World Bank Energy and Extractives Global Practice

ECA region

ROADMAP FOR THE IMPLEMENTATION OF ENERGY EFFICIENCY IN PUBLIC BUILDINGS OF THE KYRGYZ REPUBLIC

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ESMAP

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Acknowledgements

This report has been prepared under the guidance of Christian Mahler (Energy Specialist, World Bank ESMAP), with additional input from Yun Wu (Senior Energy Specialist, World Bank EAP Energy Unit), Kathrin Hofer (Senior Energy Specialist, World Bank ECA Energy Unit) and Katharina Gassner (Senior Energy Economist, World Bank ECA Energy Unit). Rainer Behnke (Senior International Energy Efficiency consultant) and the staff of the Kyrgyz consulting firm Unison Group (Nurzat Abdyrasulova and Darika Sulaimanova) prepared the information related to the local market in the Kyrgyz Republic.

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Abbreviations

ARIS	Community Development and Investment Agency of the Kyrgyz Republic
BAT	best available techniques
BREF	“best available techniques” reference (document on energy efficiency in buildings)
CAPEX	capital expenditure
CoP	coefficient of performance
DH	district heating
EUAU	Eurasian Economic Union
EBRD	European Bank for Reconstruction and Development
EE	energy efficiency
EERF	energy efficiency revolving fund
EPC	energy performance contracting
ESPC	energy savings performance contract
ERIK	Enhancing Resilience in Kyrgyzstan (World Bank project)
ESA	energy service agreement
ESCO	energy service company
EU	European Union
FESTI	Fuel and Energy Sector Transparency Initiative
GHG	greenhouse gas
GOSSTROY	State Agency for Architecture, Construction, and Housing (Kyrgyz Republic)
GOST	CIS technical standards
GWh	gigawatt-hour
HC	housing cooperative
HP	heat pump
HSIP	Heating Supply Improvement Project (World Bank)
HVAC	heating, ventilation, and air conditioning (unit)
IFI	international financial institution
K	Kelvin
KGS	Kyrgyz som (national currency), applied change rate: US$ 1 = KGS 70
KPI	key performance indicator
KR	Kyrgyz Republic
kWh	kilowatt-hour
kWth	kilowatt thermal
KyrSEFF	Kyrgyz Sustainable Energy Financing Facility
LED	light-emitting diode
LGA	local governmental authority
LRAIC	long-run average incremental cost
M&V	monitoring and verification
MWh	megawatt-hour
NDC	Nationally Determined Contribution (UN SDGs)
NEHC	National Energy Holding Company
NGO	nongovernmental organization
NZEB	net-zero energy building
O&M	operation and maintenance
OJSC	open joint stock company
PBMA	Public Buildings Management Agency
PIU	project implementation unit
PPP	private-public partnership
PV	photovoltaic
RE(S)	renewable energy (sources)
RKDF	Russian Kyrgyz Development Fund
SB	supervisory board
SDGs	Sustainable Development Goals (UN)
SHW	sanitary hot water
SNiP	technical standard or norm
SPMH	State Property Management Fund

toe	tonne(s) of oil equivalent
TA	technical assistance
TRACE	Tool for Rapid Assessment of City Energy
UDP	World Bank Urban Development Project
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	UN Framework Convention on Climate Change
W	watt

Barrier types

RB	legislative and regulatory barrier
IB	institutional barrier
BB	budgetary barrier
CB	capacity barrier
FB	financing barrier
MB	market barrier

Glossary

Aiyl Okmot	local planning and budget commission
Kenesh	local council (also “City Kenesh”)

Applied change rate: US$1 = KGS 70.

Executive Summary

The objective of this document is to provide guidance for the development and implementation of a national energy efficiency (EE) investment program for public buildings in the Kyrgyz Republic. It begins by assessing the country's **energy efficiency potential**; analyzing its **institutional, legislative and financial frameworks**; reviewing the **market for EE supply and services**; and summarizing **current barriers to EE implementation in the public sector**. It then provides two forward-looking chapters:

- A **Vision 2040** list of medium- and long-term targets for a sustainable, climate-resilient, safe and low-carbon stock of public buildings in the Kyrgyz Republic by 2040, with reference to the UN Sustainable Development Goals and the draft "Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040"; and
- A **Roadmap** and accompanying **catalogue of recommended measures** that sets out the steps and timeframe necessary to:
    - Improve the political and regulatory framework for EE;
    - Strengthen the delivery capacities of relevant institutions and sectoral stakeholders; and
    - Scale up the nation's EE investments in the country.

The following is an extended summary of the overall report.

1 Energy Efficiency Potential in the Kyrgyz Public Buildings Sector

In the Kyrgyz Republic, the term *public buildings* refers to buildings and facilities designated for public use, including those occupied by authorities and administrative bodies. Construction design standard ("SNiP")[1] KR 31-04-2001, "Public Buildings and Structures,"[2] lists the following public building types:

- Educational buildings (buildings used as premises for child-rearing and personnel training);
- Research institutions, project and public organizations, and offices;
- Health and recreation institutions;
- Physical culture, health, and sports facilities;
- Cultural, educational, and entertainment institutions;
- Trade, public catering, and consumer services enterprises;
- Transport enterprises providing direct services to the population (stations);
- Public utilities (except for industrial, storage, and transport buildings and structures).

1.1 Public Buildings Inventory

In May 2018, an analysis of the Kyrgyz public buildings stock was conducted to develop a public buildings inventory and to identify the overall energy efficiency potential and the corresponding investment demand[3] in the sector. The inventory encompasses buildings that are owned by the government – that is, state or municipal property, usually referred to as *state-financed institutions*. This includes buildings that are privately owned but of social significance (schools, kindergartens) and have an appropriate legal status.

The analysis found that there are 9,780 public buildings in the Kyrgyz Republic. The number of buildings correlates with the distribution of the Kyrgyz population: most buildings are located in the Chui Oblast, which hosts 32% of the country's population, whereas the least number of buildings can be found in the Talas Oblast, home to only 4% of the Kyrgyz population.

The public buildings inventory defined three main categories:

- Educational buildings (schools, kindergartens, higher and other education facilities);
- Healthcare buildings (hospitals, policlinics,[4] and other small health facilities); and
- Other buildings (including administrative buildings and social protection).

One-third of the public buildings stock are educational facilities, representing 60% of the overall heated floor area. The health sector exhibits the smallest floor area of the three categories but with a high number of small buildings.

On average, the condition of buildings is considered to be satisfactory. However, about 50% of the building stock considered within the research was built between 1950 and 1980, which means it has been in operation for 40-60+ years; thus, only a minor share of buildings benefitting from the retrofits that have occurred during the last 15 years.

1.2 Energy Efficiency Potential in the Public Buildings Sector

Public buildings in the Kyrgyz Republic consume about 850 GWh of energy annually.[5] 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 one of the largest energy end-consumers. However, the sector is plagued by energy supply shortages, resulting in underheating of public buildings during winter with comfort conditions far below norm requirements. The specific energy consumption currently averages 162 kWh per square meter of floor area, while demand averages 250 kWh per square meter. Approximately 70 to 88% of energy use in public buildings can be attributed to space heating, and electricity is used for space heating in 60% of all public buildings.

Based on a number of energy audits in schools and hospitals (as well as the 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, or 500 GWh/year**. This retrofit effort would require investments worth US$1.085 billion and would bring the entire public buildings stock into compliance with Class B energy performance requirements – which, according to Kyrgyz national legislation on building energy performance, are the current minimum requirements for energy efficiency performance.

Standard and Advanced EE Scenarios

Energy efficiency potentials were determined on the basis of two scenarios: (i) a *standard* energy efficiency (EE) technology scenario and (ii) an *advanced* EE technology scenario.

Standard EE technologies are recommended in order for buildings to comply with the minimum energy-performance requirements (Class B) in the Kyrgyz Republic. This approach follows domestic best practice and comprises commonly applied technologies for building retrofits in the country.

Advanced EE technologies were assessed in terms of the following criteria:

- Innovative in the Kyrgyz context and capable of delivering additional energy savings and ensured economic viability;
- Domestic representation through suppliers and reference projects in the local market, and through the existence of sufficient local capacity to design, install and operate equipment;
- Technical feasibility and applicability of the selected building;
- Low levels of operational risk;
- Potential to increase the level of the building's function, safety and value;
- Potential for country- and sector-wide scalability.

Assessment of Appropriate Technologies

Five advanced technologies were identified (in a separate World Bank market assessment) as most appropriate for the Kyrgyz public buildings context. They can be implemented in 70–80% of all existing public buildings in addition to the standard energy efficiency measures:

1. Heat pumps for space heating can replace electric boilers and save up to 65% of current electricity consumption for space heating. Heat pumps have very good economic viability.
2. Heat pumps for sanitary hot water (SHW) can replace electric boilers and save up to 73% of current electricity consumption for hot water production. This technology has the best economic viability of all water heating equipment in the country.
3. Lighting control systems include daylight and movement sensors to control the lighting intensity according to the demand in particular rooms. This technology is recommended for application in public buildings with varying room-occupancy rates, such as large health or education administration buildings.
4. Ventilation systems with heat recovery are necessary to ensure air exchange; these can reduce heat losses (through controlled air exchange) by up to 60%.
5. Combined PV / battery systems for hospitals or policlinics – to replace emergency diesel generator sets and increase building-operation resilience by providing baseline power supply and emergency power supply during power outages.

The main report (Table 1.2) summarizes the applicability of various advanced EE and renewable energy (RE) technologies.

1.3 Costs and Economic Benefits of an EE retrofit

The public building stock in the Kyrgyz Republic covers almost 10,000 buildings, of which approximately 5,000 are deemed retrofittable.[6] The estimated investment demand for those buildings amounts to US$1.085 billion and would deliver energy savings of between 55 and 75%. With 3,350 units, educational buildings represent the largest share of buildings in need of rehabilitation, in terms of both floor area and number of buildings.

As Table 1.4 (in the main report) shows, **specific investment costs for the complete package of standard and advanced EE measures range between US$140 and US$190 per square meter**.[7]

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**.[8] The ratio of the invested CAPEX for the EE retrofit to the forecasted lifetime energy cost savings is at a level of US$0.05 per kilowatt-hour (3.6 KGS/kWh); this means that for every kilowatt-hour saved, US$0.05 (5 U.S. cents) of investment is needed.

A calculation of energy cost savings – based on the Kyrgyz long-run average incremental cost (LRAIC)[9] – generates **approximately US$69 million in annual savings for the whole public buildings investment program, with a simple economic payback period of between 11 and 13 years**. This is a good level of profitability for public infrastructure retrofit projects; it would also create additional economic benefits in terms of building comfort, function and safety.

2 Institutional, Legislative and Financial Framework

2.1 Institutional Structure

The promotion of efficient energy end-use is a low priority in the Kyrgyz government, especially in the context of the strong, countervailing lobbying effort that exists in support of low-cost energy generation, transmission and distribution. The liquidation in 2015 of the Ministry of Energy and Industry (and rearrangements of its control structures), the establishment and consolidation of the National Energy Holding Company (NEHC), and the division of responsibility for energy efficiency into separate institutions have further weakened the sector as a whole and resulted in a loss of institutional memory.

Also, energy efficiency as a cross-sectoral topic requires effective intergovernmental communication and cooperation. However, the Kyrgyz public buildings sector is plagued by fragmented institutional responsibilities with diverging interests that hamper a more unified approach to improving building function and energy efficiency performance. Further, there is insufficient information exchange and adaptation of efficient work routines in terms of communication, document and data management, norm compliance, and other areas.

Governmental Agencies Responsible for Energy Efficiency

Responsibility for energy and energy-efficiency policies and regulation is shared by two government agencies. The **State Committee for Industry, Energy and Subsoil** Use (the "**State Energy Committee**") is responsible for energy efficiency governance, along with energy saving and the development of alternative energy. The regulation covering the State Energy Committee[10] contains a wide range of functions to do with energy efficiency policy, regulation and control.

The **State Agency for Architecture, Construction, and Housing (Gosstroy)**[11] is responsible for the implementation of energy-savings and energy-efficiency policies in the construction and building sectors. Institutionally, agencies under Gosstroy are separate entities coordinated by the general management.

In addition, the **State Inspectorate for Environmental and Technical Safety** is a third state body directly involved in the implementation of energy savings and energy efficiency policies in public buildings. Its functions include the verification of the technical safety of heating systems in public buildings and the availability of energy passports[12] of buildings. The Inspectorate is also in charge of issuing energy passports for public buildings.

Ownership and Technical Management of Public Buildings

The general management of public buildings is the responsibility of the related sector ministry (Health, Education, etc.), while responsibility for building operations is usually shared between central and local governmental authorities. Technical inspections, including energy, are conducted by the central government through the State Inspectorate for Environmental and Technical Safety.

Recent Developments and Outlook on Institutional Framework

In response to demand from energy efficiency stakeholders, a meeting was held in December 2017 to create a **Coordination Council for Energy Efficiency** under the auspices of the State Energy Committee. Efforts are underway to determine the Council's composition, structure, and mechanisms for cooperation and activities.[13]

A good example of a sound coordination council is the Supervisory Board of the Fuel and Energy Sector Transparency Initiative (FESTI SB), which existed between 2010 and 2015 under the Ministry of Energy and Industry of the Kyrgyz Republic (see Box 1 in the main body of the report).

Other Stakeholders

Given the challenge of climate change, **energy conservation** is becoming increasingly important for the agenda of the government of the Kyrgyz Republic and in programs implemented by international financial institutions and private sector. Following the introduction in 2012 of new legislation governing energy efficiency in buildings, and the improvement of the investment climate in this sector, the number of energy efficiency projects in the country increased and, accordingly, the number of stakeholders in the private sector, public organizations and academia has increased too.

One of the key players is the **European Bank for Reconstruction and Development (EBRD),** which for many years has supported the Kyrgyz government's efforts to develop and improve the legislation for energy efficiency in buildings. Since 2009, with the technical consulting support of Gosstroy, the Law on Energy Performance of Buildings and a number of related by-laws and technical documents have been developed and implemented. In addition, the government has made extensive efforts to increase the capacity of governmental agencies and specialists in the construction industry.

Table 2.2 (in Chapter 2) presents an overview of the main stakeholders in energy efficiency in the Kyrgyz Republic, including their roles and limitations.

2.2 Legislative and Regulatory Framework for Energy Efficiency

This section addresses the Kyrgyz Republic's legislative and regulatory framework with regard to three areas:

- Energy efficiency programs;
- Energy efficiency legislation; and
- Building-related technical regulations, norms and standards.

Energy Efficiency Programs

As a cross-cutting issue, energy efficiency is affected by various governmental programs and reflected in numerous plans, concepts and strategies; these are detailed in Chapter 2 (Section 2.2) of the main report. In particular, in 2015 the Ministry of Energy and Industry developed and adopted the **Program of the Government of the Kyrgyz Republic on Energy Savings and Energy Efficiency Policy Planning for 2015-2017**[14] within the framework of the Sustainable Energy Program for Central Asia (CASEP)[15] and with advisory support from the European Union. The program defined the main priorities for the development of energy efficiency and set general targets for the entire economy of the country. These targets include achieving:

- Energy savings of 2.23 million tonnes of oil equivalent (toe) by 2017;
- A reduction of energy losses of 4.1 million toe by 2020 by promoting the use of energy-efficient technologies and materials in the production, transmission and consumption of power and gas;
- A reduction of energy intensity by 30% and annual energy consumption by 5% (generating energy savings of up to 8 million tonnes of fuel equivalent), through a "restructuring" of the economy over the period 2015-2025; and
- A reduction of greenhouse gas emissions (in CO_2 equivalents) of up to 20% by 2020, in accordance with the Kyrgyz Republic's obligations to the UN Framework Convention on Climate Change (UNFCCC).[16]

The Program highlights the importance of a mechanism for reinvesting the energy savings retained by public organizations as a result of implementing energy savings measures. However, the document contains no further energy efficiency targets by sectors (industry, buildings, transport) and does not specify the instruments or provisions required to implement the program and meet the specified targets.

In the context of the program, the Kyrgyz government did provide some instructions,[17] in particular to achieve energy savings by reducing energy losses or supply.

The program expired in 2017, but no information on the results of its implementation is officially available and the attainment of those targets remains questionable. Experience shows that monitoring and reporting of program implementation is usually not carried out due to lack of specific targets, methodologies and capacities. In fact, incomplete activities are commonly carried over to subsequent programs.

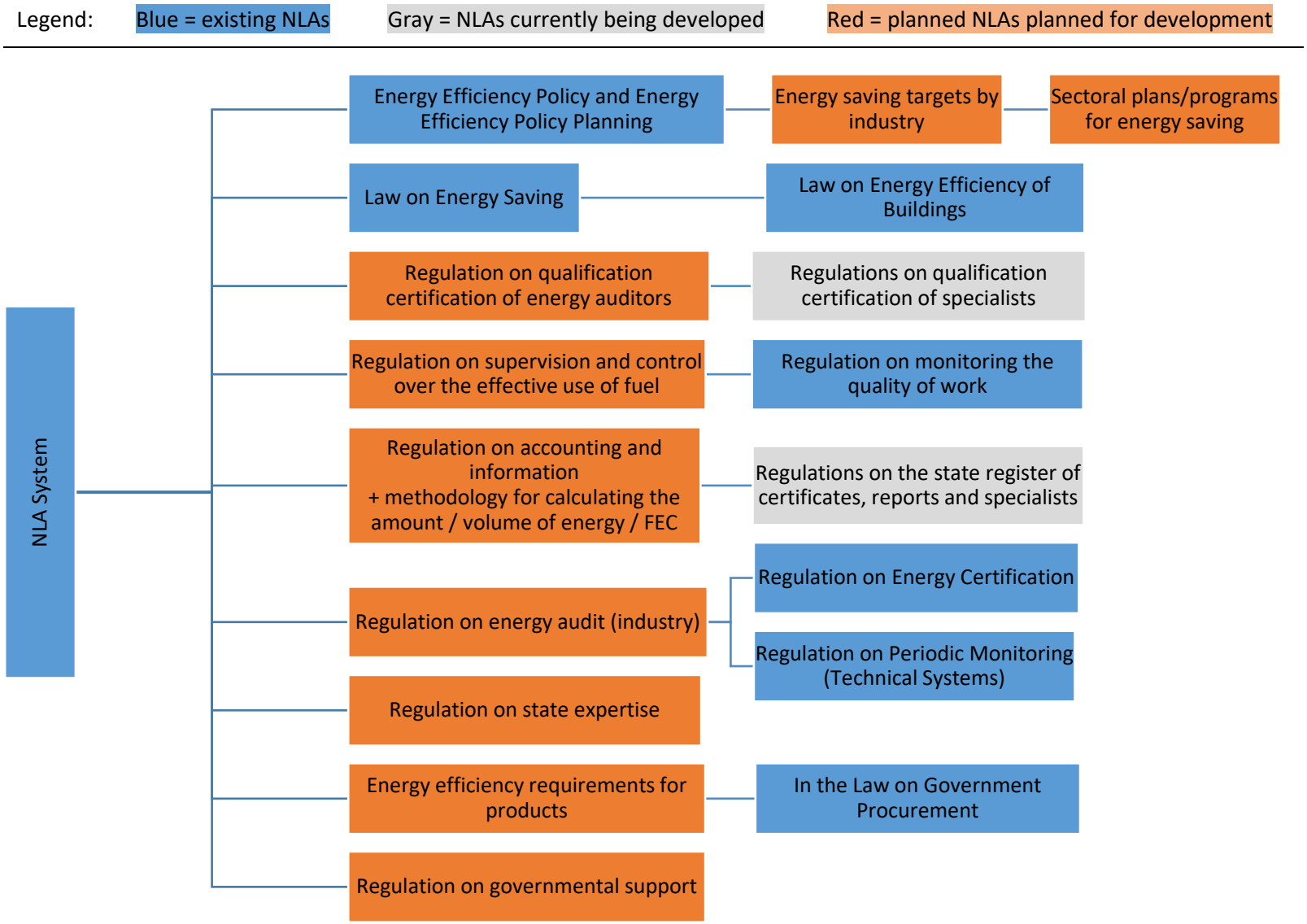
There are no additional energy-saving programs developed for state or local administrations or other sector institutions or stakeholders, with two exceptions:

- Municipal Energy Efficiency Plans in the cities of Toktogul, Sulukta, and Balykchi were prepared in 2015 in the context of the World Bank Urban Development Project.
- The Kyrgyz Sustainable Energy Financing Facility (KyrSEFF)[18] contributed an estimated 4%[19] of the total planned savings by 2017.

A new **Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040** is currently under development and should provide a strategy with a wider scope and specific targets for a longer-term horizon. The current draft concept foresees increasing energy efficiency by focusing efforts on supply-side (generation, transmission, and distribution) facilities managed by energy companies. The demand side – including energy efficiency in public buildings – is still under development and has been identified as an entry point for the analysis and recommendations of this roadmap document.

Figure ES-1 provides an overview of the structure of **existing and planned normative legal acts (NLAs)**. A few leading NLAs exist (marked in blue), while several NLAs are currently being developed (gray). According to current governmental initiatives, several more NLAs are at the planning stage (red). Recommendations for further specifications and NLAs are provided in Chapters 4 and 5.

Figure ES-1. Overview of Existing and Planned Normative Legal Acts (NLAs)



Energy Efficiency Legislation

The Kyrgyz Republic's energy efficiency 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 cross-cutting issue, energy efficiency is affected by several other laws, many of which are outdated or lack effective implementation in the area. The most important laws in this context are as follows:

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

Law on Energy Saving

The **Law on Energy Saving**[20] contains the following key declarations of the country's general energy savings policy:

- Establishment of an economic and regulatory framework for energy saving and energy efficiency;
- Development of state programs and projects for energy savings, energy efficiency and renewable energy;
- Activities to raise awareness and build capacity to implement energy savings;
- Development and roll-out of databases for generation and utilization of energy resources;
- International cooperation to foster effective use of energy resources.

The law was enacted in 1998 and has not been significantly changed since. It announces the development of mechanisms, regulatory provisions and procedures that remain undeveloped to this day, such as:

- Rules and procedures governing the energy efficiency of economic development projects (Article 10); and
- The establishment of a fund for energy savings and new energy equipment (Article 20).

Following an agreement on technical assistance between the State Energy Committee and the European Bank for Reconstruction and Development, draft amendments to the Law on Energy Saving were suggested in October 2017 to harmonize the law with the more recent Law on Energy Performance of Buildings. The draft law is undergoing an extended process of inter-ministerial and public consultations prior to parliamentary approval; this is planned to take place in 2019.

Law on the Energy Performance of Buildings

The **Law on the Energy Performance of Buildings**[21] governs the energy performance of buildings in the Kyrgyz Republic during design and construction (for new buildings) as well as for major renovations (existing buildings). It was developed in 2011 with support provided by the European Bank for Reconstruction and Development. At the time of its adoption, the law was a unique normative act based on the successful practice of promoting energy efficiency in the European Union and adapted to the conditions and regulatory framework of the Kyrgyz Republic. It was one of the first laws in Central Asia in which market-based energy efficiency management mechanisms replaced specialized requirements from the post-Soviet era at the level of technical regulations and standards. It introduced obligatory minimum energy-efficiency classifications applicable to both the design and construction phases in new buildings and to major renovations in existing buildings. Each building's energy efficiency class[22] is identified through its energy certificate, which includes

information on the current energy consumption baseline and energy efficiency potential. This allows the building owner to determine which measures to introduce in the building and to plan future savings. The law is complemented by by-laws and technical documents, and further efforts are underway to improve the legislation and its enforcement.[23]

Decree on the Rational Use of Energy

Decree No. 255 – "On the Approval of Limits for the Consumption of Heat, Electric Energy, Natural Gas, Water and the Intake of Wastewater for 2005-2006 for Public Organizations and on Measures for the Rational Use of Funds Allocated to Budget Organizations for Utilities Cost,"[24] dated June 2, 2005 – is directly linked to the rational use of energy. With this regulation the government annually determines the supply limitations of energy consumed by regions and responsible agencies.[25] As a result, many public buildings operators reduce energy supply in order to comply with the government order, which leads to lower and often sub-standard comfort levels (in such areas as indoor temperature and lighting). The order is provided either in physical terms (e.g. electricity amount in kWh or fuel amount in liters) or monetary terms (the cut in the energy supply budget, in KGS) and often forces building operators to switch to lower-cost types of energy (coal, for example) to maintain a certain level of heating. **Table 2.3 (in the main text) lists other regulations applicable to EE in public building in the country.**

Energy Certification and Energy Passports

The purpose of the **energy passport**, which is based on Decree No. 255 (discussed in the previous section), limits the consumption of energy by public organizations. The purpose of a public building's energy passport is to collect building data from municipalities and energy companies in order to determine energy demand and energy supply limits. Energy passports are the basis for imposing a limit on the consumption of energy resources by public institutions. They are not intended to monitor or improve the energy efficiency of buildings. The passport is prepared by the institution itself, sometimes with the support of local power utility experts. The accuracy of its content must be verified by the State Inspectorate for Environmental and Technical Safety – although due to a lack of staff and monitoring, data reliability is poor.

Energy performance certificates,[26] on the other hand, are issued for new construction and building rehabilitation. The Law on the Energy Performance of Buildings obliges public building operators to prepare energy passports for public buildings and boiler houses and lays out the provisions and verification procedures. Due to the absence of certified energy efficiency specialists (see Chapter 4), very few new or retrofitted buildings have been certified up to now. After a building is retrofitted it will need to meet the energy performance certification of class "B" in accordance with the building's type, function and location in a climatic zone. Despite the existence of a legislative basis for energy performance certification, a responsible state institution for implementation and enforcement as well as a pool of qualified experts is not yet available.

Building-related Technical Regulations, Norms and Standards

The Law on the Energy Performance of Buildings presupposes the application of minimum energy efficiency norms to buildings – meaning that the structures and components of new and retrofitted buildings[27] must adhere to minimum requirements for thermal conductivity. These standards and requirements are rooted in "SNiPs" (construction standards and regulations) originally used in the former Soviet Union to regulate building construction; the Kyrgyz Republic uses them in part through its accession to the Eurasian Economic Union (EUAU) in 2015. **Many of those SNiPs are outdated, and there is an urgent need to update them to**

reflect best-practice energy-efficiency technologies and materials in building design and implementation.

Some areas, such as building-integrated renewable energy, are not covered by SNiPs. Due to insufficient institutional capacities, limited efforts have been made to reform technical construction and equipment standards, resulting in a mixture of SNiP and technical norms. Moreover, there is a large gap between the level of implementation and policy as project design and construction companies rely on existing technical documents that are outdated in terms of compliance with politics and the market. Also, contractors and design institutions usually apply all norms/standards to comply with the requirements, leading to very high retrofit costs.

2.3 Budgeting in the Public Buildings Sector

Operational Expenditures

Operational expenditures (including the cost of energy) for the public buildings sector are paid for mostly out of the central government budget of the Kyrgyz Republic but channeled through different municipalities and oblast administrations, depending on the responsibility for building operation.[28] Local funding originates from local taxes and is kept locally. Due to the low economic development of most Kyrgyz regions, most oblasts and municipalities are heavily subsidized by the central budget. The distribution of funds for building operations follows the budget classification and is intended to provide the basic function of the public service (education, health care, administration, etc.).

Municipalities can reallocate funds according to demand and availability. Reduced spending in one sector – such as energy bills – does not reduce budget transfers. However, retaining those savings is not possible which represents a barrier to increased energy efficiency investments by municipalities. Financing of public buildings energy supply is subject to annually adjusted limits determined on the basis of the previous year's consumption of energy resources (coal, electricity, etc.), and agreed for the subsequent heating season.[29]

The current setup for funding operational expenditures is heavily bureaucratic and can cause disbursement delays (and, consequently, liquidity shortages) on the side of the municipalities. This can increase municipal debt to energy utilities and ultimately result in power cut-offs.[30]

Despite the existence of an effective procedure for planning local budgets, there are several factors that constrain the development of sound public buildings energy budgets, such as:

- Incomplete or missing data to confirm real energy demand and consumption, such as energy passports, or technical passports of power equipment;
- Failure of the management of public organizations to submit draft budgets containing precise forecasts to the local council (the “City Kenesh” or the “Kenesh”) in writing; and
- Failure of the Kenesh to scrutinize draft budgets on building expenditures.

Public building operators and responsible departments in the local administration often cannot determine the real demand of energy and respective expenditure for the next heating season. As a result, budgeting of energy expenditure is often done on a provisional basis.

The *Open Budget Portal* of the Ministry of Finance discloses budget and expenditure data for each agency and according to budget categories.[31] [32] An analysis of the data reveals that housing and utility expenditures amount to 1.43% of the central government budget and 3.25% of the local budget.

Local Budget Development

Proposals for and approvals of national and local budgets are conducted publicly during open sessions of the Kenesh and public hearings. The main body of this report describes this process in detail.

2.4 Public Procurement

Sound public procurement can help improve energy efficiency through methodologies that consider the potential energy consumption and related costs of **procured equipment and services**. All budget organizations procure goods and/or consulting services in accordance with the Law of the Kyrgyz Republic on Public Procurement of April 2015.[33] Tender procedures are conducted through the official web portal for public procurement[34] and according to different procurement methodologies to determine price and quality. A *tender* commission – i.e. an entity like the Planning and Budget Commission, which focuses on tenders and public procurement – ensures the sound process and compliance of the proposal with the terms and conditions of the technical specifications.

Procuring entities develop procurement plans on the basis of requests from the operators of the country's public buildings (kindergartens, schools, and hospitals). The plans contain information on the subject of public procurement, its quantity and expected prices, and the timing of procurement. There is no mandatory energy efficiency performance requirement of the purchased goods by law, but the procuring entity can add energy efficiency requirements to the tender specifications. **Most tender procedures select the winner by choosing the lowest-price offer**; in other words, restrictive procurement rules are biased towards lowest-price procurement and do not reflect the full cost of ownership (i.e. lifecycle cost). The current public procurement regulation does not consider criteria for reduction of building-operation or energy-supply costs. With respect to energy efficiency, the criteria for lowest life-cycle costing could be applied to reflect this, but the concept remains theoretical due to (i) a lack of life-cycle cost-benefit assessment, (ii) insufficient capacities to establish an EE project investment case, and (iii) a lack of detailed analysis for the evaluation. Consequently, the lowest initial price remains the decisive criterion.

Another challenge for scaling up energy efficiency through procurement is that **budgets in the public sector are submitted and approved on a single-year basis rather than on an extended (e.g. five-year) basis**. This makes multi-year planning for facility upgrades quite difficult and, in general, can impede the multi-year contracting. An annual budget over one year is too short for adjusting expenditure priorities. This is particularly problematic for energy performance contracting (EPC), since such contracts require several years of energy savings before the investments are recovered. **Multi-year budgeting** could ensure that commitments made by governments are consistent with the medium-term fiscal outlook. Multi-year budgeting would also allow for better connections between policies, planning and budgeting.

2.5 Financing of Energy Efficiency in the Public Buildings Sector

Because the potential positive macroeconomic effects of energy efficiency are not well known in the Kyrgyz Republic, **there is a lack of financial resources allocated for large-scale energy efficiency rehabilitation in the public buildings sector**. Funds allocated to the renovation of buildings usually do not include measures for improving energy efficiency and most renovation programs entail replacing only windows, lighting and heating systems. Building operators can tap into different funding sources for building renovation, such as municipal or regional budgets and central government funds (partly through the Community Development and Investment Agency of the Kyrgyz Republic, ARIS). At the request of local authorities, schools can apply for "stimulating" grants provided by the Ministry of Finance.[35] These funds are provided by the national

budget on a competitive basis that requires co-funding from local budgets. Funds can also be allocated from the District Development Funds, which are formed as a 2% share of the total tax paid by the country's mining companies.[36] Usually, funds are allocated for urgent repairs of buildings, but mainly the funds are allocated to the needs of social facilities through village or district administrations. The Kyrgyz government also has a program called "Safe Schools and Pre-School Educational Organizations," which aims to build or rebuild more than 2,000 schools and kindergartens in 2015-2024[37] at an overall cost of almost 50 billion KGS.

With help from donor agencies, the government has also piloted EE projects using purely grant or budget financing. These projects have generally demonstrated high levels of energy savings and good payback periods considering the low electricity costs. In addition, such projects provide substantial co-benefits including building modernization, improved comfort, and increased awareness.

However, the main lessons learned from these projects indicate that there can be very limited replication of donor pilot programs and grant financing **without substantial investments; a sustainable, scalable financing mechanism; and the participation of the private sector**. At the same time, **energy efficiency investment in large public buildings or bundles of investment projects could generate cash flows from cost savings that can be used to repay the initial investment costs.** Various countries have implemented a range of sustainable financing and implementation options, to enhance the financial leverage of public funds and/or to better transition to commercial funding for public sector EE projects by involving the private sector. In the Kyrgyz Republic, however, **there are currently no financial products offered by commercial banks targeted at EE rehabilitation in the public buildings sector.** This is chiefly because:

- Public buildings do not generate income;
- Public buildings are state property and cannot be used as a real estate collateral;
- For any work or service involving a public building, building managers must obtain permits from the relevant line ministry representatives (Ministry of Education, Ministry of Health, etc.);
- The budgeting code does not allow a public agency to retain energy cost savings; and
- Alternative obligations to increase a public borrower's performance[38] under a loan agreement (such as bail, guarantees, or penalties for late payments) are considered complex procedures by local commercial banks and usually not applied.

3 Energy Efficiency Supply and Service Market

The private sector is an important actor for developing a market for energy efficiency products and services and to eventually scale up energy efficiency in the public buildings sector. The energy efficiency market in the Kyrgyz Republic is still in its infancy and currently focused on providing services and equipment for project preparation and implementation, such as for energy auditing and construction services or energy efficiency equipment providers. Due to a lack of norms and quality performance criteria, there is a high variability of quality and cost across the different technologies and services offered. Also, while demand exists throughout the Kyrgyz Republic, most of the companies are located in Bishkek and Osh, which restricts access for rural communities to those technologies and services. As illustrated in Figure ES-2, the energy services value chain encompasses a wide range of activities.

Figure ES-2. Energy Services Value Chain

There are many different types of energy service providers that may provide some or all of the elements of the value chain; these are commonly referred to as *energy service companies* (ESCOs). An ESCO generally performs these services using a performance-based approach known as *energy performance contracting*, or EPC. The main characteristics of EPC as offered by ESCOs are as follows:

- An ESCO provides or arranges a wide-ranging package of services comprising many or all of the elements of the energy services value chain.
- The services are offered using business and financing models under which customers effectively pay for the energy services from the energy cost savings achieved.
- Payments to the ESCO are contingent upon achieving guaranteed performance.
- Most of the project risks are assumed by the ESCO.

3.1 Energy Services, Buildings Design and Construction Services

Starting in 2013 and according to the Law of the Kyrgyz Republic on "Licensing",[39] the design and auditing of public buildings, as well as construction and installation works, are subject to mandatory licensing of the service provider. This means that building designers, seismologists, engineers, and so on must all obtain a qualification certificate issued by the Kyrgyz government. However, although there are approximately 70 experts in energy efficiency and HVAC (heating, ventilation, and air conditioning) technologies in the Kyrgyz construction sector, **there are no specialists in building energy efficiency**. While regulatory requirements exist for energy performance certification of buildings and monitoring of equipment, the lack of an approved qualification certification by Gosstroy means that specialists have officially not yet been trained.

Energy auditing is not regulated, and no obligatory licensing is required for this service. One of the origins of this problem is **the lack of an institution in charge of standardization**.

The construction sector is better represented and organized. More than 700 construction companies are registered in the Kyrgyz Republic, with the largest concentration of developers in Bishkek. While many construction companies participate in the energy efficiency market, **only a few have a well-educated labor force capable of installing thermal insulation such as rock wool and EE windows**. Building companies are graded according to their ability to perform work of a certain degree of complexity.[40]

In order to obtain a license, the company must present the following information:

- Information about the enterprise's state registration, tax payments, and insurance premiums;
- General information about the organization, such as the qualifications of its managers, specialists, and workers and information about its technical base; and
- Procedures for ensuring quality control and production safety.

A legal entity must have at least one specialist with the appropriate certification for each type of requested activity and work. Licenses are issued without limitation of the term and territory of action.

In 2015, the State Construction Committee of the Kyrgyz Republic initiated an initiative on electronic licensing[41] to reduce the costs for applicants and budget expenses for the purchase of forms and delivery.

It is important to note that the leading construction organizations that carry out the construction of complex buildings **are usually not interested in the construction of public buildings**. Instead, they focus on the construction of facilities with short payback periods. Companies that compete for public-buildings works are often founded for the express purpose of participating in public tenders, and work quality is often lower due to lower levels of experience.

Table 3.1 (in Chapter 3) provides a summary overview of market actors, including their respective capacity levels.

3.2 EE Equipment Suppliers

The market for energy-efficient materials and equipment in the Kyrgyz Republic is relatively well developed. However, **most energy-efficient materials and equipment must be imported**. There are only a few domestic producers of energy-efficient materials.

In accordance with the requirements of the Eurasian Economic Union and the Law on Technical Regulations for the Safety of Construction Materials, Products, and Structures, energy-efficient equipment is exempted from mandatory conformity assessment. This means **there are no performance requirements for the energy efficiency of imported equipment that could prevent the import of low-energy-efficiency performance technologies.**

Similarly, equipment classified as a "renewable energy source" (RES) is exempted from custom duties in accordance with the Law on Renewable Energy Sources (since 2008). However, the definition of RE technology is weak. A survey of technology suppliers showed that the interpretation of equipment differs. More advanced heating technologies, such as heat pumps, are not explicitly exempted from import duties.

Most of the companies are located in Bishkek, in the City of Osh, as well as in regional centers. Companies located in regional cities usually purchase equipment through dealers in Bishkek. Some advanced technologies (heat pumps, solar systems) are available for sale in Bishkek only.

The market for plastic windows is the most developed of all the energy-saving technologies: approximately 1,000 companies supply, produce, or install windows in the Kyrgyz Republic. An important challenge with respect to window manufacturing (and to boilers and thermal insulation material) is **the absence of a domestic laboratory to certify the heat coefficient (U-value) of windows**. Domestic manufacturer thus need to rely on laboratories abroad – but because this is expensive and often not feasible for small manufacturers, it ultimately means that few producers can obtain energy efficiency certificates for their products.

4 Summary of Key Barriers to Public Sector EE Implementation

International experience shows that the main barriers to public EE implementation can be classified as follows:

- Legislative and regulatory barriers (RB)
- Institutional barriers (IB)
- Budgetary barriers (BB)
- Capacity barriers (CB)
- Financing barriers (FB)
- Market barriers (MB)

With reference to this classification, **Table 4.1 (in Chapter 4) contains an extensive summary of the major barriers to public sector EE implementation in the Kyrgyz Republic.**

5 Vision 2040 for an Energy-Efficient Public Building Stock

The government of the Kyrgyz Republic has committed to achieving the UN Sustainable Development Goals (SDGs). **SDG 7 is to "ensure access to affordable, reliable, sustainable and modern energy" by 2030** –

specifically by increasing substantially the share of renewable energy, doubling the rate of energy efficiency improvements, enhancing international cooperation to facilitate access to clean energy research and technology, promoting clean energy technology and energy efficiency investment, and expanding infrastructure and upgrading technology for supplying modern and sustainable energy services.[42]

In December 2015 the Kyrgyz Republic submitted its **Nationally Determined Contribution (NDC) to the UN Framework Convention on Climate Change (UNFCCC)**, which foresees a reduction in "business-as-usual" (BAU) levels of greenhouse gas (GHG) emissions in the range of 11.5 -13.75% by 2030 and 12.7 -15.7% by 2050.

The general economic and energy sector development targets of the Kyrgyz Republic, like those for energy efficiency and renewable energy, are not well-formulated. **It is thus important to develop a vision for an energy-efficient public buildings sector and define specific targets for its implementation**. Several key energy policy objectives are set by the Kyrgyz government according to the draft "Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040" document. However, while these energy policy priorities offer an entry point for increased energy efficiency action, the main challenge is to make public buildings energy efficiency a priority among the relevant institutions of the Kyrgyz government. This report thus suggests the following "**Vision 2040**" list of medium- and long-term targets for a sustainable, climate-resilient, safe and low-carbon public buildings stock in the Kyrgyz Republic by 2040. The medium-term targets (through 2030) are designed to establish a supportive policy and regulatory framework and to develop and strengthen institutional capacities – so as to provide the basis for scaled-up investments in the sector.

Medium-Term Targets (by 2030)

- Establish and implement a target to reduce annual energy consumption in the public buildings sector by at least 25-30% (or 250 GWh) compared to the baseline year of 2017.
- Amend laws, budget codes, procurement rules, and energy efficiency performance requirements and norms to stimulate EE scale-up of retrofits and new construction.
- Develop, budget and launch a dedicated public buildings investment program to address retrofit needs in at least 5,000 public buildings, including upgrading of all public buildings to performance Class B from a current performance class of D or lower.
- Establish and operationalize a dedicated public entity (unit/institution/agency/department) to manage the public buildings stock and the investment program and to play a lead role in coordinating and building capacity in market stakeholders and sectoral institutions.
- Develop and operationalize a financing mechanism to encourage energy efficiency investments in the public buildings sector (e.g. by combining existing budget lines for building operation and retrofit with external financing).

Long-Term Target (by 2040)

Upgrade at least one-third of the public building stock to Class "A" (net-zero-energy buildings, or NZEBs), with the remainder upgraded to at least Class "B".

6 Roadmap for an Energy-Efficient Public Building Stock

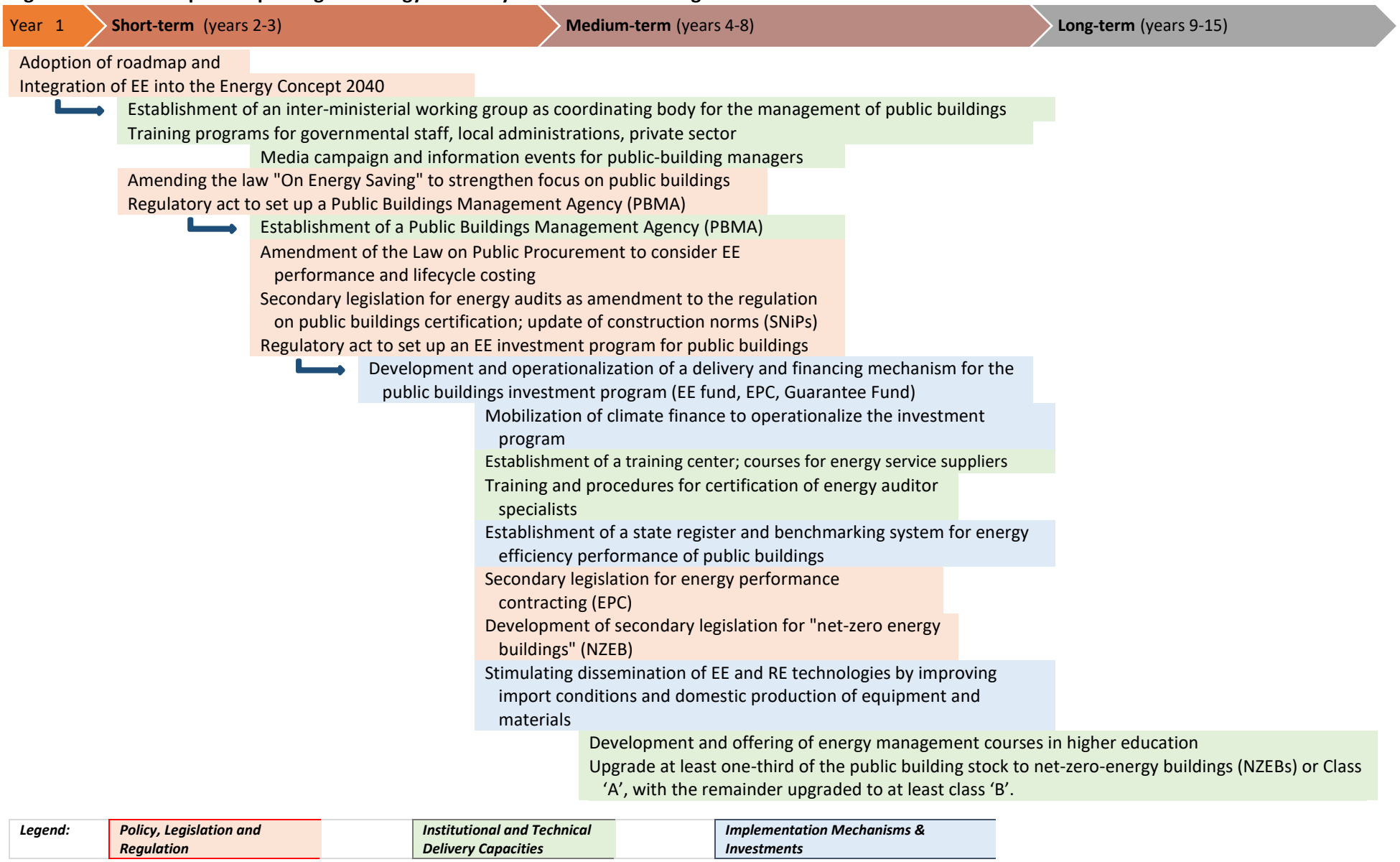
In order to address the identified barriers and operationalize the Vision for an energy-efficient public buildings sector by 2040, it is important to develop a **roadmap** that sets out the steps and timeframe necessary to:

- *Improve the political and regulatory framework for EE;*
- *Strengthen delivery capacities*; and
- *Scale up EE investments* by developing and implementing instruments.

The following roadmap – along with the accompanying **catalogue of recommended measures** – recommends a time-bound sequence of measures that are grouped according to the three areas – *policy, legislation and regulation (in orange); institutional and technical delivery capacities (in green); and implementation mechanisms and investments (in blue)* – and structured as *short-term* (1-3 years), *medium-term* (4-8 years) and *long-term* (10-15 years) measures.

Although the State Committee for Industry, Energy and Subsoil Use (the "State Energy Committee") plays a crucial role in setting the cross-sectoral framework for EE, local authorities can stimulate EE investments and accelerate implementation through their own sound strategies and policies.

Figure ES-3. Roadmap for Improving the Energy Efficiency of the Public Buildings Sector



Catalogue of Recommended Measures

In addition to the roadmap, the main body of this document contains an extensive **catalogue of recommended measures (Table 6.1 in Chapter 6)** designed to address the specific barriers identified earlier.

Operationalizing the Roadmap

The public buildings sector is plagued by highly fragmented institutional responsibilities, regulatory gaps and lack of coordination. In order to operationalize the preceding **roadmap** and implement the numerous measures laid out in the roadmap **catalogue of measures**, it is important to first address the most rampant deficiencies and establish an enabling environment. **The following four immediate actions are recommended to empower the government of the Kyrgyz Republic to implement the roadmap:**

- Strengthening the coordination of relevant agencies
- Strengthening the regulatory framework
- Establishing a public enterprise for public buildings management
- Developing financing mechanisms

1. Strengthening the Coordination of Relevant Agencies

The government should establish a **Coordinating Council for Energy-Efficient Public Buildings** as an inter-ministerial working group under the State Energy Committee. As a model, it could use the existing World Bank HSIP Project Selection Commission (which comprises representatives from the Ministry of Emergency, the Ministry of Health, the Ministry of Economic Development, the Ministry of Finance, the State Property Management Fund (SPMF), the State Committee on Penalty Control, etc.). The Council should have the following functions:

- Sector-wide coordination of, and consensus-building toward, the development of energy efficiency retrofit investments in the public buildings sector;
- Facilitation of the measures and regulatory acts necessary to address identified barriers;
- Coordination of support, assistance and funding instruments and projects by international donors in the EE sector; and
- Supporting legislation related to a national energy efficiency investment program for public buildings (see next section) and a regulation governing the establishment of a dedicated implementation body.

2. Strengthening the Regulatory Framework

The current draft “Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040” offers an opportunity to integrate the findings of this roadmap to showcase the enormous energy-saving potential in the Kyrgyz public building stock. The following legislative and regulatory changes are urgently needed to establish the right legislative framework for energy efficiency:

- An amendment to the "Resolution of the Government of the Kyrgyz Republic on the Preparation of the Economic Sectors and the Population for the Autumn-Winter Period (May 24, 2018, No. 249) to introduce the obligation to verify the energy efficiency performance of public buildings;
- A new regulatory act or law establishing a comprehensive energy-efficiency investment program for public buildings; and
- Amendments to the Law "On Energy Saving" with a strengthened focus on public buildings and secondary legislation for energy services and energy performance contracting, including amendments to relevant public procurement laws

3. Establishing a Public Enterprise for Public Buildings Management

In order to institutionalize and streamline the responsibility for public buildings, it will be important to set up an agency that has the political mandate and appropriate budget to work across stakeholder institutions. Setting up the agency as new, unified state enterprise on a cost-accounting basis and as a 'one-stop-shop' for management of all buildings can pool the authority:

- for purchasing and payment for utilities (energy);
- for management of building maintenance;
- for preparation of building retrofit investments (with a focus on energy efficiency), including energy audits;
- for implementation of building retrofit investments (acting as a Program Implementation Unit;
- to implement accompanying information and capacity-building measures, such as guidelines and training for subordinated project institutions and suppliers;
- to accumulate revenues from energy savings and allocate them to project reinvestment; and
- to monitor, evaluate and report on financial flows, results and achievement of targets.

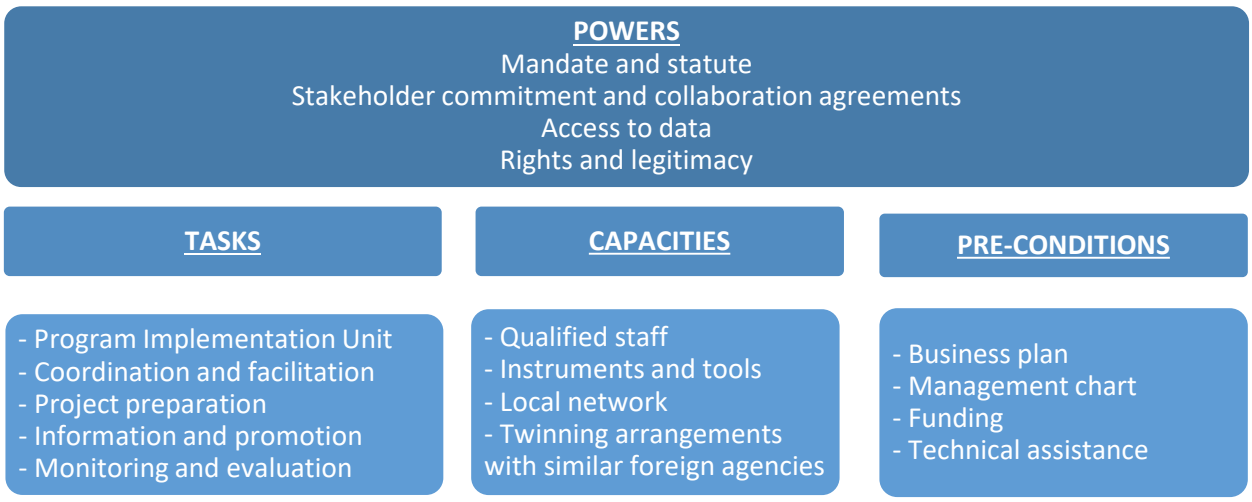
Once the government decides to establish a dedicated implementation agency, it will need to:

- prepare a regulatory act establishing an agency responsible for the management of public buildings and task it with the necessary responsibilities, supervisory board and functional operations budget;
- conduct business planning, including: developing tasks and targets for program preparation and implementation; analyzing the market and determining the extent of the investment program; and establishing rules, procedures, instruments and financing mechanisms; and
- engage key staff by (i) nominating the supervisory board members and (ii) identifying and hiring key experts of the agency,[43] starting with the director and key engineers and economists.

Given the current institutional structure of public building management in the country, it is recommended to focus initially on educational and health facilities (schools, hospitals/policlinics), with later expansion to social and municipal public buildings (kindergartens, etc.). There are various options for the organizational structure of an implementation agency:

- A dedicated administrative unit within the Ministry of Energy or State Energy Committee;
- A dedicated administrative unit within the Fund on State Property Management; or
- An independent entity of governmental state enterprises in the form of an Energy Agency.

Figure ES-4. Key Requirements and Elements of a Public Buildings Agency



4. Development Financing Mechanisms

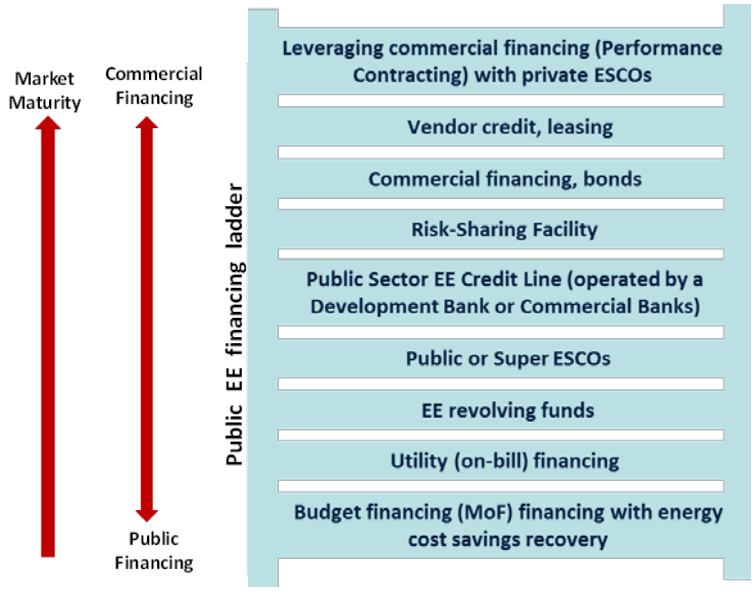
Judging from the audits conducted in 14 buildings under the World Bank's Heating Supply Improvement Project (HSIP) and Urban Development Project (UDP) in the Kyrgyz Republic, EE investments have to date demonstrated solid energy savings of 60-70%. This means the techniques implemented will significantly reduce the energy cost for respective central and local governmental agencies. However, despite the positive results of these pilot projects, there is limited replication potential because grant financing is scarce. It is generally recognized that such grant and budget financing is not sustainable in the long term, and that EE projects generating cost savings can be used for repayment of the investment costs.

Various countries have implemented a range of different sustainable financing and implementation options to enhance the financial leverage of public funds and/or to better transition to commercial funding for public sector EE projects. A review of international experience with public sector financing reveals various options for providing financing for public buildings. **Perhaps the best such option is energy performance contracting (EPC)**, under which an energy service company (ESCO) finances energy efficiency investments and, subsequently, is repaid through the full or partial annual energy savings achieved throughout the contract period. Under an EPC, the revenues obtained from energy savings should be used both to refinance obligations and to fund other EE interventions. Hence, the EPC could establish a corridor through which EE savings can flow from one project to another.

EE investments under the EPC scheme would first need to take initial steps to lay the groundwork for project implementation, including development of the EPC framework, setting up guarantees, and outlining expected results following execution of EE measures. Thereafter, private ESCOs can help overcome barriers in scaling-up implementation of EE projects in the public sector.

Figure ES-5 illustrates the different financing options in the form of **a "financing ladder" for public sector projects**. The ladder includes the **various options identified in Annex B of this document** plus the two non-sustainable options (grant financing and budget financing). At the bottom of the ladder are options that rely almost entirely on public financing (such as budget and grant financing), while the top of the ladder represents mostly private financing using commercial lenders. Moving up the ladder leads to increasing levels of private financing and requires increasing levels of market maturity.

Figure ES-5. Illustrative Financing Ladder for Public Sector EE Projects



1 Energy Efficiency Potential in the Kyrgyz Public Buildings Sector

In the Kyrgyz Republic, the term *public buildings* refers to buildings and facilities designated for public use, including those occupied by authorities and administrative bodies. Construction design standard ("SNiP")[44] KR 31-04-2001, "Public Buildings and Structures,"[45] lists the following public building types:

- Educational buildings (buildings used as premises for child-rearing and personnel training);
- Research institutions, project and public organizations, and offices;
- Health and recreation institutions;
- Physical culture, health, and sports facilities;
- Cultural, educational, and entertainment institutions;
- Trade, public catering, and consumer services enterprises;
- Transport enterprises providing direct services to the population (stations);
- Public utilities (except for industrial, storage, and transport buildings and structures).

1.1 Public Buildings Inventory

In May 2018, an analysis of the Kyrgyz public buildings stock was conducted to develop a public buildings inventory and to identify the overall energy efficiency potential and the corresponding investment demand[46] in the sector. The inventory encompasses buildings that are owned by the government – that is, state or municipal property, usually referred to as *state-financed institutions*. This includes buildings that are privately owned but of social significance (schools, kindergartens) and have an appropriate legal status. The state-financed institutions in this document are as follows:

- Educational institutions under the Ministry of Education;
- Health facilities under the Ministry of Health;
- Public administrative buildings under the State Property Management Fund;
- Social institutions under the Ministry of Labor and Social Development; and
- Buildings occupied by rural clubs, libraries and other cultural establishments under municipalities and local self-government authorities.

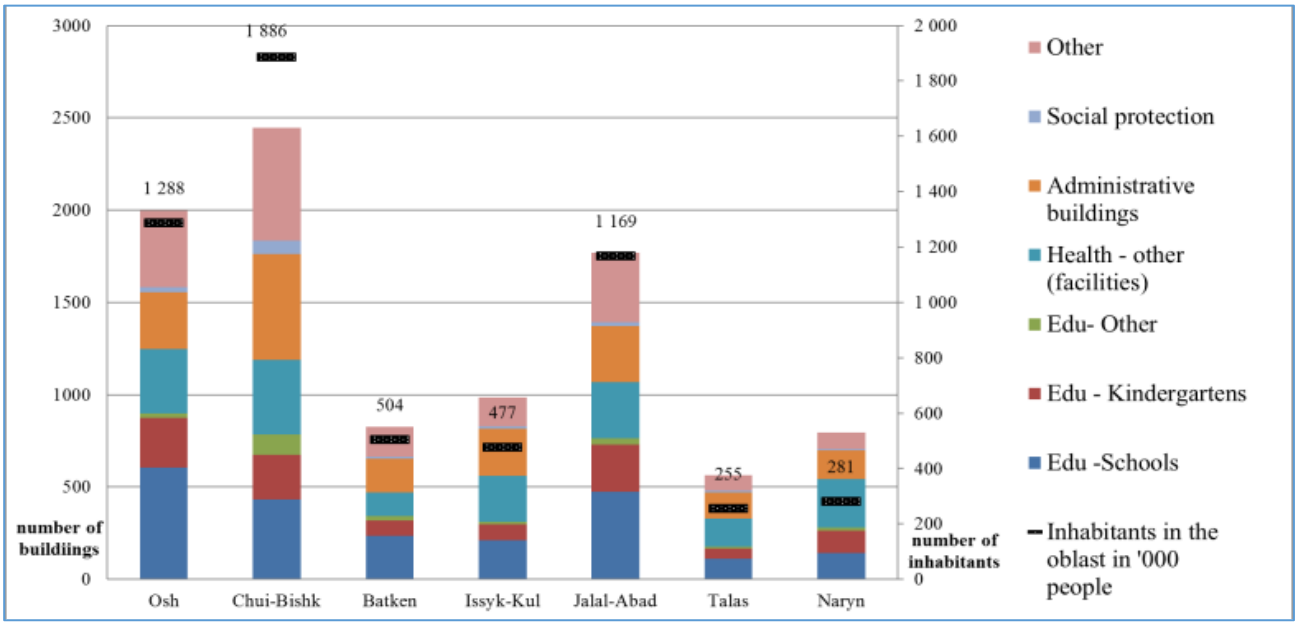
The analysis found that there are 9,780 public buildings in the Kyrgyz Republic. The number of buildings correlates with the distribution of the Kyrgyz population: most buildings (mainly schools, kindergartens, and government offices) are located in the Chui Oblast, which hosts 32% of the country's population, whereas the least number of buildings can be found in the Talas Oblast, home to only 4% of the Kyrgyz population (Figure 1.1).

The public buildings inventory defined three main categories:

- Educational buildings (schools, kindergartens, higher and other education facilities);
- Healthcare buildings (hospitals, policlinics,[47] and other small health facilities); and
- Other buildings (including administrative buildings and social protection).

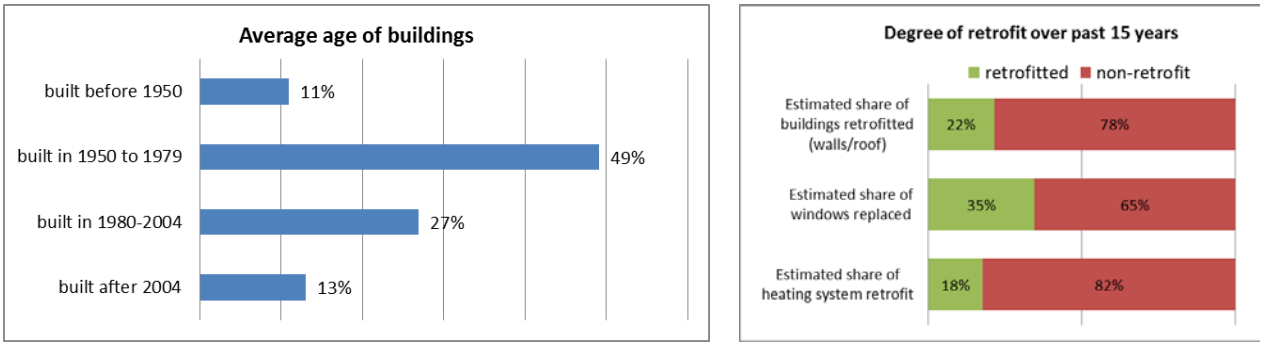
One-third of the public buildings stock are educational facilities, representing 60% of the overall heated floor area. The health sector exhibits the smallest floor area of the three categories but with a high number of small buildings.

Figure 1.1. Public Buildings in Kyrgyz Regions, by Population Distribution



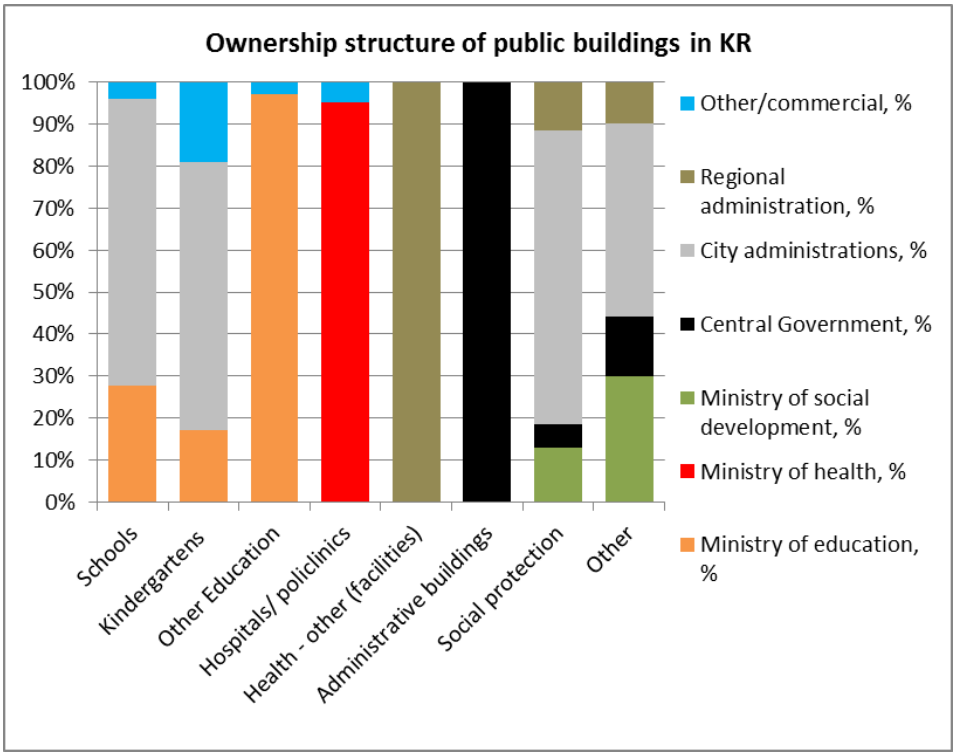
On average, the condition of buildings is considered to be satisfactory. However, about 50% of the building stock considered within the research was built between 1950 and 1980 and, which means it has been in operation for 40-60 years; thus, only a minor share of buildings benefitting from the retrofits that have occurred during the last 15 years (Figure 1.2).

Figure 1.2. Public Buildings: Stock Age and Current Degree of Energy Efficiency Retrofit



As Figure 1.3 shows, the sectors with the largest floor area – namely, schools and kindergartens – have a relatively fragmented ownership structure. A small share of kindergartens, schools and small health facilities is in commercial ownership.

Figure 1.3. Ownership Structure of Public Buildings in Kyrgyz Republic



1.2 Energy Efficiency Potential in the Public Buildings Sector

Public buildings in the Kyrgyz Republic consume about 850 GWh of energy annually.[48] 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 one of the largest energy end-consumers. However, the sector is plagued by energy supply shortages, resulting in underheating of public buildings during winter with comfort conditions far below norm requirements. The specific energy consumption currently averages 162 kWh per square meter of floor area, while demand averages 250 kWh per square meter. Approximately 70 to 88% of energy use in public buildings can be attributed to space heating, and electricity is used for space heating in 60% of all public buildings.

Based on a number of energy audits in schools and hospitals (as well as the 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, or 500 GWh/year. This retrofit effort would require investments worth US$1.085 billion and would bring the entire public buildings stock into compliance with Class B energy performance requirements – which, according to Kyrgyz national legislation on building energy performance, are the current minimum requirements for energy efficiency performance.

Energy efficiency potentials were determined on the basis of two scenarios: (i) a *standard* energy efficiency (EE) technology scenario and (ii) an *advanced* EE technology scenario.

Standard EE technologies are recommended in order for buildings to comply with the minimum energy-performance requirements (Class B) in the Kyrgyz Republic. This approach follows domestic best practice and comprises commonly applied technologies for building retrofits in the country.

Advanced EE technologies were assessed in terms of the following criteria:

- Innovative in the Kyrgyz context and capable of delivering additional energy savings and ensured economic viability;
- Domestic representation through suppliers and reference projects in the local market, and through the existence of sufficient local capacity to design, install and operate equipment;
- Technical feasibility and applicability of the selected building;
- Low levels of operational risk;
- Potential to increase the level of the building's function, safety and value;
- Potential for country- and sector-wide scalability.

Table 1.1 shows EE measures grouped by "packages" that address the different investment needs of the Kyrgyz public buildings and are the result of the on-site energy audits.

Table 1.1. Catalogue of Energy Efficiency Intervention Measures

Standard EE technologies	Advanced EE technologies
Package A. Building envelope retrofit	
Replacement of windows	
Replacement of outside doors	
Insulation of external walls	
Insulation of roof ceiling (attic)	
Insulation of floor ceiling	
Room ventilation system	Ventilation system with heat exchanger
Package B. Space-heating system retrofit[a]	
Renewal of heating network and radiators	
Electric boiler replacement	Heat pump for space heating (replacing the standard technology solution)
Coal boiler replacement	
Installation of a modern district heating (DH) substation (in case of DH supply)	
IR ceramic heaters (room based)	
Package C. Lighting system and sanitary hot water[b]	
LED lighting, indoor and outdoor	
Replacement of electric devices (such as kitchen and education equipment)	
Replacement of boilers or network of sanitary hot water	Heat pump for sanitary hot water (replacing the standard technology solution)
	Solar collector for sanitary hot water
	Energy monitoring and management system (optional for large facilities)

[a] Renewal of the heat generation (e.g. electric or coal boiler) is recommended for most buildings. Rehabilitation of the building internal heating system (pipes, radiators, thermostat valves) is usually necessary to i) ensure a balanced distribution of heat to the rooms according to demand, ii) to reduce heat energy and hydraulic losses, iii) to enable room-based temperature control (to set-point of 20° C) and avoid over-heating and energy losses.
[b] The renewal of kitchen equipment and other electric devices (such as education and IT equipment) are not taken into consideration.

Five advanced technologies were identified (in a separate World Bank market assessment) as most appropriate for the Kyrgyz public buildings context. They can be implemented in 70–80% of all existing public buildings in addition to the standard energy efficiency measures:[49]

1. **Heat pumps for space heating** can replace electric boilers and save up to 65% of current electricity consumption for space heating. Heat pumps have very good economic viability.
2. **Heat pumps for sanitary hot water** (**SHW)** can replace electric boilers and save up to 73% of current electricity consumption for hot water production. This technology has the best economic viability of all water heating equipment in the country.

3. **Lighting control systems** include daylight and movement sensors to control the lighting intensity according to the demand in particular rooms. This technology is recommended for application in public buildings with varying room-occupancy rates, such as large health or education administration buildings.
4. **Ventilation systems with heat recovery** are necessary to ensure air exchange; these can reduce heat losses (through controlled air exchange) by up to 60%.
5. **Combined PV / battery systems for hospitals or policlinics** – to replace emergency diesel generator sets and increase building-operation resilience by providing baseline power supply and emergency power supply during power outages.

Table 1.2 summarizes findings for key technologies (by public building type) from the aforementioned World Bank public-buildings inventory and market assessment. It also displays the applicability of various advanced EE and renewable energy (RE) technologies.

Table 1.2. Applicability of Advanced EE and RE Technologies

Energy consumption purpose	Schools	Pre-schools/ kindergartens	Hospitals/ policlinics
Ventilation	Ventilation with heat exchange via central HVAC	Room based ventilation with heat exchanger	Ventilation with heat exchange via central HVAC
Energy management			Building energy management system
Sanitary hot water	SHW heat pump	SHW heat pump	SHW heat pump
Space heating	Large heat pump + ventilation via HVAC or Large heat pump + heat network	Large heat pump + heat network	Large heat pump + ventilation via HVAC
Lighting control			Lighting control (including LED lighting)
Emergency power			Rooftop PV + battery unit

Note: HVAC = heating, ventilation, and air conditioning unit. PV = photovoltaic. SHW = sanitary hot water.

1.3 Costs and Economic Benefits of an EE retrofit

The public building stock in the Kyrgyz Republic covers almost 10,000 buildings, of which approximately 5,000 are deemed retrofittable.[50] The estimated investment demand for those buildings amounts to US$1.085 billion and would deliver energy savings of between 55 and 75%. With 3,350 units, educational buildings represent the largest share of buildings in need of rehabilitation, in terms of both floor area and number of buildings.

Table 1.3. Energy Savings Potential in Public Buildings

Building type	Estimated number of buildings for EE retrofit	Building stock floor area for retrofit (m^2)	Energy savings potential (MWh/yr)	Average energy savings ratio (%)	CAPEX for energy savings retrofit (US$, millions)
A: Education (schools, kindergartens, higher and other education facilities)	3,350	3,270,322	280,225	60-65	458
B: Healthcare (hospitals, policlinics, other small health facilities)	400	210,668	18,637	55-70	344

C: Other (Administrative buildings, Social protection, other, etc.)	1,250	1,811,347	191,501	60-75	283
Total	**5,000**	**5.3 million**	**490,363 (i.e. about 500 GWh/year)**	**55 -75**	**1,085**

Note: Data based on World Bank (2018), *Analysis of Public Buildings Stock and EE Potential* (internal report).

As Table 1.4 shows, specific investment costs for the complete package of standard and advanced EE measures (Packages A, B and C as shown in Table 1.1) range between US$140 and US$190 per square meter.[51]

Table 1.4. Costs and Expected Results of Energy Savings Interventions in Public Buildings

Technology type	Specific annual energy saving (kWh/m²)	Specific Investment (US$/m²)
Standard/ conventional EE technologies	80-110 (~ 50% EE)	80-100
Building envelope: Insulation of external walls, roof and floor ceiling, replacement of windows and doors		
Room ventilation system		
Heating system: New heating boilers, retrofit of heating network, hydraulic balancing, radiators, thermostatic valves		
Energy-efficient lighting (LED) indoor + outdoor		
Innovative technologies	35-55 (additional ~ 20% EE)	70-100 (additional costs)
Ventilation system with heat recovery		
Heat pumps for space heating		
Sanitary hot water: Solar collectors or SHW heat pumps		
Building energy management systems and lighting control		
Overall (conventional + advanced technologies)	**100–160 (60-70% EE)**	**140-190**

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.[52] The ratio of the invested CAPEX for the EE retrofit to the forecasted lifetime energy cost savings is at a level of US$0.05 per kilowatt-hour (3.6 KGS/kWh); this means that for every kilowatt-hour saved, US$0.05 (5 U.S. cents) of investment is needed, which is a good ratio.

A calculation of energy cost savings – based on the Kyrgyz long-run average incremental cost (LRAIC)[53] – generates approximately US$69 million in annual savings for the whole public buildings investment program, with a simple economic payback period of between 11 and 13 years. This is a good level of profitability for public infrastructure retrofit projects; it would also create additional economic benefits in terms of building comfort, function and safety.

2 Institutional, Legislative and Financial Framework

2.1 Institutional Structure

The promotion of efficient energy end-use is a low priority in the Kyrgyz government, especially in the context of the strong, countervailing lobbying effort that exists in support of energy generation, transmission and distribution. The liquidation in 2015 of the Ministry of Energy and Industry (and rearrangements of its control structures), the establishment and consolidation of the National Energy Holding Company (NEHC), and the division of a regulatory body into separate institutions have further weakened the sector as a whole and resulted in a loss of institutional memory.

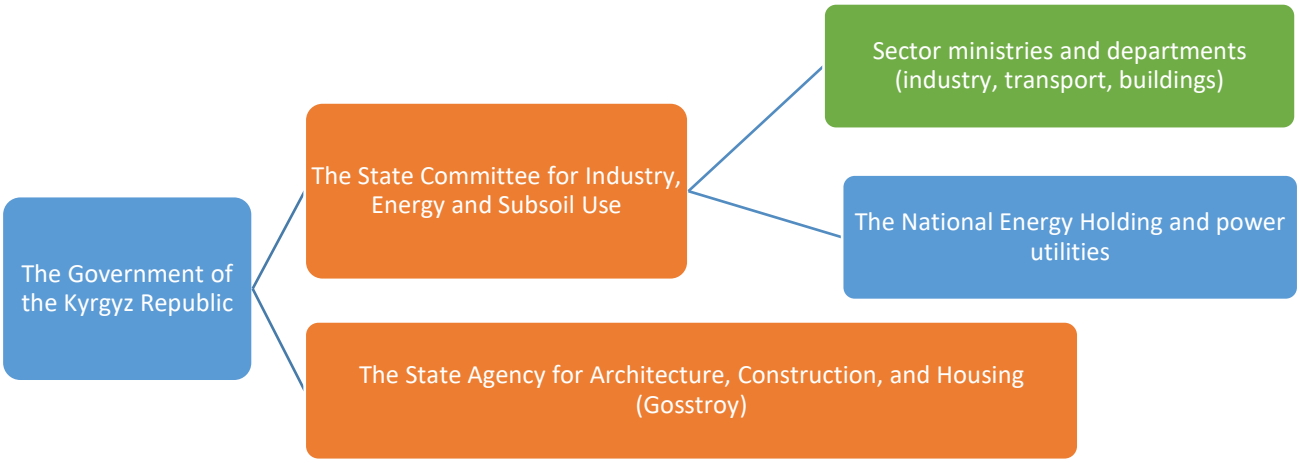
Also, energy efficiency as a cross-sectoral topic requires effective intergovernmental communication and cooperation. However, the Kyrgyz public buildings sector is plagued by fragmented institutional responsibilities with diverging interests that hamper a more unified approach to improving building function and energy efficiency performance. Further, there is insufficient information exchange and adaptation of efficient work routines in terms of communication, document and data management, norm compliance, and other areas. For example, although the various line ministries are focused on the functional demands of buildings,

- The local governmental authority (LGA) struggles to allocate funds for energy supply and maintenance,
- The regional administration sets energy supply limits, and
- The State Inspectorate for Environmental and Technical Safety has limited capacity to ensure compliance with technical norms.

2.1.1 Governmental Agencies Responsible for Energy Efficiency

Responsibility for energy and energy-efficiency policies and regulation is shared by two government agencies, shown in orange in Figure 2.1 (sectoral ministries are shown in green).[54]

Figure 2.1. Institutional Structure for Energy Efficiency



Source: Adapted from UN Economic Commission for Europe, *National Report on the Development of EE and RES in KG* (2015).

The **State Committee for Industry, Energy and Subsoil** Use (the "**State Energy Committee**") is responsible for energy efficiency governance, along with energy saving and the development of alternative energy. The

regulation covering the State Energy Committee[55] contains a wide range of functions to do with energy efficiency policy, regulation and control, including the following:

- **The development, coordination and implementation** of state policies and rational use of energy resources and renewable energy sources (including cooperation with energy companies and industrial enterprises for policy implementation);
- **The development of draft legal acts** in their respective responsibilities and preparation of national legislative acts (including work on national and international standards and technical regulations and participation in the development of national and sector strategies for developing the fuel and energy sector);
- **The development of incentive mechanisms** for energy efficiency and energy saving, and the **introduction of renewable energy sources**;
- **The attraction of foreign and domestic direct investments** in the fuel and energy sector, the **coordination of technical assistance** for its development, and the **fulfillment of obligations** under conventions, projects and programs implemented with the financial and technical support of foreign donors;
- **The analysis of technical and economic indicators** for the overall industrial sector and the fuel and energy sector, and **control over the fulfillment of targets** in industry and the fuel and energy sector; and
- Assistance in the **introduction of environmentally friendly, resource- and energy-saving technologies** in industrial enterprises and in the fuel and energy sector.

The **State Agency for Architecture, Construction, and Housing (Gosstroy)**[56] is responsible for the implementation of **energy-savings and energy-efficiency policies in the construction and building sectors**. Institutionally, agencies under Gosstroy are separate entities coordinated by the general management, including:

- The State Department for the Examination of Design Estimates, which monitors the compliance of design estimates with current standards and regulations (including energy efficiency requirements);
- The Republic Center for 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 standardized parameters; and
- The training school within the Republic Center for Certification in Construction, which is responsible for educating specialists in the construction sector and certifying their qualification in the future.

The **State Inspectorate for Environmental and Technical Safety** is the third state body directly involved in the implementation of energy savings and energy efficiency policies in public buildings. Its functions include the verification of the technical safety of heating systems in public buildings and the availability of energy passports[57] of buildings. The Inspectorate is also in charge of issuing of energy passports for public buildings.

2.1.2 Ownership and Technical Management of Public Buildings

The general management of public buildings is the responsibility of the related sector ministry (Health, Education, etc.), while responsibility for building operations is usually shared between central and local governmental authorities.

Technical inspections, including energy, are conducted by the central government through the State Inspectorate for Environmental and Technical Safety. Table 2.1 provides an overview of the management function of public buildings by the various governmental agencies.

Table 2.1. Overview of Responsibilities for Management of Public Buildings

	General Education and Pre-School Institutions	Health Sector Institutions	Administrative buildings
Ownership	The State Property Management Fund (SPMF)		
Ministerial functions (line function)	The Ministry of Education and Science: organization of the educational process, control of funding from the state budget – done through district and city education organizations including local education authorities (RONO) and city boards of education (GORONO)	Ministry of Health	Departments and ministries, local authorities
Building maintenance	LGAs allocate funding for maintenance/renovation of buildings (for all buildings located on a settlement).		
Energy supply	Power consumption limits are determined annually by the government and local authorities and distribution companies in accordance with technical conditions established for each facility. Building management monitors compliance of actual consumption with the established limits. For buildings heated with coal, local authorities initiate procurement.		
Inspection of technical systems	The State Inspectorate for Environmental and Technical Safety conducts an annual inspection of the preparation of the technical systems of buildings for autumn and winter.		

2.1.3 Recent Developments and Outlook on Institutional Framework

In response to demand from energy efficiency stakeholders, a meeting was held in December 2017 to create a **Coordination Council for Energy Efficiency** under the auspices of the State Energy Committee. Efforts are currently underway to determine the Council's composition, structure, and mechanisms for cooperation and activities.[58] To date, only one meeting has been held, and the Council so far includes only representatives from state structures (the State Energy Committee, the Ministry of Economy, the NEHC, Gosstroy) and two representatives from relevant local organizations. Representatives from international organizations, business and civil society organizations are recorded in the Decree on Establishment of the Council as "by agreement". Recent inputs by stakeholder organizations and initiatives to improve collaboration in the sector have provided momentum toward carrying out the steps necessary to operationalize the Coordination Council.

A good example of a sound coordination council is the Supervisory Board of the Fuel and Energy Sector Transparency Initiative (FESTI SB), which existed between 2010 and 2015 under the Ministry of Energy and Industry of the Kyrgyz Republic (Box 1).

Box 1. The Fuel and Energy Sector Transparency Initiative (FESTI) Supervisory Board

Regulatory framework: Decree of the President of the Kyrgyz Republic, http://cbd.minjust.gov.kg/act/view/ru-ru/92428.

Members: Four representatives of state authorities, four representatives of energy companies (upon agreement), eight representatives of civil society.

Management: Two co-chairmen of state structures and the public (equal rights).

Management (working body): One to two staff members of the Secretariat, on a paid basis (support was provided by the Soros Foundation-Kyrgyzstan).

Organization of work: Quarterly meetings/meetings of the FESTI SB, involvement of own and external experts to analyze key issues, public discussions and extended meetings, etc.

Results:

- Achieved energy savings totaling around 200,000 KGS through the reduction of electricity losses in distribution company networks from 39% in 2010 to 22.3% in 2011.
- Decreased the cost of credit projects by more than 11 billion KGS (US$200 million). This involved CASAREM (Central Asia–South Asia Regional Electricity Market) projects including "Improving Power Supply in the South of Kyrgyzstan", "Construction of Datka-Kemin Power Line", and "Modernization of Thermal Power Plant in the City of Bishkek".
- Exposed corruption schemes worth more than 400 million KGS (US$5.714 million) .
- Returned to consumers more than 8.5 million KGS (US$ 121,429) accrued in the form of unjustified fines or improper electricity bills (an indirect result of FESTI and FESTI SB activities) through the efforts of civil society organizations to protect the rights of energy consumers.

2.1.4 Other Stakeholders

Given the challenge of climate change, energy conservation is becoming increasingly important for the agenda of the government of the Kyrgyz Republic and in programs implemented by international financial institutions and private sector.

Following the introduction in 2012 of new legislation governing energy efficiency in buildings, and the improvement of the investment climate in this sector in 2013, the number of energy efficiency projects in the country increased and, accordingly, the number of stakeholders in the private sector, public organizations and academia has increased too.

One of the key players is the European Bank for Reconstruction and Development (EBRD), which for many years has supported the Kyrgyz government's efforts to develop and improve the legislation for energy efficiency in buildings. Since 2009, with the technical consulting support of Gosstroy, the Law on Energy Performance of Buildings and a number of related by-laws and technical documents have been developed and implemented. In addition, the government has made extensive efforts to increase the capacity of governmental agencies and specialists in the construction industry.

Table 2.2 presents an overview of the main stakeholders in energy efficiency in the Kyrgyz Republic, including their roles, drivers and limitations**.**

Table 2.2. Stakeholders and their Roles

Stakeholders	Governmental Authorities	Energy Companies	International Financial Institutions and Programs	Suppliers / Manufacturers of EE Materials and Technologies	Supplier lobbyist associations	Expert Community and Universities	Commercial financing institutions	Public Buildings	Private Sector
Represented by entities/ institutions	Government, mayor's offices and departments, housing cooperatives (HCs), LGAs	National Energy Holding Company (NEHC)	Russian Kyrgyz Development Fund (RKDF), EU, KyrSEFF, UNDP, etc.	<1,000 organizations	Union of Builders, Union of Architects; etc.	<7 specialized organizations	25 local banks	>10,000 budget-financed buildings	>400,000 entrepreneurs and enterprises, >1,147,000 households
Drivers	• Regulatory requirements to develop programs to reduce energy consumption	• Energy shortages motivates energy consumers to seek energy-efficient solutions	• Broad range of assistance (law-making, consulta-tions, implementa-tion, etc.)	• Mobility, proactivity • Open markets: China, Europe, Russia • Willingness to cooperate	• Opportunity to reflect a consolidated opinion	• Understan-ding of energy efficiency • Simplified procedures (licensing is not required)	• Focused on final consumers and sectors • Flexibility and variety of commercial products	• Necessity of energy saving, regulatory limits, and required certification of buildings • Vast positive experience in pilot projects	• Interested in cost reduction and introduction of EE measures • Accumulated experience (positive and negative) • Variety of market opportunities
Limits and barriers	• Lack of personnel (and rotation) and institutional memory • Lack of understanding of benefits of energy-efficient measures • Lack of political will to implement recommended mechanisms	• Monopoly market position • Lack of state control over the installation of heat meters	• Government projects lack clear energy efficiency parameters	• Lack of clear requirements for materials • Absence of a mechanism for certifying new materials and equipment in the country (there is no laboratory)	• Lack of real power • Can only provide consolidated opinion if associations deem it necessary • Management is carried out on a volunteer basis	• Lack of legal frameworks regulating the market • Lack of public service contracts • Lack of specialized training programs	• Energy efficiency is not a priority	• Absence of own resources • Absence of motivating frameworks to promote EE • Bureaucratic barriers • Dependent attitude towards the installation of innovative systems	• Lack of knowledge on correct use of materials and equipment • A certain amount of dependent attitude towards pilot projects • Absence of ESCOs

2.2 Legislative and Regulatory Framework for Energy Efficiency

This section addresses the Kyrgyz Republic's legislative and regulatory framework with regard to three areas:

- Energy efficiency programs;
- Energy efficiency legislation; and
- Building-related technical regulations, norms and standards.

2.2.1 Energy Efficiency Programs

As a cross-cutting issue, energy efficiency is affected by different governmental programs and reflected in numerous plans, concepts and strategies, such as:

- The "National Sustainable Development Strategy for 2018-2040,"[59] adopted in October 2018, which defines energy as one of five critical sectors (the strategy foresees the scaling-up of energy-savings and energy-efficiency programs for the existing building stock and net-zero-energy buildings (NZEBs)[60] for new construction);
- The "Roadmap for Improving Legislation on Energy Performance of Buildings 2017-2019" (an internal document approved by Gosstroy in 2016);
- A document titled "Medium-Term Tariff Policies of the Kyrgyz Republic for Electrical Energy and Heat for 2014-2017" (approved in 2014) foresees tariff increases by 20% annually for residential consumers and by 7% annually for commercial and industrial consumers;
- The "Program on Energy Savings and Energy Efficiency Policy Planning 2015-2017" (approved by the government in August 2015) and "Action Plan for Implementation of the Program on Energy Saving and Energy Efficiency Policy Planning" state the general objectives for and direction of energy efficiency policy;
- The draft "Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040"; and
- The draft "Program of the Development of Heat Supply Systems in Small and Medium Towns of the Kyrgyz Republic for 2017-2025".

In particular, in 2015 the Ministry of Energy and Industry developed and adopted the **Program of the Government of the Kyrgyz Republic on Energy Savings and Energy Efficiency Policy Planning for 2015-2017**[61] within the framework of the Sustainable Energy Programme for Central Asia (CASEP)[62] and with advisory support from the European Union. The program defined the main priorities for the development of energy efficiency and set general targets for the entire economy of the country. These targets include achieving:

- Energy savings of 2.23 million tonnes of oil equivalent (toe) by 2017;
- A reduction of energy losses of 4.1 million toe by 2020 by promoting the use of energy-efficient technologies and materials in the production, transmission and consumption of power and gas;
- A reduction of energy intensity by 30% and annual energy consumption by 5% (generating energy savings of up to 8 million tonnes of fuel equivalent), through a "restructuring" of the economy over the period 2015-2025; and
- A reduction of greenhouse gas emissions (in CO_2 equivalents) of up to 20% by 2020, in accordance with the Kyrgyz Republic's obligations to the UN Framework Convention on Climate Change (UNFCCC).[63]

The Program highlights the importance of a mechanism for reinvesting the energy savings retained by public

organizations as a result of implementing energy savings measures. However, the document contains no further energy efficiency targets by sectors (industry, buildings, transport) and does not specify the instruments or provisions required to implement the program and meet the specified targets.

In the context of the program, the Kyrgyz government did provide some instructions,[64] in particular to achieve energy savings by reducing energy losses or supply:

- For sectoral line ministries, state enterprises KyrgyzKomur and KyrgyzZhilKommunSoyuz, regional and local governments, and local state administrations, the government suggested the following:
  - To develop and adopt sub-programs on energy-saving policy planning for 2015-2017; and
  - To provide annual reduction in energy intensity by 3% in sectoral and subordinate facilities during 2015-2017 in comparison the figures from previous year.
- The government suggested that the State Agency for Regulation of the Fuel and Energy Sector consider processes for economically justified energy-savings investments undertaken by energy (district heating, gas and power grids) companies.

The program expired in 2017, but no information on the results of its implementation is officially available and the attainment of those targets remains questionable. Experience shows that monitoring and reporting of program implementation is usually not carried out due to lack of specific targets, methodologies and capacities. In fact, incomplete activities are commonly carried over to subsequent programs.

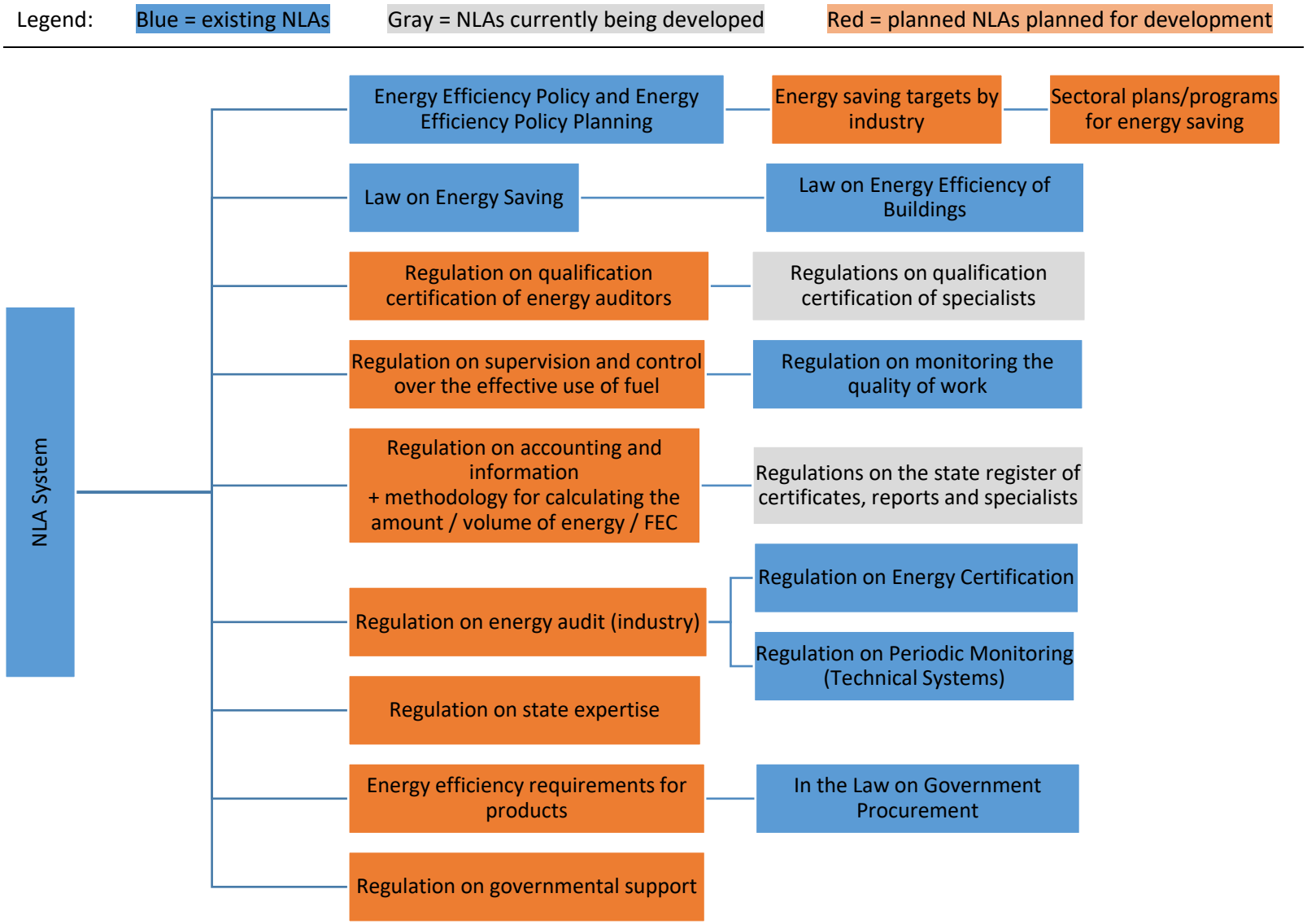
There are no additional energy-saving programs developed for state or local administrations or other sector institutions or stakeholders, with two exceptions:

- Municipal Energy Efficiency Plans in the cities of Toktogul, Sulukta, and Balykchi were prepared in 2015 in the context of a World Bank Urban Development Project.
- The Kyrgyz Sustainable Energy Financing Facility (KyrSEFF)[65] contributed an estimated 4%[66] of the total planned savings by 2017.

A new **Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040** is currently under development and should provide a strategy with a wider scope and specific targets for a longer-term horizon. The current draft concept foresees increasing energy efficiency by focusing efforts on supply-side (generation, transmission, and distribution) facilities managed by energy companies. The demand side – including energy efficiency in public buildings – is insufficiently developed and has been identified as an entry point for the analysis and recommendations of this roadmap document.

Figure 2.2 provides an overview of the structure of existing and planned normative legal acts (NLAs). A few leading NLAs exist (marked in blue), while several NLAs are currently being developed (gray). According to current governmental initiatives, several more NLAs are at the planning stage (red). Recommendations for further specifications and NLAs are provided in Chapters 4 and 5.

Figure 2.2. Overview of Existing and Planned Normative Legal Acts (NLAs)



2.2.2 Energy Efficiency Legislation

The Kyrgyz Republic's energy efficiency 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. This is the subject of this section.

However, it should be noted that as a cross-cutting issue, energy efficiency is affected by several other laws, many of which are outdated or lack effective implementation. The most important laws in this context are as follows:

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

2.2.2.1 Law on Energy Saving

The legislation is based on a the **Law on Energy Saving**,[67] which contains the following key declarations of the country's general energy savings policy:

- Establishment of an economic and regulatory framework on energy saving and energy efficiency;
- Development of state programs and projects for energy savings, energy efficiency and renewable energy;
- Activities to raise awareness and build capacity to implement energy savings;
- Development and roll-out of databases for generation and utilization of energy resources;
- International cooperation to foster effective use of energy resources.

The law was enacted in 1998 and has not been significantly changed since. It announces the development of mechanisms, regulatory provisions and procedures that remain undeveloped to this day, such as:

- Rules and procedures governing the energy efficiency of economic development projects (Article 10); and
- The establishment of a fund for energy savings and new energy equipment (Article 20).

Following an agreement on technical assistance between the State Energy Committee and the EBRD, draft amendments to the Law on Energy Saving were suggested in October 2017 to harmonize the law with the more recent Law on Energy Performance of Buildings. The draft amendments to the law included:

- **Energy efficiency and energy savings targets** for energy production, energy transmission and distribution, and final energy consumption. Each target should be complemented by clear (mid- and long-term) timelines. For final consumption, energy savings should be quantified instead of energy efficiency gains. This is due to definition problems of the baseline that will change with economic development. Target achievement should be reported regularly, i.e. annually.
- **Obligatory metering for electricity, natural gas, and heat; and the introduction of flexible billing systems.** Installation of meters is obligatory for energy suppliers/project owners for electricity, natural gas, and heat for each final consumer. All meters will have to fulfil requirements defined in secondary legislation (e.g. display of actual, not estimated, energy consumption). Particular attention will be paid to residential consumers that receive heat from district heating systems. Each consumer unit (i.e. apartment) in new buildings or buildings that undergo a major refurbishment shall be equipped with individual heat meters. Energy bills have to include certain information (energy tariff,

actual consumption, climate data, etc.) that will be defined in corresponding regulations. Billing will be based on real consumption.

- **Enhancing the role of public institutions through the mandatory energy certification of large public buildings.** Public buildings with a heated gross floor area greater than 6,000 square meters (such as public hospitals, educational buildings and administrative buildings) will be obliged to carry out comprehensive assessments by certified and registered experts and have to meet specific quality standards, to be defined by secondary energy efficiency legislation. These assessments must be repeated every five years. Based on the findings of the energy assessment, the institution must reduce its energy consumption by 10% every five years until the building reaches the Class B minimum requirements for energy efficiency, according the Law on the Energy Performance of Buildings.
- **Energy assessments will be integrated into the permitting process for large infrastructure projects.** The assessments will complement existing permitting procedures for businesses and projects. Applicants will have to provide an energy assessment that is carried out by qualified/certified experts along energy efficiency assessment guidelines where the topics and methodology of the assessments are defined (by law or decree). The objective of the energy assessment is to confirm that only the best available cost-effective technology and processes will be implemented.

The draft law will undergo an extended process of inter-ministerial and public consultations prior to parliamentary approval; this is planned to take place in 2019.

2.2.2.2 Law on the Energy Performance of Buildings

The **Law on the Energy Performance of Buildings**[68] governs the energy performance of buildings in the Kyrgyz Republic during design and construction (for new buildings) as well as for major renovations (existing buildings). It was developed in 2011 with support provided by the European Bank for Reconstruction and Development. At the time of its adoption, the law was a unique normative act based on the successful practice of promoting energy efficiency in the European Union and adapted to the conditions and regulatory framework of the Kyrgyz Republic. It was one of the first laws in Central Asia in which market-based energy efficiency management mechanisms replaced specialized requirements from the post-Soviet era at the level of technical regulations and standards. It introduced obligatory minimum energy-efficiency classifications applicable to both the design and construction phases in new buildings and to major renovations in existing buildings. Each building's energy efficiency class[69] is identified through its energy certificate, which includes information on the current energy consumption baseline and energy efficiency potential. This will allow the building owner to determine which measures to introduce in the building and to plan future savings. The law is complemented by by-laws and technical documents, and further efforts are underway to improve the legislation and its enforcement.[70]

2.2.2.3 Decree on the Rational Use of Energy

Decree No. 255 "On the Approval of Limits for the Consumption of Heat, Electric Energy, Natural Gas, Water and the Intake of Wastewater for 2005-2006 for Public Organizations and on Measures for the Rational Use of Funds Allocated to Budget Organizations for Utilities Cost,"[71] dated June 2, 2005, is directly linked to the rational use of energy. With this regulation the government annually determines the supply limitations of energy consumed by regions and responsible agencies.[72] As a result, many public buildings operators reduce energy supply in order to comply with the government order, which leads to lower and sub-standard comfort levels (in such areas as indoor temperature and illumination). The order is provided either in physical terms (e.g. electricity amount in kWh or fuel amount in liters) or monetary terms (the cut in the energy supply

budget, in KGS) and often forces building operators to switch to lower-cost types of energy (coal, for example) to maintain a certain level of heating.

Table 2.3 lists other regulations applicable to EE in public building in the country.

Table 2.3. List of Accepted and Developed Regulations in the Context of EE in Public Buildings

№	Normative Legal Act	Approved
1	Law of the Kyrgyz Republic on the Energy Efficiency of Buildings	July 26, 2011, № 137
2	Regulation on the Modalities for the Energy Certification of Buildings	Government Decree № 531, August 2, 2012
3	Regulation on the Procedure for Periodic Monitoring of Energy Efficiency of Boilers, Heating and Hot Water Supply Systems	Government Decree № 531, August 2, 2012
4	SNiP 23-01:2013, “Building Heat Engineering (Thermal Protection of Buildings)”	Gosstroy order 26.05.2013
5	SP 23-101-2013, “Design of Thermal Protection of Buildings”	Gosstroy order 26.05.2013
6	Method for Calculating the Energy Efficiency of Buildings and Determining Energy Efficiency Class for Energy Certification of Buildings	Gosstroy order 26.05.2013
7	Methodical instructions for conducting periodic monitoring of the energy efficiency of boilers, heating systems of buildings, and hot water supply of buildings	Gosstroy order 26.05.2013
8	Guide to the settlement application for energy certification of buildings	Gosstroy order 26.05.2013
9	Plan of measures ("roadmap") for creating conditions for the practical implementation of legislation in the sphere of the energy efficiency of buildings in the Kyrgyz Republic	Gosstroy order 26.10.2016
10	(draft) Regulation on rules and procedures for the qualification certification of specialists in energy certification of buildings and the periodic monitoring of the energy efficiency of boilers, heating systems, and hot water supply of buildings	At the stage of discussion and approval
11	(draft) Regulation on the State Register of • The Energy Certificates of Buildings, • Reports on the Periodic Monitoring of the Energy Efficiency of Boilers, Heating Systems and Hot Water Supply Systems of Buildings • Certified Specialists in Energy Efficiency of Buildings and on the Periodic Monitoring of Energy Efficiency of Boilers, Heating Systems and Hot Water Supply of Buildings	At the stage of discussion
12	(draft) Draft amendments to the Law on Energy Efficiency of Buildings	At the stage of discussion

2.2.2.4 Energy Certification and Energy Passports

The purpose of the energy passport, which is based on Decree No. 255 (discussed in the previous section), which limits the consumption of energy by public organizations. The purpose of a public building’s energy passport is to collect building data from municipalities and energy companies in order to determine energy demand and energy supply limits. Energy passports are the basis for imposing a limit on the consumption of energy resources by public institutions. It is not intended to monitor or improve the energy efficiency of buildings. The passport presents a table of data on resource costs and does not contain actual data on the energy characteristics of the building and its technical systems. The passport is prepared by the institution itself, sometimes with the support of local power utility experts. The accuracy of its content must be verified by the State Inspectorate for Environmental and Technical Safety – although due to a lack of staff and monitoring, data reliability is poor.

Energy performance certificates,[73] on the other hand, are issued for new construction and building

rehabilitation. The Law on the Energy Performance of Buildings obliges public building operators to prepare energy passports for public buildings and boiler houses and lays out the provisions and verification procedures. Due to the absence of certified energy efficiency specialists (see Chapter 4), very few new or retrofitted buildings have been certified up to now. After a building is retrofitted it will need to meet the energy performance certification of class "B" in accordance with the building's type, function and location in a climatic zone (see Table 2.4). Despite the existence of a legislative for energy performance certification, a responsible state institution for implementation and enforcement as well as a pool of qualified experts is not yet available.

Table 2.4. Requirements for Specific Energy Consumption in Buildings (kWh/m²)

Building type	Standardized value (minimum requirement) for energy consumption for new buildings and buildings under energy renovation - Class B (by climatic region)					
	I	II	III	IV	V	VI
Administrative buildings	16-31	25-50	26-52	39-77	32-64	39-78
Schools	16-32	27-53	28-55	41-81	32-64	40-79
Orphanages and nurseries, kindergartens	19-38	32-63	33-66	49-97	38-76	48-94

2.2.3 Building-related Technical Regulations, Norms and Standards

The Law on the Energy Performance of Buildings presupposes the application of minimum energy efficiency norms to buildings – meaning that the structures and components of new and retrofitted buildings[74] must adhere to minimum requirements for thermal conductivity.

These standards and requirements are rooted in "SNiPs" (construction standards and regulations) originally used in the former Soviet Union to regulate building construction; the Kyrgyz Republic uses them in part through its accession to the Eurasian Economic Union (EUAU) in 2015. Many of those SNiPs are outdated and there is an urgent need to update them to reflect best-practice energy-efficiency technologies and materials in building design and implementation. They include the following:

- SNiP KR[75] 31-04-2001, "Public Buildings and Structures"; SNiP KR 31-08: 2013, "School Buildings"; SNiP KR 23-01-2013, "Construction Heat Engineering"; SNiP KR 20-02:2009, "Seismic Resistant Construction"; SNiP KR 35-01-99, "Designing a living environment taking into account the needs of low-mobility groups"; etc.
- SNiP 2.04.05-91(as updated), "Heating, ventilation and air conditioning"; SNiP 2.01.02-85 (*) "Fire regulations"; SNiP 2.04.01 – 85 (as updated), "Internal water supply and sewerage of buildings"; MSN 2.04-05-95, "Natural and artificial lighting"; MSN 59-88, "Electrical equipment for residential and public buildings"; SNiP 2-02-01-83, "Foundations of buildings and structures"; and others.
- Sanitary and epidemiological rules and standards (SanPiN) in medical and preventive organizations, educational institutions, and so on.
- In addition to technical regulations, construction norms (EAEU CN) and code specifications (EAEU CS) of the EAEU countries have been put into effect in the territory of the Republic in accordance with established procedure.

Some areas, such as building-integrated renewable energy, are not covered by SNiPs. Due to insufficient institutional capacities, limited efforts have been made to reform technical construction and equipment standards, resulting in a mixture of SNiP and technical norms. Moreover, there is a large gap between the level of implementation and policy as project design and construction companies rely on existing technical documents that are outdated in terms of compliance with politics and the market. Also, contractors and

design institutions usually apply all norms/standards to comply with the requirements, leading to excessive retrofit costs.

Table 2.5 summarizes some of the technical norms relevant to energy-efficient construction – specifically heat transfer coefficients, or U-values.[76] In addition, building operators are required to provide certain indoor conditions according to Decree No. 531 of August 2, 2012.[77] This decree, which is part of the Law on the Energy Performance of Buildings, stipulates an indoor room temperature of 20/22 °C, various minimums or maximums for different indoor environments (e.g. at least 50% in classrooms), an hourly air exchange rate of 0.5 per volume, and illumination levels of 300–500 lux. Due to inefficient, low-performance installations, it is almost impossible to achieve those norm values in practice for a building that has not been retrofitted.

Table 2.5. Requirements for U-values of Building Structures for New Buildings

Building structures	U-Value ($W/(m^2K)$)
External walls	0.32
Windows in external walls and doors in spaces in which people permanent reside	≤1.5
Flat roof	0.20
Ceiling with vertical thermal flow (depending on the thermal flow direction and temperature difference)	0.20 - 1.70

Note: $W/(m^2K)$ = watts per square meter per Kelvin.

2.3 Budgeting in the Public Buildings Sector

2.3.1 Operational Expenditures

Operational expenditures (including the cost of energy) for the public buildings sector are paid for mostly out of the central government budget of the Kyrgyz Republic but channeled through different municipalities and oblast administrations, depending on the responsibility for building operation.[78] Local funding originates from local taxes and is kept locally. Due to the low economic development of most Kyrgyz regions, most oblasts and municipalities are heavily subsidized by the central budget.

- **Educational facilities** are funded by the Ministry of Education and Science based on the number of enrolled students.[79] Higher, professional and central schools are funded directly by the Ministry of Finance, while schools located in municipalities are funded through the municipal budget.
- **Pre-schools/kindergartens and social facilities** (such as elderly homes, social hostels, dormitories, and orphanages) are funded by the budget of their respective municipality.
- **Healthcare** facilities (hospitals/ policlinics) are funded by the health state budget through the Ministry of Health and medical insurance funds, channeled through the respective budgets of the regional administrations.
- **Municipal administrative buildings** are funded by the respective municipal budget.
- **State government buildings** (ministries, sub-ordinated agencies, institutes and facilities) are funded by the budget of the respective line ministry.

The distribution of funds for building operations follows the budget classification and is intended to provide the basic function of the public service (education, health care, administration, etc.). Budget sub-lines include (i) costs for employees (wages, including surcharges and allowances); (ii) expenses for utility services (energy, water, waste, etc.); (iii) material and technical base of buildings (equipment and overhead and operation material); and (iv) basic building maintenance and repair. Other eligible expenditures are specific to the building function, such as car fleet operation and security.

Municipalities can reallocate funds according to demand and availability. Reduced spending in one sector – such as energy bills – does not reduce budget transfers. However, retaining those savings is not possible and represent a barrier to increased energy efficiency investments by municipalities. Financing of public buildings energy supply is subject to annually adjusted limits determined on the basis of the previous year's consumption of energy resources (coal, electricity, etc.), and agreed for the subsequent heating season.[80]

The current setup for funding operational expenditures is highly bureaucratic and can cause disbursement delays (and, consequently, liquidity shortages) on the side of the municipalities. This can increase municipal debt to energy utilities and ultimately result in power cut-offs.[81]

Despite the existence of an effective procedure for planning local budgets, there are several factors that constrain the development of sound public buildings energy budgets, such as:

- Incomplete or missing data to confirm real energy demand and consumption, such as energy passports, or technical passports of power equipment;
- Failure of the management of public organizations to submit draft budgets containing precise forecasts to the local council (the "City Kenesh" or the "Kenesh") in writing; and
- Failure of the Kenesh to scrutinize draft budgets on building expenditures.

Public building operators and responsible departments in the local administration often cannot determine the real demand of energy and respective expenditure for the next heating season. As a result, budgeting of energy expenditure is often done on a provisional basis:

- Because the previous year's energy supply was partly limited, it does not reflect the real demand to achieve indoor heating and lighting comfort; it is thus not appropriate for an accurate demand forecast.
- The accuracy of energy passports is questionable.
- Buildings' energy performance certification does not determine the real energy demand.

Procurement and payment of energy for municipal public buildings is the responsibility of the municipal administration. Payments for consumed electricity are based on real consumption according to meter readings in the buildings. Fuels for heating (e.g. coal) are directly procured by the municipality from local suppliers.

For buildings that are supplied directly (through either district heat or an individual heating boiler operated by a district heating company) payments are made according to installed meters or based on methods of determining the demand for heat energy.

The *Open Budget Portal* of the Ministry of Finance discloses budget and expenditure data for each agency and according to budget categories.[82] [83] An analysis of the data reveals that housing and utility expenditures amount to 1.43% of the central government budget and 3.25% of the local budget (Table 2.6).

Table 2.6. Comparison of Expenditures by Budget Line Items

	National Budget	Local Budget
Total budget for 2017	129 276 705 million KGS	194 525 064,9 million KGS
Budget line "Housing and Utility Costs"	**1,43% of the total budget** 1 842 478 million KGS (26 702 million US$)	**3,25% of the total budget** 6 321 947 million KGS (91 622 million US$)
Budget sub- line "Utilities" (energy, water, waste)	**0,035% of the budget line** 648 400 KGS (US$9 397)	**1,3% of the budget line** 82,377 million KGS (1.2 million US$)

Budget sub-line “Acquisition of coal and other types of fuel”	-	**0,015% of the budget line** 964 580 KGS (US$13 979)
Budget sub- line "Expenses for repair works of property"	**0,018% of the budget line** 329 080 KGS (US$4,769)	**3,612% of the budget line** 228,7 million KGS (US$3.3 million)
Budget sub-line "Buildings and structures" (investments into new buildings, major retrofit and leasing costs)	**26,7% of the budget line** 493,5 million KGS (7,152 million US$)	**30,75% of the budget line** 1 955 million KGS (28,17 million US$)

Source: Open Budget Portal of the Ministry of Finance.

The above table illustrates that the local (municipal) budget covers most expenses for utility services, renovation and construction of public buildings. The annual budget for new construction and retrofit amounts to US$35 million, of which the local/municipal budget share is 80%.

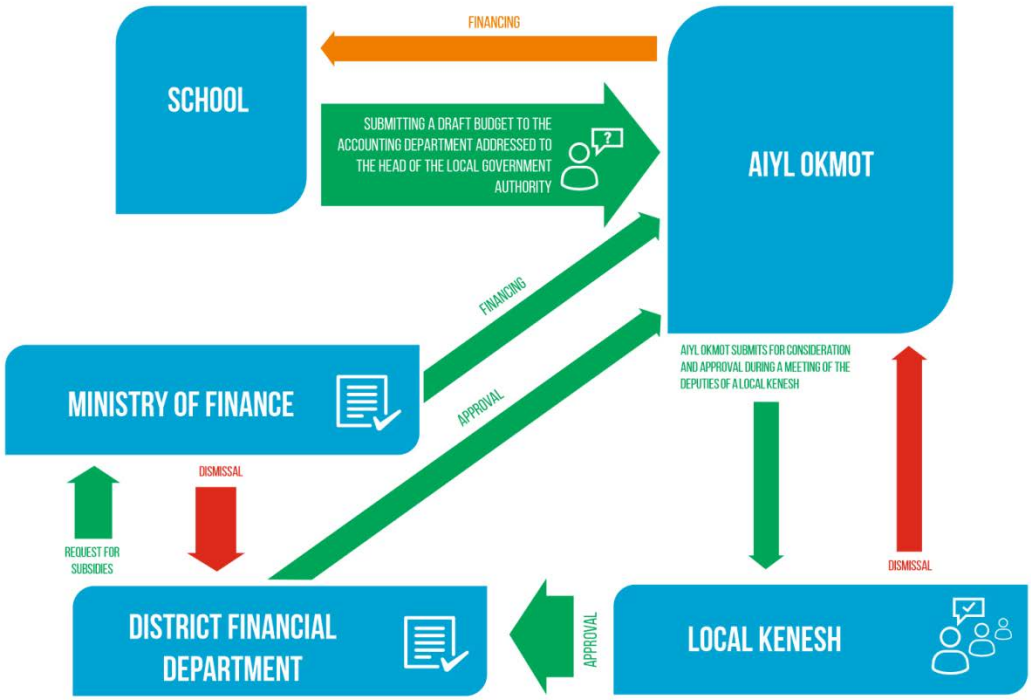
Due to the absence of a detailed buildings inventory and consistent database management, it is currently impossible to disaggregate allocations to the various budget lines by building type (e.g. x KGS for the retrofit of y schools).

2.3.2 Local Budget Development

Proposals for and approvals of national and local budgets are conducted publicly during open sessions of the Kenesh (local council) and public hearings. As illustrated in Figure 2.3, the procedure for local budget development is as follows:[84]

1. The Kenesh discusses and comes to a preliminary agreement on priorities for local development and budget spending.
2. The local Planning and Budget Commission (Aiyl Okmot) invites the responsible sectoral authorities (education, social and health, etc.) to report on the budget expenditures of the previous period and to propose a budget for the coming year.
3. The Commission then estimates (i) budget incomes (e.g. tax revenues and transfers) and (ii) expenditures (based on the proposals and development/investment needs) to balance and refine the income and expenditure of local budgets.
4. The budget is then submitted to the appropriate local (*aiyl* or city) Kenesh for approval and subsequent execution, followed by transfer requests to the regional administration for allocation and approval and forwarding of the request to the Ministry of Finance.

Figure 2.3. Procedure of Facility Budget Planning by Local Authorities



Source: Unison Group, "Coal for schools' space heating: guideline for users" brochure (Bishkek: Unison, 2016).

2.4 Public Procurement

Sound public procurement can help improve energy efficiency through methodologies that consider the potential energy consumption and related costs of procured equipment and services. All budget organizations procure goods and/or consulting services in accordance with the Law of the Kyrgyz Republic on Public Procurement of April 2015.[85] Tender procedures are conducted through the official web portal for public procurement[86] and according to different procurement methodologies to determine price and quality. A *tender* commission – i.e. an entity like the Planning and Budget Commission, which focuses on tenders and public procurement – ensures the sound process and compliance of the proposal with the terms and conditions of the technical specifications.

Procuring entities develop procurement plans on the basis of requests from the operators of the country's public buildings (kindergartens, schools, and hospitals). The plans contain information on the subject of public procurement, its quantity and expected prices, and the timing of procurement. There is no mandatory energy efficiency performance requirement of the purchased goods by law, but the procuring entity can add energy efficiency requirements to the tender specifications. Most tender procedures select the winner by choosing the lowest-price offer; in other words, restrictive procurement rules are biased towards lowest-price procurement and do not reflect the full cost of ownership (i.e. lifecycle cost). The contracting authority must state in the tender documentation the criterion of the most economically advantageous offer as well as sub-criteria for evaluation in accordance with the nature and purpose of the specific procurement subject. The current public procurement regulation does not consider criteria for reduction of building-operation or energy-supply costs. With respect to energy efficiency, the criteria for lowest life-cycle costing could be applied to reflect this, but the concept remains theoretical due to (i) a lack of life-cycle cost-benefit assessment, (ii) insufficient capacities to establish an EE project investment case, and (iii) a lack of detailed analysis for the evaluation. Consequently, the lowest initial price remains the decisive criterion.

Another challenge for scaling up energy efficiency through procurement is that budgets in the public sector are submitted and approved on a single-year basis rather than on an extended (e.g. five-year) basis. This makes multi-year planning for facility upgrades quite difficult and, in general, can impede the multi-year contracting. An annual budget over one year is too short for adjusting expenditure priorities. This is particularly problematic for energy performance contracting (EPC), since such contracts require several years of energy savings before the investments are recovered. Multi-year budgeting could ensure that commitments made by governments are consistent with the medium-term fiscal outlook. Multi-year budgeting would also allow for better connections between policies, planning and budgeting.

2.5 Financing of Energy Efficiency in the Public Buildings Sector

Because the potential positive macroeconomic effects of energy efficiency are not well known in the Kyrgyz Republic, there is a lack of financial resources allocated for large-scale energy efficiency rehabilitation in the public buildings sector. Funds allocated to the renovation of buildings usually do not include measures for improving energy efficiency and most renovation programs entail replacing only windows, lighting and heating systems. Building operators can tap into different funding sources for building renovation, such as municipal or regional budgets and central government funds (partly through the Community Development and Investment Agency of the Kyrgyz Republic, ARIS). At the request of local authorities, schools can apply for “stimulating” grants provided by the Ministry of Finance.[87] These funds are provided by the national budget on a competitive basis that requires co-funding from local budgets. Funds can also be allocated from the District Development Funds, which are formed as a 2% share of the total tax paid by the country’s mining companies.[88] Usually, funds are allocated for urgent repairs of buildings, but mainly the funds are allocated to the needs of social facilities through village or district administrations. The Kyrgyz government also has a program called "Safe Schools and Pre-School Educational Organizations,” which aims to build to build or rebuild more than 2,000 schools and kindergartens in 2015-2024[89] at an overall cost of almost 50 billion KGS.

With help from donor agencies, the government has also piloted EE projects using purely grant or budget financing. These projects have generally demonstrated high levels of energy savings and reasonable payback periods. In addition, such projects provide substantial co-benefits including building modernization, improved comfort, and increased awareness. Notable examples are as follows:

- EBRD’s Kyrgyz Sustainable Energy Financing Facility ($55 million) to finance the implementation of equipment to save energy and water and to dispose of waste from homes and enterprises in the Kyrgyz Republic (since April 2013, more than 1,415 energy-saving projects have been supported, resulting in annual energy savings of 128 GWh);
- A World Bank “Urban Development” project[90] for the rehabilitation of four schools and two kindergartens to improve their energy efficiency and seismic resilience, strengthen the building structure, and renew the heating system and building insulation;
- A UNDP project, “Improving the Energy Efficiency of Buildings" (2010-2014), to build an energy-efficient school in Osh and design an energy-efficient school in Bishkek; and
- A World Bank “Enhancing Resilience in Kyrgyzstan” (ERIK) project, which aims to improve the safety and functional conditions of schools (including energy efficiency improvements) in the areas of highest seismic hazard.

However, the main lesson learned from these projects indicate that there can be very limited replication of donor pilot programs and grant financing without substantial investments; a sustainable, scalable financing mechanism; and the participation of the private sector. At the same time, energy efficiency investment in

large public buildings or bundles of investment projects could generate cash flows from cost savings that can be used to repay the initial investment costs. Various countries have implemented a range of sustainable financing and implementation options, to enhance the financial leverage of public funds and/or to better transition to commercial funding for public sector EE projects by involving the private sector. In the Kyrgyz Republic, however, there are currently no financial products offered by commercial banks targeted at EE rehabilitation in the public buildings sector. A number of impediments limit the feasibility of commercial financing in the sector, including the following:

- Public buildings do not generate income;
- Public buildings are state property and cannot be used as a real estate collateral;
- For any work or service involving a public building, building managers must obtain permits from the relevant line ministry representatives (Ministry of Education, Ministry of Health, etc.);
- The budgeting code does not allow a public agency to retain energy cost savings; and
- Alternative obligations to increase a public borrower's performance[91] under a loan agreement (such as bail, guarantees, or penalties for late payments) are considered complex procedures by local commercial banks and usually not applied.

3 Energy Efficiency Supply and Service Market

The private sector is an important actor for developing a market for energy efficiency products and services and to eventually scale up energy efficiency in the public buildings sector. The energy efficiency market in the Kyrgyz Republic is still in its infancy and currently focused on providing services and equipment for project preparation and implementation, such as for energy auditing and construction services or energy efficiency equipment providers. Due to a lack of norms and quality performance criteria, there is a high variability of quality and cost across the different technologies and services offered. Also, while demand exists throughout the Kyrgyz Republic, most of the companies are located in Bishkek and Osh, which restricts access for rural communities to those technologies and services. As illustrated in Figure 3.1, the energy services value chain encompasses a wide range of activities.

Figure 3.1. Energy Services Value Chain

There are many different types of energy service providers that may provide some or all of the elements of the value chain; these are commonly referred to as *energy service companies* (ESCOs). An ESCO generally performs these services using a performance-based approach known as *energy performance contracting*, or EPC. The main characteristics of EPC as offered by ESCOs are as follows:

- An ESCO provides or arranges a wide-ranging package of services comprising many or all of the elements of the energy services value chain.
- The services are offered using business and financing models under which customers effectively pay for the energy services from the energy cost savings achieved.
- Payments to the ESCO are contingent upon achieving guaranteed performance.
- Most of the project risks are assumed by the ESCO.

3.1 Energy Services, Buildings Design and Construction Services

Starting in 2013 and according to the Law of the Kyrgyz Republic on "Licensing",[92] the design and auditing of public buildings, as well as construction and installation works, are subject to mandatory licensing of the service provider. This means that building designers, seismologists, engineers, and so on must all obtain a qualification certificate issued by the Kyrgyz government. However, although there are approximately 70 experts in energy efficiency and HVAC (heating, ventilation, and air conditioning) technologies in the Kyrgyz construction sector, there are no specialists in building energy efficiency. While regulatory requirements exist for energy performance certification of buildings and monitoring of equipment, the lack of an approved qualification certification by Gosstroy means that specialists have officially not yet been trained.

Energy auditing is not regulated, and no obligatory licensing is required for this service. One of the origins of this problem is the lack of an institution in charge of standardization.

The construction sector is better represented and organized. More than 700 construction companies are registered in the Kyrgyz Republic, with the largest concentration of developers in Bishkek. While many construction companies participate in the energy efficiency market, only a few have a well-educated labor force capable of installing thermal insulation such as rock wool and EE windows. Building companies are graded according to their ability to perform work of a certain degree of complexity.[93]

In order to obtain a license, the company must present the following information:

- Information about the enterprise's state registration, tax payments, and insurance premiums;
- General information about the organization, such as the qualifications of its managers, specialists, and workers and information about its technical base; and
- Procedures for ensuring quality control and production safety.

A legal entity must have at least one specialist with the appropriate certification for each type of requested activity and work. Licenses are issued without limitation of the term and territory of action.

In 2015, the State Construction Committee of the Kyrgyz Republic initiated an initiative on electronic licensing[94] to reduce the costs for applicants and budget expenses for the purchase of forms and delivery.

It is important to note that the leading construction organizations that carry out the construction of complex buildings are usually not interested in the construction of public buildings. Instead, they focus on the construction of facilities with short payback periods. Companies that compete for public-buildings works are often founded for the express purpose of participating in public tenders, and work quality is often insufficient due to lower levels of experience.

The following table provides a summary overview of market actors, including their respective capacity levels.

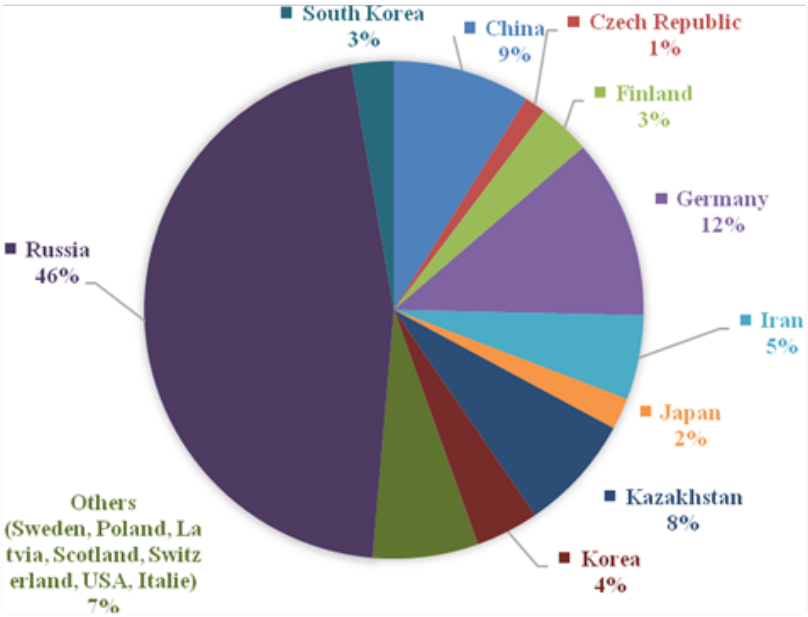
Table 3.1. Overview of Available Service Suppliers and Capacities

Type	Existing service providers	Capacity level of companies/ institutes
Consulting companies/ individual experts	<10 public and commercial	Medium
	<30 commercial	
Energy audit companies	<5 commercial	Medium to high
Design institutes	4 big institutes: • Giprostroy and Promproekt – joint stock companies • Garantproekt and Gorproekt – Ltd.	Medium to high
	> 50 small and medium-scale companies	
	Kyrgyz National Research Institute of Seismic Construction	
Construction companies	>150 in Bishkek	Low to medium
	<10 in regions	
Project supervisors for design and construction works *(excludes state departments)*	State Agency for Architecture, Construction, and Housing	Low to medium
	State Inspectorate for Environmental and Technical Safety	
	1 specialized company on technical supervision only	
	+ all construction and design companies	

3.2 EE Equipment Suppliers

The market for energy-efficient materials and equipment in the Kyrgyz Republic is relatively well developed. However, most energy-efficient materials and equipment must be imported (Figure 3.2). There are only a few domestic producers of energy-efficient materials; they include NewTEk LLC[95] (solar collectors), Interglass LLC[96] (energy-saving windows with glazing), Fakel LLC[97] (mineral-wool basalt slabs and coils), and Tansu Ltd[98] (coal boilers).

Figure 3.2. Suppliers of Energy-Efficient Materials and Equipment



Source: Chart based on data provided (2018) by Kyrseff from their list of recommended suppliers at http://www.kyrseff.kg/list-of-suppliers/?lang=en.

In accordance with the requirements of the Eurasian Economic Union and the Law on Technical Regulations for the Safety of Construction Materials, Products, and Structures, energy-efficient equipment is exempted from mandatory conformity assessment. This means there are no performance requirements for the energy efficiency of imported equipment that could prevent the import of low-energy-efficiency performance technologies.

Similarly, equipment classified as a "renewable energy source" (RES) is exempted from custom duties in accordance with the Law on Renewable Energy Sources (since 2008). However, the definition of RE technology is weak. A survey of technology suppliers showed that the interpretation of equipment differs. More advanced heating technologies, such as heat pumps, are not explicitly exempted from import duties.

Most of the companies are located in Bishkek, in the City of Osh, as well as in regional centers. Companies located in regional cities usually purchase equipment through dealers in Bishkek. Some advanced technologies (heat pumps, solar systems) are available for sale in Bishkek only.

The market for plastic windows is the most developed of all the energy-saving technologies: approximately 1,000 companies supply, produce, or install windows in the Kyrgyz Republic. An important challenge with respect to window manufacturing (and to boilers and thermal insulation material) is the absence of a domestic laboratory to certify the heat coefficient (U-value) of windows. Domestic manufacturer thus need to rely on laboratories abroad – but because this is expensive and often not feasible for small manufacturers, it ultimately means that few producers can obtain energy efficiency certificates for their products.

Table 3.2 summarizes the capacity levels of the various types of energy service supplier in the country.

Table 3.2. Energy Service Suppliers: Capacity Levels

Service	Consulting companies	Energy audit companies	Design institutes	Construction companies	Project supervisors
Energy auditing know-how	Medium	High	Low	Low	Low
Economic assessment know-how	Medium	Medium	Low	High	Low
Renewable and advanced energy technology knowledge	Medium	Low	Low	Low	Low
Technical know-how (construction)	Low	Medium	High	High	Medium
Regulatory knowledge	High	Medium	High	High	High
Design know-how	Low	Low	High	Medium	Medium
Implementation know-how	Low	Low	Medium	High	Medium
Supervision know-how	Low	Low	Medium	High	High
References available	High	Low	Medium	Medium	Low

4 Summary of Key Barriers to Public Sector EE Implementation

The previous chapters provided insights from the relevant sectors and areas affecting the potential scale-up of energy efficiency in the Kyrgyz Republic, showing how the specific barriers to increasing energy efficiency in the public buildings sector are numerous and span multiple sectors. This chapter summarizes these barriers.

International experience shows that the main barriers to public EE implementation can be classified as follows:

- Legislative and regulatory barriers (RB)
- Institutional barriers (IB)
- Budgetary barriers (BB)
- Capacity barriers (CB)
- Financing barriers (FB)
- Market barriers (MB)

With reference to this classification, Table 4.1 summarizes the major barriers to public sector EE implementation in the Kyrgyz Republic.

Table 4.1. Barriers to EE Implementation in Public Buildings in the Kyrgyz Republic

Type of barrier	Specific barriers	Acronym
Legislative and regulatory barriers (RB)	• Outdated energy savings law, outdated Program of Energy Efficiency Policy for 2015-2017, and lack of quantified and committed energy-saving targets in the long-term national strategic documents (e.g. the National Strategy for Sustainable Development 2040 or the Concept of Green Economy of Kyrgyzstan)	RB-1
	• Limited implementation of the Law on Energy Performance of Buildings due to incomplete secondary legislation (e.g. energy performance monitoring and certification) and missing administrative acts to enforce primary legislation	RB-2
	• Lack of instruments for monitoring the implementation of and enforcing the current energy savings legislation and programs (qualified inspection, program evaluation, etc.)	RB-3
	• Restrictive procurement rules are biased towards lowest-price procurement and do not reflect the full cost of ownership (i.e. lifecycle cost) • Public procurement regulations do not specify energy performance criteria for equipment and materials	RB-4
	• Lack of a methodological basis for performing energy audits	RB-5
	• Lack of an official methodology for building certification under Gosstroy	RB-6
	• Lack of a central register and inventory of public buildings to benchmark energy performance	RB-7
	• Outdated construction design standards (SNiPs)	RB-8
	• Lack of a regulatory framework for energy performance contracting (EPC) or private-public partnerships (PPPs) to encourage private sector investment	RB-9
Institutional barriers (IB)	• General lack of institutional focus and commitment to save energy	IB-1
	• Fragmented responsibility for public buildings across agencies, and partly diverging interests for the technical management of the same building	IB-2
	• Poor institutional memory due to high staff fluctuation and general lack of staff, as well as insufficient follow-up of failure to comply with commitments and acts	IB-3
	• Weak inter-ministerial cooperation and coordination on energy efficiency targets, initiatives, projects and instruments	IB-4

Type of barrier	Specific barriers	Acronym
	• Limited communication and exchange between governmental agencies, NGOs and market players with regard to equipment and financing	
	• Weak donor coordination on public energy efficiency	IB-5
Budgetary barriers (BB)	• Strained public-sector budgets • Lack of financial resources for programmatic EE investment projects • Lack of dedicated investment budget lines for building rehabilitation • Limited public funds for detailed project development	BB-1
	• Restrictive regulation that limits retainable energy cost savings, e.g. to use energy cost savings for energy efficiency investments	BB-2
	• Public-building owners are not able to commit to long-term financial obligations	BB-3
Capacity barriers (CB)	• Limited awareness and understanding of energy efficiency opportunities, solutions, and benefits among public sector decision makers leading to lack of incentives to promote energy efficiency • Insufficient utilization and promotion of results of past and ongoing EE demonstration projects	CB-1
	• Buildings energy consumption limits are not properly enforced and lack support mechanisms to reduce energy consumption	CB-2
	• Insufficient capacities at all levels to identify, develop and propose concrete and feasible EE project investment projects	CB-3
	• Weak enforcement of EE regulation (municipalities, buildings, material) due to missing control mechanisms, inspectors, etc.	CB-4
	• Weak domestic market capacity and experience (e.g. energy auditors, design institutes, construction companies) • Missing guidelines, instruments and specific capacities for conducting energy audits and energy performance certification by trained and qualified experts	CB-5
	• Lack of standardized energy audit procedures and certification for public buildings energy passports and certification	CB-6
	• Lack of a domestic laboratory for certification of materials and equipment to confirm their EE performance	CB-7
Financing barriers (FB)	• Low financial profitability of EE investments (high payback time) at current energy prices and by neglecting economic costs • Missing macro-economic assessment for energy efficiency investments	FB-1
	• Lack of customized financial products for public sector EE • Lack of demonstration for energy performance contracting and ESCO services	FB-2
	• Poor access of public agencies to commercial financing • Restrictions on borrowing from commercial banks • Limited availability of equity funding and lack of collateral	FB-3
	• Lenders unwilling to provide debt financing to public agencies • Limited capacity of lenders to lend for energy efficiency in public sector • Lenders' perception of high risk	FB-4
Market barriers (MB)	• Weak and fragmented market capacities for energy service • Absence of an energy efficiency lobby from the market player side, e.g. a dedicated association of suppliers	MB-1
	• High variability of quality and costs of equipment and service market due to missing norms for quality and performance	MB-2
	• Limited presence of equipment and service providers in rural areas/regions	MB-3
	• Low quality of installation services due to missing requirements for procurement and supervision by contractors	MB-4
	• High cost for advanced (imported) equipment due to import duties	MB-5

5 Vision 2040 for an Energy-Efficient Public Building Stock

The government of the Kyrgyz Republic has committed to achieving the UN Sustainable Development Goals (SDGs). SDG 7 is to "ensure access to affordable, reliable, sustainable and modern energy" by 2030 – specifically by increasing substantially the share of renewable energy, doubling the rate of energy efficiency improvements, enhancing international cooperation to facilitate access to clean energy research and technology, promoting clean energy technology and energy efficiency investment, and expanding infrastructure and upgrading technology for supplying modern and sustainable energy services.[99]

In December 2015 the Kyrgyz Republic submitted its Nationally Determined Contribution (NDC) to the UN Framework Convention on Climate Change (UNFCCC), which foresees a reduction in "business-as-usual" (BAU) levels of greenhouse gas (GHG) emissions in the range of 11.5 -13.75% by 2030 and 12.7 -15.7% by 2050.

The general economic and energy sector development targets of the Kyrgyz Republic, like those for energy efficiency and renewable energy, are not well-formulated. It is thus important to develop a vision for an energy-efficient public buildings sector and define specific targets for its implementation. The following key energy policy objectives are set by the Kyrgyz government according to the draft "Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040" document:

- Sustainable energy and economic development;
- Safe and reliable energy supply throughout the country, including in remote regions;
- Reduced energy intensity and increased energy savings in all economic sectors;
- A decrease in harmful environmental impacts; and
- The establishment of a supportive institutional, regulatory, financial and market framework.

While these energy policy priorities offer an entry point for increased energy efficiency action, the main challenge is to make public buildings energy efficiency a priority among the relevant institutions of the Kyrgyz government. This report thus suggests the following "**Vision 2040**" list of medium- and long-term targets for a sustainable, climate-resilient, safe and low-carbon public buildings stock in the Kyrgyz Republic by 2040. The medium-term targets (through 2030) are designed establish a supportive policy and regulatory framework and develop and strengthen institutional capacities – so as to provide the basis for scaled-up investments in the sector.

Medium-Term Targets (by 2030)

- Establish and implement a target to reduce annual energy consumption in the public buildings sector by at least 25-30% (or 250 GWh) compared to the baseline year of 2017.
- Amend laws, budget codes, procurement rules, and energy efficiency performance requirements and norms to stimulate EE scale-up of retrofits and new construction.
- Develop, budget and launch a dedicated public buildings investment program to address retrofit needs in at least 5,000 public buildings, including upgrading of all public buildings to performance Class B from a current performance class of D or lower.
- Establish and operationalize a dedicated public entity (unit/institution/agency/department) to manage the public buildings stock and the investment program and to play a lead role in coordinating and building capacity in market stakeholders and sectoral institutions.
- Develop and operationalize a financing mechanism to encourage energy efficiency investments in the public buildings sector (e.g. by combining existing budget lines for building operation and retrofit with external financing).

Long-Term Target (by 2040)

- Upgrade at least one-third of the public building stock to Class “A” (net-zero-energy buildings, or NZEBs), with the remainder upgraded to at least Class “B”.

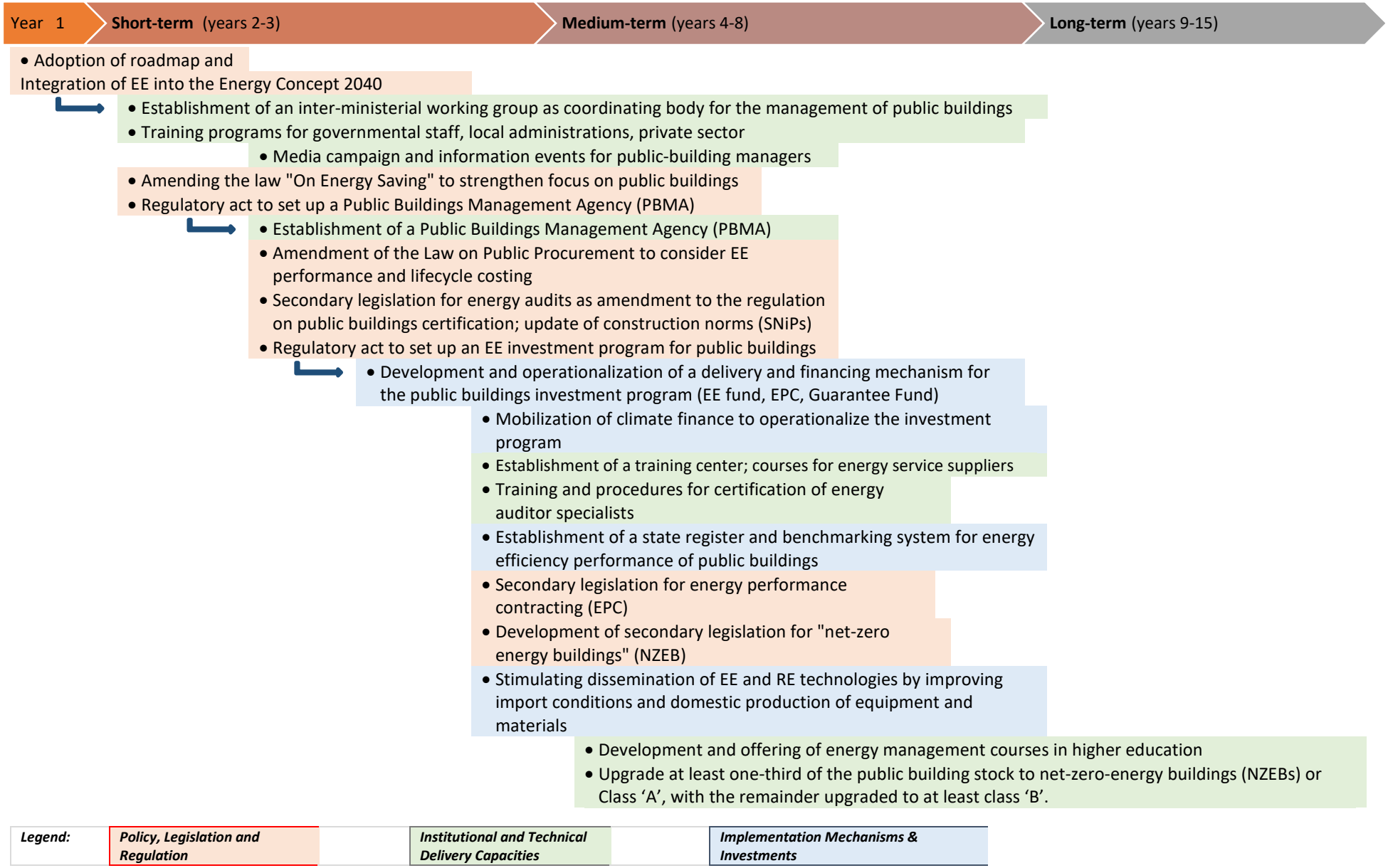
6 Roadmap for an Energy-Efficient Public Building Stock

In order to address the identified barriers and operationalize the Vision for an energy-efficient public buildings sector by 2040, it is important to develop a **roadmap** that sets out the steps and timeframe necessary to:

- *Improve the political and regulatory framework for EE* – by (a) developing and ratifying the "Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040" document, and then by (b) emphasizing the use of EE in public buildings through the improved coordination of involved agencies, which will serve to enhance the political and regulatory framework.
- *Strengthen delivery capacities* by building institutions and enhancing the capacities of all sectoral stakeholders; and
- *Scale up EE investments* by developing and implementing instruments – such as a large, staged investment program for EE building retrofit; financing mechanisms such as energy performance contracting; and other instruments to provide access to finance and remove market barriers.

The following roadmap – along with the accompanying **catalogue of recommended measures** – recommends a time-bound sequence of measures that are grouped according to the three areas – *policy, legislation and regulation (in orange); institutional and technical delivery capacities (in green); and implementation mechanisms and investments (in blue)* – and structured as *short-term* (1-3 years), *medium-term* (4-8 years) and *long-term* (10-15 years) measures. Although the State Committee for Industry, Energy and Subsoil Use (the "State Energy Committee") plays a crucial role in setting the cross-sectoral framework for EE, local authorities can stimulate EE investments and accelerate implementation through their own sound strategies and policies.

Figure 6.1. Roadmap for Improving the Energy Efficiency of the Public Buildings Sector



6.1 Catalogue of Recommended Measures

The following catalogue of measures – which refers to the specific barriers identified earlier in Table 4.1 – is designed to support the operationalization of the roadmap. Further operational details are set forth in section 6.2.

Table 6.1. Catalogue of Recommended Measures

Policy, Legislative & Regulatory Framework					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Development of the "Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040" document and adoption of the EE public buildings roadmap	RB-1	• Approved "Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040" with emphasis on energy efficiency to achieve national energy savings targets and integration of roadmap key issues • Sectoral EE targets defined and implementation plan with specific measures developed	State Energy Committee and inter-ministerial working group	• Inter-ministerial consultations • Input by sector experts and public consultations (ongoing since December 2018)	Short term (next 1 year)
Amendment of the law "On Energy Saving" to strengthen focus on public buildings	RB-2 IB-2 FB-2 BB-1	• Incorporation of (i) Public Buildings Management Agency (PBMA), (ii) obligation for energy monitoring, energy audits and performance certification for each public building, (iii) investment program for EE public buildings, (iv) development of energy performance contracting, (v) "net-zero energy building" (NZEB) • Secondary legislation (on above five items), technical regulation (such as review of SNiP) and analysis on implications for other primary and secondary laws, such as procurement law and budget law • Ratification of amended law in parliament	Research Center for Energy and Economics / State Energy Committee	• Technical and legal needs assessment • Utilization of international best practice • Layout of respective secondary legislation • Governmental stakeholder consultation and agreement	Short term (next 1-2 years)

Policy, Legislative & Regulatory Framework					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Regulatory act to set up a Public Buildings Management Agency (PBMA)	IB-2	• Governmental decree on "Establishment of Public Buildings Management Agency (PBMA)", its mandate, power and tasks • Drafting of decree by relevant authorities and release	State Energy Committee and Fund on State Property Management	• Stakeholder consultation and agreement • Development of statute, business and budget plan, staff needs, organization chart, supervision board, allocation of annual budget for PBMA	Short term (next 1 year)
Secondary legislation for energy audits as amendment of regulation for public building certification	RB-3 RB-5 RB-7	• Incorporation of provisions for obligatory energy audits in combination with performance certification for each public building • Specific provisions: required qualification and certification of the auditors; methodology, quality levels, and results of energy audits (e.g. analysis of baseline and retrofit needs, identification of EE potential, and assessment of EE measures, as initial steps in investment project preparation) • Provisions for a registry of certified energy auditors • Specific provisions for building certificates: methodology, performance classes • Methodology for engagement/hiring of energy auditors	Research Center for Energy and Economics / State Energy Committee	• Guidelines and standards for performing energy audits • Detailed methodology and calculation tools for energy audits and performance certificates • Information campaigns for public agencies / building owners • Capacity building for energy auditors and introduction of quality-check mechanisms for energy audits at PBMA • Development of a support program to enable public building owners to hire professional auditors • Inter-ministerial consultations and agreement	Short term (next 2-3 years)

Policy, Legislative & Regulatory Framework					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Regulatory act for setting up of an investment program for EE public buildings	BB-1 FB-2 FB-3	• Development of program targets, definition of focus for investment, responsible implementation agency, budget and funding mechanisms • Development draft budget • Definition of Program Implementation Unit (PIU) (recommended PBMA) • Development of draft act and parliamentary ratification	State Energy Committee, PBMA	• Detailed planning of investment program: scope and priority areas, program phases, standard and advanced EE technology interventions, project preparation steps (investment plan and design), procurement principles for services and supplies, project management unit • Budget allocation and respective fund raising (e.g. from IFI) • Building PIU capacities	Short term (next 1-2 years)
Amendment of the Law on Public Procurement to consider EE performance and lifecycle costing	RB-4 BB-2 BB-3 FB-1	• Review of public procurement law to incorporate: (i) consideration of lifecycle cost assessment replacing selection by lowest price, (ii) specification of high-energy-performance equipment and materials, and (iii) enabling public-building owners to commit to long-term contracting of services (five years at a minimum) • Amended law and ratification in parliament	State Energy Committee, Ministry of Finance	• Technical and legal assessment, development of standardized assessment methodology • Inter-ministerial consultation and agreement	Medium term (next 3-4 years)

Policy, Legislative & Regulatory Framework					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Update of technical construction norms (SNiPs)	RB-8	• Review and amendment of SNiPs: • To enable best-practice design of technical systems used for building retrofits and consideration of high-energy-performance materials (especially heating devices and use of renewable energies) • To eliminate overlaps and contradictions among technical norms • To harmonize standards/regulations for the EE technologies market • To increase transparency on existing and expired regulations and acts	Research Center for Energy and Economics/ State Energy Committee and Gosstroy, PBMA	• Update of SNiP with best available techniques (BAT) in compliance with reference international climate technologies documentation (i.e. the EU BREFs) • Promotion of updated SNiP for mandatory application in the design of building retrofits • Adoption of EE regulation among the countries of the Eurasian Economic Community	Medium term (next 4-5 years)
Secondary legislation for energy performance contracting (EPC) as an amendment to the Private-Public Partnership (PPP) Law (of February 22, 2012) or separate regulation	RB-9 FB-2	• Amendments of budget code, public procurement regulations, and procedures for public agencies and municipalities to work with private or public ESCOs	State Energy Committee, Ministry of Finance	• Detailed development of EPC funding mechanism, draft regulation and related standard documents (contract, etc.) • Inter-ministerial consultation and agreements • In case of establishments of a public ESCO, development of a business plan	Long term (years 5-8)

Policy, Legislative & Regulatory Framework					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Development of secondary legislation for net-zero energy buildings (NZEBs)	RB-2 MB-2	• Development of technical standard solutions for NZEBs in the Kyrgyz Republic and provisions for NZEBs, including building-integrated renewable energies • Long-term setting of performance standards for all and new building construction • Review of regulations for granting of construction permits for NZEBs • Development of the regulation and ratification in parliament	Gosstroy, State Energy Committee	• Development of performance standards (following EU directives) and secondary legislation • Inter-ministerial consultation and agreement • Consultation with equipment suppliers and design institutes to develop capacities and make technologies available	Medium-term (years 5-7)

Institutional and Technical Delivery Capacities					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Establishment of an inter-ministerial working group as coordinating body to facilitate management of public buildings	IB-4	• Decree or administrative act to formally establish an inter-ministerial working group for public buildings • Adoption of roadmap objectives and measures	State Energy Committee involving relevant ministries, and other institutions, e.g. Gosstroy, Research Center for Energy and Economics, PBMA	• Regular inter-ministerial consultations and coordination • Consensus-building across stakeholders, concerted activities to promote and support roadmap measures, and collaboration across stakeholder institutions	Short term (next year)

Institutional and Technical Delivery Capacities					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Establishment of a Public Buildings Management Agency (PBMA) for managing and implementing EE retrofit programs	IB-2 CB-3 IB-3	• Set-up of a 'one-stop-shop' to pool public buildings responsibility for: procurement of energy, building maintenance and retrofit investments • Increasing awareness on EE opportunities, funding and financing sources • Strengthening coordination between building operators and decision-makers (LGAs, MOF, MoES, MOH, etc.) • Establishing procedures for monitoring of energy efficiency program.	State Energy Committee and Fund on State Property Management	• Business plan and staffing within existing structures of the State Property Management Fund • Budget allocation for operation of the PBMA • Guidelines for public building operators for sources to support technical assistance (TA) and funding	Short term (next 1-2 years)
Training programs for governmental staff in the Ministry of Energy, The State Energy Committee, Research Center for Energy and Economics and line ministries	CB-1 IB-1	• Implementation of training programs for public sector decision-makers and implementers to (i) improve understanding and commitment for EE, (ii) improve EE costs – benefits assessment, (iii) improve EE project identification and planning.	Research Center for Energy and Economics / State Energy Committee, PBMA, Universities	• Training needs assessment, curricula, manuals and training of trainers • Budgeting of training across regions	Short- term (next year)
Capacity-building program to enhance project management and implementation monitoring for Project Implementation Units	CB-1 CB-2	• Dedicated training program for PIUs, such as ARIS, GKP The State Energy Committee EN, Public Buildings Management Agency / State Property Fund, Ministry of Education, etc., to ensure and improve effective implementation of building construction and renovation projects and fiduciary responsibilities.	The State Energy Committee	• Development of training curricula and manuals, guidelines for monitoring and verification, procurement and supervision, etc.	Short to medium term (years 1-3)

Institutional and Technical Delivery Capacities					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Improving capacities and procedures for quality certification of energy auditors and building energy specialists	RB-2 RB-5 RB-6 CB-4 CB-6	• Increase capacities for inspections (number and qualification of inspectors) • Improve enforcement of the provisions and secondary regulations of the law "On EE of Buildings" and certification regulation • Increase the qualification and certification of energy auditors to conduct high quality energy audits	Gosstroy and Research Center for Energy and Economics / State Energy Committee	• Development of training curricula and manuals, guidelines and training-on-the-job for: methodology and results (e.g. baseline analysis, retrofit needs, identification of EE potentials and assessment of EE measures), follow-up energy audit procedures	Short- term (next 2 years)
Media campaign and information events for public-building managers on energy efficiency	CB-1 CB-4	• Increase awareness of EE opportunities among directors, groundskeepers, facility managers • Increase number of project proposals for building retrofits	Research Center for Energy and Economics / State Energy Committee	• TV spots, newspaper articles, information flyers, and newsletter service, combined with regular educational activities in the regions	Medium term (next 2-4 years)
Municipal training events to support development of municipal EE programs and public building retrofits	CB-1 CB-3 CB-4 FB-3	• Support municipalities to perform energy assessments and develop investment pipelines and action plans • Compliance with regulation on municipal EE planning and enabling of at least 50% of the large municipalities (above 50,000 population) to prepare municipal EE plans	Research Center for Energy and Economics / State Energy Committee	• Establishment of a program template and list of indicators to reflect the city's EE program • Development of case studies, training programs • Dissemination of tools for municipal energy management	Medium term (next 2-4 years)

Institutional and Technical Delivery Capacities					
Title	Barriers addressed	Measures/outputs	Responsible institution	Required resources	Timeframe
Improving capacities for building retrofits in the private sector	MB-3 MB-4	• Set up of a trainings center to increase awareness, information and capacities of commercial and public institutes, design and construction companies on best-practice EE building retrofits • Delivery of a series of dedicated Training courses 2-3 days (each year 6 courses) for energy service suppliers in economic and regional centers to increase regional capacities for energy audits, project design in combination with seismic/ construction safety • Stimulation of EE retrofits and equipment installations funded by private/ commercial donors (e.g. LED lighting or windows) to comply with minimum technical performance requirements and sanitary norms	Research Center for Energy and Economics / State Energy Committee and Gosstroy	• Handbook on best practice for building repairs, checklists, catalogue of technologies incl. mandatory minimum performance criteria (equipment/window, service/energy audits) as well as reference cases • Establishment of a training center as a PBMA department • Development of curricula, course manuals, training of trainers • Setup of roundtable with the private sector to discuss dissemination and co-funding opportunities	Medium term (years 2-3)
Improving capacity and quality of higher education with respect to building energy management	CB-1 CB-3 MB-4	• Develop a postgraduate course on buildings energy management	Research Center for Energy and Economics / State Energy Committee and Ministry of Education	• Development of curricula and course manual for teachers, training of trainers • Cooperation with the private sector	Long term (years 5-10)

Implementation Mechanisms and Investments					
Title	Barriers addressed	Measure/output	Responsible institution	Resources and activities required	Timeframe
Establishment of a state registry and benchmarking system for public buildings	RB-3 RB-7 IB-3 CB-6	• Adoption of Gosstroy provisions regarding energy consumption and performance monitoring for all public buildings • Introduction of energy monitoring in all public buildings (municipal, regional and central level) and benchmarking of key performance indicators • Development and roll-out of a central buildings inventory database (area, energy consumption and energy costs, level of performance/certificate, energy audits, needs for EE retrofit)	Research Center for Energy and Economics / State Energy Committee and Gosstroy as well as oblast and municipal administrations	• Development of key performance indicators (KPIs), defining of data collection responsibilities, guidelines for data management, benchmarking methodology • Development of the registry structure • Development of a monitoring methodology and instruments, guidelines, and standards for certification and reporting	Short to medium term (next 2-5 years)
Development of an investment program for the retrofit of 5,000 public buildings to performance class “B”	FB-2 FB-3	• Identification of responsible institution for delivery of investment program • Development of program targets, delivery and funding mechanisms • Preparation of draft law and amendment of related laws and regulations • Allocation of an investment budget by the Ministry of Finance • Upgrade at least one-third of the public building stock to net-zero energy building (NZEB) or Class ‘A’, with the remainder upgraded to at least class ‘B’.”	State Energy Committee, Ministry of Finance, PBMA	• Detailed analysis of retrofit needs across all public building sectors and sub-sectors, and subsequent development of detailed investment plan, cost-benefits analysis, mobilization of US$500-700 million form public budget, donors and IFIs	Short term (next 2-3 years)
Mobilization of climate finance (from GCF or other sources) to operationalize the investment program	IB-5 FB-2	• Request for funding proposal to GCF or other institution that outlines investment demand, mitigation potential, financing mechanism	State Energy Committee, Ministry of Finance	• Preparation of funding applications	Medium-to-long term (years 5-20)

Implementation Mechanisms and Investments					
Title	Barriers addressed	Measure/output	Responsible institution	Resources and activities required	Timeframe
Development of a financing mechanism that allows sustained investments for EE rehabilitation of the public building stock	RB-9 FB-2 FB-3 FB-4 BB-1 BB-2	• Analysis of different financing options and consultation with relevant stakeholders, • Identification of the appropriate mechanism (e.g. EE fund or a public or Super ESCO), • Amendments of relevant laws to operationalize and institutionalize a financing mechanism as outlined in the EE law • Analysis of opportunities to extend existing financial support mechanisms such as Guarantee Fund OJSC or dedicated credit lines to extend the access to financing for public borrowers	State Energy Committee and Public Buildings Management Agency, Ministry of Finance	• Market analysis • Development of financing mechanism design • Development of legal provisions/amendments to relevant laws and budget code • Mobilization of equity to operationalize the financing mechanism	Medium term (years 3-5)
Stimulating dissemination of advanced EE and RE technologies and domestic production	MB-2 MB-3 MB-5 CB-7	• Development of support programs for stimulation of domestic equipment production and distribution (such as windows, insulation and LED lighting) through tax rebates, marketing support, etc. • Waiving of import duties on foreign EE equipment • Establishment (or contracting) of a domestic laboratory for certification of EE performance of materials and equipment	Ministry of Economy, Ministry of Finance GOST Institute, Research Center for Energy and Economics / State Energy Committee	• Setup of a catalogue of relevant equipment and high-performance specifications, e.g. coefficient of performance (CoP) for heat pumps • Design, funding and implementation of small, dedicated support programs • Establishment of test databases and laboratories for product certification	Medium-to-long term (years 5-10)

6.2 Operationalizing the Roadmap

The public buildings sector is plagued by highly fragmented institutional responsibilities, regulatory gaps and lack of coordination. In order to operationalize the preceding roadmap (Figure 6.1) and implement the numerous measures laid out in the roadmap catalogue (Table 6.1), it is important to first address the most rampant deficiencies and establish an enabling environment. The following four immediate actions are recommended to empower the government of the Kyrgyz Republic to implement the roadmap:

1. Strengthening the coordination of relevant agencies
2. Strengthening the regulatory framework
3. Establishing a public enterprise for public buildings management
4. Developing financing mechanisms

The remainder of this chapter will discuss each of these actions in turn.

1. Strengthening the Coordination of Relevant Agencies

The government should establish a **Coordinating Council for Energy-Efficient Public Buildings** as an inter-ministerial working group under the State Energy Committee. As a model, it could use the existing World Bank HSIP Project Selection Commission (which comprises representatives from the Ministry of Emergency, the Ministry of Health, the Ministry of Economic Development, the Ministry of Finance, the State Property Management Fund (SPMF), the State Committee on Penalty Control, etc.). The Council should have the following functions:

- Sector-wide coordination of, and consensus-building toward, the development of energy efficiency retrofit investments in the public buildings sector;
- Facilitation of the measures and regulatory acts necessary to address identified barriers;
- Coordination of support, assistance and funding instruments and projects by international donors in the EE sector; and
- Supporting legislation related to a national energy efficiency investment program for public buildings (see next section) and a regulation governing the establishment of a dedicated implementation body.

2. Strengthening the Regulatory Framework

The current draft “Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040” offers an opportunity to integrate the findings of this roadmap to showcase the enormous energy-saving potential in the Kyrgyz public building stock. The following legislative and regulatory changes are urgently needed to establish the right legislative framework for energy efficiency:

- An amendment to the "Resolution of the Government of the Kyrgyz Republic on the Preparation of the Economic Sectors and the Population for the Autumn-Winter Period (May 24, 2018, No. 249) to introduce the obligation to verify the energy efficiency performance of public buildings;
- A new regulatory act or law establishing a comprehensive energy-efficiency investment program for public buildings; and
- Amendments to the Law "On Energy Saving" with a strengthened focus on public buildings and secondary legislation for energy services and energy performance contracting, including amendments to relevant public procurement laws

3. Establishing a Public Enterprise for Public Buildings Management

In order to institutionalize and streamline the responsibility for public buildings, it will be important to set up an agency that has the political mandate and appropriate budget to work across stakeholder institutions.

Setting up the agency as new, unified state enterprise on a cost-accounting basis and as a 'one-stop-shop' for management of all buildings can pool the authority:

- for purchasing and payment for utilities (energy);
- for management of building maintenance;
- for preparation of building retrofit investments (with a focus on energy efficiency), including energy audits;
- for implementation of building retrofit investments (acting as a Program Implementation Unit;
- to implement accompanying information and capacity-building measures, such as guidelines and training for subordinated project institutions and suppliers;
- to accumulate revenues from energy savings and allocate them to project reinvestment; and
- to monitor, evaluate and report on financial flows, results and achievement of targets.

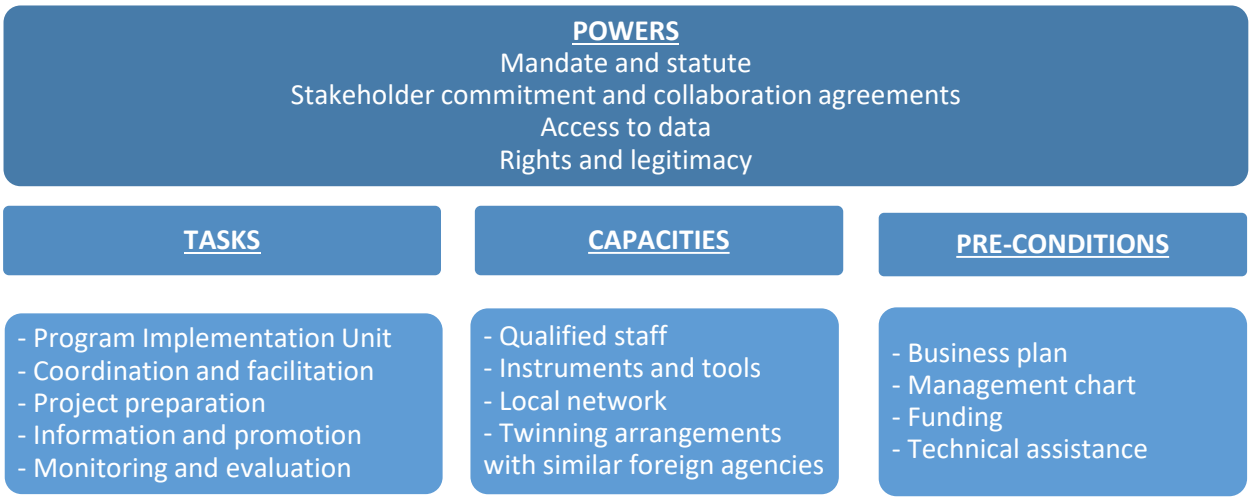
Once the government decides to establish a dedicated implementation agency, it will need to:

- prepare a regulatory act establishing an agency responsible for the management of public buildings and task it with the necessary responsibilities, supervisory board and functional operations budget;
- conduct business planning, including: developing tasks and targets for program preparation and implementation; analyzing the market and determining the extent of the investment program; and establishing rules, procedures, instruments and financing mechanisms; and
- engage key staff by (i) nominating the supervisory board members and (ii) identifying and hiring key experts of the agency,[100] starting with the director and key engineers and economists.

Given the current institutional structure of public building management in the country, it is recommended to focus initially on educational and health facilities (schools, hospitals/policlinics), with later expansion to social and municipal public buildings (kindergartens, etc.). There are different options for the organizational structure of an implementation agency:

1. A dedicated administrative unit within the Ministry of Energy or State Energy Committee;
2. A dedicated administrative unit within the Fund on State Property Management; or
3. An independent entity of governmental state enterprises in the form of an Energy Agency.

Figure 6.2. Key Requirements and Elements of a Public Buildings Agency



4. Development Financing Mechanisms

Judging from the audits conducted in 14 buildings under the World Bank's Heating Supply Improvement Project (HSIP) and Urban Development Project (UDP) in the Kyrgyz Republic, EE investments have to date

demonstrated solid energy savings of 60-70%. This means the techniques implemented will significantly reduce the energy cost for respective central and local governmental agencies. However, despite the positive results of these pilot projects, there is limited replication potential because grant financing is scarce. It is generally recognized that such grant and budget financing is not sustainable in the long term, and that EE projects generating cost savings can be used for repayment of the investment costs.

Various countries have implemented a range of different sustainable financing and implementation options to enhance the financial leverage of public funds and/or to better transition to commercial funding for public sector EE projects. A review of international experience with public sector financing reveals various options for providing financing for public buildings. Perhaps the best such option is energy performance contracting (EPC), under which an energy service company (ESCO) finances energy efficiency investments and, subsequently, is repaid through the full or partial annual energy savings achieved throughout the contract period. Under an EPC, the revenues obtained from energy savings should be used both to refinance obligations and to fund other EE interventions. Hence, the EPC could establish a corridor through which EE savings can flow from one project to another.

EE investments under the EPC scheme would first need to take initial steps to lay the groundwork for project implementation, including development of the EPC framework, setting up guarantees, and outlining expected results following execution of EE measures. Thereafter, private ESCOs can help overcome barriers in scaling-up implementation of EE projects in the public sector by:

- Offering a range of services throughout the energy services value chain; and
- Providing the technical skills and resources required to identify and implement EE opportunities, execute services using performance-based contracts (reducing the risks to the municipal utilities and public agencies), facilitate access to commercial banks, and enable energy users to pay for services out of the cost savings.

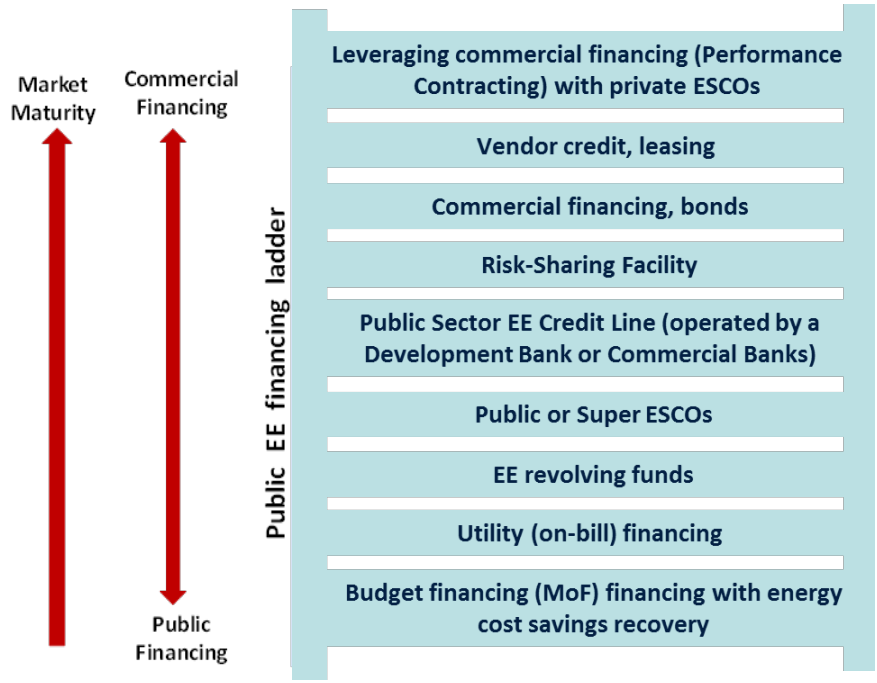
Table 6.2 further details the potential benefits of energy performance contracting.

Table 6.2. How EPCs Can Help to Overcome the Key Barriers in Public Sector Energy Efficiency

Lack of **commercial incentives** to reduce operating costs	• EPCs cannot by themselves address the fundamental lack of incentives, but they *can* help to reduce both transaction costs and perceived risks **by offering a full package of services** and assuming project performance risk.
No **incentive to save energy** (no retention of savings)	• EPCs cannot address the principal-agent issue, but they *can* **better define the costs and benefits upfront**, so agencies can negotiate and apportion them appropriately.
High **perceived risks** from new technologies and mechanisms	• EPCs include **performance guarantees** to assign many project risks away from the public agency and financier to the EPC.
Inflexible procurement procedures	• EPCs can allow for high returns by fast-tracking the implementation of the best-value projects, bypassing procurement of service providers and equipment for each measure.
Constrained annual budgets for capital upgrades	• EPCs often offer **project financing**, either through an ESP or a third party, with repayment derived from project savings.
Small projects with high project development and transaction **costs**	• EPCs **allow for multiple smaller public projects to be bundled**, since there is common ownership, often with notional audit/baseline information, thus helping to **reduce development and transaction costs**.
Inadequate **information** and technical **know-how**	• EPCs invite technically competent private sector firms to compete based on their qualifications, experience, and best project ideas

Figure 6.3 illustrates the different financing options in the form of **a "financing ladder" for public sector projects**. The ladder includes the **various options identified in Annex B** plus the two non-sustainable options (grant financing and budget financing). At the bottom of the ladder are options that rely almost entirely on public financing (such as budget and grant financing), while the top of the ladder represents mostly private financing using commercial lenders. Moving up the ladder leads to increasing levels of private financing and requires increasing levels of market maturity. A brief description of each of the nine options is provided in Annex B.

Figure 6.3. Illustrative Financing Ladder for Public Sector EE Projects



Note: See Annex B for a full description of options for financing mechanisms.

Annexes

Annex A: List of Reference Documents and Interviewees

Documents

1. Constitution of the Kyrgyz Republic, from June 27, 2010
2. Tax Code, from October 17, 2018, № 230
3. Administrative Code, from August 4, 1998, № 114 (and new version of the Code on Violations, approved by Parliament on March 2, 2017, which will enter to force in January 2019)
4. National Strategy for Sustainable Development of the Kyrgyz Republic for 2013-2017, from January 21, 2013, № 11
5. (draft) National Strategy for the Development of the Green Economy in the Kyrgyz Republic for 2019-2023, by the Ministry of Economy, September 2018
6. Governmental Program "On the Transition of the Kyrgyz Republic to Sustainable Development for the period 2013-2017", from April 30, 2013, № 218
7. Governmental Program “Forty steps of the new dispensation”, from September 22, 2017, № 602
8. Governmental Program "Affordable Housing 2015-2020" from August 5, 2015, № 560
9. Long-term Strategy for Heat Supply of the Kyrgyz Republic, from April 27, 2004, № 300
10. Program of Development of Small and Medium Energy in the Kyrgyz Republic until 2012, from October 14, 2008, № 365
11. Program "Safe Schools and Pre-School Educational Organizations” for the period 2015-2024, from July 31, 2015, № 551
12. (outdated) National Energy Program 2008-2010 and Strategy of Development of Fuel Energy Complex and Energy Sector until 2025, from February 13, 2008, № 47
13. (outdated) National Program of Housing Construction in the Kyrgyz Republic for 2008-2010, from November 26, 2007 No. 562
14. (outdated) Program of the Government of the Kyrgyz Republic on Energy Saving and Energy Efficiency Policy Planning in the Kyrgyz Republic for 2015-2017, approved by Governmental Decree on August 25, 2015, № 601
15. (outdated) Program of the Government of the Kyrgyz Republic " Trust and unity for 2017 year", from January 30, 2017 № 53
16. (draft) Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040
17. (draft) Program of the Development of Renewable Energy Sources in the Kyrgyz Republic, June 2018
18. (draft) Climate Investment Program "Operational Framework for Management and Access to Climate Finance in the Kyrgyz Republic”, May 2018
19. (draft) Program “Energy saving and energy efficiency in the area of construction for 2015-2019”, from September 2015
20. Plan of measures ("Roadmap") for Creating Conditions for Practical Implementation of Legislation in the Sphere of Energy Efficiency of Buildings of the Kyrgyz Republic, from October 26, 2016, № 1
21. Law of the Kyrgyz Republic “On Regulatory Legal Acts”, from July 20, 2009, № 241
22. Law of the Kyrgyz Republic “On Energy” from October 30, 1996, № 56
23. Law of the Kyrgyz Republic “On the Energy Efficiency of Buildings”, from July 26, 2011, № 137
24. Law of the Kyrgyz Republic “On Energy Saving”, from July 7, 1998, № 88
25. Law of the Kyrgyz Republic "On Renewable Energy Sources", from December 31, 2008, № 283
26. Law of the Kyrgyz Republic “On Public Procurement”, from April 3, 2015, № 72
27. Law of the Kyrgyz Republic "On Licensing” from October 19, 2013, № 195
28. Law of the Kyrgyz Republic “On public-private partnership in the Kyrgyz Republic” from February 22, 2012, № 7;
29. Law of the Kyrgyz Republic "On Local Self-Government”, from July 15, 2011, № 101

30. Law of the Kyrgyz Republic "On the State Budget for 2018 and the Forecast for 2019-2020", from December 28, 2017, № 218(23)
31. Law of the Kyrgyz Republic “On the State Budget for 2017 and the forecast for 2018-2019”, from December 22, 2016, № 215
32. Law of the Kyrgyz Republic "On the National Bank of the Kyrgyz Republic, Banks and Banking Activities”, from December 16, 2016, № 206
33. Law of the Kyrgyz Republic "On the Financial and Economic Foundations of Local Authorities" from September 25, 2003, № 215
34. The Kyrgyz Republic Intended Nationally Determined Contribution (INDC), 2017
35. Priorities for Adaptation to Climate Change in the Kyrgyz Republic until 2017, from October 2, 2013, № 549
36. (outdated) Law of the Kyrgyz Republic "Technical Regulations for the Safety of Buildings and Structures" from June 27, 2011, № 57
37. (outdated) Law "Technical Regulations for Fire Safety" from July 26, 2011, № 142
38. (draft) Law “Amendments to the Law on Energy Efficiency of Buildings”, by the State Agency on Architecture, Construction, and Housing” from October 2018
39. (draft) Law “Amendment to the Law on Energy Saving” from the State Committee on Energy, Industry and Subsoil Use, from July 2018
40. Medium-Term Tariff Policy of the Kyrgyz Republic for Electric Energy for 2014-2017, from November 20, 2014, № 660
41. Medium-Term Tariff Policy of the Kyrgyz Republic for Thermal Energy for 2014-2017, from November 20, 2014, № 660
42. Regulation “On the Rules and Procedures of the Energy Certification of Buildings” from August 2, 2012, № 531
43. Regulation on the Procedure for Periodic Monitoring of Energy Efficiency of Boilers, Heating and Hot Water Supply Systems; Government Decree, from August 2, 2012, № 531
44. Sample of Contract on Purchasing Electricity”, from April 28, 2017, № 1/1
45. Regulation “On Tender for the Right to Build Small Hydropower Stations in the Kyrgyz Republic”, from March 24, 2017 № 175
46. Regulation “On the State Committee on Energy, Industry and Subsoil Use”, from July 15, 2016, № 401
47. Regulation “On the State Agency for Architecture, Construction and Housing”, from June 24, 2013, № 372
48. (suspended) Regulation “On the Licensing of Certain Types of Activities”, from May 31, 2001, № 260
49. Regulation “On Measures for Stabilizing the Situation on Energy and Gas Supply to the Population” from December 25, 2012, № 857, December 6, 2015, № 1
50. (draft) Regulation “On the Rules and Procedures for the Qualification Certification of Specialists in the Energy Certification of Buildings and the Periodic Monitoring of the Energy Efficiency of Boilers, Heating Systems and Hot Water Supply of Buildings” (June 2018)
51. (draft) 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” (June 2018)
52. Decree of the Government of the Kyrgyz Republic "On Approval of the Limits for the Consumption of Heat, Electric Energy, Natural Gas, Water and the Intake of Wastewater for 2005-2006 for Public Organizations and on Measures for Rational Use of Funds Allocated to Budget Organizations for Utilities", from June 2, 2005, № 255

53. Decree of the Government of the Kyrgyz Republic "On the Results of the Preparation of Economy and Population in the Kyrgyz Republic for the Heating Season 2008/2009", from October 29, 2008, № 602
54. Decree of the Government of the Kyrgyz Republic "On the Preparation of Economic Sectors and the Population of the Kyrgyz Republic for the Autumn-Winter Period 2016/2017", from April 26, 2016, № 215
55. Decree of the Government of the Kyrgyz Republic “The Financial Agreement between the Government of the Kyrgyz Republic and the European Union on the Program for Sustainable Energy for Central Asia: Renewable Energy - Energy Efficiency (RES-EE)”, from February 2014, № 40-r
56. Decree of the Government of the Kyrgyz Republic "On Temporary Measures to Ensure the Implementation of Supervisory Functions in the Field of Energy and Construction", from December 4, 2014 № 690
57. Decree of the President of the Kyrgyz Republic "On the Transparency Initiative of the Fuel and Energy Sector of the Kyrgyz Republic", from July 20, 2010, № 49
58. Decree of the State Committee on Energy, Industry and Subsoil Use “On Coordination Council for Energy Efficiency”, from December 4, 2017
59. Decree of the Government of the Kyrgyz Republic “About the Report of the Prime Minister of the Kyrgyz Republic on the Work of the Government of the Kyrgyz Republic for 2013”, from April 8, 2014 № 202
60. Decree of the State Committee on Energy, Industry and Subsoil Use “On the National Research Center on Energy and Economy”, from November, 2015
61. (draft) Decree on Electronic Licensing, by the State Agency for Architecture, Construction and Housing, from May 2015
62. Budget classification of the Kyrgyz Republic, from December 21, 2017, № 161
63. Rules for Assigning a Level of Responsibility for the Licensing of Work in the Construction Industry, from May 31, 2001, № 260
64. Methodology of Calculation for Electricity Tariffs Supplied by Stations Generating Energy from Renewable Energy Sources, from August 6, 2015, № 1
65. Methodology for Calculating the Energy Efficiency of Buildings and Determining Energy Efficiency Class for Energy Certification of Buildings, from May 26, 2013, № 1
66. Methodical Guide for Conducting Periodic Inspection of Energy Efficiency of Boilers, Heating Systems of Buildings and Hot Water Supply of Buildings, from May 26, 2013, № 1
67. SNiP 23-01:2013 “Building Heat Engineering (Thermal Protection of Buildings)”, from May 26, 2013, № 1
68. SP 23-101-2013 “Design of Thermal Protection of Buildings”, from May 26, 2013, № 1
69. SNiP KR 31-04-2001 “Public Buildings and Structures”, from April 16, 2001, № 62
70. SNiP KR 31-08: 2013 “School Buildings”, from July 12, 2013, № 149
71. SNiP 2.04.05-91(*) “Heating, Ventilation and Air Conditioning”
72. SNiP 2.01.02-85 (*) “Fire Regulations”
73. SNiP 2.04.01 - 85* “Internal Water Supply and Sewerage of Buildings”
74. MCH 2.04-05-95 “Natural and Artificial Lighting”
75. IBC 59-88 “Electrical Equipment for Residential and Public Buildings”
76. SNiP 2-02-01-83 “Foundations of Buildings and Structures”
77. List of legislative documents on building materials, products and structures, which leads to compliance with the requirements of the Technical Regulation “Safety of Building Materials, Products and Structures” of March 22, 2011
78. Guide to the Settlement Application for Energy Certification of Buildings, May 26, 2013, № 1
79. National Statistics Committee of the Kyrgyz Republic, “Industry of Kyrgyzstan”, Bishkek, 2017

80. Analytical report "Financing of the Education Sector in the Kyrgyz Republic", Bishkek (2016), https://eeas.europa.eu/delegations/kyrgyz-republic_el/50040/Support%20to%20the%20Reform%20of%20the%20Education%20Sector%20in%20the%20Kyrgyz%20Republic
81. "Reference Document on Best Available Techniques for Energy Efficiency in Buildings" (February 2009), http://eippcb.jrc.ec.europa.eu/reference/BREF/ENE_Adopted_02-2009.pdf.
82. Unison, "Coal for school's space heating: guideline for users" brochure (Bishkek: Unison, 2016).
83. "On Strategic Directions for the Development of the Education System in the Kyrgyz Republic", decision of the GKR from March 23, 2012, № 20
84. Open data of the National Statistic Committee of the Kyrgyz Republic http://www.stat.kg/
85. Web portal "Open Budget" of the Ministry of Finance of the Kyrgyz Republic, https://budget.okmot.kg/
86. Web portal of financial data "Akchabar", https://www.akchabar.kg/
87. Web portal for government procurement, https://zakupki.gov.kg/
88. "National Sustainable Development Strategy for 2018-2040," adopted in October 2018
89. "Roadmap for Improving Legislation on Energy Performance of Buildings 2017-2019" (approved by Gosstroy in 2016)
90. "Medium-Term Tariff Policies of the Kyrgyz Republic for Electrical Energy and Heat for 2014-2017" (approved in 2014)
91. "Program on Energy Savings and Energy Efficiency Policy Planning 2015-2017" (approved by the government in August 2015)
92. "Action Plan for Implementation of the Program on Energy Saving and Energy Efficiency Policy Planning"
93. "Program of the Development of Heat Supply Systems in Small and Medium Towns of the Kyrgyz Republic for 2017-2025" (draft)

Interviewees

1. Azamat Omorov, Head of Department of the Fuel Energy Complex and Subsoil Use of the Government Office of the Kyrgyz Republic
2. Joomart Kubanychbekov, Expert in the Department of Economics and Investments of the Government Office of the Kyrgyz Republic
3. Marat Cholponkulov, Advisor of the State Committee on Energy, Industry and Subsoil Use
4. Aitmamat Kadyrbaev, Deputy Chairman of the State Committee for Energy, Industry and Subsoil Use;
5. Maksat Amiraev, Head of Housing Department of the State Agency for Architecture, Construction and Housing
6. Valentina Kasymova, Professor of the Kyrgyz State University named after Razzakov I (author of the draft "Concept for the Development of the Fuel and Energy Sector of the Kyrgyz Republic until 2040")
7. Eshimbek Karasartov, the Deputy Head of the Committee on Fuel, Energy and Construction of the Parliament of the Kyrgyz Republic
8. Rustam Sydykov, Senior Specialist of the National Energy Holding Company
9. Bakyt Askarbekov, Financial Manager of the Kyrgyzstan Sustainable Energy Financing Facility (KyrSEFF)
10. Rajap Biyaliev, Heat Supply expert
11. Zuhra Hurova, Senior Loan Officer of the Optima Bank
12. Gulnara Abdyldaeva, Senior Specialist of Housing Department, Bishkek Mayor's office
13. Taalai Kurmanbekov, Head of Financial Department of Sokuluk region
14. Aibek Askarbekov, Member of City Council in Naryn Municipality

15. Aibek Kasymov, CEO of ES Technology, Ltd.
16. Azamat Akeleev, CEO of Smart Energy Solutions, Ltd.
17. Kairat Janbaev, CEO of NurSun, Ltd.
18. Talgat Chinetov, Director of BiFORCE, Ltd.
19. Aidar Mendeev, Technical Director of SMU (construction company)
20. Rahatbek Asanov, CEO of Evrotechstroy (construction company)
21. Timur Vildanov, General Design Director of Ailunstroy (design company)

Annex B: Description of EE Financing Mechanisms in the Public Sector[101]

Budget Financing with Capital Recovery

This approach, also referred to as "budget capture," anticipates that financing is provided by a government agency, such as the Ministry of Finance (MOF), using a combination of government budget allocations and funds from donors and international financial institutions (IFIs). This funding covers the investment costs of the EE projects in both central and municipal buildings and facilities. The recipient of the funding "repays" the funds using the savings generated by the investment project in the form of reduced budgetary outlays ("budget capture") for energy bills of the public agency in future years. The size of the reduced outlay is usually based on the amount of energy cost savings. The flow of funds to pay for EE improvements follows the same procedures as for any other funds received from the MOF. The repayment to MOF could be full or partial; the partial approach encourages municipal utilities and public agencies to participate in the program because they retain a share of the savings achieved. The captured energy cost savings would then be made available to finance additional EE investments and establish a basis for sustainable EE financing by allowing funds to revolve.

Utility On-Bill Financing

Utility on-bill financing is a mechanism under which an energy utility finances the implementation of EE projects at the premises of their public customers. The funds are provided as a loan to the customer (which could be a public sector agency) for equipment purchase and installation, and loan repayments are recovered by the utility through the energy bill. The cost of the EE measures is borne by the individual customers in whose facilities the EE measures have been installed. These customers are the direct beneficiaries of the energy savings and related cost reductions.

The utility on-bill financing approach is designed to overcome the first cost barrier (lack of availability of internal funds) for investment in EE. Under this approach, the utility provides or arranges for the financing needed for the project investment. The customer signs a loan agreement with the utility and the utility collects the loan repayments from the customer through the customer's utility bill by adding a line item on the bill. In most cases, the loan repayments are arranged so that the amount of the repayment is smaller than the customer's cost reduction from the energy savings created by the energy-efficient equipment. This allows the customer to be "cash flow positive" throughout the life of the EE project.

Energy Efficiency Revolving Fund

An energy efficiency revolving fund (EERF) has been proven to be a viable option for scaling up EE financing in the public sector. Under a typical EERF, created using public funds and IFI loans, financing is provided to public agencies to cover the initial investment costs of EE projects; some of the resulting savings are then used to repay the EERF until the original investment is recovered, plus interest and service charges. The repayments can then be used to finance additional projects, thereby allowing the capital to revolve and creating a sustainable financing mechanism.

Since both the borrower and lender are publicly owned, such funds may often offer lower-cost financing with longer repayment periods and less-stringent security requirements than typical commercial loans. Because EE projects have positive financial rates of return, capturing these cost savings and reusing them for new investments creates a more-efficient use of public funds than typical budget- or grant-funded approaches.

This can help demonstrate the commercial viability of EE investments and provide credit histories for public agencies, paving the way for future commercial financing.

Public or Super ESCO

Several countries have taken a more active role in promoting EE projects using the performance contracting approach by creating either public or "super" ESCOs that are wholly or partly owned by the state. Often this was done to promote ESCOs in general, examples being China (pilot EMCs created by the World Bank in Beijing, Shandong, and Liaoning), Poland (MPEC) and Croatia (HEP ESCO). Another example is the establishment of UkrESCO in Ukraine. Such public ESCOs were typically formed when the local ESCO markets were nascent and some public effort was deemed necessary to catalyze them. An additional advantage of a public ESCO is that project development procedures and costs can be streamlined since a public agency is simply contracting with another public agency, and can do so using a memorandum of understanding (MOU) or a simple framework agreement.

The *super ESCO* is a special type of public ESCO. Established by the government, it has two very important functions: (i) implementing EE projects for the public sector (hospitals, schools, municipal utilities, government buildings, and other public facilities) using the performance contracting approach; and (ii) supporting the capacity development and project development activities of existing private sector ESCOs by engaging them as subcontractors to undertake various project implementation functions. The government (possibly with help from IFIs) capitalizes the super ESCO with sufficient funds to undertake public-sector energy savings performance contract (ESPC) projects and to leverage commercial financing.

Another function of the super ESCO is to facilitate access to project financing by developing relationships with local or international financial institutions. The super ESCO may also provide credit or risk guarantees for ESCO projects, or act as a leasing or financing company to provide ESCOs and/or customers with EE equipment on lease or on benefit-sharing terms.

Public Sector Energy Efficiency Credit Line (operated by a Development Bank or Commercial Banks)

A public-sector EE credit line is a financing mechanism that makes funds available to local banks and financial institutions (FIs) to provide debt financing of EE projects in utilities and public buildings and facilities. The major purpose of such a credit line is to increase the funding available from these lenders for debt financing of municipal EE project investments. These can be managed by a development bank, municipal bank, commercial bank(s), or other financial institutions.

Dedicated EE credit lines may be established by governments, multilateral or bilateral financial institutions, or governments in cooperation with international donor agencies. The funds provided by the donors or governments to lenders are often leveraged by additional funds provided by the participating banks and/or financial institutions to increase the total amounts available for debt financing.

Risk-Sharing Facility

A major barrier to commercial financing of public EE projects is commercial lenders' perception that EE projects are inherently riskier than their traditional investments. A risk-sharing facility is designed to address this by providing partial coverage of the risk involved in extending loans for EE projects. The facility – essentially a bilateral loss-sharing agreement – generally includes a subordinated recovery guarantee and

might also have a "first-loss reserve"[102] to be used to absorb up to a specified amount of losses before the risk sharing occurs.

A partial risk-guarantee facility, provided by a government, donor agency, or other public agency, can assist municipal utilities and public agencies by: (a) providing them access to finance, (b) reducing the cost of capital, and (c) expanding the loan tenor or grace periods to match project cash flows (Mostert 2010).

Such a facility would also build commercial lenders' capacity to finance EE projects on a commercially sustainable basis.

Commercial Financing and Bond Issuance

Under this option, municipalities either take commercial bank loans (if they are creditworthy and have borrowing capacity) or issue bonds to finance EE investments. This option can mobilize commercial financing which can deliver scale and be sustainable. The elements of competition can help lower financing costs, address overcollateralization/short tenor issues, and allow public agencies to undertake own procurement/ implementation.

This option can work if there are well-developed municipal credit and rating systems, financial institutions that are willing and able to lend to the public sector for EE projects, and large municipalities with strong technical capacity willing and able to bundle many EE projects together.

Vendor Credit and Leasing

A lease is a contractual arrangement in which a leasing company (lessor) gives a customer (lessee) the right to use its equipment for a specified length of time (lease term) and specified payment (usually monthly). Depending on the lease structure, at the end of the lease term the customer can purchase, return, or continue to lease the equipment. Many different types of organizations – including proprietorships, partnerships, corporations, government agencies, and religious and non-profit organizations – use leasing throughout the world. Suppliers of energy-efficient equipment can provide such equipment under a leasing arrangement, usually with lease payments based on estimated energy savings.

Equipment leases are broadly classified into two types: the *operating* lease and the *finance* or *capital* lease. In an operating lease, the lessor (or owner) transfers only the right to use the property to the lessee. At the end of the lease period, the lessee returns the property to the lessor. Since the lessee does not assume the risk of ownership, the lease expense is treated as an operating expense in the income statement and the lease does not affect the balance sheet.

Leveraging Commercial Financing with Private ESCOs

At the top of the "financing ladder" for public sector projects described earlier is the development of private sector energy service providers, such as ESCOs that specialize in EE project development and implementation. Private ESCOs can help overcome important barriers to scaling up implementation of public sector EE projects. They can (a) offer a range of services spanning the energy services value chain and (b) provide the technical skills and resources needed to identify and implement EE opportunities, perform services using performance based contracts (thereby reducing the risks to the municipal utilities and public agencies), facilitate access to financing from commercial lenders, and enable energy users to pay for services out of the cost savings achieved.

Performance contracting refers to EE implementation services offered by private ESCOs under ESPCs. These have the following key attributes:

- ESCOs offer a complete range of implementation services, including (a) design, engineering, construction, commissioning, and maintenance of EE measures and (b) monitoring and verification of the resulting energy and cost savings.
- ESCOs provide or arrange financing (often up to 100%) and undertake "shared savings" or "guaranteed savings" contracts, such that the payments to the ESCO are less than the cost savings resulting from the project implementation.
- Under the performance contract, ESCOs offer specific performance guarantees for the entire project (as opposed to individual equipment guarantees offered by equipment manufacturers or suppliers) and generally guarantee a level of energy and/or cost savings.
- Payments to the ESCO are contingent upon demonstrated satisfaction of the performance guarantees.
- Most of the technical, financial, and maintenance risk is assumed by the ESCO, thereby substantially reducing the risks to the energy user.

Summary

The following table summarizes these financing options.

Table B-1. Summary of Characteristics of Financing Options for Public Sector Energy Efficiency Projects

Financing Option	Conditions	Pros	Cons	Issues to be addressed	Examples
1. Budget financing with capital recovery or budget capture	• Credit barrier is too high, underdeveloped banking sector, collateralization is difficult • Financing should target new and underdeveloped markets, programs must be efficiently administered, initial subproject results should be intensely disseminated, need viable co-financing • Availability of funding for EE projects	• Easy to implement • Can directly finance municipal entities and central government agencies	• Sustainability may be questionable, even if repayment is obtained through budget financing	• Who will manage and administer the funds? • Is there sufficient implementation capacity?	• Hungary • Lithuania • FYR Macedonia • Serbia
2. Utility on-bill financing	• Requires regulations for utility participation • Strong financial position and financial management of utilities • Payment discipline among public clients, adequate energy pricing and billing practices	• Streamlined repayments, lower repayment risk if risk of utility disconnection • Builds off utility relationships and services • Can be done on a sustainable and scalable basis	• Requires changes in utility regulations and billing systems • Creates potential for monopolistic behaviors • Financing may compete with local banks, • Limited experience with heat utilities	• Are utilities interested and willing? • Do they have capacity and billing systems for on-bill financing? • Is the regulatory system conducive and supportive?	• Brazil • China • India • Mexico • Sri Lanka • Tunisia • U.S.
3. Energy efficiency revolving fund	• Insufficient liquidity in banking sector, major aversion to risk among lenders • Use of grant funds as subordinated debt can help mobilize commercial co-financing • TA to disseminate information on EE subproject performance/financial data critical to sustainability • Need for professional, well-incentivized Fund Management Team	• Can be structured to address financing needs and evolving capacity of all public buildings (central and municipal) • ESA option can be very useful for municipalities with poor credit and lack of capacity	• May require new legislation • May be difficult to cover administrative costs of the Fund from its revenues	• Needs a strong and capable fund manager or management team • Needs supporting legislative framework for establishment	• Bulgaria • Romania • Armenia

Financing Option	Conditions	Pros	Cons	Issues to be addressed	Examples
4. Public or super ESCO	• Immature private sector ESCO industry, but interest/demand to develop ESCO industry • Contracting between public ESCO and public-sector entities may be easier than with private sector service providers	• Can address financing issues and build ESCO capacity	• Need to create a new organization • Need to provide funding • Needs to operate efficiently and avoid acting as monopoly	• Where will such a public ESCO be located? • Will donors be interested in funding such an agency?	• Ukraine Public ESCO (EBRD) Croatia HEP ESCO (WB/GEF), Armenia, Uruguay, EESL (India)
5 a. Dedicated credit line with development bank	• Developed public/ municipal credit market • High commercial bank lending rates and low tenors • Existence of credible development bank willing to lend for EE and assume repayment risks • Municipalities must have ability and willingness to borrow • Public agencies able to retain energy cost savings	• Builds commercial lending market by demonstrating public agencies can repay • Allows public agencies to undertake own procurement and implementation • Allows for lower interest rates • Funds can revolve making it more sustainable	• Relies on strong banking partner with incentive and ability to proactively develop pipeline and offer good financial products • Serves only creditworthy municipalities • Some development banks do not conduct proper risk assessments and appraisals	• Is there a suitable development bank? • How many public agencies can borrow and are creditworthy	• Brazil • India (municipal infrastructure fund) • Mexico • Turkey (proposed)
5 b. Dedicated EE credit line with commercial financial institution(s)	• Well-developed banking sector, willingness of banks to accept risks and EE as line of business • Sufficient market activity to develop project pipeline • Need for parallel TA to develop strong demand, create sustained quality pipeline	• Leveraging of private funds • Utilization of existing banking infrastructure for financing public sector	• Needs municipalities or ESCOs that have borrowing capacity (credit and collateral) • Banks/FIs need to be willing to lend to public sector	• Will the participating financial institutions provide loans to municipal utilities & public agencies? • How many public agencies are creditworthy and have borrowing capacity?	• KfW credit line in Serbia • Hungary • China • Turkey • Ukraine • Uzbekistan

Financing Option	Conditions	Pros	Cons	Issues to be addressed	Examples
6. Risk-sharing program (such as partial credit guarantee)	• Well-developed banking sector, banks are liquid and willing to accept some risks but have a perception of high risk with respect to EE projects • Sufficient market activity to develop project pipeline	• Has worked well in some Central and Eastern European countries • May scale up commercial financing	• Needs a relatively mature banking sector and eligible borrowers • Poor experience of WB and USAID in some countries with respect to public agencies	• Is the banking sector mature enough? • How many municipalities are creditworthy?	• USAID DCA in FYR Macedonia, Bulgaria and other countries • Bulgaria, CEEF (Central/Eastern Europe), China, Croatia, Hungary, Poland
7. Commercial financing, bonds	• Requires well-developed public-sector credit and rating systems • Financiers willing and able to lend to public sector for EE projects • Large municipalities with strong technical capacity willing to bundle many EE projects together	• Mobilizes commercial financing which can deliver scale and be sustainable • Elements of competition can help lower financing costs • Can help address overcollateralization/short tenor issues	• Only makes sense for very large bundles of projects • Only highly creditworthy agencies can use these schemes • Relatively high transactions costs	• Are financiers willing and able to lend to public sector? • How many public agencies are creditworthy and have borrowing capacity?	• Bulgaria • Denmark • India • U.S.
8. Vendor credit, leasing	• Large, credible local and/or international vendors able and willing to finance public EE projects • Local bank financing available for vendor leasing • Creditworthy public agencies able to sign long-term vendor contracts • Public agencies able to retain energy cost savings, pay based on consumption	• Mobilizes commercial financing which can deliver scale and be sustainable • Can help address overcollateralization/short tenor issues • Financing and procurement in one contract • Lease may not count against public debt	• Relies on local banks and leasing companies • Serves only very creditworthy public agencies, • Vendors must assume substantial debt and offer long-term financing • Only some building equipment suited for leasing (lighting, SWH, boilers)	• How many public agencies are creditworthy and have borrowing capacity?	• China • EU • U.S.

Financing Option	Conditions	Pros	Cons	Issues to be addressed	Examples
9. Leveraging commercial financing using private ESCOs/ performance contracts	• Supportive policies and enabling environment • Introduction of simpler business models first • Appropriate financing schemes • Early market development through public sector projects • Development of PPP models to kick-start market	• Mobilizes commercial financing which can deliver scale and be sustainable • Helps address overcollateralization/short tenor issues • ESPC may not count against public debt, public agency shifts technical risks to third party	• Needs local banks and ESCOs to provide reasonable cost financing and assume credit risk • Serves only very creditworthy public agencies, • ESCO industry is difficult to develop • Public procurement issues difficult to address	• Are there any private ESCOs in the market? • Are private ESCOs and/or municipalities creditworthy for commercial project financing?	• WB China ESCO program • Czech Republic • Germany • Hungary • India • Japan • South Korea • U.S. • Canada

Source: World Bank.

Annex C: Diffusion of EE Technologies in the Kyrgyz Republic

	Windows	Insulation material Wall / Roof / Floor	Efficient gas and solid fuel boilers	Solar water heaters	Air conditioners (AC) with heat pumps	Heat pumps (HP) (air-to-air)	Heating system upgrade, dwelling level	Heating system upgrade, building level	Heating system upgrade, building level	Solar building-integrated PV	Water/water and ground/water heat pumps
Basis of sales figures for BAT and CMP (common market practice) equipment	m² of windows	m² of insulation	Number of boiler units of average capacity of 24 KW	Number of collector units	Number of AC split units of average capacity of 5 kWth output	Number of HP units of average capacity of 17 kWth	Apartment units with new radiators, thermostat balancing valves, system balancing	Buildings with heat metering + control	Buildings with modern heating sub-station	Number of PV units	Number of heat pump units of average capacity of 17 KWth
	Equipment, installation	Equipment, installation	Boiler, system connection, installation	Collector, storage tank, installation	AC, installation	HP, installation	Equipment, installation	Equipment, installation	Equipment, installation	Equipment, installation	Equipment, installation
Total sales in KR	135,000	633,333	500	413	1,000	11	3 300	20	20	300	2
of which for rehabilitation	20%	50%	20%	50%	40%	0%	-	-	-	250	-
of which for new buildings	80%	50%	80%	50%	60%	100%	3 300	20	20	50	2
Total number of units (m² or no.) in KR = overall market for the technology	7,702,500	88,131,250	200,000	50,000	150,000	10,000	145,200	4,400	4,400	886,000	886, 000
Number of units already installed	280,000	1,200,000	1,250	1,250	2,500	10	3,300	130	800	70	2
Market penetration in 2017	20%	30% (in urban area) – 5% in total	3%	5%	4%	0%	5%	3%	20%	0%	0%

Notes

[1] As explained in a 2015 USAID report (*Kyrgyzstan Construction Materials Value Chain Stakeholder Analysis*, available at www.ibc.kg/en/download/858), "GOST are a set of technical standards that cover energy, oil and gas, environmental protection, construction, transportation, telecommunications, mining, food processing, and other industries. Quality and safety standards fall within the GOST codes. Within the GOST standards are building codes and regulations (SNiP). The certification of construction materials and on-site verification is housed under the Republican Center for Certification of Construction. The construction material certification standard for the industry is the Construction Norms and Regulations (SNiP), which is a holdover from the Soviet Union. The Kyrgyz SNiP practices have not been updated to include contemporary international construction material standards. Also, SNiP are not translated fully in Kyrgyz and are no longer legal acts."

[2] A free resource (in Russian) for these standards is available at http://cbd.minjust.gov.kg/act/view/ru-ru/200296.

[3] World Bank (2018), *Analysis of Public Buildings Stock and EE Potentials*.

[4] A *policlinic* (also *polyclinic*) is a dispensary or department of a hospital at which outpatients are treated.

[5] The overall energy consumption is the result of the extrapolation of (i) reported and verified real energy consumption by the public central and local agencies that pay the energy bills, (ii) sample energy audits, and (iii) the inventory of public building stock.

[6] The remaining public buildings either are new, exhibit good energy performance, or are deemed infeasible to rehabilitate due to cost or structural safety considerations.

[7] Estimates are based on assessments undertaken for the following World Bank projects: Urban Development Project (6 pre-feasibility studies for 2 kindergartens and 4 schools); Heat Supply Improvement Project (8 energy audits in 2 hospitals, 3 kindergartens and 3 schools); and Enhancing Resilience of Public Buildings in Kyrgyzstan: 25 walk-through energy audits in schools.

[8] The average lifetime of standard technologies (in particular of the building envelope) is 25 to 30 years, while the average lifetime of innovative technologies (e.g. heat pumps) is 15 to 20 years.

[9] For a rough economic analysis, we have applied a LRAIC for electric power of US$0.14 per kWh. The LRAIC measures the incremental costs of providing the total service. Power tariff assumptions:

- Current tariff for public sector institutions (12/2017) = 2.5 KGS/kWh (0.036 US$/kWh).
- Average projected electricity tariff of the next 20 years (with annual CPI of 5%, and constant FX of 69 KGS/US$)= 4.3 KGS/kWh (0.063 US$/kWh).
- For the economic assessment the LRAIC electricity supply tariff has been applied: LRAIC of 0.14 US$/kWh.
- For the RE power generation analysis, a premium of 40% was added to the LRAIC to reflect the additional economic benefit of reduced likelihood for power outages. This factor for PV characterizes the improved economic value for building operation resilience up to about 40% of the generated electricity value.
- According to the RE legislation provisions, the FIT for solar PV power of 0.15 $/kWh is only guaranteed for a period of 8 years.

[10] The Regulation of the State Energy Committee, approved on July 15, 2016, by Decree No. 401. See http://cbd.minjust.gov.kg/act/view/ru-ru/99446.

[11] Gosstroy's organizational structure is explained at http://cbd.minjust.gov.kg/act/view/ru-ru/94558.

[12] See Section 2.2.2.2, Energy Certification and Energy Passports.

[13] The expected main tasks of the Coordinating Council are to organize effective and constructive coordination among all stakeholders involved in energy efficiency; to improve the effectiveness of the actions, the efficiency of allocating international support and financial resources, and the sharing of knowledge and best practices; and to prevent inconsistency and duplication of efforts.

[14] http://cbd.minjust.gov.kg/act/view/ru-ru/97870.

[15] For more on CASEP, see http://www.inogate.org/projects/75?lang=en&order=date_end_desc&section=activities.

[16] This voluntary commitment was announced by the Minister of Foreign Affairs, Mr. E. Abdyldaev, on September 23, 2014, at the New York Climate Summit. (See Chapter 5.)

[17] http://cbd.minjust.gov.kg/act/view/ru-ru/97869?cl=ru-ru.

[18] The Kyrgyz Sustainable Energy Financing Facility (KyrSEFF) is an investment mechanism designed to finance the implementation of modern RE equipment to save energy, water, and dispose waste in homes and enterprises in Kyrgyzstan. The Facility was developed by the European Bank for Reconstruction and Development (EBRD). Its loan portfolio totals $55 million. For the successful implementation of energy saving measures, KyrSEFF clients receive a 10-to-35% grant provided by the EU Investment Facility for Central Asia (EU IFCA). Since April 2013, more than 1,415 energy saving projects have been supported within KyrSEFF. It has led to the annual energy saving of 128,293,890 kWh/year and hazardous emissions reduction of 39,048 tons annually. See http://www.kyrseff.kg or (in English) http://www.kyrseff.kg/?lang=en.

[19] Based on estimates prepared by KyrSEFF, December 2017.

[20] http://cbd.minjust.gov.kg/act/view/ru-ru/96.

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

[22] As stipulated in the regulation "On the Energy Certification of Buildings" (http://cbd.minjust.gov.kg/act/view/ru-ru/93706), there are seven classes (A to G) for five categories of buildings:

- Residential family building
- Residential multi-apartment buildings
- Administrative buildings
- Schools
- Kindergartens

[23] The roadmap for the implementation of legislation in the sphere of energy efficiency of buildings was approved in October 2016, by the order of Gosstroy.

[24] http://cbd.minjust.gov.kg/act/view/ru-ru/56374?cl=ru-ru.

[25] For example, Decree No. 215 of April 26, 2016, "On the Preparation of Economic Sectors and the Population of the Kyrgyz Republic for the Autumn-Winter Period 2016/2017."

[26] These certificates have as their regulatory base the Law "On Energy Performance," 2011.

[27] Energy performance requirements of structures and material must be met for building retrofit in case it comprises more than 25% of the building envelope.

[28] http://cbd.minjust.gov.kg/act/view/ru-ru/111496?cl=ru-ru.

[29] In accordance with the annual resolution of the Government of the Kyrgyz Republic on the timely preparation for the autumn-winter period, which is issued every year in April-May, for example, the RCC of April 26, 2016 No. 215 "On the preparation of the economy and the population of the Kyrgyz Republic for autumn-winter the period 2016/2017 "

[30]http://www.gov.kg/?p=74589&lang=ru

[31] http://cbd.minjust.gov.kg/act/view/ru-ru/200200.

[32] See https://budget.okmot.kg/ru/exp_func/index.html, the Open Budget portal on the Akchabar website. Akchabar is an independent financial web-portal (https://www.akchabar.kg/ru/about). At https://www.akchabar.kg/budget/expenses/56/year/ the data is visualized, but an analysis suggests that calculated estimates are not correct. The Ministry of Finance has a separate portal with other information (https://budget.okmot.kg/ru).

[33] http://cbd.minjust.gov.kg/act/view/ru-ru/111125.

[34] https://zakupki.gov.kg.

[35] https://stimgrant.okmot.kg/stimgrand. In the Law of the Kyrgyz Republic "On the Central Government Budget of the KR for 2018 and the Forecast for 2019-2020," under the article on stimulating (share) grants, the amount of 500,000 KGS is provided. According to the Protocol of the meeting of the Commission for approval of projects due to share (incentive) grants for the implementation in 2018 of 14.03.2017, No. 15-01 / 27, 213 projects were approved.

[36] The District Development Funds are administered by te regional or local authorities. See http://cbd.minjust.gov.kg/act/view/ru-ru/97125.

[37] http://edu.gov.kg/ru/schools/save-schools.

[38] According to the Law of the Kyrgyz Republic "On the National Bank of the Kyrgyz Republic, Banks and Banking Activities".

[39] Dated October 19, 2013, No. 195.

[40] This is governed by the rules for assigning a level of responsibility with regard to the licensing of work in the construction industry: http://cbd.minjust.gov.kg/act/view/ru-ru/6849?cl=ru-ru#p2

[41] http://gosstroy.gov.kg/ru/?p=1015.

[42] https://www.un.org/sustainabledevelopment/energy.

[43] A qualified and motivated staff is the key to success. However, given the currently low salary levels for public officials, it might be difficult to convince top experts to join the agency.

[44] As explained in a 2015 USAID report (*Kyrgyzstan Construction Materials Value Chain Stakeholder Analysis*, available at www.ibc.kg/en/download/858), "GOST are a set of technical standards that cover energy, oil and gas, environmental protection, construction, transportation, telecommunications, mining, food processing, and other industries. Quality and safety standards fall within the GOST codes. Within the GOST standards are building codes and regulations (SNiP). The certification of construction materials and on-site verification is housed under the Republican Center for Certification of Construction. The construction material certification standard for the industry is the Construction Norms and Regulations (SNiP), which is a holdover from the Soviet Union. The Kyrgyz SNiP practices have not been updated to include contemporary international construction material standards. Also, SNiP are not translated fully in Kyrgyz and are no longer legal acts."

[45] A free resource (in Russian) for these standards is available at http://cbd.minjust.gov.kg/act/view/ru-ru/200296.

[46] World Bank (2018), *Analysis of Public Buildings Stock and EE Potentials*.

[47] A *policlinic* (also *polyclinic*) is a dispensary or department of a hospital at which outpatients are treated.

[48] The overall energy consumption is the result of the extrapolation of (i) reported and verified real energy consumption by the public central and local agencies that pay the energy bills, (ii) sample energy audits, and (iii) the inventory of public building stock.

[49] A separate World Bank report, *Market assessment for Deployment of Innovative Energy Efficiency and Renewable Energy Technologies in Public Buildings Rehabilitation* (2018, not publicly available), features an in-depth review of the Kyrgyz market for EE and RE technologies.

[50] The remaining public buildings either are new, exhibit good energy performance, or are deemed infeasible to rehabilitate due to cost or structural safety considerations.

[51] Estimates are based on the Urban Development Project (6 pre-feasibility studies for 2 kindergartens and 4 schools); Heat Supply Improvement Project (8 energy audits in 2 hospitals, 3 kindergartens and 3 schools); and Enhancing Resilience of Public Buildings in Kyrgyzstan: 25 walk-through energy audits in schools.

[52] The average lifetime of standard technologies (in particular of the building envelope) is 25 to 30 years, while the average lifetime of innovative technologies (e.g. heat pumps) is 15 to 20 years.

[53] For a rough economic analysis, we have applied a LRAIC for electric power of US$0.14 per kWh. The LRAIC measures the incremental costs of providing the total service. Power tariff assumptions:

- Current tariff for public sector institutions (12/2017) = 2.5 KGS/kWh (0.036 US$/kWh).
- Average projected electricity tariff of the next 20 years (with annual CPI of 5%, and constant FX of 69 KGS/US$)= 4.3 KGS/kWh (0.063 US$/kWh).
- For the economic assessment the LRAIC electricity supply tariff has been applied: LRAIC of 0.14 US$/kWh.
- For the RE power generation analysis, a premium of 40% was added to the LRAIC to reflect the additional economic benefit of reduced likelihood for power outages. This factor for PV characterizes the improved economic value for building operation resilience up to about 40% of the generated electricity value.
- According to the RE legislation provisions, the FIT for solar PV power of 0.15 $/kWh is only guaranteed for a period of 8 years.

[54] National Report on the Development of EE and RES in KG, UN Economic Commission for Europe, 2015.

[55] The Regulation of the State Energy Committee, approved on July 15, 2016, by Decree No. 401. See http://cbd.minjust.gov.kg/act/view/ru-ru/99446.

[56] Gosstroy's organizational structure is explained at http://cbd.minjust.gov.kg/act/view/ru-ru/94558.

[57] See Section 2.2.2.2, Energy Certification and Energy Passports.

[58] The expected main tasks of the Coordinating Council are to organize effective and constructive coordination among all stakeholders involved in energy efficiency; to improve the effectiveness of the actions, the efficiency of allocating international support and financial resources, and the sharing of knowledge and best practices; and to prevent inconsistency and duplication of efforts.

[59] Text available (in Russian) at http://www.president.kg/sys/media/download/52135. See also http://kabar.kg/eng/news/national-development-strategy-of-kyrgyzstan-for-2018-2040-approved.

[60] A *net-zero-energy building* – also known as a *zero net energy* (ZNE) building, *net zero building* or *zero-carbon building* – is a building with zero net energy consumption. This means the total amount of energy it uses roughly equals the amount of renewable energy created either on site or by renewable energy sources elsewhere.

[61] http://cbd.minjust.gov.kg/act/view/ru-ru/97870.

[62] For more on CASEP, see http://www.inogate.org/projects/75?lang=en&order=date_end_desc&section=activities.

[63] This voluntary commitment was announced by the Minister of Foreign Affairs, Mr. E. Abdyldaev, on September 23, 2014, at the New York Climate Summit. (See Chapter 5.)

[64] http://cbd.minjust.gov.kg/act/view/ru-ru/97869?cl=ru-ru.

[65] The Kyrgyz Sustainable Energy Financing Facility (KyrSEFF) is an investment mechanism designed to finance the implementation of modern RE equipment to save energy, water, and dispose waste in homes and enterprises in Kyrgyzstan. The Facility was developed by the European Bank for Reconstruction and Development (EBRD). Its loan portfolio totals $55 million. For the successful implementation of energy saving measures, KyrSEFF clients receive a 10-to-35% grant provided by the EU Investment Facility for Central Asia (EU IFCA). Since April 2013, more than 1,415 energy saving projects have been supported within KyrSEFF. It has led to the annual energy saving of 128,293,890 kWh/year and hazardous emissions reduction of 39,048 tons annually. See http://www.kyrseff.kg or (in English) http://www.kyrseff.kg/?lang=en.

[66] Based on estimates prepared by KyrSEFF, December 2017.

[67] http://cbd.minjust.gov.kg/act/view/ru-ru/96.

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

[69] As stipulated in the regulation "On the Energy Certification of Buildings" (http://cbd.minjust.gov.kg/act/view/ru-ru/93706), there are seven classes (A to G) for five categories of buildings:

- Residential family building
- Residential multi-apartment buildings
- Administrative buildings
- Schools
- Kindergartens

[70] The roadmap for the implementation of legislation in the sphere of energy efficiency of buildings was approved in October 2016, by the order of Gosstroy.

[71] http://cbd.minjust.gov.kg/act/view/ru-ru/56374?cl=ru-ru.

[72] For example, Decree No. 215 of April 26, 2016, "On the Preparation of Economic Sectors and the Population of the Kyrgyz Republic for the Autumn-Winter Period 2016/2017."

[73] These certificates have as their regulatory base the Law "On Energy Performance," 2011.

[74] Energy performance requirements of structures and material must be met for building retrofit in case it comprises more than 25% of the building envelope.

[75] SNIP "KR" means the standard (or construction norm, CN) has been fully adapted to Kyrgyz Republic conditions and is aligned with the country's legislation. The standards are available in national databases such http://cbd.minjust.gov.kg/act/view/ru-ru/200296.

[76] U-values are used to measure how well elements of a building's fabric act as insulators. The lower the U-value, the better the material performs as an insulator.

[77] http://cbd.minjust.gov.kg/act/view/ru-ru/93633.

[78] http://cbd.minjust.gov.kg/act/view/ru-ru/111496?cl=ru-ru.

[79] Typical standards per student, class-set and group are set by the government, based on the conditions of each institution. For small rural schools, the standard does not depend on the number of students.

[80] In accordance with the annual resolution of the Government of the Kyrgyz Republic on the timely preparation for the autumn-winter period, which is issued every year in April-May, for example, the RCC of April 26, 2016 No. 215 "On the preparation of the economy and the population of the Kyrgyz Republic for autumn-winter the period 2016/2017 "

[81]http://www.gov.kg/?p=74589&lang=ru

[82] http://cbd.minjust.gov.kg/act/view/ru-ru/200200.

[83] See https://budget.okmot.kg/ru/exp_func/index.html, the Open Budget portal on the Akchabar website. Akchabar is an independent financial web-portal (https://www.akchabar.kg/ru/about). At https://www.akchabar.kg/budget/expenses/56/year/ the data is visualized, but an analysis suggests that calculated estimates are not correct. The Ministry of Finance has a separate portal with other information (https://budget.okmot.kg/ru).

[84] Law of the Kyrgyz Republic of July 15, 2011, No. 101, "On Local Self-Government" http://cbd.minjust.gov.kg/act/view/ru-ru/203102?cl=en-ru; Law of the Kyrgyz Republic of September 25, 2003, No. 215, "On the financial and economic foundations of local self-government" http://cbd.minjust.gov.kg/act/view/ru-ru/1341.

[85] http://cbd.minjust.gov.kg/act/view/ru-ru/111125.

[86] https://zakupki.gov.kg.

[87] https://stimgrant.okmot.kg/stimgrand. In the Law of the Kyrgyz Republic "On the Central Government Budget of the KR for 2018 and the Forecast for 2019-2020," under the article on stimulating (share) grants, the amount of 500,000 KGS is provided. According to the Protocol of the meeting of the Commission for approval of projects due to share (incentive) grants for the implementation in 2018 of 14.03.2017, No. 15-01 / 27, 213 projects were approved.

[88] The District Development Funds are administered by te regional or local authorities. See http://cbd.minjust.gov.kg/act/view/ru-ru/97125.

[89] http://edu.gov.kg/ru/schools/save-schools.

[90] More information about the project: http://www.aris.kg/ru/proekty_aris/realizuemye_proekty/proekt_gorodskogo_razvitiya

[91] According to the Law of the Kyrgyz Republic “On the National Bank of the Kyrgyz Republic, Banks and Banking Activities”.

[92] Dated October 19, 2013, No. 195.

[93] This is governed by the rules for assigning a level of responsibility with regard to the licensing of work in the construction industry: http://cbd.minjust.gov.kg/act/view/ru-ru/6849?cl=ru-ru#p2

[94] http://gosstroy.gov.kg/ru/?p=1015.

[95]http://newtek-schmid.com.

[96]http://www.interglass.kg.

[97] http://fakel.kg.

[98]http://tansutech.com.

[99] https://www.un.org/sustainabledevelopment/energy.

[100] A qualified and motivated staff is the key to success. However, given the currently low salary levels for public officials, it might be difficult to convince top experts to join the agency.

[101] This discussion is extracted from previous World Bank studies of international experience with financing options for energy efficiency.

[102] In a *subordinated recovery guarantee*, the guarantor ranks behind other lenders in the recovery of the guarantee funds it pays out in case the borrower defaults on the loan. This allows lenders to offer better loan terms, such as lower interest rates or longer tenors. A subordination provision may be useful, for example, when interest rates are high due to higher perceived risk, or if a new technology with limited operational experience is being deployed. In the event of a loan default, a *first-loss reserve* pays for all losses incurred until the maximum first-loss reserve amount is exhausted. The lender incurs losses only if the total loan loss exceeds the first-loss amount. By covering all or a large share of first losses and sizing the definition of first losses to be a reasonable proportion of the loan portfolio (usually higher than the estimated default or loss rate), a first-loss reserve can provide meaningful risk coverage to the lender, but with a low level of total guarantee liability relative to the total size of the portfolio.