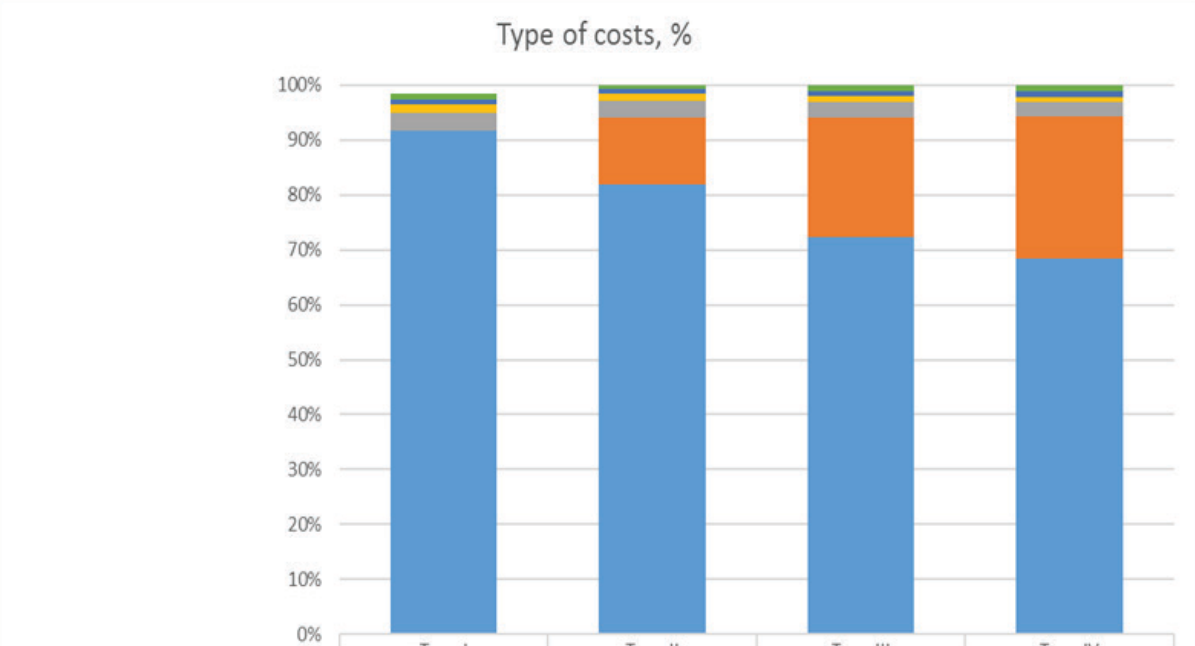


Source: Kyrseff 2020

7 http://www.stat.kg/ru/statistics/stroitelstvo/
8 www.kyrseff.com
9 Approx. 220,000 m² of housing floor area within 7 years of KyrSEFF/KyrSEFF+ (2013-2019)

The share of costs for energy-efficient technologies does not exceed 25–30% in cases where energy efficiency requirements are set up by the national legislation. In relation to existing common construction practice, the additional costs for meeting minimum energy efficiency requirements will amount to about 8–13% of the total construction cost for buildings with 38 cm wall thickness (Type III), and about 30% for buildings with 25 cm wall thickness (Type II; see Figure 3).

Figure 3. Costs of energy efficiency measures by type of structural systems (Kyrgyzstan)



	Type I	Type II	Type III	Type IV
Electrical installation (wiring etc.)	1%	1%	1%	1%
Mechanical Installation (piping etc)	1%	1%	1%	1%
Heating System	2%	1%	1%	1%
Windows	3%	3%	3%	3%
Thermal Insulation	0%	12%	22%	26%
Structure	92%	82%	72%	68%

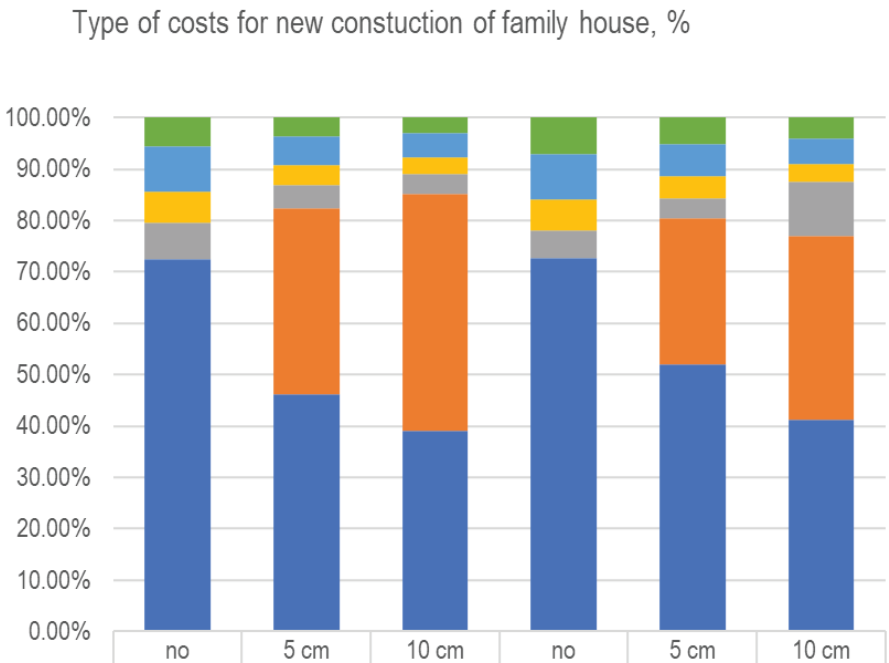
Source: Kyrseff 2020

To provide an assessment of the costs involved for energy efficiency measures in the new construction of a single-family house, a comparison of two options for a building area of up to 150 m^2 (in accordance with the threshold norm of minimum energy efficiency requirements) and 300 m^2 (threshold to the relevant construction practice without mandatory permits) is given in Figure 4.

However, if requirements similar to the NZEB regulations in Europe were adopted for new construction, the costs of energy efficiency techniques required to meet these requirements would represent an increase of about 20–35% out of total construction costs, as compared with the current practice.[10] This is a significant share of the costs, and also raises the question of associated embodied energy and carbon. Clearly, improving overall carbon performance over the lifetime of a building should take into consideration both carbon emissions emitted during the operation of the building as well as embodied energy and carbon associated with production, transportation, and use of these construction materials and components during construction phase. In addition, to reduce the overall carbon emissions buildings should be designed and built in a way that allows reuse of specific materials – their recycling after the building lifespan – i.e. after demolition of the building. Some of these materials can be repurposed and reused for further construction (e.g. bricks and other useful structural elements with a longer lifespan than the building itself) or for other uses (i.e. for concrete aggregates, filling for road or other infrastructure projects). Moreover, some of these materials, such as granulated concrete aggregates, can be used as carbon sinks since they absorb significant amounts of carbon emissions from the atmosphere. More details on the opportunities for the introduction of circular economy concepts applicable in buildings and construction are provided in Chapter 4.

10 Source: Unison Group, Kyrseff statistics 2016–2020.

Figure 4. Costs of energy efficiency measures in construction of family houses (Kyrgyzstan)



	no insulation - 150m2	5 cm insulation- 150m2	10 cm insulation - 150 m2	no insulation - 300 m2	5 cm insulation- 300 m2	10 cm insulation - 300 m2
Electrical installation (wiring etc.)	5.67%	3.61%	3.06%	7.11%	5.08%	4.04%
Mechanical Installation (piping etc)	8.72%	5.56%	4.71%	8.75%	6.25%	4.97%
Heating System	6.11%	3.89%	3.29%	6.13%	4.38%	3.48%
Windows	7.10%	4.52%	3.83%	5.34%	3.82%	10.57%
Thermal Insulation	0.00%	36.27%	46.06%	0.00%	28.56%	35.68%
Structure	72.40%	46.14%	39.06%	72.66%	51.91%	41.26%

Source: Kyrseff 2020

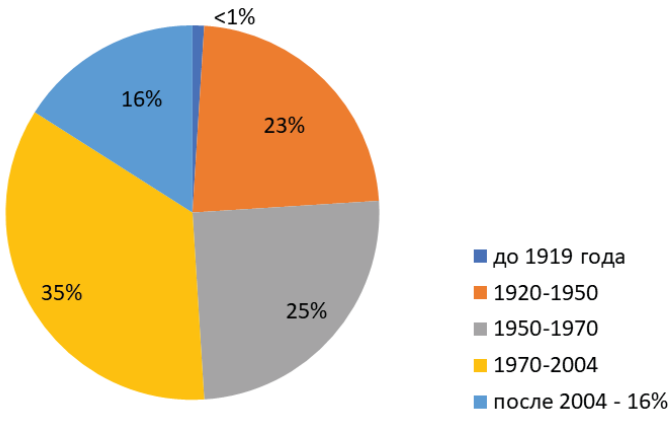
1.2 Renovation of residential buildings

At present, the housing stock comprises an estimated 1.033 million residential buildings, including about 1.029 million family houses and approximately 4,200 apartment buildings. The corresponding floor area is:

- 68.7 million m^2 in family houses (including estimates for rural housing); and
- 14.9 million m^2 in multi-family apartment buildings.

The age structure of this housing stock is illustrated in Figure 5.

Figure 5. Age structure of housing stock



source: National Statistic, 2019

These data show that the largest share of about 55% of residential building stock is 30–60 years old.

This means that their energy performance is deeply substandard, with engineering systems at the end of their lifetime and with potential structural improvements needed. The cost of energy-efficiency renovation for this age category of residential buildings is assessed at around USD 350–500/m^2 of floor area.

The category of buildings aged 10–30 years, (comprising 83,123 buildings and 10% of the overall floor area), may also need energy-efficiency retrofitting, although to a limited extent. Typically, these buildings are structurally sound, and the basic engineering systems require only partial replacement. Renovation here involves mostly energy efficiency improvements, including both enhanced thermal protection of the building envelope, use of renewables, and efficiency improvements of building services. Costs are typically in the range of USD 200–300/m^2 of floor area.

Buildings built after 2010 correspond to around 12% of the housing stock. These buildings will require basic energy efficiency improvements at the cost of USD 120–220/m^2 of floor area.

Buildings older than 60 years, accounting for 23% of the total housing stock, might be subjected to renovation depending on their structural stability, earthquake resistance and their cultural or historical value. Taking into account the structural soundness of these buildings and their remaining lifespan, some might be better considered for demolition and replacement, rather than for renovation. This would particularly apply to buildings made of materials and structural components of limited lifespan or initially built as temporary accommodation during or after the Second World War (1940–50s).

There are no official data available on renovation rates of the building stock. Based on reasonable assumptions and data from KyrSEFF from 2013–2019, it is estimated here that around 147,000 m^2 of building floor area were renovated in about 1,000 buildings. Almost all of these were private family houses, while some partial renovation was conducted in common areas and structures in about 12–15 multi-family apartment buildings.

This is a very low share of renovated buildings out of the total housing stock. Under the KyrSEFF programme several marketing surveys have been conducted, along with interviews with relevant market stakeholders: homeowners, chairs of condominiums, municipal authorities, technology suppliers and construction companies and individual builders. The outcomes of these surveys help build a comprehensive view of the barriers and drivers for energy efficiency renovations.

Gaps and barriers for energy efficiency in buildings

Barriers have been analysed in several reference studies and there is a general consensus among the professional community as to the reasons for the market failures of wider and market-based renovations. These relate to insufficient policy and regulatory frameworks, the structure of the market, affordability, a lack of capacities and information asymmetries. This set of barriers is common to all Central Asian or, in general, to post-Soviet countries with different degrees of magnitude in different countries. Based on detailed knowledge of the market conditions in Kyrgyzstan, the assessment provided in Table 1 explains the magnitude of each barrier on a qualitative scale of low (L), medium (M) or high (H) for each of the three segments of the building sector: residential, public and commercial buildings.

Table 1. Market barriers for renovation of residential buildings

Market segment	Residential buildings	Public buildings	Commercial buildings
Insufficient policy and regulatory	M	H	M
Regulatory enforcement	M	H	M
Market fragmentation	M	H	L
Affordability (higher upfront costs, structure of energy tariffs)	H	H	L
Split incentives	M	L	M

Market segment	Residential buildings		Public buildings	Commercial buildings
Availability of simple financing products with efficient distribution channels	M	L	H	L
Technology availability	M		M	L
Implementation capacity (quality and capacity of construction industry)	M		L	L
Information asymmetries (awareness of market stakeholders over wider benefits from better EE and broader SCP)	M		L	L

A high magnitude of barriers (squares in **red**) indicates that market-based solutions are unlikely, significant efforts and resources are needed to overcome these barriers and further regulatory reforms or policy dialogue are needed. Demonstration or pilot projects are possible, although only with very substantial grant support and technical assistance.

A medium magnitude of barriers (squares in **yellow**) indicates that some conditions for market-based solutions have already been created, but they are hindered by further market imperfections. Practical implementation can go beyond pilot and demonstration projects, but substantial support of grant funding, technical assistance and potential policy dialogue are needed for scaling up and wider replication.

A low magnitude of barriers (squares in **green**) indicates that conditions for market-based solutions already exist, and limited support is needed in terms of subsidies and technical assistance, although for some a wider implementation requires further work and adoption of applicable best-practice models.

This analysis of barriers can be complemented with consideration of practical issues that further hinder the implementation of energy efficiency techniques as well as any further SCP in buildings:

- *Low energy tariffs and standard benchmark-based billing for district heating*. Energy tariff policies fall under the barrier of insufficient policies and regulations in the above analysis. However, tariffs set up in the wrong way (i.e. without taking into account environmental externalities or wider society benefits) can also impact affordability and economic incentives for implementing EE and SCXP practices.
- *Restricted public-sector budgets and lack of access to commercial financing by public entities, including for energy efficient retrofits*. As with energy tariffs, public procurement rules fall under the barrier of insufficient policies and regulations. However, it is up to the financing sector itself to offer financing products that encompass the value added of better EE and/or broader SCP and to scale up their portfolio of greener and environmental investments.
- *Public budgeting regulations do not allow any energy cost savings to be retained*. This specific gap, again, falls under policy and regulatory barriers.
- *Lack of local market capacity and experience (e.g. energy auditors, design institutes, construction companies, etc.) in preparing and implementing high quality EE projects*.
- *Lack of credible data and awareness combined with behavioural inertia, which act to hamper the demand for investments in EE products and services*. These gaps fall under both the lack of sufficient implementation capacity (for EE and broader SCP practices) and the barrier of information asymmetries.
- *Other institutional and regulatory barriers, such as incomplete legislation and weak enforcement of building codes*.

Even with only a brief review, it is clear that for residential buildings most of the barriers fall into the medium range of magnitude. The only barrier in the red zone is the affordability of a complex energy-efficiency renovation for most Kyrgyz households. Higher upfront costs of such renovations make it difficult for families with limited income to cover the expenses, while the benefits would be only thinly spread over the longer lifetime of the investments conducted. A possible solution would be the introduction of financing instruments that would enable the capture of longer term and additional benefits from energy-efficient renovation and align it with the financing terms (tenor of financing provided by the lender). Alternatively, these could be financing instruments with an element of limited subsidy, like KyrSEFF, which could retain the tenor of financing as assessed by the lender but reduce the incremental costs with an element of subsidy. This subsidy could be justified here with the additional macro-economic benefits of energy efficiency renovation.

Kyrgyz Sustainable Energy Financing Facility (KyrSEFF)

There are financial instruments available to the Kyrgyz population so that they can benefit from green technologies support, such as the KyrSEFF programme, which provides an example of good project delivery (provision of loans, grants, technical assistance and policy dialogue). In 2013, the European Bank for Reconstruction and Development (EBRD[11] launched KyrSEFF, a USD 20 million credit line for projects supporting energy efficiency improvements in households and businesses. As part of the programme, the EU Central Asia Investment Facility provided free technical assistance to applicants as well as grants to businesses and private borrowers upon successful project completion.

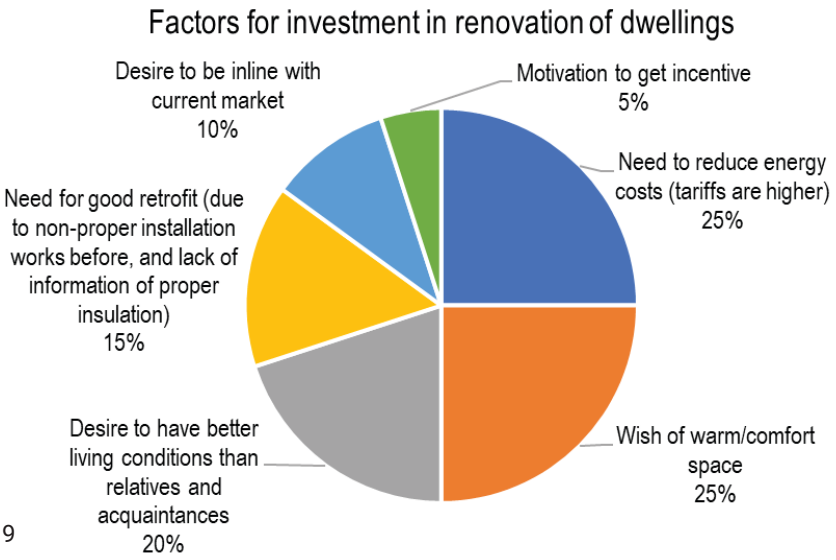
Private households could receive loans for the installation of energy-efficient windows, the insulation of walls, roofs and floors and the installation of efficient boilers, heaters, solar water systems or heat pumps. In the commercial sector, KyrSEFF supported the purchase of new production machinery and improvements in production processes and facilities. Following its successful implementation, in 2016 the EBRD launched a second phase of the facility (March 2022) with a credit line of USD 35 million, extending it to water management and wastewater technologies.

Since 2013, the programme financed more than 3,000 energy-efficiency projects for more than USD 50 million. It also provided USD 6.3 million in EU grants to 1,930 projects. In aggregate, these successful projects annually save 177 million kWh of electricity, conserve 111,000 m3 of water and reduce CO_2 emissions by over 61,000 tonnes.[12]

An additional barrier is the relatively high annual interest rates of local partner banks of the financial facility, especially for socially vulnerable groups. In Kyrgyzstan, the interest rates of the KyrSEFF partner banks have varied from 18% in 2013 to over 20% in 2018. Partly because of these rates, the majority of projects were implemented in the economically more affluent northern Chui oblast and Bishkek City. Therefore, depending on the socio-economic situation, it is important for international development banks and other financial institutions to introduce higher additional grant funding or hedging guarantees to help more projects on renewable energy and energy efficiency take off.[13]

A deeper examination of the barriers and drivers for renovation can be provided by exploring the practical experience of KyrSEFF with implementation. Although the relative number of renovations in the residential buildings is very modest, there are positive trends. According to interviews and marketing surveys conducted by KyrSEFF, around 50% of the population of Kyrgyzstan is aware of and care about thermal insulation, mostly for thermal comfort reasons.[14] Figure 6 illustrates the correlation between the factors influencing the homeowners' decision to carry out energy renovations – insulating the roof and walls, and replacing the heating system. Project statistics of KyrSEFF also show an increasing demand for thermal insulation among homeowners: the number of KyrSEFF projects by dwelling level focused on thermal insulation in 2019 increased by 23% in comparison to 2017 (see Figure 7).

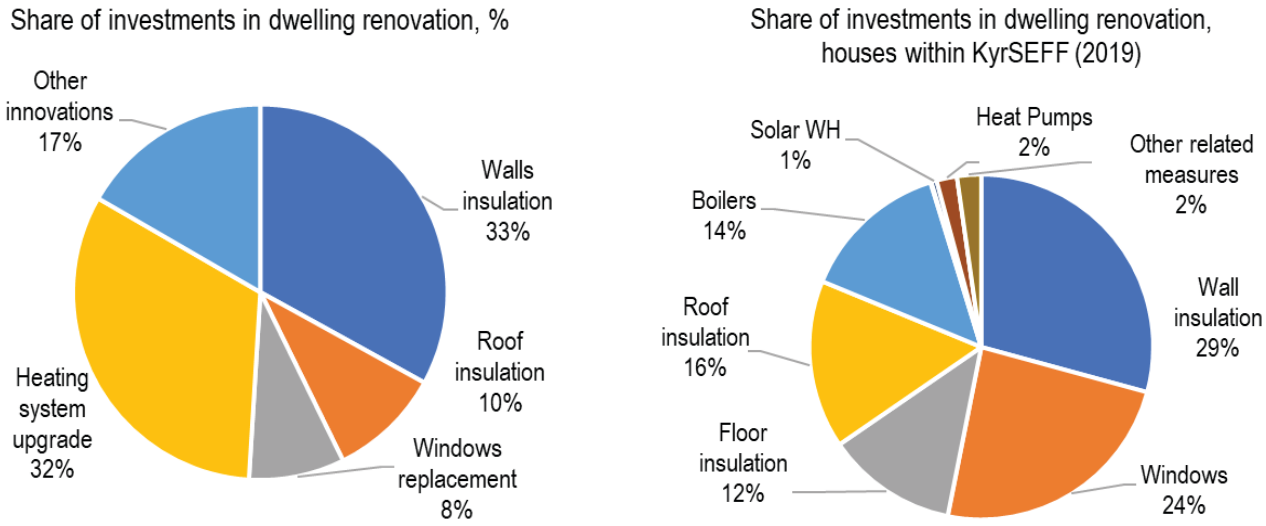
Figure 6. Driving factors for investments in renovations of residential buildings



Source: UNISON, 2019

11 According to the EBRD, Green Economy Financing Facilities with different components were or are still functioning in Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, FYR Macedonia, Georgia, Kazakhstan,* Kyrgyzstan, Russia,* Serbia, Tajikistan and Ukraine (EBRD 2018).
12 www.kyrseff.com
13 See http://library.fes.de/pdf-files/id-moe/14922.pdf
14 UNISON Group, 2019: Based on the accumulated data on energy efficiency consulting by the population program since 2013, taking into account the coverage of the entire territory of the country and all types of consumers, the assumption is made that the sample of recipients of consultations (more than 10,000 persons) is equal to the population of Kyrgyzstan.

Figure 7. Share of investments in renovation techniques



Source: Kyrseff, 2019

Using the example of an existing 150 m^2 one-storey house, the ratio of renovation costs are as follows:

- Insulation of 150 m^2 wall surface with 5 cm mineral wool, including materials, installation and turnkey work – USD 2,550,
- Insulation of 150 m^2 of roof with 10 cm of mineral wool, including materials, installation and turnkey work – USD 750,
- Replacement of 11 m^2 of windows with 4–5 chambers PVC profile, with double glazing and e-coating – USD 638,
- Replacement of old boiler with a certified boiler with automating and upgrading of the heating-distribution pipes USD 2,500,
- Other innovations, up to 20% of overall renovation costs – renovation of lighting systems, hot water supply and simple cosmetic repairs – USD 1,287.

There is a significant market potential for energy efficiency renovations in Kyrgyzstan and fast-growing awareness among market stakeholders. Capacities are also quickly growing within the professional community (builders, construction companies, architects, designers, vendors, etc.) among those who can provide services associated with such renovation implementation. Existing legislation does provide some guidance on the scope and extent of renovations; however, enforcement is limited.

Energy-efficiency retrofitting still focuses mainly on the reduction of energy consumption, to a lesser extent on carbon considerations, and not at all to the issues associated with the overall carbon footprint of buildings – specifically on upfront carbon emissions including embodied carbon. This is an area for further policy dialogue on policy reform and regulatory development.

Any scaling up of renovation across the country will require the design and introduction of additional financing instruments. This would allow the longer term and wider benefits from energy renovation to be internalised and help reduce higher up-front costs, which make renovation barely affordable for most Kyrgyz households.

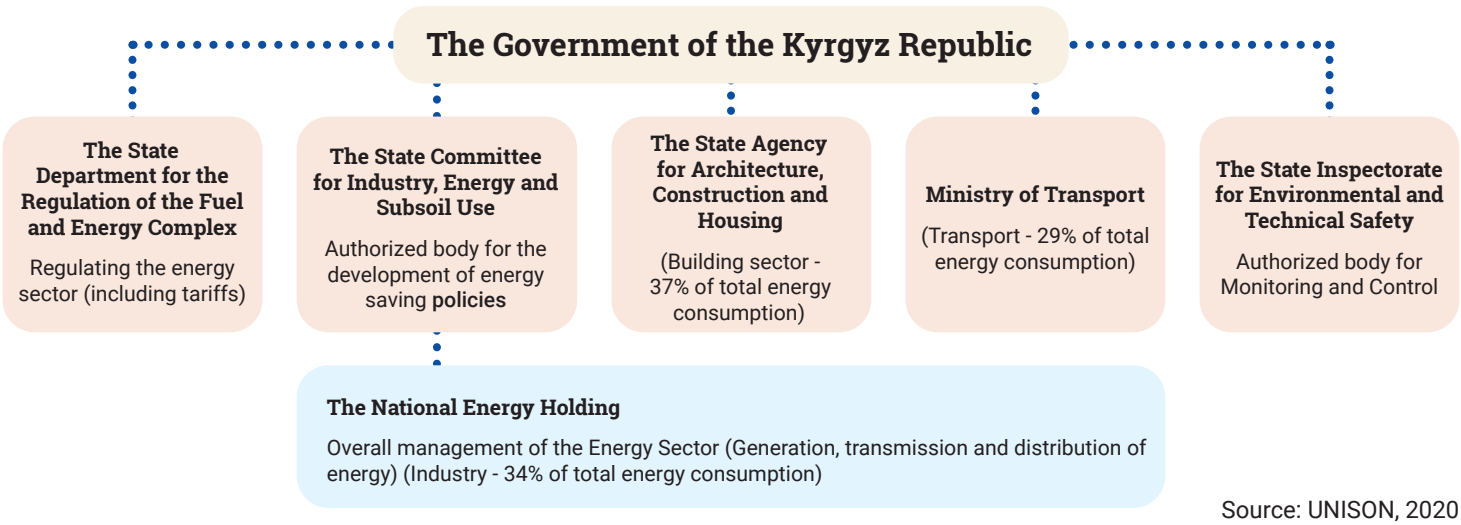
The above are general market barriers that go beyond policy and regulation. Gaps and barriers that are specifically related to policy and regulations are elaborated further in Chapter 3. Recommendations based upon best international practice are explicitly set out in section 3.3.

2. ENERGY EFFICIENCY INSTITUTIONAL STRUCTURE AND MARKET FRAMEWORK

Over the past 10 years, the structure of energy sector management has changed significantly: the liquidation of the Ministry of Energy and public control structures, the establishment of the state-owned Joint Stock Company (OJSC) 'National Energy Holding', the separation of a regulatory body into a distinct institution, and so on. Energy issues, though, are still mainly focused on energy generation, transmission and distribution, with the central aim being to provide the country with energy. The issues of effective energy use by end users – buildings and industry – are considered as secondary.

From 2016 to the present day, the main state body for energy efficiency policy in the Kyrgyz Republic is the **State Committee for Industry, Energy and Subsoil Use under the Government of the Kyrgyz Republic** (SCIESU). According to the institutional structure of the government, other issues related to the promotion of energy efficiency and the regulation of energy saving in other sectors are coordinated by the departments of other state bodies. They are schematically reflected in Figure 8. This also highlights ministries responsible for the sectors with the highest sectoral energy consumption: the building sector (37%), industry (34%) and transport (29%).[15]

Figure 8. Institutional set-up on energy and energy efficiency in Kyrgyzstan



Source: UNISON, 2020

15 National Report on the Development of EE and RES in KG, UN Economic Commission for Europe, 2015

SCIESU is an authorised state body responsible for energy-efficiency governance[16], along with energy saving and the development of alternative energy. The issues of energy efficiency are managed by a dedicated Department of Renewable Energy and Energy Saving[17], with four full-time employees; they are subordinate to the Deputy Chairman of SCIESU on Energy. Their capacity for the implementation of tasks set for the development of energy efficiency and energy saving in the country is insufficient, both quantitatively and institutionally. The department is involved in other routine tasks, including the development of small hydropower stations, and does not have the resources to address the issue of energy saving. Other structures involved in energy efficiency are also under the authority of the SCIESU:

- **The Research Center for Energy and Economics** was appointed as responsible for energy audit/inspection and has a share of the state budget allocated for these purposes (KGS 4 million for 2015 and 2016). However, there is a lack of experts, a methodological background and the human resources capacity to cover all buildings. Information on conducted energy audits is not available.
- **The Coordination Council for Energy Efficiency** was established in 2018, in response to a demand of parties interested in developing energy efficiency in Kyrgyzstan – international development banks, suppliers and producers of energy saving technologies and materials. The task expected of the Council is to organise effective and constructive coordination among all stakeholders involved in energy efficiency and energy saving. That is to improve the effectiveness of the actions undertaken and the efficiency of allocated international support and financial resources, to share knowledge and best practices, and to prevent inconsistency and duplication of efforts.

The State Agency for Architecture, Construction, Housing, and Communal Services under the Government of the Kyrgyz Republic (Gosstroy) and its expanded structure of departments and structural units[18] involved in implementation, is responsible for the implementation of energy saving and energy efficiency policies in the **construction and building sectors**. Institutionally, agencies are structurally separated entities coordinated by the general management, including:

- State Department for the Examination of Design Estimates, which monitors the compliance of design estimates with current standards and regulations (including energy efficiency requirements);
- Republic Center of Certification in Construction, which monitors the compliance of the technical characteristics of construction and energy-efficient materials with the requirements of safety standards in use and other standardised parameters;
- A training school within the Republic Center of Certification in Construction is responsible for educating specialists in the construction sector and certifying their qualifications.
- Laboratory facilities (see Table 2):
    - A testing laboratory to check conformity of construction materials, products and structures with the requirements of technical regulations at the Republican Certification Center in Construction under the Gosstroy;[19]
    - A light-bulb test laboratory (spectrometers, goniophotometers, luxmeters and accessories) of the Center for Standardization and Metrology under the Ministry of Economy of the Kyrgyz Republic (KyrgyzStandart).[20]
    - There is a lack of laboratory facilities for testing the energy efficiency of materials and technologies. For example, locally produced boilers can obtain a certificate of safety design but cannot pass the tests for fuel quality and energy-conversion efficiency of combustion. Similarly, with thermal insulation materials, the National Center for Standardization and Certification can provide a certificate of compliance with design characteristics in accordance with GOST, but cannot test for thermal conductivity.

16 http://cbd.minjust.gov.kg/act/view/ru-ru/99446 - The Regulation on SCIESU approved by the GKR from July 15, 2016 No. 401
17 http://www.gkpen.kg/index.php/komitet/control - Scheme of management of GKPEN, departmental structure. A number of advisory groups working on the improvement of the policy in the fuel and energy sector presented recommendations on the creation of an institutionally separate state body (for example, in the form of an agency) that would focus solely on the issues of energy saving and energy efficiency and would work in all sectors of the economy. The recommendation has not yet been implemented, because the establishment of a separate state agency is fraught with difficulties in budget allocation and a number of bureaucratic procedures, and there is a lack of understanding of the feasibility of energy saving in the residential sector as well as in public buildings.
18 http://gosstroy.gov.kg/ru/?page_id=1168 – the structure of departments and units of Gosstroy
19 http://gosstroy.gov.kg/ru/kyrgyzskijj-nauchno-issledovatelskijj/
20 http://www.nism.gov.kg/

Table 2. Overview of building components and systems subjected to laboratory tests

Energy efficiency technologies	Lab-tested characteristics	Characteristics required for testing (no labs in Kyrgyzstan)
Thermal insulation	Mechanical performance	Thermal conductivity
Windows	Mechanical performance	Thermal conductivity
Heating systems	Technical safety	Efficiency of fuel combustion (energy efficiency)
Lighting	Energy performance	-

At the same time, it is important to note that there are gaps in the exchange of information and adaptation of sub-institutional work schemes to modern requirements (bureaucratic inertia). This is the reason why the introduction of energy efficiency is not being implemented in practice, despite the general policy of Gosstroy for its development.

The third state body directly involved in the implementation of energy saving and energy efficiency policies is the **State Inspectorate for Environmental and Technical Safety** under the Government of the Kyrgyz Republic. Its functions include the verification of the technical safety of heating systems in budget-supported buildings (i.e. public and municipal buildings) and the availability of energy passports of buildings. However, the inspectorate's capacity is also insufficient to fully carry out these functions (quantitatively and qualitatively), and the issue of the availability of energy passports with reliable data remains relevant for many buildings. It is important to note that the main function of state inspections is to check for technical safety, and issues of rational use of energy are not included in the scope of the parameters being checked, in accordance with current guidelines of control.[21] However, the authorised monitoring body for quality control of work in the field of energy efficiency of buildings and monitoring procedures has yet to be defined.

21 http://proverka.gov.kg/media/uploads/files/gko/energetika.pdf

3. ENERGY EFFICIENCY POLICY AND REGULATORY FRAMEWORK

European policy context

Before providing an overview of the national policy and regulatory framework applicable for SCP practices in buildings, it is important to give a brief overview of European Union policies, and particularly those on energy performance in buildings, which have been used as a model for the development of the current legislation on energy efficiency in buildings. Therefore, it is useful to follow the lessons learned in the implementation of EU policies, and expand the scope to wider environmental and sustainability considerations including the introduction of SCP and circular economy concepts in the building sector.

Europe has been a global leader in energy efficiency and the decarbonisation of building stock. Yet despite the building blocks provided by the EU Performance of Buildings Directive[22], the EcoDesign Directive[23] and the Energy Efficiency Directive[24], combined with extensive capacity and robust support mechanisms, the outcomes have not been of the scale needed to match the objectives of the Paris Agreement, or even the climate commitments of individual EU countries.

The European Energy Performance of Buildings Directive (EPBD) is the cornerstone of the EU's approach to decarbonisation of the building sector. Originally introduced in 2002, entering into force on 4 January 2003, the EPBD has mandated the EU Member States to introduce provisions for minimum energy performance criteria, energy certifications of buildings upon resulting primary energy consumption and regular inspections of buildings' HVAC systems. The Directive was amended by so-called 'EPBD recast', which was approved on 19 May 2010 and entered into force on 18 June 2010. The following key provisions have been introduced in the recast EPBD:

- For buildings offered for sale or rent, the energy performance certificates shall be stated in the advertisements.
- Member States shall lay down the necessary measures to establish inspection schemes for heating and air-conditioning systems or take measures with equivalent impact.
- All new buildings shall be Nearly Zero Energy Buildings (NZEB) by 31 December 2020; the same applies to all new public buildings after 31 December 2018.

22 Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings.
23 Directive 2009/125/EC of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products.
24 Directive (EU) 2018/844 of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency.

- Member States shall set minimum energy performance requirements for new buildings, for buildings subject to major renovation as well as for the replacement or retrofit of building elements.
- Member States shall draw up lists of national financial measures and instruments to improve the energy efficiency of buildings.

The introduction of provisions for all new buildings to be built as NZEB, starting from 31 December 2020, has been reflected in the **EU Taxonomy for sustainable finance** and incorporated in the draft Delegated Regulation for sustainable activities (the **Delegated Act**).[25]

The EU Taxonomy for sustainable finance has been developed by a Europe-wide Technical Expert Group (TEG). Within the framework of the Taxonomy, the TEG has developed unified definitions of sustainable activities in all sectors, including buildings and construction. It provides recommendations for technical screening criteria for economic activities that can make a substantial contribution to climate change mitigation or adaptation, while avoiding significant harm to the four other environmental objectives. These are: sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention control, and protection and restoration of biodiversity and ecosystems.

On 9 March 2020, the TEG published its final report on the EU taxonomy.[26] The report contains recommendations relating to the overarching design of the EU taxonomy as well as extensive implementation guidance on how companies and financial institutions can use and disclose against the taxonomy. The report is supplemented by a technical annex containing:

- Updated technical screening criteria for 70 climate-change mitigation and 68 climate-change adaptation activities, including buildings and construction, with criteria for 'do no significant harm' to other environmental objectives.
- An updated methodology section to support the recommendations on the technical screening criteria.

Provisions from the EU Taxonomy have been incorporated into the EU's draft Delegated Act, which was published in November 2020. The Delegated Act was proposed as part of the Commission's earlier Action Plan on 'Financing Sustainable Growth' of March 2018, launching an ambitious and comprehensive strategy on sustainable finance with the aim of redirecting capital flows to help generate sustainable and inclusive growth. The Taxonomy Regulation is an important enabler for scaling up sustainable investment and thereby implementing the European Green Deal as part of the EU's response to the climate and environmental challenges. It provides uniform criteria for companies and investors to determine which economic activities can be considered environmentally sustainable, and thus aims to increase transparency and limit the risk of greenwashing and market fragmentation in the classification of green activities and investment projects.

The introduction of the EU Taxonomy and adoption of the EU Delegated Act as part of the EU's Green Deal seek to redirect financing flows into activities aiming for decarbonisation of the economy, including for buildings and broader construction. Buildings are an important and integral part of the EU decarbonisation strategy – consuming over 41% of final energy and providing an enabling environment for all human activities. Decarbonisation of the EU would be impossible without addressing the building sector.

Kyrgyz National policy and regulatory framework for energy efficiency on buildings

The National Development Strategy of the Kyrgyz Republic for 2018–2040 aims to create 'a politically stable, economically strong and socially responsible state.[27] Under the main section, 'Economic well-being and quality of environment for development,' priority 3.2 contains 'Formation of Sustainable Environment for Development'. A specific area of focus is the environment, climate change adaptation and disaster risk reduction.[28] Currently, there are two sectoral strategy plans that have been prepared on the Construction and Industry sectors.

Development Program of the Kyrgyz Republic for 2018–2022 'Unity, Trust, Creation' is a second comprehensive national document guiding the Kyrgyz Republic towards creating sustainable development programmes and solutions up until 2022. This development programme prioritises the environment being integrated into Programme areas. Priority 6 focuses on crosscutting development directions. 6.2 is specifically dedicated to the Ecological aspect of development, indicating that 'the principles and requirements of the green economy will be introduced at all stages:

25 European Commission, Regulation (EU) 2020/852, and known as well as the also known as the Taxonomy Regulation.
26 European Commission, TEG final report on the EU taxonomy, 2020: https://ec.europa.eu/info/files/200309-sustainable-finance-teg-final-report-taxonomy_en
27 http://donors.kg/en/strategy/5174-national-development-strategy-of-the-kyrgyz-republic-for-2018-2040
28 National Development Strategy of KR, 2018- 2014

planning, decision-making, implementation and monitoring'.[29] [30]

In 2019, with a corresponding action plan, the Kyrgyz government implemented the Green Economy Growth Policy for 2019–2023. Seven focus areas were identified in this programme: **renewable energy; green agriculture, green industry; low carbon and environmentally friendly transport; sustainable tourism; waste management; and green cities**. The Government is currently concentrating on the implementation of the goals for this programme.[31]

The Kyrgyz Republic's energy efficiency (EE) legislation is based on two primary laws – the Law on Energy Saving (1998) and the Law on Energy Performance of Buildings (2011) – and on related secondary legislation, such as government decrees, technical norms and regulations. However, it should be noted that as a crosscutting issue, energy efficiency is affected by several other laws, many of which are outdated or lack effective implementation. The key laws in this context are:

- The Law on Energy (1996)
- The Law on Electricity (1996)
- The Law on Renewable Energy (2008)
- The Law on Oil and Gas (2004)

The Government of Kyrgyzstan has started to recognise the importance of EE improvements and has initiated a number of important steps to help improve the EE framework. In recent years, some progress has been made with regards to the Kyrgyz EE agenda and related sector reforms, including:

- Amendments to the Law of Renewable Energy, July 24, 2019, #99
- Amendments to the Law on Energy Efficiency of Buildings, June 20, 2019, #74
- Action Plan/Roadmap for creating conditions for practical implementation of legislation in the sphere of energy efficiency of buildings of the Kyrgyz Republic, Gosstroy order 26.10.2016
- Regulation on the Modalities for the Energy Certification of Buildings, Government Decree № 531, August 2, 2012
- Regulation on the Procedure for Periodic Monitoring of Energy Efficiency of Boilers, Heating and Hot Water Supply Systems, Government Decree № 531, August 2, 2012
- Regulation on rules and procedures for qualification certification of specialists in energy certification of buildings, and periodic monitoring of energy efficiency of boilers, heating systems and hot water supply of buildings, Government Decree № 13, January 17, 2020
- Regulation on the State Register of Energy Certificates of Buildings, Reports on Periodic Monitoring of Energy Efficiency of Boilers, Heating and Hot Water Supply Systems of Buildings and Certified Specialists in Energy Efficiency of Buildings and on Periodic Monitoring of Energy Efficiency of Boilers, Heating Systems and Hot Water Supply of Buildings, Government Decree № 131, January 17, 2020
- SNiP 23-01:2013 'Building Heat Engineering (Thermal Protection of Buildings)' Gosstroy order 26.05.2013
- SP 23-101-2013 'Design of Thermal Protection of Buildings', Gosstroy order, 26.05.2013
- Methodology for Calculating the Energy Efficiency of Buildings and Determining Energy Efficiency Class for Energy Certification of Buildings, Gosstroy order 26.05.2013
- Methodical instructions for conducting periodic monitoring of energy efficiency of boilers, heating systems of buildings and hot water supply of buildings, Gosstroy order, 26.05.2013
- Guide to the settlement application for energy certification of buildings (based on Microsoft Excel), Gosstroy order, 26.05.2013
- Amendments to the Method for Calculating the Cost of works on Energy Certification of Buildings, Gosstroy Decree #40, April 17, 2020

Despite recent progress, the implementation of EE improvements is still constrained by multiple barriers. While the potential for EE improvements in economic sectors is significant, a number of technical, economic, institutional, legal, regulatory and financial impediments are preventing comprehensive EE investments from being undertaken. Notably, the main barriers are set out in Table 1. Some practical recommendations to address these barriers are specified further in section 3.3, having taken into account the lessons learned from implementation of EU legislation and from other more developed markets.

29 Development Program of the Kyrgyz Republic for 2018-2022; 'Unity, Trust, Creation'
30 https://www.gov.kg/ru/programs/6
31 https://www.kg.undp.org/content/kyrgyzstan/en/home/projects/partnership-for-action-on-green-economy.html

3.1. Law on Energy Efficiency of Buildings and associated secondary legislation

The Law on Energy Efficiency of Buildings[32] (LEPB) was developed in 2011 within the framework of technical support provided by the European Bank for Reconstruction and Development. The LEPB, defining legal responsibilities of building owners and instruments to promote energy efficiency in buildings, was adopted as Law No. 137 by the Parliament and has been in force since 6 February 2012. The LEPB addresses all stakeholders of the building sector, including private homeowners, commercial premises, and public buildings. The new legislation on energy performance of buildings in Kyrgyzstan is in almost full compliance with the EU Energy Performance of Buildings Directive 2010/31/EU (the 'EPBD' or the 'Building Directive') and introduces a new concept of legislation for the Kyrgyz authorities. The new legislation allowed the Kyrgyz Republic to become a pioneer and the first country in the post-Soviet region (with exception of the three Baltic states) to implement energy efficiency legislation for buildings, based on best practices from the European Union (EU).

After the LEPB came into force, a Government Decree No. 531 was approved, which introduces implementation procedures for energy performance certifications (EPCs) of buildings and regular inspections of boilers and heating systems. These EPCs and inspections are to be conducted by independent accredited professionals on a commercial basis. The Decree No. 531 also introduces minimum energy performance (MEP) requirements for all types of buildings under construction, major refurbishment and those for sale, and an energy assessment methodology in compliance with ISO EN 13790/2008.

Government Decree No. 531 requires the introduction of minimum energy efficiency requirements for buildings. New buildings and buildings undergoing energy renovation should:

- have a thermal conductivity of the enclosing structures that is lower than the set values;
- consume less energy than the set values per unit area, in accordance with the functional purpose of the building and the climatic zone of the building's location.

The sphere of implementation of the legislation includes residential, public, administrative, and multifunctional non-industrial buildings, with the exception of:

- buildings intended for religious rites, rituals, and ceremonies;
- buildings that, in accordance with the legislation of the Kyrgyz Republic, are considered as cultural heritage sites (historical and cultural monuments), if the fulfilment of energy efficiency requirements is impossible due to a change in its appearance and enclosing structures;
- individual residential buildings, the total area of which does not exceed 150 m^2 (facilitated by the ranking of the Tax Code of the Kyrgyz Republic);
- temporary objects of non-capital construction, country houses, and buildings and structures of auxiliary use (auxiliary farming facilities).

The legislation presupposes the existence of an institute of independent specialists conducting Energy Certification of Buildings and Periodic Monitoring of the energy efficiency of heating and hot water supply systems in buildings – procedures similar to those applied in the EU.

Further, the technical standards and rules were updated (SNiP 23-01:2013 'Building Heat Engineering (Thermal Protection of Buildings)'), with the adaptation of the requirements[33] for the section 'Energy Passport' in the design and estimate documentation. In 2013, with the update of the technical documents, the obligation of the section 'Energy Passport' was eliminated, and amendments were made to mandatory verification of compliance of the thermal protection of new buildings with the minimum requirements established by LEPB.

Although not all of the mechanisms are implemented at the planned scale until now, energy efficiency issues are gaining momentum, and there is a harmonisation and strengthening of requirements for energy efficiency in other areas – household appliances, public procurement, and so on.

32 http://cbd.minjust.gov.kg/act/view/ru-ru/203377/20?mode=tekst

33 The introduction of this section was in 2009, with the updating of the standard according to Russian standards, as part of the UNDP project 'Improving the Energy Efficiency of Buildings'. The passport suggested a 5-class energy scale system. Five years of experience in its implementation showed that the implementation of this standard is hampered by the lack of harmonization of the procedures for preparing project documentation.

3.2. Technical standards and rules in the building sector

There are around 6,000 technical documents and standards that regulate the construction sector in the Kyrgyz Republic, which can be split as follows:

- 130 construction norms and rules (SNiPs), regulating design norms of buildings,
- > 4,500 standards (GOSTs), regulating requirements for construction materials, products, structures and methods of their testing,
- > 1,500 normative documents of related departments – instructions and regulations of the Ministry of Emergency Situations, Ministry of Health, Ministry of Labor, State Mining and Technical Supervision, Fire Fighting Service, Kyrgyzstandard, etc.

Out of the 130 SNiPs currently in force, 20 documents have been developed by the Interstate Scientific and Technical Commission on Standardization, Technical Rating and Conformity Assessment in Construction as interstate construction norms (ICN), and 35 documents have been developed (some of them revised two or three times) by the State Construction Institute itself, as national construction norms (SNiP KR). Thus, 55 construction norms have been updated[34], i.e. 42% of the total number of SNiPs, while the rest of the SNiPs are Soviet-era documents that have not yet been revised. For example, there are no technical rules or design instructions for built-in photovoltaic panels, pre-insulated heat pipes and other modern technologies.

For the energy sector, most of the regulatory documents have lost force since 1 January 2010, in accordance with Article 36 of the Law of the Kyrgyz Republic 'On regulatory legal acts of the Kyrgyz Republic' #241 from 20 July 2009. These documents include the Safety Regulations for the Operation of Electrical Installations, Regulations for the Installation of Electrical Appliances, Regulations for the Technical Operation of Power Plants and Electric Networks, and Fire Safety Regulations for Power Companies. Due to the absence of technical documents, the State Inspectorate for Environmental and Technical Safety demands the prohibition of certain types of work, determines the incident of violations during the works (i.e. the level of violation), and imposes administrative fines on the employees of the companies.

The State Committee for Industry, Energy and Subsoil Use of the Kyrgyz Republic has approved the register of priority documents, which require development, but has not yet revised them. There are several developed documents approved by the Scientific and Technical Council, but the process of issuing these documents as official technical documents has been delayed.

3.3. Recommendations for amendment of policy and regulatory framework on energy efficiency in buildings

The legislation on energy efficiency of buildings in Kyrgyzstan has been developed by reflecting key provisions of the original European **Energy Performance of Buildings Directive (EPBD)**. This refers to the principal provisions relating to: setting minimum energy performance requirements for both construction of new buildings as well as for renovation of existing ones; to energy assessment of buildings and the metrics used; to energy performance certifications and conditions of its use; and to the regular inspection of heating, ventilation and air-conditioning systems in buildings. In addition, the legislation has adopted a similar system of governance, implementation and reporting on impacts as in the EU.

There are, however, several legislative and regulatory components that were not incorporated into the Kyrgyz legislation. This is mostly due to the fact that these were introduced in later amendments of the EU Directive, and/or they relate to provisions which were the subject of further methodological development in the EU at the time when the Law on Energy Performance of Buildings was submitted for approval by the Kyrgyz Parliament.

More specifically, these are the provisions that relate to development of cost-optimal requirements for building components and criteria for Nearly Zero Energy Performance of Buildings (NZEB):

- The cost-optimal level of requirements for building components and systems is defined in Article 2.14 of the EPBD as 'the energy performance level which leads to the lowest cost during the estimated economic lifecycle' from two different perspectives: (i) financial, looking at the investment itself at the building level; and (ii) macro-economic, looking at the costs and benefits of energy efficiency for society as a whole. The cost-optimal levels must be calculated following specific guidelines. Article 3 and Annex I of the EPBD define the energy-performance calculation methodology.

34 https://www.faufcc.ru/upload/iblock/257/raisova.pdf

- The EPBD requires all new buildings from 2021 (public buildings from 2019) to be **nearly zero energy buildings (NZEB)**. According to Article 2 of the EPBD-recast, 'nearly zero energy building' means a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant extent from renewable sources, including sources produced on-site or nearby. As explicit numeric thresholds or ranges are not defined in the EPBD, these requirements leave room for interpretation. This allows Member States to define their nearly zero energy buildings (NZEB) in a flexible way, taking into account their country-specific climate conditions, primary energy factors, ambition levels, calculation methodologies and building traditions. This is also the main reason as to why existing nearly zero energy buildings (NZEB) definitions differ significantly from country to country. It is thus a challenging task to find a common denominator to define nearly zero energy buildings (NZEB) on a European scale. The EU-project ZEBRA2020 sets a clear methodology for how NZEB are defined in the context of market tracking: the NZEB radar graphic.[35]

In both the cases of NZEB and cost-optimal requirements, the methodology was suggested at a higher level by the EPBD-recast from 2015. Since there was little practical experience in the EU on implementation of these provisions, the Kyrgyz policymakers have decided not to rush with incorporating these provisions into the Kyrgyz legislation.

However, it is suggested to consider integrating these two elements into the Kyrgyz regulatory framework at any future *medium-term* amendment of the existing legislation. This could take place between 2023 and 2025.

The priority in the *short-term* perspective (2021–2022) would be to operationalise all provisions of the existing legislation with specific priority given to market-based solutions introduced by the legislation. Although the legislation itself is well designed and adapted to the market conditions in Kyrgyzstan, its practical implementation is still hampered by several factors: a lack of understanding and awareness of designated authorities, low law-enforcement and a lack of market-based capacity for implementation among the professional community (designers, architects, energy auditors and assessors, builders and construction companies). Addressing these bottlenecks with specific and targeted actions will unlock the practical implementation of the legislation and allow the building of sufficient capacities for scaling up and market-based solutions.

For a *longer-term* perspective on legislative development (after 2025) it is suggested to review the experience of EU countries in addressing the question of whole lifecycle performance of the buildings, and, more specifically, the reduction of associated upfront carbon emissions and embodied energy and carbon in building materials. This falls together with better processing and possible reuse or recycling of building materials after demolition, towards the introduction of circular economy concepts. The EU is piloting a practical approach by establishing the **Level(s) Initiative**.[36] This initiative is a new European approach to assess and report on the sustainability performance of buildings, throughout their full lifecycle. Using existing standards, the *Level(s)* framework, with its indicators, provides a common language for building sustainability, which can be used directly on building projects and portfolios, or as a basis for other initiatives, policies, schemes and actions, to include lifecycle thinking and circularity. Level(s) uses a minimum number of indicators but with maximum leverage to deliver sustainability. It tracks performance across the various stages of a building project to give a complete picture throughout the full lifecycle. The EU successfully concluded piloting Level(s) across Europe from 2017 until 2020. Under the pilot phase, a new methodology introducing circular economy concepts applicable in buildings was developed, and this was tested on a voluntary basis across the EU. The outcomes and key lessons learned from the pilot phase of Level(s) were reflected in the final presentation of Level(s) in March 2020.

The European Commission will use the feedback collected during the testing phase to update the guidance on Level(s), and potentially consider further development of the regulatory framework in order to introduce circular economy concepts.

The Level(s) are particularly important from the circular economy considerations. The new Delegated Regulation for sustainable activities refers explicitly to Level(s) for the introduction of circular economy concepts in buildings. However, this is still an area under development within the European legal and regulatory framework and relevant regulations are still to be completed. From that perspective, it makes better sense for Kyrgyz authorities to monitor policy and regulatory development in Europe and then based on lessons learned adopt similar legislation at a later stage. Since Level(s) is an important initiative, which might shape the European approach and even legislation on resource efficiency and circular economy in buildings, more details are provided in Annex A.

Table 3 explains the links between the gaps and barriers identified in Chapter 1 and adds the recommendations suggested above, incorporating them into a single analytical tool.

35 https://zebra2020.eu/tools/data-tool/
36 https://ec.europa.eu/environment/topics/circular-economy/levels_en

Table 3. Links between gaps and barriers and policy recommendations

Gaps and barriers	Recommendations	Comments
Gaps in the current legislation on energy performance of buildings, waste management, and other environmental legislation (fluorinated gas substances)	Amendment to the minimum requirements to conform with the introduction of NZEB for new construction, and cost-optimal level of requirements for renovation of existing buildings. Existing waste management regulations can be amended to reflect and follow the EU Waste Hierarchy as well as support waste processing, minimisation, value recovery and recycling. Relatively easily could be adopting regulations supporting the introduction of more energy and resource efficiency equipment, appliances and technologies falling under provisions of the EU EcoDesign Directive and relevant regulations. The latter might require support for national certification and testing laboratories, which are instrumental for the implementation of these regulations.	These recommendations can be implemented through amendments and an extension of the existing regulatory framework.
Absence of policy and legislation supporting the circular economy	Adoption of a new set of policies and legislation addressing circular economy considerations across all sectors of the economy. Sector specific sub-laws or regulations can introduce circular economy concepts in buildings and construction.	Prior to adopting any suggested new set of policies and legislation, some further work is necessary, including policy dialogue, monitoring and assessing lessons learned from the implementation of similar concepts in more developed markets. This could be combined with capacity-building activities, implementation of pilot and demonstration projects as well as with some further analytical work on the wider benefits of circular economy concepts in the market context of Kyrgyzstan.
Absence of provisions supporting an integrated approach on SCP in building and construction	Adoption of a new set of policies and legislation addressing SCP considerations across all sectors of the economy. Sector specific sub-laws or regulations can support the introduction of SCP in buildings and construction.	
Energy and utility tariff policy	Amendment of tariff regulations and associated methodologies to internalise environmental impacts.	Amending tariff policies is theoretically possible within existing regulations if there is strong political will. However, such political will is completely absent at present due to recent political instability and the perceived risks of negative public opinion. Preceding any further work on amending tariff regulations it is recommended undertaking and supporting wider actions addressing broader public awareness on climate and environmental challenges. This will enhance public acceptance of the need to internalise climate and environmental externalities.

Gaps and barriers	Recommendations	Comments
Low level of policy enforcement	Capacity building and awareness raising activities targeting: (i) designated local authorities in charge of legal enforcement of regulations related to energy efficiency of buildings; and ii) the wider professional community (developers, building managers, architects, designers and construction companies) on the benefits of compliance with the new legislation on energy efficiency in buildings.	Although Kyrgyz legislators have adopted quite advanced legislation on energy performance of buildings, its implementation is hampered by a lack of legal enforcement. The reasons are mostly due to the lack of capacities of designated authorities and their limited understanding of the benefits and functionalities of the legislation as well as an absence of practical tools supporting legal compliance.
Lack of practical provisions for the integration of distributed renewable energy generation	Development and adoption of secondary legislation (by government regulation or decree) providing clear conditions for grid connections of smaller-size renewable energy projects (wind and solar PV).	Although Kyrgyzstan adopted a law supporting renewable energy generation, smaller-size distributed renewable energy projects are discouraged due to the absence of clear and practical regulations defining conditions for grid connection. One of arguments used frequently by power utilities against the connection of a larger number of smaller-size renewable energy projects is concern for grid stability, influenced by fluctuating wind and solar power generation. To address these concerns, it is recommended conducting a grid stability assessment study, which could provide factual and objective analytical evidence based on modelling the impact of renewable, distributed power generation on grid stability. This study could precede the development of grid-connection regulation, as it will provide fact-based evidence on the anticipated impact. This could also suggest measures to mitigate a possible negative impact in a larger scale deployment of renewable energy power-generation capacities.
Lack of green and sustainability -related procurement criteria	Adoption of green public procurement rules, similar to those in the EU's Green Public Procurement (GPP).	This action is recommended in coordination and following some analytical works related to the identification and assessment of circular economy and SCP concepts applicable for building sector under the market context of Kyrgyzstan.
Budgetary regulations for public entities in relation to energy performance contracting	Amendment of existing budgetary regulations for public entities to allow energy performance contracting and the retaining of revenues from energy or resource efficiency investments.	This is important for the introduction of off-balance financing instruments in the public sector (including for energy efficiency retrofits in public buildings) such as energy performance contracting and for the stimulation of energy performance services.

Gaps and barriers	Recommendations	Comments
Absence of any legal obligations for Environment, Social and Governance (ESG) disclosure for companies and financial institutions	Introduction of legal obligations on financial institutions and larger companies for public disclosure on SCP activities (or their financing).	As soon as higher-level policies targeting climate, environmental or sustainability objectives are introduced, such legal obligations to disclose activities supporting these policy objectives will stimulate their interest and engagement on SCP, climate and the environment. However, this would only be practicable to apply after corresponding SCP-related legislation is adopted (bullet points above), and reflects lessons learned from the implementation of the Sustainability-related Disclosures in the Financial Services Regulation (SFDR[37] and Non-Financial Reporting Directive NFRD[38]) in the EU.

The timetable for the implementation of key policy and regulatory recommendations for the building sector, presented in Table 4, is separated into short-term (2021–2022), medium-term (2023–2025), and longer-term perspectives (after 2025).

Table 4. Policy and regulatory recommendations (summary)

Policy and regulatory recommendations:	Short-term perspective 2021-2022	Mid-term perspective 2023-2025	Longer-term perspective - after 2025
Existing legislation on energy performance of buildings	• Ensure enforcement and a wider application of existing legislation. • Support capacity building for law enforcement of designated authorities responsible for implementation of existing legislation. • Support building up capacities for implementation of provisions of existing legislation among local professional community. • Continue with harmonisation of technical standards with existing primary and secondary legislation.	Amendment of existing legislation with introduction of: • Cost-optimal level of requirements as per the methodology introduced by the EPBD in addition to existing minimum technical requirements on energy efficiency; • NZEB requirements applicable for new construction of buildings.	Monitor any further updates of the EU legislation in buildings and, more specifically, with the EPBD, and incorporate any new provisions supporting decarbonisation of buildings in the national legislation according to local market conditions.

37 Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector

38 Directive 2014/95/EU of the European Parliament and of the Council of 22 October 2014 amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information

Policy and regulatory recommendations:	Short-term perspective 2021-2022	Mid-term perspective 2023-2025	Longer-term perspective - after 2025
Introduction of material efficiency standards and circular economy concepts	• Monitor any relevant developments within the EU and understand the lessons learned in the positive experience of EU-wide initiatives related to material efficiency and circular economy concepts in buildings. • Test the application of methodology developed under Level(s) for pilot projects in Kyrgyzstan. • Pilot Life-Cycle Assessments (LCA) of certain building products and materials and suggest prototype Environmental Performance Declarations (EPDs) mirroring the EU approach. • Support capacity building for market-based solutions in the field of circular economy of buildings in Kyrgyzstan (development and adoption of relevant methodologies, trainings and awareness-raising activities).		Adopt policy and regulations aiming at net zero carbon performance of buildings and the introduction of circular economy considerations, by reflecting on lessons learned and positive experience from the implementation of EU legislation.
Other areas of legislation supplementing he above	• Develop a concept for introducing the EU Waste Hierarchy[39], with regards to construction materials and CDW. • Adopt provisions reflecting the ban of substances with high Global Warming Potential (GWP) and, more specifically, those containing fluorinated gases – in line with the EU F-Gas Regulation.[40] • Adoption of regulations on products consuming energy and mirroring the EU Regulations implementing the EU EcoDesign Directive.[41] • Adopt grid connection regulations for smaller-size distributed renewable energy power generation.	• Adopt policies and regulations aiming to support better waste management, reuse and recycling of construction materials and CDW, by reflecting on the lessons learned and positive experience of legislation implemented in the EU. • Adopt stricter criteria for market access of energy consuming products in line with provisions of the EcoDesign Regulations and as amended by the EU. • Adopt legislation introducing provisions for climate disclosure and reporting. • Adopt legislation incorporating the 'Do No Significant Harm' principle for all economic activities including buildings and construction, in compliance with the provisions of the EU Taxonomy for sustainable activities. • Adopt GPP rules in coordination with works on circular economy and SCP. • Adoption of regulations and requirements for ESG disclosure of corporate and financial institutions with provisions similar to the EU Regulation 2019/2088 on sustainability-related disclosures in the financial services sector (known as the Disclosure Regulation, ESG Regulation or SFDR) and the Non-financial Reporting Directive (NFRD) 2014/95/EU.	

39 Directive 2008/98/EC on waste (Waste Framework Directive)
40 EU Regulation 517/2014 on fluorinated greenhouse gases.
41 EU Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products.

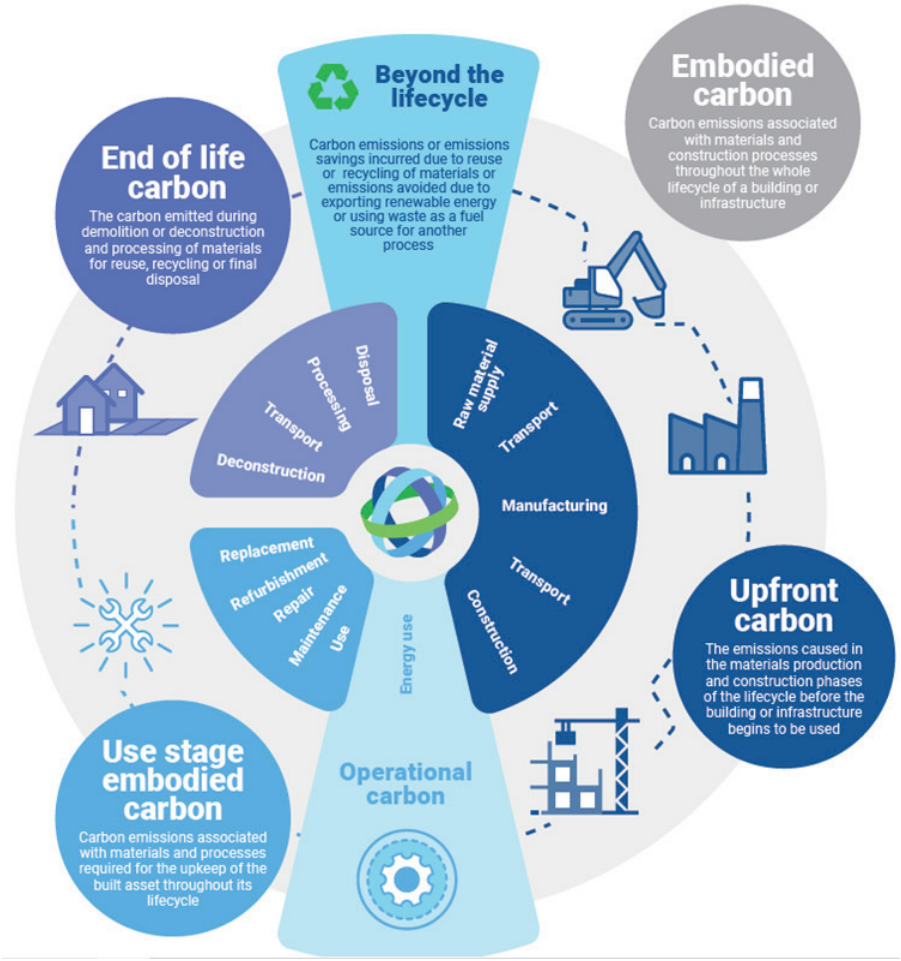
4. MARKET DEVELOPMENT FOR ENERGY EFFICIENCY MATERIALS

Carbon emissions from construction processes and materials over their lifecycle, including the embodied carbon created by their transportation, replacement and waste management, is responsible for 11% of global greenhouse gas emissions. Due to the growth of construction in cities, the embodied carbon from now until 2050 will be responsible for more than half of total carbon emissions from new construction. This makes reducing embodied carbon essential to the challenge of achieving the Paris Agreement targets. Buildings and construction are also the largest consumer sector for raw materials globally and generate very significant amounts of waste. In Europe, construction and the use of buildings account for approximately one-half of all material extraction, and construction and demolition waste (CDW) accounts for around one-third of all waste. The World Green Building Council has called for all construction to reduce embodied carbon by 40% by 2030 to meet the global climate objectives. Their report Bringing Embodied Carbon Upfront (2019[42]) has been endorsed by 80 major organisations worldwide in the buildings and construction sector. Despite the significance of the sector, embodied carbon is not yet regulated nor even addressed through market-based measures.

The ultimate objective of net zero carbon buildings, or the full decarbonisation of buildings throughout their lifecycle, is to address all opportunities across the value chain in the sector. The stages of lifecycle carbon emission in buildings are illustrated in Figure 9.

42 World Green Building Council, Bringing Embodied Carbon Upfront, 2019

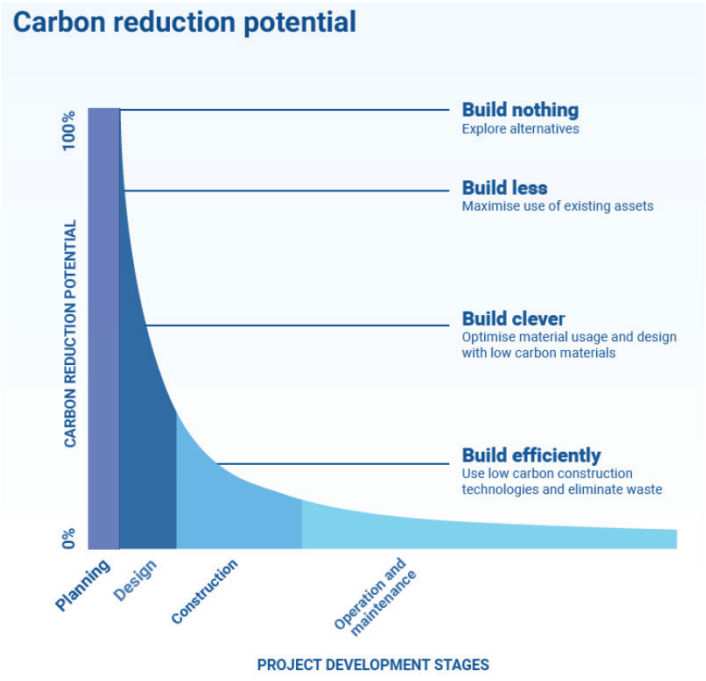
Figure 9. Building lifecycle carbon emissions



Source: World Green Building Council, Bringing Embodied Carbon Upfront, 2019

Addressing carbon emissions across the entire lifecycle will help realise the sector's potential for full carbon reduction. A hierarchy for such carbon reduction is set out in Figure 10.

Figure 10. Carbon reduction hierarchy



Source: World Green Building Council, Bringing Embodied Carbon Upfront, 2019

To meet this goal, policymakers should leverage and support proven business models and help build sufficient capacities and expertise among the professional community, ensuring effective partnerships with donors and key stakeholders to leverage an active collaboration with all relevant professional and research establishments and networks, both in Europe and globally. This should include the following organisations and networks:

- World Green Building Council
- Climate Bond Initiative
- International Capital Market Association
- Building Performance Institute – Europe
- Building Research Establishment (BRE)
- Global Construction Alliance
- World Council for Sustainable Development
- Federation of European Heating, Ventilation and Air Conditioning Associations (REHVA)
- EURIMA
- Other relevant professional networks

Embodied carbon emissions are influenced by many factors, ranging from the type and volume of the structure installed, the materials used and their associated carbon intensity in manufacturing processes, to the mode and distance of which the materials have been transported. In addition, there are the processes by which these materials have been constructed, maintained and finally removed and treated at the end of life. Some materials also absorb or sequester carbon at different lifecycle stages, which can offset emissions from other lifecycle stages. Opportunities for reducing or eliminating embodied carbon are equally varied and will differ between the types of projects as well as by region. In general, though, the greatest savings can usually be realised at the earliest stages, because as projects progress, it becomes more challenging and more costly to make design changes to reduce embodied carbon (see Figure 10 above).

The market for energy efficient materials and equipment in Kyrgyzstan is still in its infancy, but it is fast growing. It mainly comprises imported goods, with just a few supplies from domestic manufacturers. Almost all modern technologies are available, such as ground and air heat pumps combined with solar collectors, but with only a limited number of suppliers. Such a market does not stimulate competition and thus prices can be higher than in Europe for some technologies or materials.

There is an adequate range of equipment in terms of quality, characteristics and price, and consumers can find a product depending on their affordability. As is generally the case, quality rises with price, but not all products available on the market are certified by accredited institutions (i.e. the EU Certificates of Conformity CE). An absence of thorough controls and corresponding regulatory mechanisms opens the market to access for substandard products and materials, mostly imported from Asia.

There are no official data on the market size of energy efficiency and energy-saving technologies, and the main source of data is the estimates from experts at the KyrSEFF, collected in a series of market reviews conducted in 2012, 2016 and 2019. These studies covered a number of basic energy efficient technologies:

- Thermal insulation for walls, floor and roof
- Windows
- Boilers (gas and coal boilers)
- Residential air conditioners & air-to-air heat pumps
- Heat pumps (water and ground source)
- Solar water heaters
- Heating system upgrades at the building level
- Solar-PV and PV-building integrated solutions

Based on official statistics for new construction and renovation of existing buildings, as well as taking into account typical benchmarks for technology use, we have assessed the annual market size for these technologies as follows for the period 2017–2019 (Table 5).

Table 5. Energy efficiency technology market

Technologies	Quantity in physical units	Market, in USD million per year
Thermal insulation for building fabric	110,800 tonnes	55.4
Windows	1,100,000 m^2	88.0
Residential air conditioners & air to air heat pumps	87,200 kWth	21.8
Heat pumps (water and ground source)	800 kWth	<2.0
Solar water heaters	7,800 m^2	3.5
Solar-PV	7,060 kWp	12.0
Total		**182.7**

Similarly, we have assessed the market for basic construction materials per unit of construction material (tonnes/m^2 gross internal floor area) and per year on the basis of the average for the period 2017–2019 (Table 6).

Table 6. Construction materials market

Materials	Quantity in tonnes per year	Market, in USD million per year
Concrete	2,869,680	56.3
Steel	183,913	131.5
Fired bricks, gypsum, plaster and cementious materials	96,015	4.1
Timber	14,158	4.9
Glass	20,224	81
Earth-made bricks and other nature- based solutions	122,372	5.0
Total	**3,315,964**	**282.7**

The key conclusions that can be drawn from the market overview presented above are as follows:

- Currently, construction practices do not take into consideration either resource efficiency or circular economy concepts. The only positive aspect is the wider use of mudbricks, typically in rural areas for construction of family houses.
- There are no attempts to reuse or recycle construction and demolition waste.
- The current supply of technologies and materials is not sufficient to cover any wider building renovation efforts.
- Existing supply chains have limited capacity and a limited number of suppliers.
- There is no quality control over imports of materials and technologies, which potentially leaves room for the import of substandard and low-performing technologies.
- Wider renovation programmes need to consider the extension of existing supply chains and the involvement of a wider spectrum of suppliers using sticker control for market access. Otherwise scaling up investments in renovation will result in a shortage of materials and technologies or respectively higher prices and lower cost efficiency of the building renovation programmes.
- Any further policy amendments or changes to the regulatory framework will need to consider market transition to decarbonisation across the entire value chain. Relevant legislation needs to be amended taking into account lessons learned from practical implementation in more developed markets (i.e. the EU).

Further details on international best practices are provided in Chapter 5.

5. BEST INTERNATIONAL PRACTICES FOR GREENER AND RESOURCE EFFICIENT CONSTRUCTION MATERIAL

A key challenge for the reduction of embodied carbon and the effective use of construction and demolition waste (CDW) in the construction sector is value-chain fragmentation and a high dependency on subcontracting. This, in turn, leads to cost-driven sub-optimisation between parties for each transaction, which overlooks environmental impacts. Additionally, less developed markets like those in Central Asia (including Kyrgyzstan) currently lack skills and experience on the topic of embodied carbon and material efficiency. To successfully improve environmental performance, the investor/developer should set targets and establish optimisation and enforcement mechanisms from the outset. There are significant opportunities for the sector here: material efficiency reduces capital costs, Life-Cycle design reduces lifecycle costs and the solutions required for embodied carbon reduction are available today.

Several voluntary initiatives to reduce embodied carbon do exist. The *Advancing Net Zero* project by the World Green Building Council federates efforts from national green building councils, which are also active in the post-Soviet region. For the EU, as well as for countries beyond, the European Commission's *Level(s) initiative*, or more specifically the standards underlying it, provides a useful methodology and template for reporting Life-Cycle impacts. The *Carbon Heroes Benchmark Program* is a benchmarking programme focused on material efficiency and the reduction of embodied carbon and energy, which could also be adapted for use in the Central Asian context. Further good examples of international best practice that could be useful in the context of Central Asia and in Kyrgyzstan are also provided.

A number of more advanced economies have shown that reducing embodied carbon can be made standard practice in construction projects. The Netherlands, for example, has required all new offices and residential projects to meet a threshold level for a building-materials environmental assessment since 2018, and had a mandatory declaration in force since 2013. Currently, France and Finland are also preparing to launch regulatory limits, and Sweden is planning a mandatory declaration. Most markets around the world apply voluntary mechanisms, such as green building certifications, to reduce embodied carbon. While such measures are useful and necessary for building initial success, skills and best practices, they are not sufficient to achieve industry-wide decarbonisation. Of the markets with no regulatory backing, Norway has achieved the best results. Here, major investors and cities require carbon performance from projects.

5.1. The best-practice examples

5.1.1. Best practise for product environmental data: France

A French decree of 9 July 2014 for construction product environmental information requires that any manufacturer who brings to market construction products and then markets them as environmentally sustainable must produce an Environmental Product Declaration (EPD) in conformity with EN 15804 standards. This EPD must be third-party verified and published in the French INIES system. There are allowances for specific claims, such as 'compostable', 'reusable' and so forth, but any other environmental claims require an EPD. This regulation was implemented due to rampant greenwashing, a problem it has effectively addressed. In addition, the regulation has led to an increase in product environmental performance information and has allowed buyers to compare different products. Smaller manufacturers have often addressed these requirements by working together with their respective industry associations to develop a set of generic data. As a downside, this particular regulation also imposes a technical barrier to trade, as foreign manufacturers also need to deposit their EPDs in the French INIES system, so as to be able to market the environmental advantages. This requires reworking and reprocessing the data and imposes additional costs, particularly for manufacturers with large product ranges. A possible improvement to the French system would be mutual recognition for EPD data published elsewhere. Implementation has taken a substantial amount of time due to the need to educate the industry and develop the required competence and solutions.

5.1.2. Best practise for building level performance: the Netherlands

The Dutch Building Act 2012 (Bouwbesluit) required all new offices and residential buildings since 2013 to report building materials LCA using a national methodology called MPG, (Milieuprestatie Gebouwen). The regulation introduced a mandatory ceiling for the environmental impacts of materials from 1 January 2018. The national methodology for compliance is verified by an independent institute, Stichting Bouwkwaliteit. This national methodology relies on an environmental database also managed by the institute. This approach has successfully propelled the market in terms of skills and the use of LCA for building design. Clearly, the best practice here consists of a determined and staged roll-out of the requirements to ensure build-up of the required skills prior to implementation.

However, it is worth noting that the technical implementation of the said national methodology leaves much to be desired. In terms of environmental impact, as it represents a weighted score based on a basket of impacts, it has an indirect impact on carbon reduction in cases other than pure material reduction. Also, while the methodology is highly sophisticated in its calculation approach, it has not led to innovative solutions, for example in automation. Other possible improvements for this system would be extending its current scope beyond office and residential buildings, setting performance-based targets on carbon, as opposed to a basket of indicators, and the general complexity of reduction in the system. To speed up the adoption, the Dutch government has also introduced tax policy measures, including faster depreciation of environmental investments (up to 75% in first year), and a further tax rebate for the purchase of assets with a high performance using the Environmental List. The budget for this tax rebate was set at EUR 114 million for the year 2019, and the Environmental List is a collection of pre-validated measures that render projects eligible to seek tax rebates.

5.1.3. Best practise for construction and demolition waste: Finland

The Finnish Waste Act 2011 has been revised, with these changes entering into force in 2019. The waste regulation targets 70% recycling of construction and demolition waste as materials, excluding use as energy. This regulation is enforced by municipalities. The policy goal is the prohibition of sending construction and demolition waste to public landfills. One important measure has been the requirement for on-site sorting and separation of waste streams for concrete, brick, mineral slab and ceramics waste, gypsum-based waste, untreated wood waste, metal waste, glass waste, insulation wools, plastic waste, paper and cardboard waste and earth and rock mass waste. The Finnish landfill tax has been increased in several steps from a low 23 EUR/tonne in 2003, increased to 30 EUR/tonne in 2005, to 40 EUR/tonne in 2011, and since 2016 it is 70 EUR/tonne. The industry has been allowed visibility to the development trend of the taxation, which has allowed preparatory investments and actions for businesses to adapt. Further improvements for the Finnish CDW system would be streamlining the permitting of secondary materials use. Collaborative pilot programmes to improve this are underway.

5.1.4. Market for secondary aggregates via public works from France

Because road construction is a very large buyer of aggregates, it is often easier to find large volume applications for recycled materials in roads. For example, France has a current goal to achieve a 50% share of reused or recycled building waste materials in road construction materials bought by national and local authorities in 2017, rising to 60% by 2020. This can help ensure having a market for most of the recycled aggregates processed from CDW.

5.1.5. Concrete use reduction and recycled content in Singapore

The Singapore Building and Construction Authority operates a green building scheme called BCA Greenmark. The scheme awards points for using concrete more efficiently and for incorporating one of specified alternative binders to replace Portland cement. BCA Green Mark then provides additional construction rights for a good score, which is a valuable incentive in a country with scarce land. The best-in-class concrete target is using less than 840 kg/m^2 of concrete, and points are possible while using no more than double that. The alternative binder points start from 5% of Ordinary Portland Cement substitution with either Ground Granulated Blast Furnace Slag, fly ash or silica fume, and 20% substitution achieves maximum points. Same or stronger effects can be achieved by the specification of cements using alternative binders. Most CEM II types achieve at least comparable environmental benefits, except CEM II Portland-limestone cements. Higher environmental gains are achieved when using CEM III (Blast Furnace cement) or CEM IV (Pozzolanic cement) or CEM V (Composite cement).

5.1.6. Incentives for choosing lower-carbon products from Norway

The Norwegian government's Directorate of Public Construction and Property, Statsbygg, applies a requirement for using only products with Environmental Product Declarations (EPDs) for concrete, steel, insulation materials, gypsum boards, natural stone, wood-based boards, floorings, ceilings and roofing membranes. Of these, concrete, steel, gypsum and insulation have the maximum emission limits. For pilot projects limits are also set for other material types. EPDs are also used as a product specification tool by the European GPP criteria for offices. It is worth noting that such incentives do not in fact improve material efficiency but act to reduce material carbon intensity.

5.1.7. Incentives from green building certifications

Commercial green building certification systems, such as LEED (Leadership for Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method), include sustainable materials design and selection measures. These are captured in credits. In LEED these are in the *Building Life-Cycle Impact Reduction and Environmental Product Declarations credits*. In BREEAM, it is an International in the *Life-Cycle Assessment credit*. These award points for projects that demonstrate savings via Life-Cycle Assessments and those that use products that have third-party verified EPDs. LEED is also introducing in the pilot version 4.1 a mechanism for additional points for use on products that have lower than average impact. The current version of the specification suffers from technical deficiencies. In the view of the authors, use and application of mainstream green building certification systems and their associated credits improves materials transparency and documentation. It does not, however, guarantee a specific level of material nor embodied carbon savings.

5.1.8. Relevant EU and global initiatives

A recent comprehensive survey of the voluntary and regulatory green building systems used globally can be found in The Embodied Carbon Review.[43] This survey identified 156 green building systems targeting environmental performance of construction works and found that 105 of those had direct measures to report or reduce embodied carbon. General material efficiency policies in Europe are reviewed in the *More from less — material resource efficiency in Europe* report.[44] According to this report, national action plans or national strategies for construction materials were reported by two countries – Estonia and Liechtenstein – and a Life-Cycle based approach for these was adopted by Flanders (Belgium). The following broader initiatives are worthy of attention because of the possibility for further replication in the Central Asian context. Numerous other initiatives exist, but not all of those connect as directly with the industry and current practice. For clarity, this review is only concerned with initiatives formed around a specific goal and measures, not general networks or concepts. Research projects were also excluded.

5.1.9. Relevant European and global initiatives (others than regulation):

Advancing Net Zero by the World Green Building Council

The World Green Building Council is promoting a net zero energy concept, which is now adding a call to reduce projects embodied carbon by 40% by the year 2030. The initiative works on one hand by signing up commitments to deploy this practice from stakeholders and on the other by having national GBCs develop specific methodologies for implementing and accounting for these metrics nationally. It is in place, with numerous national GBCs and businesses having joined.

43 The Embodied Carbon Review (2018) – www.embodiedcarbonreview.com
44 European Environmental Agency (2016): 'More from less — material resource efficiency in Europe' report

EMAS and Sectoral Reference Document for the Construction Sector (11007/16) by the European Commission Environmental Management and Audit Scheme (EMAS)

This is a voluntary, third party audited environmental management scheme offered by the European Commission. It has a sectoral reference for construction and has a best practice for waste prevention and management on the construction site, with a target that less than 5% of material that can be reused or is recyclable is sent to landfill or incineration without energy recovery. It also requires tracking for waste generation.

Green Public Procurement (GPP) for office buildings by the European Commission

The GPP template is a flexible procurement scheme that incorporates different levels of technical ambition and complexity. For materials, it has different types of categories of demands, which include:

- use of recycled content in concrete and masonry (from 15%–30% in main building elements)
- carbon impacts of building materials with different options
- reuse of demolition waste (from 55%–80%)
- limits to the amount of construction site waste generated (from 110–70 kg/m^2 GIFA)

In decreasing order of ambition and complexity, the criteria for materials emissions are to:

1. provide LCA for main building elements
2. collect EPDs for main building elements
3. require recycled and re-used content
4. require reducing transportation impacts of heavy materials

EDGE Buildings by International Finance Corporation

EDGE is a green building system for emerging markets. It is focused on a range of simple, efficient measures to save energy and water, with clear payback times. EDGE is implemented with software and projects can undergo a third-party certification. The EDGE toolkit does include a measure for embodied energy, but this is not a particular strength of the system, which is otherwise excellent at communicating and promoting energy savings. The EDGE value added is greatest in areas with loose building codes.

Carbon Heroes Benchmark Program

This is a programme for creating embodied carbon awareness and benchmarks performance levels with an initial focus on Europe and a target of 1000 buildings. The programme is operated via national green building councils who promote embodied carbon and with the support of the One Click LCA platform, which is used to collect and calculate the data and benchmarks. The project's initial scope is being expanded as new national GBCs join. Eastern European participants, who are to some extent facing similar market challenges, are Romanian GBC and Hungarian GBC.

EU Construction and Demolition Waste Management Protocol

This is a voluntary protocol for identifying recycled materials and managing their separation, collection and logistics to improve their commercial usability and provide clarity about the properties of the associated waste streams to support risk management.

5.2. Recommendations for implementation in the Kyrgyz Republic

The topics of better material efficiency for construction materials, the introduction of circular economy concepts and reducing the embodied carbon footprint of materials in buildings and the general construction industry are each still in their infancy in Kyrgyzstan. At present, there is no policy or regulatory framework to address these opportunities, or to stimulate the market for voluntary practices aiming for environmental benefits or for value creation out of better material efficiency or to reuse and recycle CDW.

Chapter 3, section 3.3, provided a review of policy and regulatory interventions on energy efficiency in buildings, along with recommendations to be considered at short-, medium-, or longer-term perspectives, as set out in Tables 3 and 4. Building on this, key recommendations with regards to opportunities for policy dialogue are specified below.

Given that the EU policy and regulatory framework is still under development but has been endorsed and promoted under the EU Green Deal, the following actions are recommended in the short-term (2021–2023):

- Monitor any further development and understand the lessons learned and positive experience of the EU and international best practice related to material efficiency and circular economy concepts in buildings.
- Test the application of the methodology developed under Level(s) for pilot projects in Kyrgyzstan.
- Pilot Life-Cycle Assessments (LCAs) of certain building products and materials and suggest prototype Environmental Performance Declarations (EPDs), mirroring the EU approach.
- Support capacity building for market-based solutions in the field of circular economy of buildings in Kyrgyzstan (including the development and adoption of relevant methodologies, trainings and awareness-raising activities).

Reflecting on the outcome of these actions and taking into account the positive experience from the implementation of the EU policies, it is recommended to develop a similar regulatory framework adapted to the specifics of the Kyrgyz construction market in the medium- or longer-term:

- Adopt policy and regulations aiming at net zero carbon performance of buildings and the introduction of circular economy considerations by reflecting on the lessons learned.

In addition to policy dialogue seeking to improve the policy and regulatory framework, it is important that some further analytical work and activities be conducted to target enhancement capacity of relevant market counterparts and broader public awareness.

Further **analytical work** is necessary specifically for these areas in order to:

- assess the wider benefits of introducing SCP and circular economy concepts in buildings and construction
- develop analytical evidence to underpin a possible definition of NZEB requirements for new construction and cost-efficient requirements for existing buildings
- develop analytical justification on the impact on grid stability of a larger-scale introduction of smaller distributed renewable-energy power generation
- develop a *Green Building Code* as a voluntary set of standards, defining and recommending technical provisions for SCP practices in buildings
- conduct Life-Cycle Assessments for key construction materials manufactured and widely used in Kyrgyzstan in the format of an Environmental Product Declaration
- identify and assess cost-effective nature-based solutions applicable for construction practices in Kyrgyzstan

In parallel, a variety of **capacity-building and awareness-raising** activities are recommended, complementing ongoing and future policy dialogue opportunities:

- training of authorities responsible for the implementation of legislation on energy performance of buildings
- training of key market players (developers, building-facility managers, architects, designers, and construction companies) on the wider benefits of the adoption of advanced SCP, particularly in energy efficiency, and on key provisions of the new legislation
- conducting awareness-raising activities and capacity-building events on topics related to the overall environmental footprint assessments of buildings, green building materials, and use of cost-effective SCP techniques, etc.

These measures should be complemented with reporting on the outcome of **pilot and demonstration** projects (Zero-Carbon Buildings) as well as buildings integrating nature-based solutions, and so on.

Specific attention should be paid to working with financial institutions on the development and introduction of dedicated financing instruments supporting the introduction of SCP in buildings and construction. These should also be complemented with capacity-building activities with financial institutions in order for them to understand the benefits of financing projects with higher environmental and sustainability credentials.

This topic is explored further and in more detail in Chapter 6.

6. PRACTICAL MEASURES FOR THE IMPLEMENTATION OF ENERGY EFFICIENCY IN PUBLIC BUILDINGS, BASED ON INTERNATIONAL BEST SCP PRACTICES

The European Union clearly leads the global agenda on energy efficiency and decarbonisation in all sectors of energy end-use and buildings in particular. Energy Efficiency has been described as the EU's biggest energy resource,[45] and as one of the most cost-effective ways to enhance the competitiveness and security of energy supply as well as decrease the emissions of greenhouse gases and other pollutants. This is why the EU has primary energy-consumption saving targets for 2020, 2030 and further legislation in the field looking to a 2050 horizon.

According to the International Energy Agency (IEA), the global energy efficiency investments across all sectors totalled USD 310 billion in 2012,[46] representing a very significant and growing market opportunity for businesses and investors. The IEA considers that the EU needs to invest a further USD 1.3 trillion in energy efficiency in buildings from 2014–2035 and USD 154 billion in energy efficiency in industry – almost doubling current investment trends. This analysis concurs with a report from Ceres in 2014[47] projecting a need for an increased global annual investment of USD 300 billion in buildings' energy systems and USD 30 billion in industry (2010–2020), to limit global temperature rises to a 2 °C scenario. The added value of these energy efficiency investments in buildings and industry is, of course, in energy saved and in the impact on the financial performance and competitiveness buildings and industries.

Energy efficiency investments are characterised by their capacity to bring direct energy returns and additional value streams to private owners and asset operators. This combines with significant public benefits in increased employment, lower emissions, increased energy security and reduced dependence on foreign energy imports as well as improvements to a country's fiscal balance. Europe's Energy Efficiency Plan[48], for instance, is expected to deliver 2 million jobs, increased industrial competitiveness together with potential annual financial savings estimated at EUR 1,000 per European household and aggregate annual emissions reductions of 740 million tonnes of carbon dioxide equivalent (CO_2e). Enabling more energy efficiency investments also represents a way for financial institutions to bring forward tailor-made and new product offerings to the market. This contributes to their own competitiveness as well as

45 European Commission, Energy Efficiency Action Plan, COM (2011) 0109 final
46 IEA. (2014). Energy Efficiency Market Report 2014. [Executive Summary]. Retrieved from: http://www.iea.org/Textbase/npsum/EEMR-2014SUM.pdf
47 CERES. (2014). Investing in the Clean Trillion: Closing the Clean Energy Investment Gap. Retrieved from: http://www.ceres.org/resources/reports/investing-in-the-clean-trillion-closing-the-clean-energy-investment-gap/view
48 European Commission. (2014). Energy Efficiency Plan: http://ec.europa.eu/energy/efficiency/action_plan/action_plan_en.htm

giving their clients the financial support they need to assist them in the transition to a low-carbon economy.

Yet, despite the 'win-win' characteristics of energy efficiency investments, present investment flows in energy efficiency are still sub-optimal. Prominent studies[49] assessing greenhouse-gas mitigation identify the building sector as having the largest untapped long-term, cost-effective energy saving potential. Estimates suggest that EUR 60–100 billion is needed to be invested annually in EU buildings to achieve Europe's 2020 energy efficiency targets, yet current investments are below half of these requirements and five times lower than required to deliver the 2050 decarbonisation targets for buildings. In addition, while European industry is world leader in energy efficiency, continued and increasing energy efficiency investment flows will enhance global competitiveness, protect against energy price volatility and deliver further cost savings in all segments.

Buildings are responsible for the largest share of European final energy consumption (40%)[50], and they represent the greatest potential to save energy, as 75% of buildings in the EU were built during periods with minimal or no energy-related building codes. Buildings are long-term assets expected to remain useful for 50 years or more, and 75–90% of those buildings standing today are expected to still be in use in 2050. With low demolition rates (0.1% per year), low renovation rates (1.2% per year)[51] and moves to high-energy efficient new-builds (1% additions per year), Europe's energy efficiency challenge in buildings lies mainly in the energy efficiency renovation and investments of its existing building stock.

Kyrgyzstan could benefit from and aspire to the lessons learned from those European experiences which are applicable to Kyrgyzstan, and in fact the situation with energy efficiency renovation in Kyrgyzstan is even more acute and pressing than in Europe. The quality of the building stock is far worse in terms of energy performance, building fabric quality and the building engineering systems employed. Climatic conditions are harsher than for the majority of Europe, and this makes the demand for energy higher if good quality indoor environments are to be maintained. In addition, there are many other wider concerns that are both applicable and of even greater concern for the decarbonisation of buildings in Kyrgyzstan. These include the security and reliability of energy supplies, the availability of funding for energy efficiency renovations and barriers related to capacities available, such as the level of awareness combined with the quality of the regulatory framework and its enforcement.

Public buildings are those owned or operated by a governing body (central, regional or local) and often occupied by a government entity or agency. The European Energy Efficiency Financial Institutions Group (EEFIG)[52] also includes in this segment publicly owned residential buildings – such as social housing – and state schools and universities. Publicly owned or occupied buildings represent about 12% by area of the EU building stock. Roughly the same share (10 to 12%) is estimated in Kyrgyzstan as well.

Public buildings in the Kyrgyz Republic consume about 850 GWh of energy annually.[53] This is equivalent to 10% of the country's primary energy consumption (10% of national power consumption and 11% of overall coal consumption) and makes the public buildings sector among the largest end-consumer of energy. However, the sector is plagued by energy supply shortages, resulting in underheating of public buildings during winter with comfort conditions far below normal requirements. This affects the well-being and productivity of occupants – e.g. school children, medical personal, and sick patients whose recovery is slowed. The factual specific energy consumption currently stands at 162 kWh/m^2 of floor area, yet to meet even basic indoor conditions it should be above 250 kWh/m^2 on average at the current quality of building infrastructure. Low levels of thermal protection, inefficient and obsolete building services, no automation or controls – these factors all contribute to energy losses in public buildings, and in Kyrgyzstan, these levels can be two to four times lower when compared to modern public buildings under similar climatic conditions in Europe. Approximately 70–88% of energy use in public buildings can be attributed to space heating, and electricity is used for such heating in 60% of all public buildings. Based on several World Bank energy audits in schools, hospitals (and previously developed buildings inventory), the overall theoretical energy savings potential for the implementation of selected energy efficiency measures amounts to 50–60% of total energy consumption. That is around 500 GWh/year at the national level.

Realisation of this potential will not only affect the public budget and free more resources for the development of Kyrgyz municipalities and local communities, it will positively influence health and overall well-being, and a building retrofit programme would at the very least contribute more job opportunities.

With a good understanding of the subject, the World Bank has contracted the Civil Foundation Unison, part of Unison Group, to support Kyrgyzstan with the development of a **Roadmap for the energy efficiency retrofit of public buildings**.

49 Such as UNEP (2013). The Emissions Gap Report 2013: A UNEP Synthesis Report. Retrieved from: http://www.unep.org/pdf/UNEPEmissionsGapReport2013.pdf
50 https://ec.europa.eu/info/news/focus-energy-efficiency-buildings-2020-feb-17_en
51 Ibid.
52 EEFIG: https://ec.europa.eu/eefig/index_en
53 Kyrgyz Republic National statistics, 2019

The Roadmap completes the **Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040**, currently under development by the Government. This Concept is expected to provide a strategy with a wider scope and specific targets over a longer time horizon. The current draft concept foresees increasing energy efficiency by focusing efforts on the supply-side facilities (generation, transmission, distribution), managed by energy companies. The demand side, however, including energy efficiency in public buildings, is insufficiently developed and has been identified as an entry point for analysis and recommendations. The Roadmap provides an analysis of the gaps and barriers constraining these opportunities, and guidance on the optimal set of actions by different market stakeholders with a specific timeframe to undertake a radical energy efficiency transition of the public building sector in Kyrgyzstan. This document also advises on what is necessary for the development and implementation of a national energy efficiency (EE) investment programme for public buildings. The Roadmap offers its 'Vision 2040' with a set of medium and long-term targets for a sustainable, climate-resilient, safe and low-carbon public building stock in the Kyrgyz Republic by 2040, and recommends a time-bound sequence of measures that are grouped according to these three areas:

- policy, legislation and regulation
- institutional and technical delivery capacities
- implementation mechanisms and investments

The measures are structured as short-term (1–3 years), medium-term (4–8 years) and long-term (10–15 years).

Implementation of the Roadmap will require investments worth USD 1.085 billion in order to bring the entire public building stock into compliance with Class B energy performance requirements. These are the current minimum requirements for building energy performance, according to the Kyrgyz national legislation on building energy performance. In the entire public building stock of almost 10,000 buildings, approximately 5,000 require a complex energy-efficient renovation. The energy savings expected range between 55% and 75%, depending on the condition of the existing buildings and climatic conditions of the location. Out of these, about 3,350 units are educational buildings representing the largest share of buildings in need of rehabilitation in terms of both floor area and number of buildings. Specific investment costs for the complete package of standard and advanced EE measures ranges from USD 140–USD 190 per m^2.

Considering the average lifetime of the material and equipment of the EE retrofit package, the projected energy savings can be achieved over a period of 30 years. The ratio of the invested capital expenditure (CAPEX) for the EE retrofit to the forecasted lifetime energy cost savings is at a level of USD 0.05 per kilowatt-hour (3.6 KGS/kWh); this means that for every kilowatt-hour saved, USD 0.05 (5 cents) of investment is needed. This is lower than the energy tariffs expected on average over the lifecycle of the buildings in question, which means that it is better from a longer-term perspective to invest in energy efficiency rather than to keep buying and wasting energy in the current low-performing buildings. A calculation of energy cost savings, based on the Kyrgyz long-run average incremental cost, offers an assessment of around USD 70 million in annual savings for the whole public building investment programme, with a simple economic payback period of 11–13 years. This is a good level of profitability for public infrastructure retrofit projects, and much shorter than the remaining lifetime of the public buildings. Implementation of such a programme will also create additional social and economic benefits in terms of better building comfort, better functionality and improved safety of buildings and their services. It also means healthier, more productive and happier building occupants. This is even more important under the current conditions of the COVID-19 crisis.

Energy efficiency investments in public buildings are unique in that the public owner can see both the energy savings, productivity and value improvements normally accruing to the owner (as for any private owners) as well as the public good of increased employment, reduced emissions and improvements to public accounts in the local community. In principle, public buildings share many of the benefits of commercial buildings (size, energy intensity, concentrated ownership, professionalised facilities managers). Yet they face the additional challenges of more cumbersome procurement procedures, potential split incentives between different divisions responsible for procurement and for energy bills, balance sheet restrictions and limitations under public accounting rules. The EEFIG does note that Public Services Buildings and Public Residential Buildings have significantly different investment decision structures and energy needs.

The energy-efficient renovation of existing buildings is certainly a complex task to undertake because of the wide range of building types, their age, different uses, materials and energy consumption patterns, but it is no more complex than other equivalent challenges facing EU Member States, and it comes with the significant public and private benefits described above.

A summary of the international best-practice models in renovation and implementation of energy efficiency in public buildings is provided in Table 7. For each of the suggested models and instruments, best-practice examples are introduced along with their advantages, the main obstacles to their application, and an outline of what is specifically needed to roll-out the model or instrument in Kyrgyzstan.

Table 7. International best practice models and instruments to support renovation of public buildings

Dedicated credit lines (or soft loans) are a mechanism whereby public funding decreases the cost of energy efficiency building renovation loans and provides concessions on terms, such as repayment periods. The impact and relative success of dedicated credit lines can also be attributed to their retail distribution through networks of private banks.	
Best practice examples	Numerous for buildings: KfW, NRW.BANK, Kredex, etc. – For SMEs and industry: BPI France's Green Loan (2010–2013) and eco-energy loan (2014), KfW Energy efficiency programme, EBRD Sustainable Energy Finance Facilities (SEFF) or Green Economy Financing Facilities (GEFFs), OP PIK (CZ).
Advantages	• Easy to roll out, though careful ex-ante analysis of supply and demand and legal/tax framework needed. • Leverage effect of public funds is usually between 4 and 10, which is higher than traditional grants. • Standardised supply offering, at the same time flexibility according to individual preferences (repayment, interest rate fixation, etc.). • The use of any national or international donor funds for soft loans in housing is facilitated with the 'renovation loan' (an off-the-shelf instrument) – Allows 1:1 refinance to commercial banks (Basel III compliant). • Positive impact on public budgets. • Allows raising the ambition of the investment in terms of energy savings (e.g. by combining the loan with a grant component). • Can be used for ambitious renovation/refurbishing projects as well as for individual measures, which means increased flexibility. • Usually offered on a longer duration than commercial loans.
Weaknesses	• Capacity/willingness of owners to take more debt (i.e. very country dependent). • Risk aversion of banks (calling for guarantees from governments). • Often complicated, time consuming and static application processes, which act as a hurdle for projects. • Loans often require the additional implementation of costly non-energy related measures that change project characteristics.
Main obstacle	• Transaction costs to implement (technically) and manage long-term programmes within financing institutions. • Increased regulations/provisions for (promotional) banks hinder commitments of credit lines (EBA-supervisory, any State-Aid-rules, etc.).
What is needed to roll out the instrument	• Comprehensive framework, e.g. including energy audits and independent expert advice. • Large network of on-lending banks and equal conditions for all eligible stakeholders. • Long-term horizon and stability. • A set of criteria that can easily be understood, processed and checked (Monitoring, Reporting and Verification), possibly using software instruments. • An effective information strategy directed towards the final beneficiaries. • Greater involvement with EPC providers in selected subsectors.

Risk-sharing Facilities (Guarantee funds and First-loss Facilities) reduce the risks for banks and equity investors by covering part of the risk of payment default – either through a guarantee or first-loss absorption. They can be combined with dedicated credit lines and are a key instrument to grow the amount of bank lending to energy efficiency renovation.	
Best practice examples	IFC's CEEF programme (Hungary, Czech Republic, Estonia, Latvia, Lithuania and Slovakia) – Energy Efficiency and Renewable Sources Fund (EERSF) in Bulgaria, targeting ESCOs – Several Promotional Programs for commercial entities in Germany (e.g. NRW.BANK Mittelstandskredit mit Haftungsfreistellung) – European Energy Efficiency Fund (EEEF) – EIB's PF4EE guarantee scheme.
Advantages	• Reduces the risks for banks and enables them to lend greater amounts • Anecdotal evidence suggests that energy efficiency loans experience 'market standard' or better credit performance, therefore risk-sharing facilities can be a transition phase until energy efficiency loans are mainstreamed. • Provides extra leverage for private sector funds • Potential to boost energy efficiency services market.
Weaknesses	• Time to structure and negotiate. • Moral hazard if substantially all risk is removed from bank lending. • Absence of know-how to implement at regional and local government levels.
Main obstacles	Often extensive and complex handling of risk-sharing facilities especially for smaller financial intermediaries and first-time users.
What is needed to roll out the instrument	• Template approach to execution of risk-sharing facilities using European Infrastructure Funds 2014–2020. • Consensus view as to at what stage and for what market segments this Financial Instrument is most useful, and pressure by EU public financial institutions to develop faster in those identified segments and Member States. • Greater degree of collaboration/resource commitment on the design and implementation of these instruments by private and public sector financial institutions. • Further consideration of the role public guarantees might play in support of the energy efficiency services markets.
Energy Performance Contracting (Private Sector Provider) is a contractual arrangement between a host beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract. Here, investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings. EEFIG draws a distinction between 'financing EPCs' in which the EPC provider also provides finance and 'operational EPCs' where the finance is provided by the project host. Operational EPCs secure the energy savings, which reduces the risk for the lenders to the host. Some financing EPCs have been provided off-balance sheet accounting for the host (thus not increasing its debt ratios), but this depends on the details of the contract and (for the public sector) on national accounting rules.	
Best practice examples	London's RE:FIT programme (UK); ELENA projects in Milan (IT) and Barcelona (ES), Berlin Jewish Museum, Alsace high schools (FR), Barts Health Care Trust, Peterborough Council, Croatian ESCO HEP – In industry: CDC's Climate 5E Fund.

Advantages	• Turnkey contract: the EPC represents a one-stop-shop for the customer, with only one counterpart for the entire duration of the contract. • Guaranteed savings: EPC provider manages the performance risks. • Professionalism and expertise of EPC providers. • EPC provider can bring financing or facilitate access to finance through savings guarantee.
Weaknesses	• In many cases, focused on short payback times due to low requirements of the client host, although the private sector is able to deliver deep renovation through EPCs (when requested). • Increases transaction costs. • Requires more developed skills on the client side. • Lack of standardised framework and templates.
Main obstacles	• Accounting treatment needs to be clarified for public and private clients. • Lack of confidence in ESCOs. • Lack of understanding of the EPC concept, particularly in the housing sector. • Lack of capacity and willingness on the client side to launch EPCs for deep renovation of buildings. • Split incentives in the buildings rental sector. • Procurement regulations may not be adapted at the national level. • EPC is seen as self-financing, whereas for deep renovation it is only part of the financing – the rest can come from grants or additional investment from the owner based on 'green value'. • Deep renovation often happens with general refurbishment measures that increase the overall investment. • Fear of externalisation of energy management. • Lack of access to public support schemes for EPC providers (tax breaks, soft loans, reduced or no VAT, etc.) compared to project host and in-house ESCOs.
What is needed to roll out the instrument	• Capacity building for public authorities and private clients on EPCs (particularly for financial and procurement departments). • Market facilitation and aggregation programmes, notably through project development assistance. • Possibility for construction SMEs to group themselves to be able to offer EPCs. • Standardisation of contracts and procurement procedures. • Proper implementation by EU Member States of article 19 of the Energy Efficiency Directive (2012/27/EU) on the removal of obstacles to EPCs in the public sector. • Proper implementation by EU Member States of article 7 (b) of the Energy Efficiency Directive on the partnership with obligated parties in order to preserve the energy saving targets towards the customer. • Addressing the supply of finance supporting the EPC sector by making dedicated credit lines, guarantees and factoring funds more considerate of the EPC model, where appropriate.

In addition to these tested and proven models, Table 8 provides a number of new models and instruments are emerging that could be considered for implementation in Kyrgyzstan.

Table 8. Emerging new models and instruments to support renovation of public buildings

On-Bill Repayment is a mechanism used to improve the creditworthiness (or seniority) of energy efficiency investments by having them repaid within the utility or tax bill, and then recovered through the existing payment collection infrastructures of utility providers and public authorities. This acts to lever the existing payment relationship between the customer and utility provider or tax authority. It also serves to provide a direct 'credit history' giving an accurate view of likely defaults, (as customer payment histories with both utilities and tax payments are long and exhibit low default rates compared to other consumer finance). On-bill repayment has been used mostly for investments in buildings, but some schemes in the US target industry and SMEs (e.g. Massachusetts).	
Best practice examples	• Green Deal in the UK • Utility obligation programmes in the USA.
Advantages	• Energy savings connected to energy bills. • Public sector actors and utility providers are more trusted by decision makers. • Reduces transaction costs – Can overcome the split incentive between user and owner as it is connected to the property (or corporate asset) not the user. • Overcomes the 'split incentive over time' (i.e. short occupancy time for buildings) as the repayment obligation can be passed on attached to the asset to the next owner/user. • Overcomes the lack of finance capacity of final beneficiaries.
Weaknesses	• May initially require additional public support (in the form of risk-sharing facility) to provide finance at an acceptable cost. • Can be perceived as complex by users and may require technical assistance to avoid a focus on 'low-hanging fruits'. • Complex instrument to manage/market. • Might crowd out small ESCOs.
Main obstacles	• May require changes in the legal framework to comply with banking monopoly regulations. • May require modification to utility/tax collection processing systems and/or tax code/energy laws.
What is needed to roll out the instrument	• Green Deal espoused by a 'public financial institution' (based upon the KfW approach) and offered at attractive rates and marketed by utility providers to their customers. • Review and showcase of working case studies from the USA.
The Energy Service Agreement (ESA) is a 'pay-for-performance' service contract between a third-party investor and an asset owner to deliver energy savings as a service. The ESA is, in some ways, an evolution of the traditional shared-savings model provided through EPCs, but it is structured more like a Power Purchase Agreement (PPA) and used more frequently by actors present in the mainstream energy markets. A third-party investor and an asset owner enter into an ESA contract (typically for 10 years) whereby the asset owner agrees to pay their historical utility bills to the third party. An upfront 'access fee' or an ongoing utility bill discount may also be paid to the asset owner as an incentive. The third party invests into money-saving, energy efficient opportunities and owns and operates the energy equipment to provide 'energy services' to the asset/building. In industry, ESAs need to take into account the risk of decreased activity and thus could have to adapt the contract duration as well as guarantee a residual value for the assets.	

Best practice examples	• US providers such as Transcend Equity, Metrus Energy, Green City Finance, Abundant Power. • UK example of Sustainable Development Capital LLP. • Guaranteed energy services in Slovakia, developed under support by the EIB.
Advantages	• Bilateral contract does not require new regulations. • Overcomes some traditional EE barriers (e.g. split incentives). • No capital expenditure for owner, aligns incentives of project developer, building owner and investor.
Weaknesses	• Limited scale to date. • Fragmented market. • Longer-term contracts (i.e. 10 years or more) can limit third party measures installed to 'low hanging fruits' (high returns). • Limited willingness to commit to one energy supplier at the current price level (lock-in) as well as with contractual obligations on the side of the supplier. • Increases transaction costs. • Requires more developed skills on the client side. • Lack of standardised framework and templates.
Main obstacles	• Accounting treatment should be clarified. • Lack of confidence in Energy Utilities as conflicted 'energy managers'. • Lack of understanding of the ESA concept. • Unlikelihood of the use of ESAs for deep renovation of buildings. • Fear of externalisation of energy management.
What is needed to roll out the instrument	• Education of building owners and project developers. • Need for more pilots to help develop the market. • Clarity on lease accounting and investors' rights in case of bankruptcy, tenant changeover or sale of host building.

A public Energy Service Company ("ESCO") is a special-purpose, publicly owned company designed to manage energy efficiency investments and to deliver guaranteed savings to a host and counterparty in an EPC. This is set up with public funds in order to accelerate the implementation of EPCs in sectors and regions where the private sector offer is not sufficient. Public ESCOs can also reduce the cost of financing by aggregating specific credit lines, public grants and other incentives, especially if the public body establishing it provides a guarantee or capital to deliver a strong credit rating. EEFIG sees public ESCOs as mainly tackling energy performance in public buildings, taking advantage of adapted public procurement rules, and certain types of housing in some regions.

Best practice examples	• The Rhône-Alpes region (FR) is developing an in-house ESCO called OSER together with municipalities, which will set up and finance EPCs for deep retrofits of public buildings, and sub-contract to the private sector all the operational parts of EPC (design, build and maintain). • Île-de-France region is setting up Energies POSIT'IF, as a financial engineering expert subcontracting technical tasks, to implement EPCs for owner-occupied multifamily buildings, aiming at low-energy renovation, with contracts expected to last 15 to 20 years.

Advantages	• Overcomes lack of capacity in public authorities and homeowner associations. • Creates a trusted entity that makes investing easier. • Debt could be securitised once it reaches the right scale. • Potential way to overcome the lack of willingness of private ESCOs to finance long-term investments through EPCs. • A transitional instrument to demonstrate feasibility and create a market for private ESCOs in the future. • Public sector actors are trusted by homeowners and public authorities. • Targets deep renovation.
Weaknesses	• Impacts on public debt. • May crowd out private-sector ESCOs. • EPCs seem technically feasible on municipal multifamily buildings, but the main obstacles remain: split incentives (in rental housing) and long payback times
Main obstacles	• Very 'early stage' and limited to just a few applications across Europe. • Public budgets and abilities as well as in-house capabilities of local authorities to set up new 'finance-related' instruments. • Issues around quality control of projects and 'value for money'. • Need to be analysed and adapted country by country. • May require changes in the legal framework to comply with financial regulations and to access the same fiscal benefits as individual homeowners. • The lack of a clear project pipeline. • Accounting and regulatory treatment for new vehicles and their clients.
What is needed to roll out the instrument	• Proof of concept in Kyrgyz market conditions and that the idea is quickly replicable for both target segments (housing and public buildings). • Clear accounting and financial regulatory treatment for both local authorities and the ESCOs clients. • Project Development Assistance facilities to develop a pipeline of projects.

Factoring is a financial transaction in which an entity sells its accounts receivable (usually invoices) to a third party (called a factor) at a discount. In energy efficiency terms, a factoring fund for EPCs would purchase funded EPCs from their originators (usually ESCOs) at a discount, freeing up the balance sheet of the originators to originate more EPCs. As the risk of underperformance of an EPC is more likely to occur at the beginning of the contract, these "de-risked" contracts become a safer income stream which can be assigned (transferred) to a factoring fund.

An objective of this kind of fund would be to allow small EPC providers (once up the learning curve) to continue generating EPCs without breaching their own balance sheet covenants and limits with their banks. 'Forfeiting' arrangements are common practices in the most developed EPC markets (e.g. Germany) and leasing (in the form of sale-and-lease back) can also be an option if the contracts are adapted. Once active, such a fund could help establish standard legal and financial arrangements in the EPCs and then aggregate receivables into securities that can be sold in the form of bonds to institutional investors, once a critical size is reached (estimated at €150 million). A factoring fund may need public equity to speed its launch into the market, however, it could also involve private equity and debt, if the public sector takes the first-loss risk or requires a lower return on equity.

Best practice examples	• The Energy and Energy Savings Fund (EESF), Bulgaria, buys the future receivables of EPCs (the energy savings) from ESCOs (established by the EBRD with a €7m initial loan followed by a €10m loan in 2012). • The European Energy Efficiency Fund has used public and private money for forfeiting EPCs for the Berlin Jewish Museum.
Advantages	• Secures refinancing for EPC providers, clearing their balance sheets and contributing to the lowering of their capital costs. • Could contribute to the standardising of energy efficiency assets. • Dedicated vehicles to support the EPC procurement model, which should allow easier tracking of their performance than when spread across many small ESCOs. • Potentially attractive to Sustainable and Responsible Investors.
Weaknesses	• New concept that will take time to mature. • Unclear what kind of 'discounts' would make this work for EPC originators. • Requires public money to kick-start.
Main obstacles	• Very 'early stage' with limited pilot examples. • Public budgets and abilities as well as in-house capabilities of the public sector to set up a new fund. • Issues around the discount rate and 'value for public money'. • Demands further analysis and to be adapted country by country. • May require changes in contracts and the legal framework, to comply with financial regulations and to access the same fiscal benefits as individual project hosts. • The lack of a clear project pipeline. • Accounting and regulatory treatment for new vehicles and their clients.
What is needed to roll out the instrument	• Support for the development of a pipeline of 'factoring-ready' EPCs. • Public investment (or a public financial institution) willing to provide first-loss or initial junior investment to a new fund.

Based on these models, the following actions are recommended for consideration by different institutional and market stakeholders in Kyrgyzstan.

6.1. Market actions

- Improvement of and further reinforcement to the legislation on energy performance of buildings. This should specifically address buildings certification and the minimum performance standards applied in a building's upgrade, sale or rental to help build a vibrant and comparable market for energy efficiency investments in buildings.
- Improvement of information flows, by developing an open-source energy and cost database for buildings as well as effective systems for sharing information and technical experience within sectors.
- Facilitate innovation such as on-bill repayment and energy performance contracting, factoring and others, by creating pilot schemes to help grow energy-efficiency investments in public buildings.
- Develop a project-rating system to provide a transparent assessment of the technical and financial risks of energy renovation projects and their contracting structure.

6.2. Economic actions

- Streamlining, blending and optimising the use of any donor or national support funding for energy efficiency investments through ensuring better linkage to national climate strategies and with the energy market reforms.
- Increase the use of targeted fiscal instruments to motivate municipalities to prioritise energy efficiency during the natural replacement cycle of building assets and associated technologies.
- Review of public and private accounting treatment of EPCs.
- Further expert examination of the discount rates used in energy modelling, policymaking and investment decision-making, to adequately balance the benefits and risks of energy efficiency.

6.3. Financial actions

- Development of a common set of procedures and standards for the underwriting of energy efficiency and buildings renovation, for both debt and equity investments, and taking into account experience from more developed markets, particularly the EU.
- Adjustment of financial regulatory frameworks to better support innovation. This should first, ensure that risk assessment and related capital requirements for long-term energy efficiency investments correctly reflect their risks; and second, develop market potential for green bonds, factoring funds for EPCs and other more innovative sources of financing for energy efficiency.
- Address barriers to the expansion of the green mortgage market, including by examining how to include energy costs and energy efficiency potential in mortgage affordability calculations.
- Ensure that new regulatory frameworks for financial institutions (Solvency II and Basel III) do not prejudice energy efficiency investments.
- Ensure that public technical assistance and project development assistance facilities are compatible and can be easily combined with market-based and concessional funding by qualified and experienced financial institutions.
- Ensure that all public refinancing facilities confirm eligibility for financial instruments relating to energy efficiency.

6.4. Institutional actions

- Ensure better law enforcement of the existing legislation and regulatory framework on energy performance of buildings.
- Ensure that reforms to the current legal and regulatory framework are based on best international practices and lessons learned from the practical application of relevant legislation (see recommendations suggested in section 3.3).
- Increase the capacity to facilitate ongoing project development assistance to all relevant actors, and technical assistance to relevant public sector bodies and entities for the development and aggregation of energy efficiency investments in public and residential buildings.
- Conduct a review of the public authority procurement rules to prioritise lower operational costs, as a part of their tender assessment processes.
- Create institutional capacity to implement national climate strategies and/or building renovation programmes, and enable long-term planning and supply chain scaleup to deliver and finance ambitious buildings renovation programmes.
- Increase focus on regulatory frameworks that support strong corporate energy efficiency investment-choices at key points in their investment cycle (connecting with energy audits).
- Conduct a review to ensure that current rules for donor and national support do not unnecessarily burden accelerated energy efficiency investment and the upscaling of public–private financial instruments.
- Ensure that any public refinancing facilities, confirm eligibility for financial instruments relating to energy efficiency.

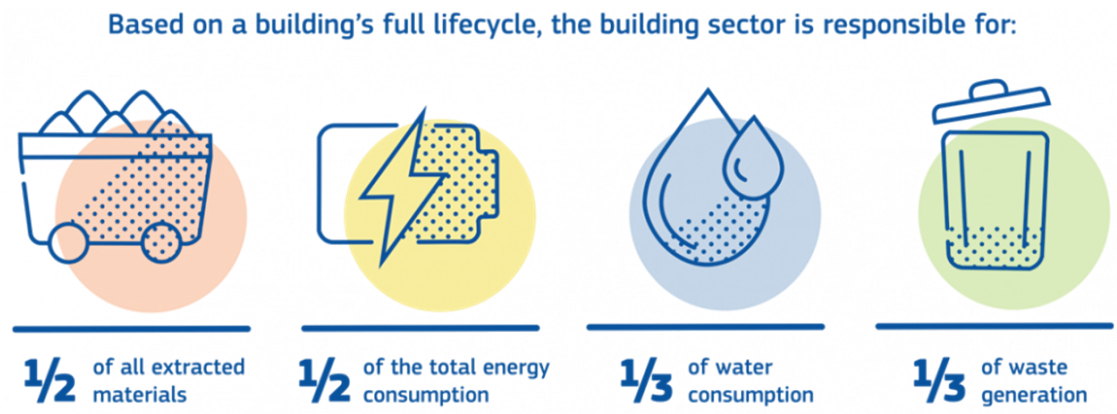
ANNEX A: Level(s) - The European framework for sustainable buildings and introduction of circular economy concepts

The home page of the European Commission Directorate General for Environment, responsible for EU policy on the environment, introduces **Level(s)** as 'an assessment and reporting framework that provides a common language for sustainability performance of buildings. Level(s) promotes lifecycle thinking for buildings and provides a robust approach to measuring and supporting improvement from design to end-of-life, for both residential buildings and offices.

Level(s) uses core sustainability indicators, tested with and by the building sector, to measure carbon, materials, water, health, comfort, and climate change impacts. It takes into account lifecycle costs and value assessments.

Level(s) is open source and freely available to all.

For all those in the sector, the challenges of cost control and environmental gain are met both by the reduction in energy, materials, and water use; and by future-proofing buildings. For those commissioning, designing, or occupying buildings, Level(s) helps them ensure that their high quality, fit-for-purpose buildings meet their cost and environmental objectives.[54]



What areas does Level(s) cover?

Level(s) is divided into three areas, each with its own subject matter and desired outcomes

- resource use and environmental performance during a building's lifecycle
- health and comfort
- cost, value, and risk

What are the main Level(s) indicators?

Each of the three areas has its own set of indicators dealing with a building's environmental, social, and economic long-term sustainability.

54 https://ec.europa.eu/environment/levels_en ; see also European Commission, Directorate-General for Environment, Level(s), A common language for building assessment, Publications Office, 2021, https://data.europa.eu/doi/10.2779/06758

Thematic areas	Macro objectives	Indicators			
Resource use and environmental performance	1. Greenhouse gas emissions along a buildings life cycle	1.1 Use stage energy performance (kWh/m^2/yr)		1.2 Life cycle Global Warming Potential (CO_2 eq./m^2/yr)	
	2. Resource efficient and circular material life cycles	2.1 Bill of quantities, materials and lifespans	2.2 Construction and Demolition waste	2.3 Design for adaptability and renovation	2.4 Design for deconstruction
	3. Efficient use of water resources	3.1 Use stage water consumption (m^3/occupant/yr)			
Health and comfort	4. Healthy and comfortable spaces	4.1 Indoor air quality	4.2 Time out of thermal comfort range	4.3 Lighting	4.4 Acoustics
Cost, value and risk	5. Adaption and resilience to climate change	5.1 Life cycle tools: scenarios for projected future climatic conditions		5.2 Increased risk of extreme weather	5.3 Increased risk of flooding
	6. Optimised life cycle cost and value	6.1 Life cycle costs (€/m²/yr)		6.2 Value creation and risk factors	

Further EU initiatives to help mainstream lifecycle and circularity in the built environment:

By June 2022

- GPP criteria based on Level(s) for offices and schools – both new builds and renovation.

By end of 2021

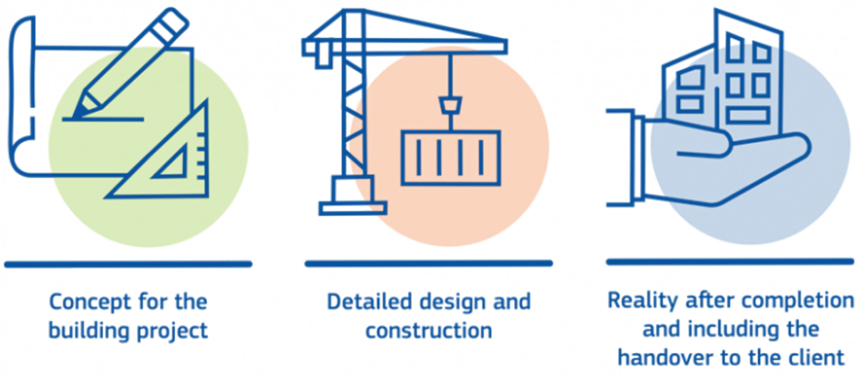
- Web-based support tool to work with Level(s) and web-based training materials;
- New Public Private Partnership under Horizon Europe;
- Implementation of the Delegated Act 'Sustainable Finance – tackling climate change'.

By end of 2020

- Adoption of the Delegated Act 'Sustainable Finance – tackling climate change';
- Launch the first Green Deal call under Horizon 2020.

The benefits of using Level(s)

Level(s) enables building professionals and their clients to use fewer resources and thus improve the environmental performance of their buildings. Level(s) can be used as an entry-level tool and at each stage of building projects to give a complete picture throughout the full lifecycle. It offers a framework to measure performance in key areas at each stage – namely:



ANNEX B: Guidelines for Enhancing Energy Efficiency in the Building Sector

This Annex builds on the analysis provided in the Report and streamlines the recommendations and suggestions for enhancing energy efficiency as well as other SCP concepts in the building sector.

The Guidelines here outline key gaps and barriers preventing the mainstreaming and scaling up of energy efficiency in buildings, and by reflecting on these gaps and barriers provide a list of practical recommendations. These recommendations distinguish between different types of actions suggested for upgrading the policy and regulatory framework. These include measures addressing capacity constraints and information asymmetries, the introduction of dedicated financing instruments and resolving any other market bottlenecks. The Guidelines also offer an indicative timetable reflecting on the sequence of actions and their priority.

In addition, the Guidelines provide suggestions for possible further analytical work, which is needed in order to support or facilitate amendments of existing legislation. There are also suggestions here for some pilot and demonstration projects, which can serve to verify the concepts associated specifically with circular economy considerations.

Climate emergency in the sector context

Buildings are places where we live, work, go for entertainment or celebrate life with our families and friends. We spend more than 90% of our lifetime in buildings. The quality of the built environment we use has a significant impact on the quality of our life as well on our productivity, and even on how we behave. Therefore, it is very important that the buildings that shape our lives are stable, safe, and – what's become increasingly important – sustainable.

What does sustainability, or SCP, mean in the context of a building? The World Green Building Council, which represents the global professional network, gives a very good answer:

> 'A green or sustainable building is a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life.
>
> There are a number of features which can make a building 'green'. These include:
>
> - Efficient use of energy, water and other resources
> - Use of renewable energy, such as solar energy
> - Pollution and waste reduction measures, and the enabling of re-use and recycling
> - Good indoor environmental air quality
> - Use of materials that are non-toxic, ethical and sustainable
> - Consideration of the environment in design, construction and operation
> - Consideration of the quality of life of occupants in design, construction and operation
> - A design that enables adaptation to a changing environment'

It is critically important in the context of climate change that alongside decarbonisation of the power sector we address decarbonisation of buildings too. Construction and buildings are responsible for half of total final energy used (including operational carbon emitted during the lifetime of buildings and embodied energy, used for the production of construction materials, transportation and construction itself). Half of all extracted raw materials are used for buildings and construction, and over one third of total generated waste comes from construction and demolition. Buildings generate about 39% of global carbon emissions. This includes 28% of CO_2 emissions at the operational stage and another 11% of embodied carbon arising from the energy used to produce materials and in the construction itself. If we take into account that the global building stock is expected to double by 2050, and that we require more and more comfort and better services from our buildings, then this all comes at the cost of increasing energy and resources demand. This growth will consume vast amounts of natural resources, contributing to an expected doubling of the total global consumption of raw materials by around the middle of this century, significantly increasing the sector's emissions and climate impact. The consequences of doing nothing except to follow the business-as-usual model will be long lasting and in some cases irreversible. This emergency calls for urgent action to radically transform the current unsustainable models of consumption in buildings and construction.

The built environment sector has a vital role to play in responding to the climate emergency. Decarbonisation of the sector is one of the most cost-effective ways to mitigate the worst effects of climate breakdown. At the same time, the wider introduction of advanced energy efficiency and sustainable construction practices in new construction, combined with a deep renovation of the existing buildings, will generate significant positive economic and social impact. There will be new job opportunities, reduced pollution, better well-being and a healthier population.
This is highly relevant to countries in Central Asia and for Kyrgyzstan in particular. Aside from heavy and energy intensive industry, buildings are the main energy end-user in Kyrgyzstan. Over half of national final energy is consumed in buildings, which have little or no thermal protection yet operate in severe continental climate conditions with long, cold winters and hot summers. Although hydropower contributes over 90% of national electricity production, this largely renewable electricity typically only contributes 20–25% of buildings' overall energy consumption. The remaining three-quarters are constituted of fossil fuels, typically imported from abroad. That is why better energy efficiency in buildings is a direct answer to the question of security of energy supply and high energy dependence in Kyrgyzstan.

There is a significant market potential for energy efficiency renovations in Kyrgyzstan. Fast demographic growth, urbanisation and increasing internal mobility, the development of the service sector and higher requirements for building comfort and conditions all drive high construction rates and investments in buildings as the main investment opportunity in Kyrgyzstan. Yet, energy efficiency retrofits still focus mainly on the reduction of energy consumption. There is some focus to a lesser extent on carbon and none at all on addressing issues associated with the overall carbon footprint of buildings and more specifically on upfront carbon emissions including embodied carbon. This is an area for further policy dialogue on policy and regulatory development.

Any scaling up of renovation across the country will require the design and introduction of additional financing instruments. This would allow longer term and wider benefits from energy renovation to be internalised and help to reduce the higher up-front costs, which make renovation barely affordable for most Kyrgyz households. Wider renovation programmes need to consider the extension of existing supply chains and the involvement of a wider spectrum of suppliers using sticker control for market access. Otherwise, scaling up investments in renovation will result in a shortage of materials and technologies or respectively higher prices and lower cost efficiency of building renovation programmes. Any further policy amendments or changes to the regulatory framework will need to consider market transition to decarbonisation across the entire value chain. Relevant legislation needs to be amended taking into account lessons learned from practical implementation in more developed markets (i.e. the EU). Hence collaboration at an international level and within the entire value chain is essential for incorporating lessons learned and adopting the most impactful models and instruments.

Gaps and barriers for energy efficiency in the sector and actions to address them

Table B1 explains the links between the gaps and barriers, as identified in Chapter 1, with the recommendations suggested below, incorporating them into a single analytical tool.

Table B1. Links between gaps and barriers and policy recommendations

Gaps and barriers	Recommendations	Comments
Gaps in the current legislation on energy performance of buildings, waste management, and other environmental legislation (fluorinated gas substances).	Amendment to the minimum requirements to conform with the introduction of NZEB for new construction and cost-optimal level of requirements for renovation of existing buildings. Existing waste management regulations can be amended in order to reflect and follow the EU Waste Hierarchy as well as support waste processing, minimisation, value recovery and recycling. Relatively easily could be adopting regulations supporting the introduction of more energy and resource efficiency equipment, appliances and technologies falling under provisions of the EU EcoDesign Directive and other relevant regulations. The latter might require support for national certification and testing laboratories, which are instrumental for the implementation of these regulations.	These recommendations can be implemented through amendments and extensions to the existing regulatory framework.
Absence of policy and legislation supporting the circular economy.	Adoption of a new set of policies and legislation addressing circular economy considerations across all sectors of the economy. Sector specific sub-laws or regulations can introduce circular economy concepts in buildings and construction.	Prior to adopting any suggested new set of policies and legislation, some further work is necessary, including policy dialogue, monitoring and assessing lessons learned from the implementation of similar concepts in more developed markets. This could be combined with capacity building activities, implementation of pilot and demonstration projects as well as with some further analytical work on the wider benefits of circular economy concepts in the market context of Kyrgyzstan.
Absence of provisions supporting an integrated approach on SCP in building and construction.	Adoption of a new set of policies and legislation addressing SCP considerations across all sectors of the economy. Sector specific sub-laws or regulations can support the introduction of SCP in buildings and construction.	
Energy and utility tariff policy	Amendment to tariff regulations and associated methodologies to internalise environmental impacts.	Amending tariff policies is theoretically possible within existing regulations if there is strong political will. However, such political will is completely absent at present due to recent political instability and the perceived risks of negative public opinion. Preceding any further work on amending tariff regulations it is recommended undertaking and supporting wider actions addressing broader public awareness of climate and environmental challenges. This will enhance public acceptance on the need to internalise climate and environmental externalities.

Gaps and barriers	Recommendations	Comments
Low level of policy enforcement	Capacity building and awareness-raising activities targeting: (i) designated local authorities in charge of legal enforcement of regulations related to energy efficiency, of buildings; and (ii) the wider professional community (developers, building managers, architects, designers and construction companies) on the benefits of compliance with the new legislation on energy efficiency in buildings.	Although Kyrgyz legislators adopted quite advanced legislation on energy performance of buildings, its implementation is hampered by a lack of legal enforcement. The reasons are mostly due to the lack of capacities of designated authorities and their limited understanding of the benefits and functionalities of the legislation as well as an absence of practical tools supporting legal compliance.
Lack of practical provisions for integration of distributed renewable energy generation	Development and adoption of secondary legislation (government regulation or decree) providing clear conditions for grid connections of smaller-size renewable energy projects (wind and solar PV).	Although Kyrgyzstan adopted a law supporting renewable energy generation, smaller-size distributed renewable energy projects are discouraged due to the absence of clear and practical regulations defining conditions for grid connection. One of arguments used frequently by power utilities against the connection of a larger number of smaller-size renewable energy projects is concern over grid stability, influenced by fluctuating wind and solar power generation. To address these concerns, it is recommended conducting a grid stability assessment study, which could provide factual and objective analytical evidence based on modelling the impact of renewable distributed power generation on grid stability. This study could precede the development of grid connection regulation, as it will provide fact-based evidence on the anticipated impact. This could also suggest measures to mitigate a possible negative impact in a larger scale deployment of renewable energy power-generation capacities.
Lack of green and sustainability-related procurement criteria.	Adoption of green public procurement rules, similar to those in the EU's Green Public Procurement (GPP).	This action is recommended in coordination and following some analytical works related to identification and assessment of circular economy and SCP concepts applicable to the building sector under the market context of Kyrgyzstan.

Gaps and barriers	Recommendations	Comments
Budgetary regulations for public entities in relation to energy performance contracting.	Amendment of existing budgetary regulations for public entities to allow energy performance contracting and the retaining of revenues from energy or resource efficiency investments.	This is important for the introduction of off-balance financing instruments in the public sector (including for energy efficiency retrofits in public buildings) such as energy performance contracting and for the stimulation of energy performance services.
Absence of any legal obligations for Environment, Social and Governance (ESG) disclosure for companies and financial institutions.	Introduction of legal obligations on financial institutions and larger companies for public disclosure on SCP activities (or their financing).	As soon as higher-level policies targeting climate, environmental or sustainability objectives are introduced, such legal obligations to disclose activities supporting these policy objectives will stimulate their interest and engagement on SCP, climate and the environment. However, this would only be practicable to apply after corresponding SCP-related legislation is adopted and reflect lessons learned from the implementation of the Sustainability-related Disclosures in the Financial Services Regulation (SFDR) and Non-Financial Reporting Directive (NFRD) in the EU.

Policy and regulatory actions

Despite the growing attention at present, better energy efficiency and material efficiency for construction are still in their infancy in Kyrgyzstan. There are still gaps in legislation on energy efficiency in buildings and currently no policy and regulatory framework at all to facilitate the introduction of circular economy concepts or material efficiency. There is little to stimulate the market for voluntary practices aiming for environmental benefits or for value creation out of better material efficiency or to reuse and recycle of CDW.

Given that the EU policy and regulatory framework is still under development but has been endorsed and promoted under the EU Green Deal, the following activities are recommended in the short term (2021–2023):

- Monitor any further development and understand on lessons learned and positive experience of the EU and international best practice related to material efficiency and circular economy concepts in buildings.
- Test the application of the methodology developed under Level(s) for pilot projects in Kyrgyzstan.
- Pilot Life-Cycle Assessments (LCAs) of certain building products and materials and suggest a prototype Environmental Performance Declarations (EPDs) mirroring the EU approach.
- Support capacity building for market-based solutions in the field of circular economy of buildings in Kyrgyzstan (including the development and adoption of relevant methodologies, trainings and awareness raising activities).

Reflecting on the outcome of these activities and taking into account the positive experience from the implementation of the EU policies, it is recommended to develop a similar regulatory framework, adapted to the specifics of the Kyrgyz construction market in the medium- or longer-term perspective:

- Adopt policy and regulations aiming at net zero carbon performance of buildings and the introduction of circular economy considerations by reflecting on the lessons learned.

The timetable for the implementation of key policy and regulatory recommendations for the building sector is separated into short-term (2021–2022); medium-term (2023–2025) and longer-term perspectives (after 2025).

Table B2 summarizes all policy and regulatory recommendations over these three time frames.

Table B2. Policy and regulatory recommendations (summary)

Policy and regulatory recommendations	Short-term perspective 2021-2022	Mid-term perspective 2023-2025	Longer-term perspective - after 2025
Existing legislation on energy performance of buildings	• Ensure enforcement and a wider application of existing legislation. • Support capacity building for law enforcement of designated authorities responsible for implementation of existing legislation. • Support building up capacities for implementation of provisions of existing legislation among local professional community. • Continue with harmonisation of technical standards with existing primary and secondary legislation.	Amendment of existing legislation with introduction of • Cost-optimal level of requirements as per the methodology introduced by the EPBD in addition to existing minimum technical requirements on energy efficiency; • NZEB requirements applicable for new construction of buildings.	Monitor any further updates of the EU legislation in buildings and, more specifically, with the EPBD, and incorporate any new provisions supporting decarbonisation of buildings in the national legislation according to local market conditions.
Introduction of material efficiency standards and circular economy concepts	• Monitor any relevant developments within the EU and understand the lessons learned in the positive experience of EU-wide initiatives related to material efficiency and circular economy concepts in buildings. • Test the application of methodology developed under Level(s) for pilot projects in Kyrgyzstan. • Pilot Life-Cycle Assessments (LCAs) of certain building products and materials and suggest prototype Environmental Performance Declarations (EPDs) mirroring the EU approach. • Support capacity building for market-based solutions in the field of circular economy of buildings in Kyrgyzstan (development and adoption of relevant methodologies, trainings and awareness-raising activities).		Adopt policy and regulations aiming at net zero carbon performance of buildings and the introduction of circular economy considerations by reflecting on lessons learned and positive experience from the implementation of EU legislation.

Policy and regulatory recommendations	Short-term perspective 2021-2022	Mid-term perspective 2023-2025	Longer-term perspective - after 2025
Other areas of legislation supplementing he above	• Develop a concept for introducing the EU Waste Hierarchy with regards to construction materials and CDW. • Adopt provisions reflecting the ban of substances with high Global Warming Potential (GWP) and more specifically those containing fluorinated gases - in line with the EU F-Gas Regulation. • Adoption of regulations on products consuming energy and mirroring the EU Regulations implementing the EU EcoDesign Directive. • Adopt grid connection regulations for smaller-size distributed renewable-energy power generation.	• Adopt policies and regulations aiming to support better waste management, reuse and recycling of construction materials and CDW by reflecting on the lessons learned and positive experience of legislation implemented in the EU. • Adopt stricter criteria for market access of energy consuming products in line with provisions of the EcoDesign Regulations and as amended by the EU. • Adopt legislation introducing provisions for climate disclosure and reporting. • Adopt legislation incorporating the 'Do No Significant Harm' principle for all economic activities including buildings and construction in compliance with the provisions of the EU Taxonomy for sustainable activities. • Adopt GPP rules in coordination with works on circular economy and SCP. • Adoption of regulations and requirements for ESG disclosure of corporate and financial institutions with provisions similar to the EU Regulation 2019/2088 on sustainability-related disclosures in the financial services sector (known as the Disclosure Regulation, ESG Regulation or SFDR) and the Non-financial Reporting Directive (NFRD) 2014/95/EU.	

The introduction of effective and supportive policies should be backed by the provision of financing resources made available on market principles by financing institutions. This Report has identified on the basis of international best practice a number of dedicated financing instruments, which could support the wider introduction of energy efficiency and further sustainability practices in the sector.

Financing instruments applicable for scaling up energy efficiency investments in buildings

Energy efficiency renovation of existing buildings is certainly a complex task to undertake. This is due to the wide range of building types, their age, different uses, materials and energy consumption patterns, but it is no more complex than the equivalent challenges facing EU Member States and it comes with significant public and private benefits.

The following recommendations are suggested for mobilising more financing resources for energy efficiency in buildings:

- Development of a common set of procedures and standards for the underwriting of energy efficiency and buildings renovation, for both debt and equity investments, and taking into account the experience from more developed markets, particularly the EU;
- Adjustment of financial regulatory frameworks to better support innovation. This should, first, ensure that risk assessment and related capital requirements for long-term energy efficiency investments correctly reflect their risks; and second, develop market potential for green bonds, factoring funds for EPCs and other more innovative sources of financing for energy efficiency;
- Address barriers to the expansion of the green mortgage market, including by examining how to include energy costs and energy efficiency potential in mortgage affordability calculations;
- Ensure that new regulatory frameworks for financial institutions (Solvency II and Basel III) do not prejudice energy efficiency investments;

- Ensure that public technical assistance and project development assistance facilities are compatible and can be easily combined with market-based and concessional funding by qualified and experienced financial institutions;
- Ensure that all public refinancing facilities confirm eligibility for financial instruments relating to energy efficiency.

After reviewing international best practice in energy efficiency financing, several dedicated financing instruments were identified as applicable to the market conditions of Kyrgyzstan. These can be implemented and scaled up by local banks with the allocation of their own resources, or by obtaining further support and provision of resources from international financing institutions:

- **Dedicated credit lines** provided by local financing institutions, which could be complemented by technical assistance for final beneficiaries and, potentially, grant support at a level sufficient to trigger a high-impact and high energy performance renovations.
- **Risk-sharing facilities**, where national or international institutions can provide risk-sharing support for high impactful projects that implement SCP techniques and, in particular, energy and resource efficiency considerations. This would reduce the risks for financing institutions and allow lower transaction costs for projects that comply with certain environmental and sustainability criteria.
- **Energy performance contracting with private-service contractors**, who can implement ambitious renovation projects upon guarantees of achieving a good level of energy savings and/or carbon reductions. Energy performance contracting is a contractual arrangement between a host beneficiary and the provider of an energy-efficiency improvement measure, which is verified and monitored during the whole term of the contract. Here, investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criteria, such as financial savings. Repayments are conducted from savings achieved over a fixed contract period. This is applicable in the implementation of advanced energy efficient solutions. Such off-balance financing through third parties addresses the problems of limited balance sheets in local municipalities, higher levels of debt, budgetary restrictions as well as lower in-house capacity to implement energy efficiency techniques.
- **On-bill repayment** schemes are a mechanism used to improve the creditworthiness (or seniority) of energy efficiency investments by having them repaid within the existing payment collection system of utility bills, or tax authorities.
- **The Energy Service Agreement (ESA)** is a 'pay-for-performance' service contract between a third-party investor and an asset owner to deliver energy savings as a service. The ESA is in some ways an evolution of the traditional shared-savings model, provided through EPCs, but it is structured more like a Power Purchase Agreement (PPA) and used more frequently by actors present in the mainstream energy markets. A third-party investor and an asset owner enter into an ESA contract (typically for 10 years) where the asset owner agrees to pay their historical utility bills to the third party. An upfront 'access fee' or an ongoing utility bill discount may also be paid to the asset owner as an incentive. The third party invests into money-saving, energy-efficient opportunities and owns and operates the energy equipment to provide 'energy services' to the asset/building.
- **A public Energy Service Company (ESCO)** is a special-purpose, publicly owned company designed to manage energy efficiency investments and to deliver guaranteed savings to a host and counterparty to an EPC. This is set up with public funds in order to accelerate the implementation of EPCs in sectors and regions where the private sector offer is not sufficient. Public ESCOs can also reduce the cost of financing by aggregating specific credit lines, public grants and other incentives especially if the public body establishing it provides a guarantee or capital to deliver a strong credit rating.
- **Factoring and forfeiting** are financing instruments where an entity sells its accounts receivable (usually invoices) to a third party (called a factor) at a discount. In energy efficiency terms, a factoring fund for EPCs would purchase funded EPCs from their originators (usually ESCOs) at a discount, freeing up the balance sheet of the originators to originate more EPCs. As the risk of underperformance of an EPC is more likely to occur at the beginning of the contract, these 'de-risked' contracts become a safer income stream which can be assigned (transferred) to a factoring fund. ‘Forfeiting’ arrangements are common practices in more developed EPC markets (e.g. Germany) and leasing (in the form of sale-and-lease back) can also be an option if the contracts are adapted. Once active, such a fund could help establish standard legal and financial arrangements in the EPCs and then aggregate receivables into securities which can be sold in the form of bonds to institutional investors, once a critical size is reached (estimated at EUR 150 million). A factoring fund may need public equity to speed its launch into the market, however, it could also involve private equity and debt, if the public sector takes the first-loss risk or requires a lower return on equity.

Building on the above recommendations for policy reform, regulatory changes and dedicated financing instruments, the Report identifies a number of further activities that could facilitate wider implementation of energy efficiency in buildings.

Capacity building, awareness raising and analytical works

In addition to policy dialogue aimedat upgrading policies and the regulatory framework, it is important that some further **analytical work** and activities are conducted targeting the enhancement capacity of relevant market counterparts and broader public awareness. Further analytical work is necessary specifically for these areas:

- Assess the wider benefits from the introduction of SCP and circular economy concepts in buildings and construction.
- Develop analytical evidence to underpin a possible definition of NZEB requirements for new construction and cost-efficient requirements for existing buildings.
- Develop analytical justification on the impact of a larger-scale introduction of smaller distributed renewable-energy power generation on grid stability.
- Develop a Green Building Code as a voluntary set of standards, defining and recommending technical provisions for SCP practices in buildings.
- Conduct Life-Cycle Assessments for key construction materials manufactured and widely used in Kyrgyzstan, in the format of an Environmental Product Declaration.
- Identify and assess cost-effective nature-based solutions, applicable for construction practices in Kyrgyzstan.

In parallel, a variety of **capacity-building and awareness-raising** activities is recommended, complementing ongoing and future policy dialogue opportunities:

- Training of authorities responsible for the implementation of legislation on energy performance of buildings.
- Training of key market players (developers, building-facility managers, architects, designers, and construction companies) on the wider benefits from the adoption of advanced SCP, particularly energy efficiency, and on key provisions of the new legislation.
- Conduct awareness-raising activities and capacity-building events on topics related to the overall environmental footprint assessments of buildings, green building materials, and use of cost-effective SCP techniques, etc.

These measures should be complemented with reporting on the outcome of **pilot and demonstration** projects (Zero-Carbon Buildings), buildings integrating nature-based solutions, and so on.

Based on these models, the following **institutional** actions are recommended to be considered by different institutional and market stakeholders in Kyrgyzstan.

- Streamline, blend and optimise the use of any donor or national support funding for energy efficiency investments linking them to national climate strategies and to the energy market reforms.
- Conduct a review to ensure that current rules for donor and national support do not unnecessarily burden accelerated energy efficiency investing and the upscaling of public–private financial instruments.
- Increase the use of targeted fiscal instruments to motivate municipalities to prioritise energy efficiency during the natural replacement cycle of building assets and associated technologies.
- Review public and private accounting treatment of EPCs.
- Review public authority procurement rules to better value lower operational costs as part of their tender assessment processes.
- Further expert examination of the discount rates used in energy modelling, policymaking and investment decision-making, to adequately balance the benefits and risks of energy efficiency.
- Ensure better law enforcement of the existing legislation and regulatory framework on energy performance of buildings.
- Increase the capacity to facilitate ongoing project development assistance to all relevant actors and technical assistance to relevant public sector bodies and entities for the development and aggregation of energy efficiency investments in public and residential buildings.

Finally, last but not least:

- Create institutional capacity to implement national climate strategies and/or building renovation programmes, and enable long-term planning and supply chain scaleup to deliver and finance ambitious buildings renovation programmes.

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