



World Bank Energy and Extractives Global Practice

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

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Abbreviations

BREF	Reference Document on Best Available Techniques for Energy Efficiency in Buildings	HSIP	World Bank Heating Supply Improvement Project
CAPEX	Capital expenditures	KGS	Kyrgyz Som (national currency), applied change rate: US\$ 1 = KGS 70
EE	Energy Efficiency	KR	Kyrgyz Republic
EERF	Energy efficiency revolving fund	KyrSEFF	Kyrgyz Sustainable Energy Financing Facility
EPC	Energy Performance Contracting	LED	Light Emitting Diode
ERIK	World Bank Project Enhancing Resilience in Kyrgyzstan	LGA	Local governmental authorities
ESA	Energy Service Agreement	M&V	Monitoring & verification
ESCO	Energy Service Company	O&M	Operation & Maintenance
EU	European Union	OJSC	Open Joint Stock Company
FESTI	Fuel and Energy Sector Transparency Initiative	RE(S)	Renewable energy (sources)
Gosstroy	State Agency for Architecture, Construction, Housing, and Communal Services	SHW	Sanitary hot water
GOST	state standards	SNiP	Technical standard or norm
HCS	Housing cooperatives	TRACE	Tool for Rapid Assessment of City Energy
HP	Heat pump	UDP	World Bank Urban Development Project
		UN	United Nations

EXECUTIVE SUMMARY

The objective of the present Roadmap for Energy Efficiency in Public Buildings is to provide guidance for the development and implementation of a national energy efficiency investment program for public buildings. The Roadmap assesses the overall energy efficiency potentials and investment needs for energy efficiency rehabilitation of the public buildings stock and provides a vision for its implementation by 2040 as well as consideration to adopt suggested actions for the Concept of the Fuel Energy Sector Development until 2040.

With more than 70% of final electricity consumption, the buildings sector is the main consumer in the Kyrgyz Republic. Widespread use of electric heating, recurring winter power shortages and high normative energy demand of approximately 250 kWh per m² due to outdated buildings and poor insulation are among the major sectoral challenges.

The public buildings stock consists of 9,780 buildings and was constructed 35-75 years ago during the Soviet period without any EE considerations. Due to insufficient resources for maintenance and poor facility management, public buildings exhibit high heat losses due to the dilapidated condition of the building envelope and the heating system. Those losses result in high overall energy demand and explain why the public buildings sector accounts for approximately 10 percent of total electricity consumption with an upward tendency. Real consumption, however, is masked by power consumption limits for public buildings to counter power winter shortages which means that real energy demand in the sector is much higher. Supply limitations and demand-side losses mean that many public buildings are severely under-heated with negative impacts on public service delivery, comfort levels and well-being of students, toddlers, patients and staff.

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

- (i) adoption of a Medium-Term Tariff Policy for 2014-2017 to increase the weighted average electricity and heat tariffs for non-residential customers, including the public sector, by more than 50% for electricity and more than 80% for heating;
- (ii) development and partial enactment of action plans to reduce electric load from public buildings, including options such as installation of solar panels, solar water heating, consumption limits and fuel switching of heating systems;
- (i) adoption of EE related legislation and regulation, including adoption of an EE performance law for new buildings (2012), enactment of regulation on rules of energy certification of buildings (2012) as well as a regulation pertaining to the periodic control of EE of boilers, heating and hot water supply systems of building;
- (ii) implementation of grant and loan financed projects targeting EE in buildings, including the Heat Supply Improvement Project (HSIP).

Based on available analytical studies and conducted energy audits for public buildings, it is estimated that EE improvements would help to reduce energy consumption by 50-60 % or 500 GWh/year. At the same time thermal comfort levels can be increased to comply with norm requirements and generate substantial social

and economic benefits with reduction of healthcare costs, reduction of operation and maintenance costs, improvement of productivity of public services and generally better quality public services. This roadmap suggests a dedicated investment program for energy efficiency rehabilitation of approximately 5,000 buildings and an overall floor area of 5.3 million m² that would require initial costs (CAPEX) of US\$1,085 million to generate lifetime energy saving benefit of 12,500 GWh within the next 25 years. The net-benefit lifetime value of the outlined energy efficiency investment program is 18 kWh savings per invested US\$ or US\$ cent 5.5 per kWh, which is at the level of the current power tariff and cheaper than new generation capacities.

In order to implement the large investment program, multiple barriers need to be mitigated that were identified during the preparation of this report and. The barriers span across different areas (legal, institutional, financial, market, etc.) and currently hamper scale-up of public buildings energy efficiency. The barriers are summarized in the following table:

Type of barrier	Specific barriers	Acronym
Legislative and regulatory barriers (RB)	<ul style="list-style-type: none"> 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. National Strategy for Sustainable Development 2040 and The Concept of Green Economy of Kyrgyzstan) 	RB-1
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> Lack of instruments for progress monitoring of implementing/enforcing the current energy savings legislation and programs (such as qualified inspection, program evaluation, etc.) 	RB-3
	<ul style="list-style-type: none"> Restrictive procurement rules are biased towards lowest price procurement and do not reflect the full cost of ownership (i.e. lifecycle cost), Public procurement regulation does not enable to specify energy performance criteria for equipment and materials 	RB-4
	<ul style="list-style-type: none"> Lack of a methodological basis for performing energy audits 	RB-5
	<ul style="list-style-type: none"> Lack of an official methodology for building certification under Gosstroy 	RB-6
	<ul style="list-style-type: none"> Lack of a central register and inventory of public buildings to benchmark energy performance 	RB-7
	<ul style="list-style-type: none"> Outdated construction design standards (SNIPs) 	RB-8
	<ul style="list-style-type: none"> Lack of a regulatory framework for Energy Performance Contracting or PPP to encourage private sector investment 	RB-9
Institutional barriers (IB)	<ul style="list-style-type: none"> General lack of institutional focus and commitment to save energy 	IB-1
	<ul style="list-style-type: none"> Fragmented responsibility for public buildings spanning different agencies and partly diverging interests for technical management of the very same building 	IB-2
	<ul style="list-style-type: none"> Poor institutional memory due to high staff fluctuation and a general lack of staff, as well as insufficient follow-up of failure of compliance with commitments and acts 	IB-3
	<ul style="list-style-type: none"> Weak inter-ministerial cooperation and coordination on energy efficiency targets, initiatives, projects and instruments, 	IB-4

Type of barrier	Specific barriers	Acronym
	<ul style="list-style-type: none"> Limited communication and exchange between governmental agencies, NGOs and market players (equipment and financing) 	
	<ul style="list-style-type: none"> Weak donor coordination on public energy efficiency 	IB-5
Budgetary barriers (BB)	<ul style="list-style-type: none"> Strained public-sector budgets, Lack of financial resources for programmatic EE investment projects, Lack of dedicated investment budget lines for buildings rehabilitation, Limited public funds for detailed project development 	BB-1
	<ul style="list-style-type: none"> Restrictive regulation that limits retainable energy cost savings, e.g. to use energy cost savings for energy efficiency investments 	BB-2
	<ul style="list-style-type: none"> Public-building owners are not able to commit to long-term financial obligations 	BB-3
Capacity barriers (CB)	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> Buildings energy consumption limits are not properly enforced and lack support mechanisms to reduce energy consumption 	CB-2
	<ul style="list-style-type: none"> Insufficient capacities at all levels to identify, develop and propose concrete and feasible EE project investment projects 	CB-3
	<ul style="list-style-type: none"> Weak enforcement of EE regulation (municipalities, buildings, material) due to missing control mechanisms, inspectors, etc. 	CB-4
	<ul style="list-style-type: none"> Weak domestic market capacity and experience (e.g. energy auditors, design institutes, construction companies, etc.), Missing guidelines, instruments and specific capacities for conducting energy audits and energy performance certification by trained and qualified experts 	CB-5
	<ul style="list-style-type: none"> Lack of standardized energy audit procedures and certification for public buildings energy passports and certification 	CB-6
	<ul style="list-style-type: none"> Lack of a domestic laboratory for certification of materials and equipment to confirm their EE performance 	CB-7
Financing barriers (FB)	<ul style="list-style-type: none"> Low financial profitability of EE investments (high payback time) under consideration of current energy prices and by neglecting economic costs, Missing macro-economic assessment for energy efficiency investments 	FB-1
	<ul style="list-style-type: none"> Lack of customized financial products for public sector EE, Lack of demonstration for energy performance contracting and ESCO services 	FB-2
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Weak and fragmented market capacities for energy services, Absence of an energy efficiency lobby from market player side, e.g. a dedicated association of suppliers 	MB-1
	<ul style="list-style-type: none"> High variability of quality and costs of equipment and service market due to missing norms for quality and performance 	MB-2

Type of barrier	Specific barriers	Acronym
	<ul style="list-style-type: none"> Limited presence of equipment and service providers in rural areas/ regions 	MB-3
	<ul style="list-style-type: none"> Low quality of installation services due to missing requirements for procurement and supervision by contractors 	MB-4
	<ul style="list-style-type: none"> High cost for advanced (imported) equipment due to import duties 	MB-5

In order to address the identified barriers, it is suggested to establish a vision and specific targets for a sustainable, climate resilient, safe and low-carbon public buildings stock in the Kyrgyz Republic until 2040. A shorter period until 2030 will be integrated to establish a supportive policy and regulatory framework and develop and strengthen institutional capacities in order to then provide the basis for scaled-up investments in the sector.

Targets for the medium-term until 2030

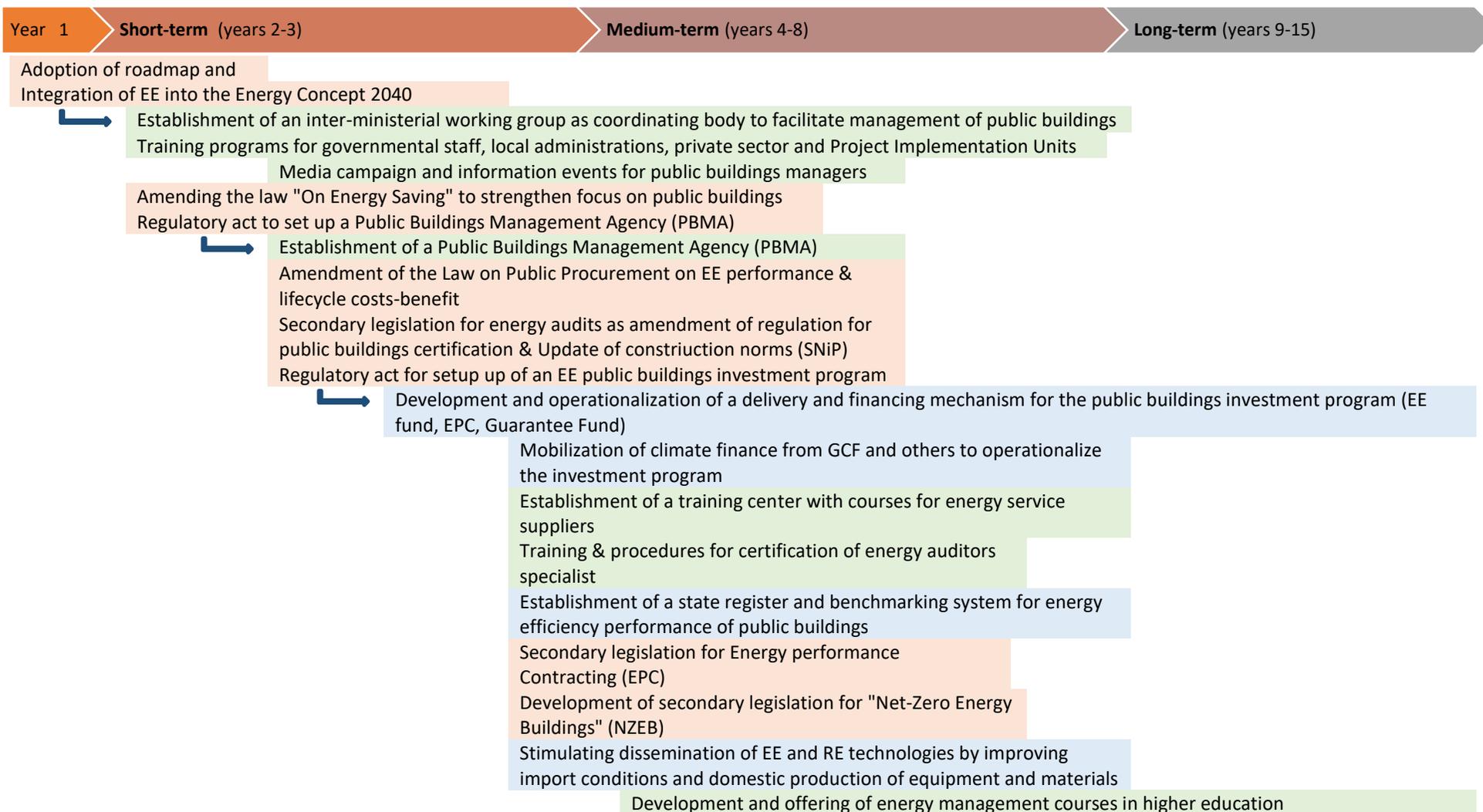
1. Establish and implement energy consumption reduction target in the public buildings sector by at least 25-30% (or 250 GWh) annually compared to the baseline year 2017;
2. Amend laws, budget codes, procurement rules, energy efficiency performance requirements and norms to stimulate EE scale-up for retrofit and new construction;
3. 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 with a current performance class of D or lower;
4. Establish and operationalize a dedicated public entity (unit/institution/agency/department) to manage the public buildings stock and the investment program and take on a lead role in coordinating and building capacity in market stakeholders and sectoral institutions;
5. Develop and operationalize a financing mechanism to invest into energy efficiency in the public buildings sector (e.g. combining existing budget lines for building operation and retrofit with external financing);

Target for the long-term until 2040

6. Upgrade at least one third of the public building stock to Nearly-Zero Carbon or Class 'A', with the remaining aiming to reach at least class 'B+'.

A set of different measures is then suggested to address the previously identified barriers and work toward achieving the targets identified in the vision to implement the large-scale public buildings investment program. The table below summarizes those measures.

Roadmap for improving energy efficiency of the public buildings sector



Legend:	Policy, Legislation and Regulation	Institutional and Technical Delivery Capacities	Implementation Mechanisms & Investments					
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1 ENERGY EFFICIENCY POTENTIALS IN THE KYRGYZ PUBLIC BUILDINGS SECTOR

In Kyrgyzstan the term “public buildings” refers to buildings and facilities for public use, including those occupied by authorities and administrative bodies. Appendix A to SNiP KR 31-04-2001 “Public Buildings and Structures” provides the list of these buildings, which includes the following types of buildings:

- 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).

1.1.1 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 demand¹ in the sector. The study considered buildings that are owned by the government (state or municipal property), most often referred to as "State-Financed Institutions", including buildings that are privately owned but of social significance (schools, kindergartens) and with an appropriate legal status. The state-financed institutions in this document include:

- educational institutions under the Ministry of Education;
- health facilities under the Ministry of Health;
- public administrative buildings under the Fund of State Property Management;
- social institutions under the Ministry of Labor and Social Development;
- 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, hosting 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 following three main categories:

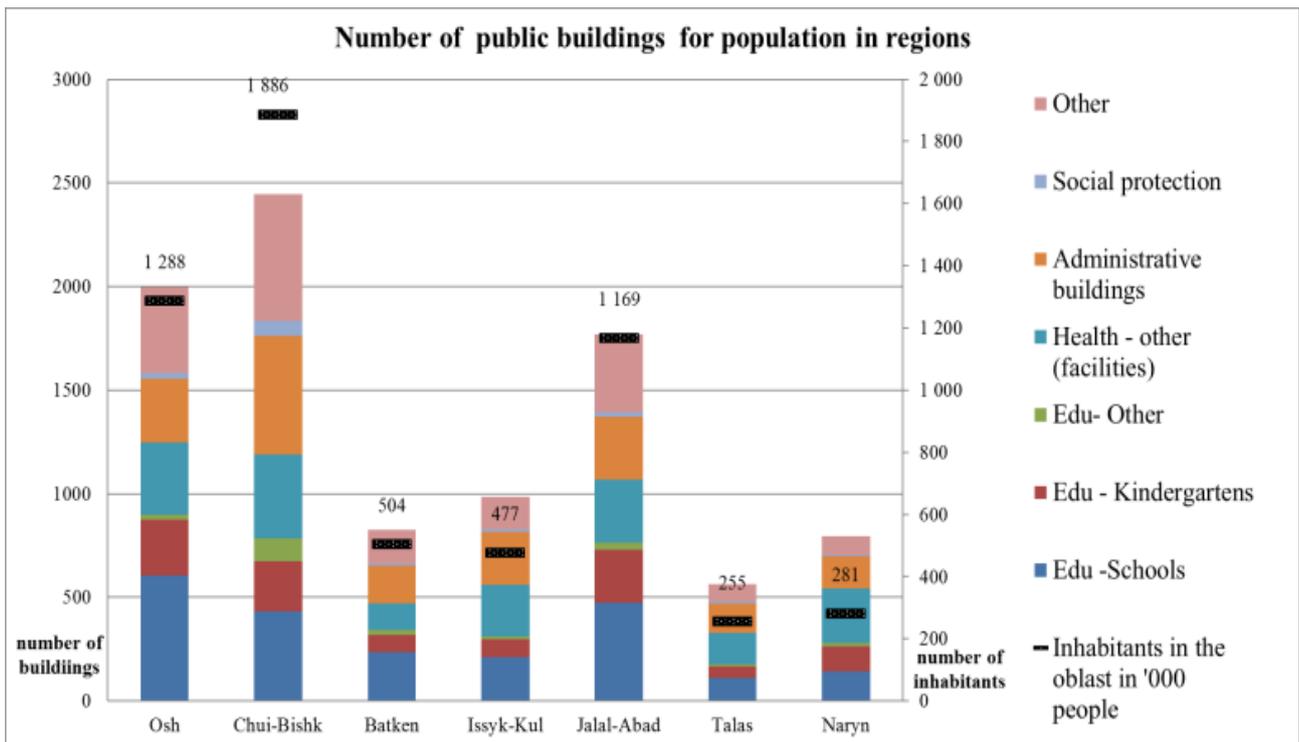
- Educational buildings (schools, kindergartens, higher and other education facilities),

¹ World Bank (2018): “Analysis of Public Buildings Stock and EE Potentials”

- Healthcare buildings (hospitals, polyclinics, other small health facilities),
- Other buildings (Administrative buildings, Social protection, other, etc.).

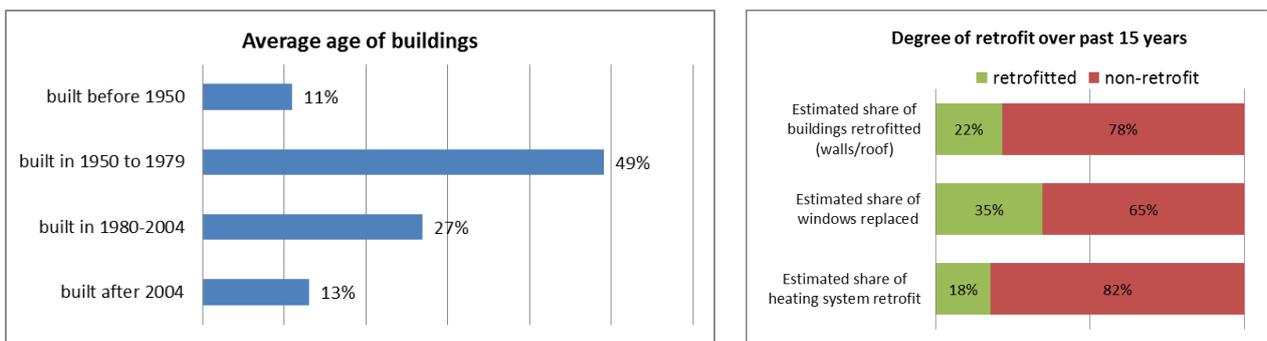
One third of the public buildings stock are educational facilities, representing 60% of the overall heated floor area. The health sector exhibits the smallest floor area of the three categories but with a high number of small buildings.

Figure 1: Public buildings in Kyrgyz Regions according to population distribution



On the average, the condition of buildings is considered to be satisfactory, but about 50% of the building stock, considered within the research, was built in the period between 1950-1980s, and, thus, these buildings have been in operation for 50-60 years with only a minor share of buildings benefitting from retrofits during the last 15 years.

Figure 2: Public buildings stock age and current degree of EE retrofit

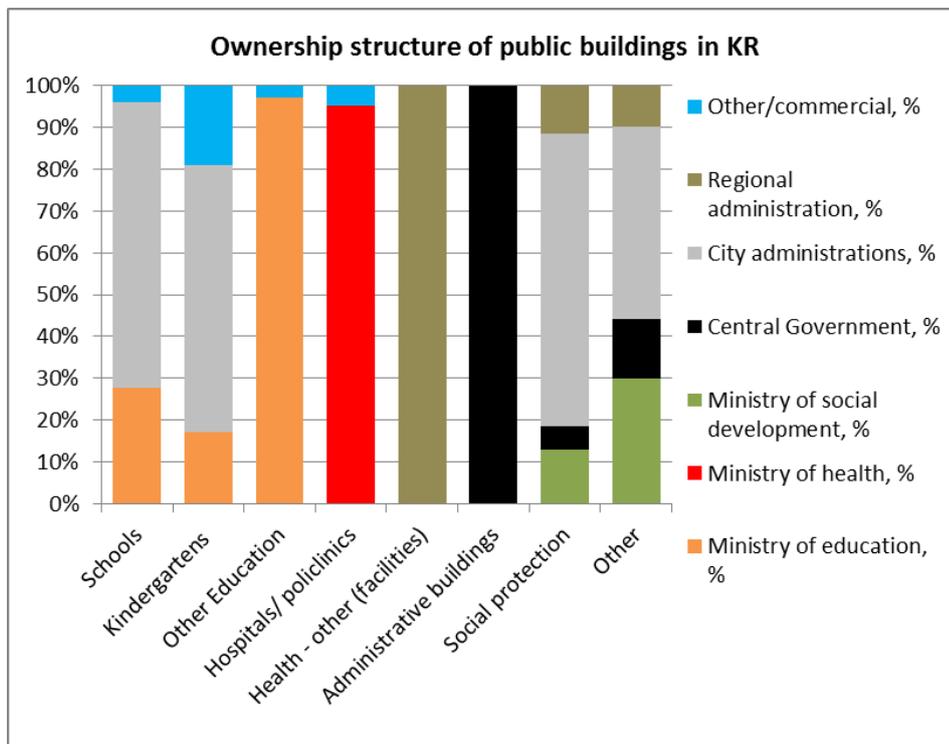


The inventory considers buildings that are owned by the government (state or municipal property), most often referred to as "**State-Financed Institutions**", including buildings that are privately owned but of social significance (schools, kindergartens) and with an appropriate legal status. The state-financed institutions in this document include:

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

Figure 8 indicates that the sector with the largest floor area, namely schools and kindergartens, has a relatively fragmented ownership structure. A small share of kindergartens, schools and small health facilities is in commercial ownership.

Figure 3: Ownership structure of public buildings in KR



1.1.2 Energy Efficiency Potentials in the Public Buildings Sector

Public buildings in the Kyrgyz Republic consume about 850 GWh annually, which equals to 10% of the country's primary energy consumption (10% of national power consumption and 11% of the 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 time with comfort conditions far below norm requirements. The current specific energy consumption averages 162 kWh per floor area (m²) while the actual demand averages 250 kWh per m². Approximately 70 to 88% of energy use in public buildings can be allocated for 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 implementation of selected energy efficiency measures amounts to 50-60% of the total energy consumption or 500 GWh/year. This retrofit effort requires investments of US\$ 1,085 million and will bring the entire public buildings stock up to Class B performance, which is the current minimum energy efficiency performance requirement.

Energy efficiency potentials were determined based on (i) a standard EE technology scenario and (ii) an advanced technology scenario.

Standard EE technologies are recommended 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 retrofit in the country.

Advanced EE technologies were considered according to the following criteria:

- Innovative in the Kyrgyz context and delivery of additional energy savings and ensured economic viability;
- Domestic representation through suppliers and reference projects at the local market, as well as 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 function, safety and value;
- Potential for country- and sector-wide scalability.

Table 1: Catalogue of energy efficiency intervention measures

Standard EE technologies	Advanced EE technologies
Package A) Building envelop 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 retrofit²	
Renewal of heating network + radiators	
Electric boiler replacement or	Heat pump for space heating (<i>replacing the standard technology solution</i>)
Coal boiler replacement or	
Installation of modern DH substation (in case of district heat supply)	
IR ceramic heaters (room based)	
Package C) Lighting system & sanitary hot water³	

² 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.

³ The renewal of kitchen equipment and other electric devices (such as education and IT equipment) are not taken into consideration.

Standard EE technologies	Advanced EE technologies
LED lighting indoor and outdoor	
Replacement of electric devices (such as kitchen and education equipment)	
Replacement of boilers/ network of Sanitary hot water	Heat pump for Sanitary hot water (<i>replacing the standard technology solution</i>)
	Solar collector for Sanitary hot water
	Energy monitoring and management system (optional for large facilities)

Five advanced technologies were identified as most appropriate for the Kyrgyz public buildings context and can be implemented in 70-80% of all existing public buildings in addition to the standard energy efficiency measures⁴:

1. **Heat pumps for space heating** can replace electric resistance 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 Ariston boilers and save up to 73% of current electricity consumption for hot water production. This technology is the champion in terms of economic viability.
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 to apply at public buildings with varying occupation of rooms, e.g. large health, education administration buildings.
4. **Ventilation system with heat recovery** are necessary to ensure air exchange and can reduce heat losses through controlled air exchange by up to 60%.

Combined PV / battery system in hospitals or polyclinics to substitute emergency diesel gen-sets and increase building operation resilience by providing baseline power supply and emergency power supply during power outages.

Table 4 summarizes findings for key technologies by public building type from the earlier World Bank Market Assessment and Public Buildings Inventory and displays the applicability of different advanced EE and RE technologies.

Table 2: Applicability of advanced EE & RE technologies

Energy consumption for	Schools	Pre-school/ kindergartens	Hospitals/ polyclinics
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

⁴ A separate World Bank report “Market assessment for Deployment of Innovative Energy Efficiency and Renewable Energy Technologies in Public Buildings Rehabilitation” conducted an in-depth review of the Kyrgyz market for EE and RE technologies

1.1.3 Costs and economic benefits if EE retrofit

The public building stock in the Kyrgyz Republic covers almost 10,000 buildings, of which approximately 5,000 are deemed retrofittable.⁵ The estimated investment demand for those buildings amounts to US\$ 1,085 million and would deliver energy savings between 55 and 75%. With 3,350 units, educational buildings represent the largest share of buildings in need of rehabilitation, both in terms of floor area and number of buildings.

Table 3: Energy savings potential in public buildings⁶

	Estimated number of buildings for EE retrofit	Building stock floor area, m ² for retrofit	Energy savings potential, MWh/yr	Average energy savings ratio, %	CAPEX for energy savings retrofit, M US\$
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 buildings	5.3 million m² heated area	500 GWh/year	55 -75 % on average	US\$ 1,085 M

Specific investment costs for the complete package of standard and advanced energy efficiency measures range between 140-190 US\$/m².⁷

Table 4: Costs and expected results of energy savings interventions in public buildings

	Specific annual energy saving, in	Specific Investment
Standard/ conventional EE technologies	80-110 kWh/m ² yr (~ 50% EE)	80-100 US\$/m ²
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 kWh/m ² yr (additional ~ 20% EE)	70-100 US\$/m ² (additional costs)
Ventilation system with heat recovery		
Heat pumps for space heating		
Sanitary hot water: Solar collectors or SHW heat pumps		

⁵ The remaining public buildings are either new exhibit good energy performance or rehabilitation is not feasible to cost or structural safety considerations.

⁶ For more details please refer to the report "Analysis of Public Buildings Stock and EE Potential".

⁷ 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.

Building energy management systems and lighting control		
Overall (conventional + advanced technologies)	100 – 160 kWh/m ² yr (60-70% EE)	140-190 US\$/m ²

Considering the average lifetime of the material and equipment of the EE retrofit package, the projected energy savings can be achieved over a period of 30 years⁸. The ratio of the invested CAPEX for the EE retrofit by the forecasted lifetime energy cost savings is at a level of 5 cent US\$/ kWh (3.6 KGS/kWh) and means that for every kWh saved US\$ 5 cent of investment are needed, which is a good ratio.

Energy cost savings are calculated based on the Kyrgyz Long-Run Average Incremental Cost (LRAIC)⁹ and generate approximately US\$ 69 million of savings annually for the whole public buildings investment program with a simple economic payback period between 11 and 13 years, which is a good level of profitability for public infrastructure retrofit projects and generates additional benefits in terms of building comfort, function and safety.

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

⁹ For a rough economic analysis, the LRAIC (Long-Run Average Incremental Cost) for electric power of 0.14 US\$/kWh is applied. LRAIC - Long-Run Average Incremental Cost measures the incremental costs of providing the total service.

2 INSTITUTIONAL, LEGISLATIVE AND FINANCIAL FRAMEWORK

2.1 Institutional Structure

Efficient energy end-use is considered a low priority in the Kyrgyz Government and there is strong lobbying power towards energy generation, transmission and distribution. The previous liquidation of the Ministry of Energy and rearrangements of control structures, establishment and consolidation of the National Energy Holding Company JSC and set up of a regulatory body into separate institutions are processes that further weaken the sector as a whole and result in loss of institutional memory. Energy efficiency as a cross-sectoral topic requires effective intergovernmental communication and cooperation. However, the public buildings sector is plagued by fragmented institutional responsibilities with diverging interests that hamper a more unified approach to improve building function and energy efficiency performance. Insufficient exchange of information and adaptation of efficient work routines, e.g. in terms of communication, document and data management, norm compliance. For example,

- a) the line ministry is focused on the functional demand of the building, while
- b) the LGA struggles to allocate funds for energy supply and maintenance,
- c) the regional administration sets energy supply limits and
- d) the State Inspectorate with limited capacities ensures compliance with technical norms.

2.1.1 Governmental Agencies Responsible for Energy Efficiency

The responsibility for energy and energy efficiency policies and regulation is covered by three state agencies. They are schematically reflected in orange in the below figure. In addition, the scheme highlights sectoral ministries in green¹⁰.

Figure 4: Institutional structure for energy efficiency



The State Committee for Industry, Energy and Subsoil Use (the “The State Energy Committee”) under the Government of the Kyrgyz Republic is an authorized state body responsible for energy efficiency governance, along with energy saving and development of alternative energy. The Regulation at the State Energy

¹⁰ National Report on the Development of EE and RES in KG, UN Economic Commission for Europe, 2015

Committee¹¹ contains a wide range of functions of energy efficiency policy, regulation and control:

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

The State Agency for Architecture, Construction, Housing, and Communal Services under the Government of the Kyrgyz Republic (GOSSTROY)¹² 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:

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

The State Inspectorate for Environmental and Technical Safety (the “Inspectorate”) under the Government of the Kyrgyz Republic 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 of buildings. However, the inspectorate’s capacity is not sufficient to carry out these functions to a full extent. 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 (i.e. Health,

¹¹ <http://cbd.minjust.gov.kg/act/view/ru-ru/99446> - The Regulation of the State Energy Committee approved by the GKR from July 15, 2016 No. 401

¹² http://gosstroy.gov.kg/ru/?page_id=1168 – the structure of departments and units of Gosstroy

Education, etc.), while responsibility for the operation of buildings is usually shared between central and local governmental authorities (e.g. local government authority).

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

Table 5: 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		
Ministerial functions (line function)	The Ministry of Education and Science: organization of the educational process, control of funding from the state budget (through district and city education organizations – Local Education Authorities - RONO, City Board of Education - GORONO)	Ministry of Health	Departments and ministries, local authorities
Building Maintenance	LGAs allocate funding for maintenance/renovation of buildings (among all buildings located on the territory of a settlement)		
Energy Supply	Power consumption limits are determined annually by the Government, and local authorities and distribution companies in accordance with technical conditions 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 for the composition of the Council, its structure and mechanisms for cooperation and activities¹³. To date, only one meeting was held and the Council only includes representatives from state structures (The State Energy Committee, Ministry of Economy, National Energy Holding, Gosstroy) and 2 representatives from local expert organizations. Representatives from international organizations, business and civil society organizations are recorded in the Decree on Establishment of the Council as “by agreement”. Inputs by stakeholder organization and the initiatives for meeting the coordination demand provides a good momentum to support and accelerate the next steps towards operationalizing 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) described in the box below that was established for the period of 2010 to 2015 under the Ministry of Energy and Industry of the Kyrgyz Republic.

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

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: 4 representatives of state authorities, 4 representatives of energy companies (upon agreement), 8 representatives of civil society

Management: 2 co-chairmen of state structures and the public (equal rights)

Management (working body): 1-2 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:

- Energy savings totaling around 200 thousand KGS through the reduction of electricity losses in distribution company networks from 39% in 2010 to 22.3% in 2011.
- Decrease in the cost of credit projects of more than 11 billion KGS (\$200 million), within CASAREM projects (Central Asia –South Asia Regional Electricity Market - CASA-1000), "Improving Power Supply in the South of Kyrgyzstan", "Construction of Datka-Kemin Power Line", "Modernization of Thermal Power Plant in the City of Bishkek", etc.
- Exposing corruption schemes worth more than 400 million KGS.
- Returning more than 8.5 million KGS accrued in the form of unjustified fines or improperly billed for consumed electricity (indirect result of FESTI and FESTI SB activities) to consumers through efforts of public centers for protecting the rights of energy consumers created on the basis of civil society organizations.

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.

After the introduction of new energy efficiency legislation in buildings and improvement of the investment climate in this sector in 2013, the number of energy efficiency projects in the country has been increasing¹⁴ 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, which supports the Kyrgyz Government since many years 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 by-laws and technical documents were developed and implemented. In addition, extensive efforts were undertaken to increase the capacity of governmental agencies and specialists in the construction industry.

An overview of the main stakeholders in energy efficiency, their role, drivers and limitations is presented in the following table.

¹⁴ In more detail, all programs and projects are discussed in Appendix 1 of the report on public buildings statistics (task 1 of this project)

Table 6: Stakeholders and their roles

Stakeholders	Governmental Authorities	Energy Companies	International Financial Institutions and Programs	Suppliers / Manufacturers of EE Materials and Technologies	Associations As lobby of suppliers	Expert Community and Universities	Commercial financing institutions	Public buildings	Private Sector
Represented by entities/ institutions	Government, mayor's offices and departments, HCS, LGA	NEHC JSC	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	<ul style="list-style-type: none"> regulatory requirements to the development of programs and the reduction of energy consumption 	<ul style="list-style-type: none"> energy shortage motivates energy consumers to seek for energy efficient solutions 	<ul style="list-style-type: none"> broad range of assistance (law-making, consultations, implementation, etc.) 	<ul style="list-style-type: none"> mobility, proactivity open markets: Russia, Europe, China willingness to cooperate 	<ul style="list-style-type: none"> opportunity to reflect a consolidated opinion 	<ul style="list-style-type: none"> understanding of energy efficiency simplified procedures (licensing is not required) 	<ul style="list-style-type: none"> specialized on final consumers and sectors flexibility and variety of commercial products 	<ul style="list-style-type: none"> necessity in energy saving, regulatory limits and required certification of buildings vast positive experience in pilot projects 	<ul style="list-style-type: none"> interested in cost reduction and introduction of EE measures accumulated experience (positive and negative) variety of market opportunities
Limits and barriers	<ul style="list-style-type: none"> lack of personnel (and rotation) and institutional memory lack of understanding of benefits of energy efficient measures lack of political will on the implementation of recommended mechanisms 	<ul style="list-style-type: none"> monopoly market position lack of state control over the fulfillment of normative for meters 	<ul style="list-style-type: none"> lack of clear energy efficiency parameters for the projects (from the government) 	<ul style="list-style-type: none"> lack of clarity in requirements to materials absence of a mechanism of certification for new materials and equipment in the country (there is no laboratory) 	<ul style="list-style-type: none"> do not have real power can only provide consolidated opinion, only if it is necessary management is carried out on a volunteer basis 	<ul style="list-style-type: none"> lack of legal frameworks regulating the market lack of demand (public contract) lack of specialized training programs 	<ul style="list-style-type: none"> energy efficiency is not a priority 	<ul style="list-style-type: none"> absence of own resources absence of motivating frameworks to promote EE bureaucratic barriers dependent attitude towards the installation of innovative systems 	<ul style="list-style-type: none"> lack of knowledge on correct use of materials and equipment a certain share of dependent attitude towards pilot projects absence of ESC

2.2 Legislative and Regulatory Framework for Energy Efficiency

2.2.1 Energy Efficiency Programs

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

- The National Sustainable Development Strategy for 2018-2040 (adopted in October 2018), which defines energy as one of five critical sectors. The strategy foresees scaling up of energy savings and energy efficiency programs for the existing building stock and zero energy buildings for new construction.
- The Road Map for improving legislation on energy performance of buildings 2017-2019 (approved by Gosstroy in 2016)
- The 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 Government in August 2015) and Action Plan for Implementation of the Program on Energy Saving and Energy Efficiency Policy Planning states general objectives and direction of energy efficiency policy
- The draft Concept for the Development of the Fuel and Energy Complex of the Kyrgyz Republic until 2040
- The draft Program of the Development of Heat Supply Systems in Small and Medium Towns of the Kyrgyz Republic for 2017-2025

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**¹⁵ within the framework of the CASEP program and with advisory support provided by the European Union.

The program defines the main priorities for the development of energy efficiency and sets general targets for the entire economy of the country:

- Achieving energy savings of 2.23 million toe in 2017,
- Reduction of energy losses of 4.1 million toe in 2020 through promotion of energy efficient technologies and materials in the production, transmission and consumption of power and gas,
- Reduction of energy intensity by 30% and annual energy consumption by 5%, generating energy savings of up to 8 million tons of fuel equivalent, through 'restructuring' of the economy over the period between 2015-2025,
- Reduction of greenhouse gas emissions in CO₂ equivalents in the amount of up to 20% until 2020, in accordance with the obligations to UNFCCC adopted by the Kyrgyz Republic.¹⁶

Any further energy efficiency targets by sectors (industry, buildings, transport) as well as instruments and

¹⁵ <http://cbd.minjust.gov.kg/act/view/ru-ru/97870>

¹⁶ Voluntary commitment announced by the Minister of Foreign Affairs Mr. E. Abdyl daev on 23 September 2014 at the New York Climate Summit

provisions on how to implement and achieve targets are missing.

The Program highlights the importance of a mechanism for reinvesting retained energy savings by public organizations as a result of implementing energy savings measures.

Additionally, in the context of the program the Government of the Kyrgyz Republic provided some instructions¹⁷ in particular to achieve energy savings by reduction of energy losses or supply:

- To sectoral line Ministries, state enterprises KyrghyzKomur and KyrghyzZhilKommunSoyuz, regional and local governments, local state administrations:
 - to develop and adopt sub-programs on energy saving policy planning for 2015-2017;
 - 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 State Agency for Regulation of the Fuel and Energy Complex to consider processes for economically justified investments undertaken by the energy (district heating, gas and power grids) companies to implementing energy saving investments.

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 implementation 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 / local administrations or other sector institutions or stakeholders, with two exceptions:

- Municipal Energy Efficiency Plans in the cities of Toktogul, Sulukta, and Balykchi have been prepared in 2015 in the context of the World Bank Urban Development Project.
- The Kyrgyz Sustainable Energy Financing Facility (KyrSEFF¹⁸) contributes an estimated 4%¹⁹ of the total planned savings by 2017.

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

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

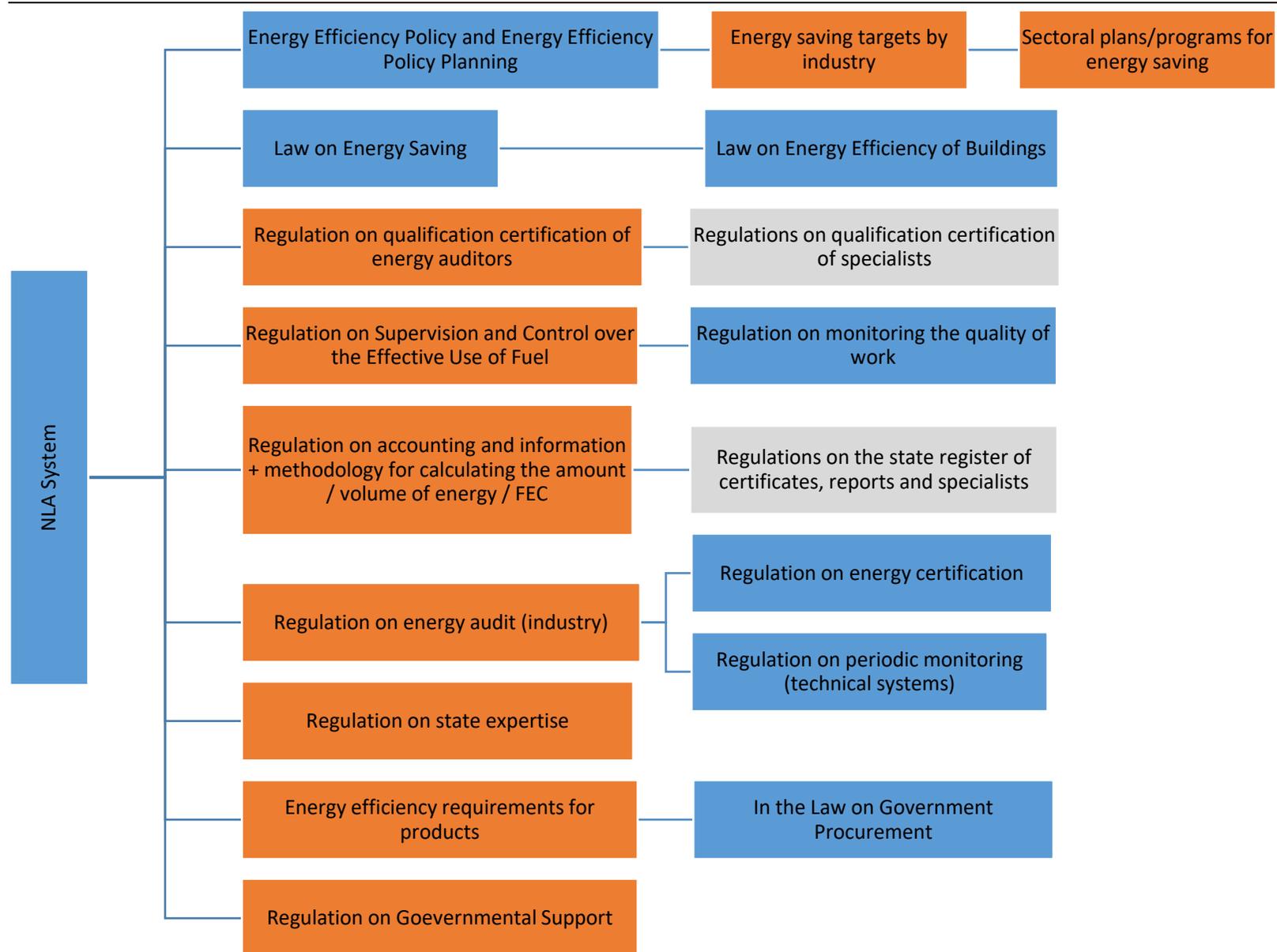
¹⁸ Kyrgyz Sustainable Energy Financing Facility is an investment mechanism to finance the implementation of modern RE equipment to save energy, water, and dispose waste in homes and enterprises in Kyrgyzstan. The Facility was developed by the European Bank for Reconstruction and Development (EBRD). Its loan portfolio totals \$55 million. For the successful implementation of energy saving measures, KyrSEFF clients get 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 were 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. More information: www.kyrseff.kg

¹⁹ Based on estimates prepared by KyrSEFF, December 2017

The following figure provides an overview of the structure of existing and planned Normative and Legislative Acts (NLA). A few leading NLAs exist (blue marked box), while several NLAs are currently being developed (grey color marks box). According to the current governmental initiatives NLAs are planned to be developed (marked in red box). Recommendations for specification and further NLAs are provided in the recommendations of section 4 and 5 below.

Figure 5: Overview of existing and planned Normative- Legislation Acts (NLA)

Legend: Blue marked are existing NLAs Grey color marks are NLAs that are currently being developed marked in red: NLAs which are planned to be developed, but currently do not exist



2.2.2 Energy Efficiency Legislation

Kyrgyzstan's energy efficiency legislation is based on two primary laws the “Law on Energy Saving” and the Law on “Energy Performance of Buildings” as well as related secondary legislation, such as Government decrees, technical norms and regulations. However, as a cross-cutting issue energy efficiency is impacted by several other laws (of which many are outdated or lack effective implementation). The most important laws in this context are:

- Law on Energy (1996)
- Law on Electricity (1996)
- Law on Energy Savings (1998)
- Law on Renewable Energy (2008)
- Law on Oil and Gas (2004)
- Law on Energy Performance in Buildings (2011)

Law “On Energy Saving”

The legislation is based on a framework/declarative **Law on Energy Saving**²⁰ and 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 changed since. The law announces development of mechanisms, regulatory provisions and procedures, which have not been developed until today. For example:

- announcement of rules and procedure of the state expertise of energy efficiency of projects of development economy or programs, should be established by the Government (Article 10);
- announcement for establishing of an energy savings and new energy equipment fund by the Government (Article 20).

Following an agreement for technical assistance between the State Energy Committee and the European Bank for Reconstruction and Development (EBRD) the “Law on Energy Saving” was amended in October 2017 to harmonize the law with the more recent “Law on Energy Performance of Buildings”. The amended draft law now includes:

- **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

²⁰<http://cbd.minjust.gov.kg/act/view/ru-ru/96>

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, heat and 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 energy consumption). Particular attention will be paid for residential consumers that receive heat from district heating systems. Each consumer unit (= apartment) of 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.) to be defined in corresponding regulations. Billing will be based on real consumption.
- **Improving the role model of public institutions through mandatory energy certification of large public buildings.** Public buildings with a heated gross floor area > 6.000 m² (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 have to be repeated every 5 years. Based on the findings of the energy assessment the institution is obliged to reduce the energy consumption by 10% every five years until the building will reach the minimum energy requirements of energy efficiency of class “B” according the Law of Kyrgyz Republic “On Energy Performance of Buildings”.
- **Energy assessments will be integrated into the permitting process for large infrastructure projects.** Energy 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 topics as well as methodology of energy 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 for inter-ministerial and public consultations before parliamentary approval. The draft law justification and submission is planned for the 1st and 2nd quarter 2019.

Law on “Energy Performance of Buildings”

This law 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). The **Law on Energy Performance of Buildings**²¹ 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. This law was one of the first ones 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 classes during the design and construction phase in new buildings as well as for major renovations in existing buildings. The energy efficiency class is identified through the energy certificate of the building, which includes information on the current energy consumption baseline and energy efficiency potential. This will

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

allow the building owner to identify the priority measures to introduce on the building and plan future savings. The law is complemented by by-laws and technical documents, and further efforts are undertaken to improve the legislation and its enforcement²².

Table 7: List of accepted and developed regulations in the context of EE in public buildings

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

The decree of the Government of the Kyrgyz Republic No 255 "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 Cost"²³, dated June 2, 2005 is directly linked to the rational use of energy. With this regulation the Government annually determines supply limitations of energy consumption by regions and responsible agencies²⁴. As a result, many public buildings operators reduce energy supply in order to comply with the

²² 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

²³ <http://cbd.minjust.gov.kg/act/view/ru-ru/56374?cl=ru-ru>

²⁴ For example, the decree of the Government of the Kyrgyz Republic of April 26, 2016 No. 215 "On the preparation of economic sectors and the population of the Kyrgyz Republic for the autumn-winter period 2016/2017"

Government Order, which leads to lower and sub-standard thermal comfort (e.g. indoor temperature, illumination). The order is provided either in physical (kWh or fuel), or monetary terms (cut of budget of energy supply in KGS) and often forces building operators to switch to lower cost types of energy to maintain a certain level of heating, for example coal.

Energy Certification and Energy Passports

The purpose of the energy passport²⁵ directly relates to Decree No 255 to limit consumption of energy for public organizations. The purpose of a public building’s energy passport is to collect buildings data for 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 the building. 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 support of local power utility experts. The accuracy of its content shall be verified by the State Inspectorate for Technical and Environmental Safety but due to a lack of staff and monitoring, data reliability is poor.

Energy performance certificates²⁶ on the other hand are issued for new construction and buildings rehabilitation. The Law on Energy Performance of Buildings obliges public building operators to prepare energy passports of public buildings and boiler houses and lays out the provisions and verification procedures. Due to the absence of certified energy efficiency specialists (for more information please refer to 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 type, function and its location in a climatic zone (according to table 10). 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 8: Requirements for Specific Energy Consumption in Buildings in kWh/m²

Buildings	Standardized value (minimum requirement) for energy consumption for new buildings and buildings under energy renovation - Class B by climatic regions					
	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 Buildings-related technical regulations, norm and standards

The Law on Energy Efficiency Performance of Buildings presupposes the application of the technical norms for minimum energy efficiency requirements for buildings, which means structures and components of new and retrofitted buildings²⁷ for instance shall have a minimum thermal conductivity with the set values. Table 11 summarizes some of those technical requirements. SNiP norms originate from the times of the Soviet

²⁵ On the regulatory base Governmental Decree “On establishment of limits for consumption of energy and fuel resources.”, 2005

²⁶ On the regulatory base: 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 envelop.

Union and regulate planning, calculation as well as implementation of building construction. Many of those SNiPs are outdated and there is an urgent need to update SNiPs to reflect best practice energy efficiency technologies and materials in building design and implementation but also due to Kyrgyzstan's accession to the Treaty on the Eurasian Economic Union, such as:

- SNiP KR 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" adopted in Kyrgyzstan, SNiP KR 35-01-99 "Designing a living environment taking into account the needs of low-mobile groups", etc.
- SNiP 2.04.05-91(*) "Heating, ventilation and air conditioning", SNiP 2.01.02-85 (*) "Fire regulations", SNiP 2.04.01 - 85* "Internal water supply and sewerage of buildings", MCH 2.04-05-95 "Natural and artificial lighting", IBC 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, etc.
- as well as technical regulations, construction norms (EAEU CN) and code specifications (EAEU CS) of the EAEU countries, put into effect on the territory of the Republic in accordance with the established procedure.

Some areas, such as buildings-integrated renewable energy, are not covered by SNIP. Due to insufficient institutional capacities, limited efforts have been undertaken to reform technical construction and equipment standards resulting in a piecemeal 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 over-dimensioning and excessive retrofit costs.

Table 11 summarizes some of the technical norms relevant for energy efficient construction. In addition, building operators are required to provide certain indoor conditions according to decree #531²⁸, dated 2 August 2012. This decree is part of the Law on Energy Performance of Buildings and requires indoor room temperature of 20/22 °C, an indoor humidity of 50%, air exchange rates and illumination levels 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 9: Requirements for U-values of Building Structures for New Buildings

Building structures	$U_N, W/(m^2.K)$
External walls	0,32
Windows (in the external wall and the doors to the space with the permanent stay of people)	$\leq 1,5$
Flat roof	0,20

²⁸ <http://cbd.minjust.gov.kg/act/view/ru-ru/93633>

Ceiling with vertical thermal flow (depending from the thermal flow direction and temperature difference)	0,20 - 1,70
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2.3 Budgeting the Public Buildings Sector

2.3.1 Operational Expenditures

Payment of operational expenditures (including the cost of energy) for the public buildings sector are paid for mostly by the central government budget of the Kyrgyz Republic but channeled through different municipalities and oblast administrations, depending on the responsibility for building operation²⁹. 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 students³⁰. Higher, professional and central schools are funded directly from the Ministry of Finance, while schools located in municipalities are funded through the municipal budget;
- **Pre-schools/kindergartens, social facilities** (such as elderly homes and social hostels, 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 paid for 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, security, etc.

Municipalities can reallocate funds according to demand and availability. Reduced spending in one sector – like energy bills - does not reduce budget transfers. However, retaining of 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 previous year's consumption of energy resources (coal, electricity, etc.), and agreed for the subsequent heating season.³¹

²⁹ <http://cbd.minjust.gov.kg/act/view/ru-ru/111496?cl=ru-ru>

³⁰ 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 for their funding is made up of the costs that do not depend on the number of students.

³¹ 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 "

The current setup of funding operational expenditures is highly bureaucratic and can cause disbursement delays and consequently liquidity shortages on the side of the municipalities which can increase municipal debt to energy utilities and ultimately result in power cut-offs.³²

Despite an effective procedure for planning of 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;
- The management of public organizations does not submit draft budgets with precise forecasts to the Kenesh in writing;
- Absence from participation in the Kenesh on budgeting to scrutinize draft budgets on building expenditures.

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

- Previous year's energy supply was partly limited and does not reflect the real demand to achieve indoor heating and lighting comfort and 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 and according to the meter reading in the buildings. Fuels for heating (e.g. coal) are directly procured by the municipality from local suppliers.

For buildings that are supplied directly (district heat, or 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^{33 34}. An analysis of the data reveals that expenditures on housing and communal expenditures amount to 1.43% of the central government budget and 3.25% of the local budget.

Table 10: 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	3,25% of the Total Budget 6 321 947 million KGS

³² <http://www.gov.kg/?p=74589&lang=ru>

³³ <http://cbd.minjust.gov.kg/act/view/ru-ru/200200>

³⁴ https://budget.okmot.kg/ru/exp_func/index.html - Open Budget portal on Akchabar website
<https://www.akchabar.kg/budget/expenses/56/year/> the data is visualized but an analysis suggests that calculated estimates are not correct.

	(26 702 million US\$)	(91 622 million US\$)
Budget line "Utilities" (energy, water, waste)	0,035% of the Article 648 400 KGS (US\$ 9 397)	1,3% of the Article 82,377 million KGS (1.2 million US\$)
Budget line "Acquisition of coal and other types of fuel"	-	0,015% of the Article 964 580 KGS (US\$ 13 979)
Budget line "Expenses for repair works of property"	0,018% of the Article 329 080 KGS (US\$ 4 769)	3,612% of the Article 228,7 million KGS (US\$ 3.3 million)
Budget line "Buildings and structures" (investments into new buildings, major retrofit and leasing costs)	26,7% of the Article 493,5 million KGS (7,152 million US\$)	30,75% of the Article 1 955 million KGS (28,17 million US\$)

The above table illustrates that the local (municipal) budget covers most expenses for utility services, renovation and construction of public buildings.

- The allocated budget for utility services, including energy supply and repair is with 99% at the local/municipal budget.
- The budget for new construction and retrofit amounts to US\$ 35 million annually, of which local/municipal budget shares are 80%.

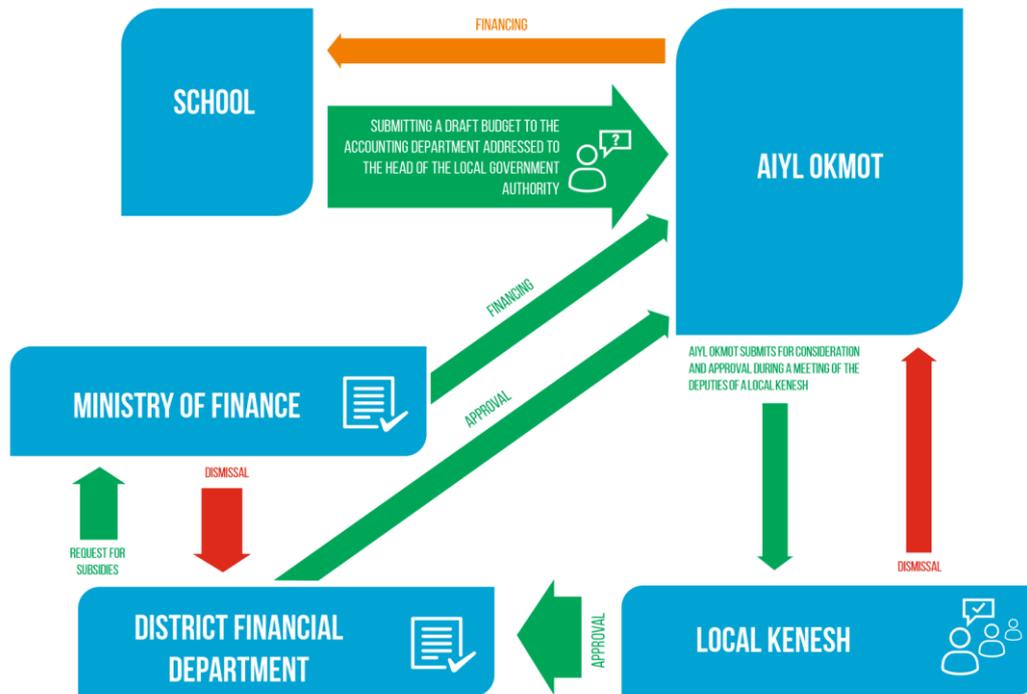
Due to the absence of a detailed buildings inventory and consistent database management it is currently not possible to separate the allocation of different budget lines for particular types of buildings (e.g. x KGS for retrofit of y schools).

Proposals and approval of national and local budgets are conducted publicly during open sessions of the local council (the "City Kenesh" or the "Kenesh") and public hearings. The process for local budget development is as follows³⁵:

1. The Kenesh discusses and preliminary agrees on priorities for the local development and budget spending;
2. The local Planning and Budget Commission (Aiyl Okmot) invites responsible sectoral authorities (education, social and health, etc.) to provide a report on budget expenditures of the previous period, and present a proposal 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 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.

³⁵ The Law of the KR 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>

Figure 6: Procedure of facility's budget planning by local authorities³⁶



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 2015³⁷. Tender procedures are conducted through the official web portal for public procurement³⁸ and according to different procurement methodologies to determine price and quality. A tender commission ensures the sound process and compliance of the proposal with the terms and conditions of the technical specifications.

Procurement plans are established by procuring entities on the basis of requests from public building operators (kindergartens, schools, hospitals on the territory) and 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 the lowest price offer. The contracting authority is obliged to elaborate in the tender documentation the criterion of the most economically advantageous tender, in a way to determine and elaborate 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 cost reduction of building operation or energy supply. 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

³⁶ Source of the picture: "Coal - User's Guide", Unison Group, 2015

³⁷ <http://cbd.minjust.gov.kg/act/view/ru-ru/111125>

³⁸ <https://zakupki.gov.kg/>,

capacities to establish an EE project investment case; (iii) a lack of detailed analysis for the evaluation. Consequently, the lowest initial price remains the decisive criteria.

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 an extended (e.g., five years) period. 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 EPCs, since such contracts require several years of energy savings in order to allow recover the investments. 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

The positive potential macroeconomic effects of energy efficiency are not well-known in the Kyrgyz Republic and consequently 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 only include replacement of windows, lighting and heating systems. Building operators can tap into different funding sources for buildings renovation from municipal, regional budgets, central government funds (partly through ARIS). Upon request from local authorities, schools can apply for stimulating grants provided by the Ministry of Finance³⁹. These funds are provided by the national budget on a competitive basis that require 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 mining companies on the territory. 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 announced a program "Safe Schools and Pre-School Educational Organizations" for the period 2015-2024⁴⁰, for reconstruction, and construction of more than 2,000 schools and kindergartens. The overall cost of the program amounts to almost 50 billion KGS.

The Government of Kyrgyzstan with help from donor agencies, has 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, increased awareness, etc. Notable examples are:

- EBRD Kyrgyz Sustainable Energy Financing Facility (\$55 million) to finance the implementation of equipment to save energy, water, and dispose waste in homes and enterprises in Kyrgyzstan. Since April 2013, more than 1,415 energy saving projects were supported, resulting in annual energy saving of 128 GWh.

³⁹<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 stimulating (share) grants is provided - 500 000.0 thousand KGS. 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.

⁴⁰ <http://edu.gov.kg/ru/schools/save-schools/>

- World Bank Urban Development Project⁴¹ for rehabilitation of four schools and two kindergartens to improve energy efficiency and seismic resilience, strengthening of the building structure, renewal of the heating system and buildings insulation;
- UNDP project "Improving Energy Efficiency of Buildings" (2010-2014) for construction of an energy efficient school in Osh as well as design of an energy efficient school for the city of Bishkek;
- World Bank Enhancing Resilience in Kyrgyzstan (ERIK) project. ERIK aims to improve the safety and functional conditions of schools in areas of highest seismic hazard including energy efficiency improvements.

However, the main lesson learned from those projects indicate that here can be very limited replication of donor pilot programs and grant financing without a sustainable financing mechanism while the sector is in need of substantial investments and scalable financing mechanisms that also involve 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 more 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:

- 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 concerning 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;
- alternative obligations to increase a public borrower's performance⁴² under a loan agreement, such as bail, guarantee, 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 product and services and to eventually scale up energy efficiency in the public buildings sector. The energy efficiency market in the Kyrgyz Republic is still 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

⁴¹ More information about the project:

http://www.aris.kg/ru/proekty_aris/realizuemye_proekty/proekt_gorodskogo_razvitiya

⁴² According to the Law of the Kyrgyz Republic "On the National Bank of the Kyrgyz Republic, Banks and Banking Activities"

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 Kyrgyzstan, most of the companies are located in Bishkek and Osh which restricts access for rural communities to those technologies and services. Energy services encompass a wide range of activities that are illustrated below in the energy services value chain.

Figure 7: Energy Service Value Chain



There are many different types of energy service providers that may provide some or all of the elements of the value chain, such as an energy service company (ESCO). An ESCO is generally defined as an organization that provides a wide range of these services using a performance-based approach. This approach is referred to as energy performance contracting or EPC. The main characteristics of EPC as offered by ESCOs are:

- An ESCO provides or arranges a wide-ranging package of services, comprising of 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 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"⁴³, design, auditing of public buildings, as well as construction and installation works are subject to mandatory licensing of the service provider. This means, building designers, seismologists, engineers, etc. have to obtain a qualification certificate issued by the Kyrgyz government. There are approximately 70 experts in the market for energy efficiency and HVAC technologies in the construction sector but no specialists for buildings 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, 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 a lack of an institution in charge of standardization.

The construction sector is better represented and organized. More than 700 construction companies are registered in Kyrgyzstan, with the largest concentration of developers in Bishkek. While many construction companies participate in the energy efficiency market, only a few companies have a well-educated labor force for installing thermal insulation such as rockwool and EE windows. Building companies are graded

⁴³ Dated October 19, 2013 N 195

according to their ability to perform work of a certain degree of complexity⁴⁴.

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

- Information on the state registration of the enterprise, on payment of tax and insurance premiums
- General information about the organization: qualifications of managers, specialists, workers; information about the technical base,
- Procedures for ensuring quality control and safety of production.

A legal entity needs to 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 licensing⁴⁵ 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. These companies are focused on the construction of facilities with short payback periods. Companies that compete for public buildings works are often founded for the very purpose of participating in public tenders and quality is often insufficient due to missing experience.

The following table provides a summary overview of market actors and their respective capacities.

Table 12: Overview of available service suppliers and capacities

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

⁴⁴ In accordance with the rules for assigning a level of responsibility for the licensing of work in the construction industry, <http://cbd.minjust.gov.kg/act/view/ru-ru/6849?cl=ru-ru#p2>

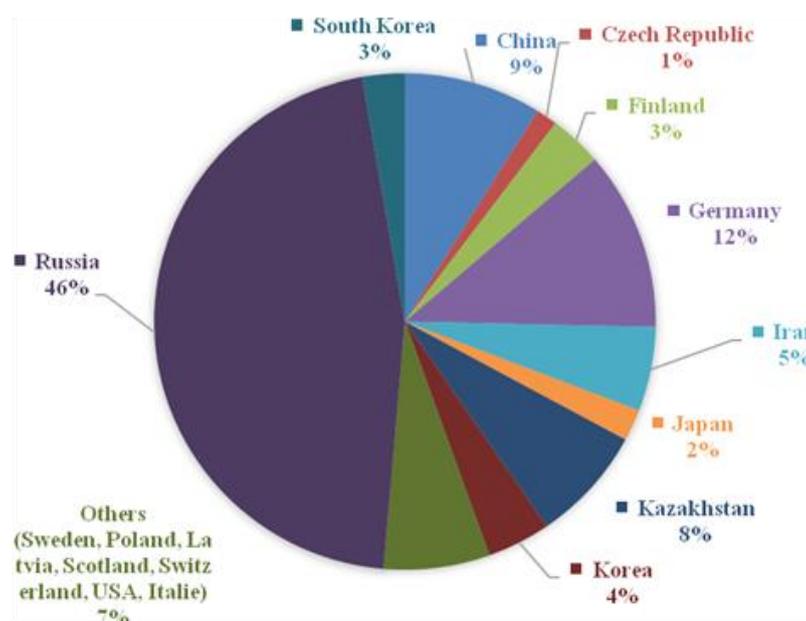
⁴⁵ <http://gosstroy.gov.kg/ru/?p=1015>

3.2 EE Equipment Suppliers

The market for energy-efficient materials and equipment in Kyrgyzstan is relatively well-developed. There are only few domestic producers of energy efficient materials: NewTEK LLC⁴⁶ (solar collectors), Interglass LLC⁴⁷ (energy saving windows with glazing), Fakel LLC (mineral wool basalt slabs and coils), Tansu Ltd.⁴⁸ (coal boilers), and etc.

Due to the Kyrgyz accession to the Treaty on the Eurasian Economic Union and in accordance with the Law on Technical Regulations on the Safety of Construction Materials, Products, and Structures energy savings equipment is exempted from mandatory conformity assessment according to the requirements of the Eurasian Economic Union. This mean, that there are no performance requirements for energy efficiency of imported equipment that could ban import of low energy efficiency performance technologies. Equipment classified as "renewable energy sources" is exempted custom duties in accordance with the Law on RES (since 2008). However, the definition of RE technology is weak. A survey among technology suppliers shows that the interpretation of equipment differs. More advanced heating technologies such as heat pumps are not explicitly exempted from import duties.

Figure 1: Suppliers of Energy Efficient Materials and Equipment, KyrSEFF List (2018)



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

The market of plastic windows is most developed among all energy saving technologies. There are approximately 1,000 companies that supply/produce/install windows in Kyrgyzstan. An important challenge with respect to window manufacturing but also boilers and thermal insulation material is the absence of a domestic laboratory for certification of the heat coefficient (U-value) of windows. Domestic manufacturer

⁴⁶<http://newtek-schmid.com/>

⁴⁷<http://www.interglass.kg/>

⁴⁸<http://tansutech.com/>

hence need to rely on laboratories abroad, which is expensive and often not feasible for small manufacturers and ultimately means that few producers can obtain energy efficiency certificates for their products.

Table 13: Level of capacities by energy service suppliers

	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 IDENTIFICATION OF KEY BARRIERS

The previous chapters provided insights from the relevant sectors and areas that impact and hamper scaling up of energy efficiency. Those barriers and challenges to increase energy efficiency in the public buildings sector are multifold and span across multiple sectors.

International experience points out that the main barriers to public EE implementation can be classified into the following types:

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

The following table summarizes the major barriers for public sector EE implementation in the Kyrgyz Republic.

Table 14: Barriers to Public buildings EE Implementation

Type of barrier	Specific barriers	Acronym
Legislative and regulatory barriers (RB)	<ul style="list-style-type: none"> • 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. National Strategy for Sustainable Development 2040 and The Concept of Green Economy of Kyrgyzstan) 	RB-1

Type of barrier	Specific barriers	Acronym
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> Lack of instruments for progress monitoring of implementing/enforcing the current energy savings legislation and programs (such as qualified inspection, program evaluation, etc.) 	RB-3
	<ul style="list-style-type: none"> Restrictive procurement rules are biased towards lowest price procurement and do not reflect the full cost of ownership (i.e. lifecycle cost), Public procurement regulation does not enable to specify energy performance criteria for equipment and materials 	RB-4
	<ul style="list-style-type: none"> Lack of a methodological basis for performing energy audits 	RB-5
	<ul style="list-style-type: none"> Lack of an official methodology for building certification under Gosstroy 	RB-6
	<ul style="list-style-type: none"> Lack of a central register and inventory of public buildings to benchmark energy performance 	RB-7
	<ul style="list-style-type: none"> Outdated construction design standards (SNIPs) 	RB-8
	<ul style="list-style-type: none"> Lack of a regulatory framework for Energy Performance Contracting or PPP to encourage private sector investment 	RB-9
Institutional barriers (IB)	<ul style="list-style-type: none"> General lack of institutional focus and commitment to save energy 	IB-1
	<ul style="list-style-type: none"> Fragmented responsibility for public buildings spanning different agencies and partly diverging interests for technical management of the very same building 	IB-2
	<ul style="list-style-type: none"> Poor institutional memory due to high staff fluctuation and a general lack of staff, as well as insufficient follow-up of failure of compliance with commitments and acts 	IB-3
	<ul style="list-style-type: none"> Weak inter-ministerial cooperation and coordination on energy efficiency targets, initiatives, projects and instruments, Limited communication and exchange between governmental agencies, NGOs and market players (equipment and financing) 	IB-4
	<ul style="list-style-type: none"> Weak donor coordination on public energy efficiency 	IB-5
Budgetary barriers (BB)	<ul style="list-style-type: none"> Strained public-sector budgets, Lack of financial resources for programmatic EE investment projects, Lack of dedicated investment budget lines for buildings rehabilitation, Limited public funds for detailed project development 	BB-1
	<ul style="list-style-type: none"> Restrictive regulation that limits retainable energy cost savings, e.g. to use energy cost savings for energy efficiency investments 	BB-2
	<ul style="list-style-type: none"> Public-building owners are not able to commit to long-term financial obligations 	BB-3
Capacity barriers (CB)	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> Buildings energy consumption limits are not properly enforced and lack support mechanisms to reduce energy consumption 	CB-2
	<ul style="list-style-type: none"> Insufficient capacities at all levels to identify, develop and propose concrete and feasible EE project investment projects 	CB-3

Type of barrier	Specific barriers	Acronym
	<ul style="list-style-type: none"> Weak enforcement of EE regulation (municipalities, buildings, material) due to missing control mechanisms, inspectors, etc. 	CB-4
	<ul style="list-style-type: none"> Weak domestic market capacity and experience (e.g. energy auditors, design institutes, construction companies, etc.), Missing guidelines, instruments and specific capacities for conducting energy audits and energy performance certification by trained and qualified experts 	CB-5
	<ul style="list-style-type: none"> Lack of standardized energy audit procedures and certification for public buildings energy passports and certification 	CB-6
	<ul style="list-style-type: none"> Lack of a domestic laboratory for certification of materials and equipment to confirm their EE performance 	CB-7
Financing barriers (FB)	<ul style="list-style-type: none"> Low financial profitability of EE investments (high payback time) under consideration of current energy prices and by neglecting economic costs, Missing macro-economic assessment for energy efficiency investments 	FB-1
	<ul style="list-style-type: none"> Lack of customized financial products for public sector EE, Lack of demonstration for energy performance contracting and ESCO services 	FB-2
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> Weak and fragmented market capacities for energy services, Absence of an energy efficiency lobby from market player side, e.g. a dedicated association of suppliers 	MB-1
	<ul style="list-style-type: none"> High variability of quality and costs of equipment and service market due to missing norms for quality and performance 	MB-2
	<ul style="list-style-type: none"> Limited presence of equipment and service providers in rural areas/ regions 	MB-3
	<ul style="list-style-type: none"> Low quality of installation services due to missing requirements for procurement and supervision by contractors 	MB-4
	<ul style="list-style-type: none"> 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 towards achieving the UN Sustainable Development Goals (SDG). SDG 7 demands to “ensure access to affordable, reliable, sustainable and modern energy” for 2030 in particular to substantially increase the share of renewable energy, double the rate of energy efficiency improvements, enhance international cooperation to facilitate access to clean energy research and technology, promote clean energy technology and energy efficiency investment, and to expand infrastructure and upgrade technology for supplying modern and sustainable energy services.

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

The general economic and energy sector development targets of the Kyrgyz Republic and those for energy efficiency and renewable energy are not well-formulated. It is hence 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 Fuel and Energy Sector Development 2040:

- Sustainable energy & economic development;
- Safe and reliable energy supply throughout the country, including remote in regions;
- Reduction of energy intensity and increasing energy savings in all economic sectors;
- Decreasing harmful environmental impacts;
- 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 hence suggests a Vision and targets for a sustainable, climate resilient, safe and low-carbon public buildings stock in the Kyrgyz Republic until 2040 to be reflected. A shorter period until 2030 will be integrated to establish a supportive policy and regulatory framework and develop and strengthen institutional capacities in order to then provide the basis for scaled-up investments in the sector.

Targets for the medium-term until 2030

7. Establish and implement energy consumption reduction target in the public buildings sector by at least 25-30% (or 250 GWh) annually compared to the baseline year 2017;
8. Amend laws, budget codes, procurement rules, energy efficiency performance requirements and norms to stimulate EE scale-up for retrofit and new construction;
9. 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 with a current performance class of D or lower;
10. Establish and operationalize a dedicated public entity (unit/institution/agency/department) to manage the public buildings stock and the investment program and take on a lead role in coordinating and building capacity in market stakeholders and sectoral institutions;
11. Develop and operationalize a financing mechanism to invest into energy efficiency in the public buildings sector (e.g. combining existing budget lines for building operation and retrofit with external financing);

Target for the long-term until 2040

12. Upgrade at least one third of the public building stock to Nearly-Zero Carbon or Class 'A', with the remaining aiming to reach at least class 'B+'.

6 ROADMAP FOR AN ENERGY-EFFICIENT PUBLIC BUILDING STOCK

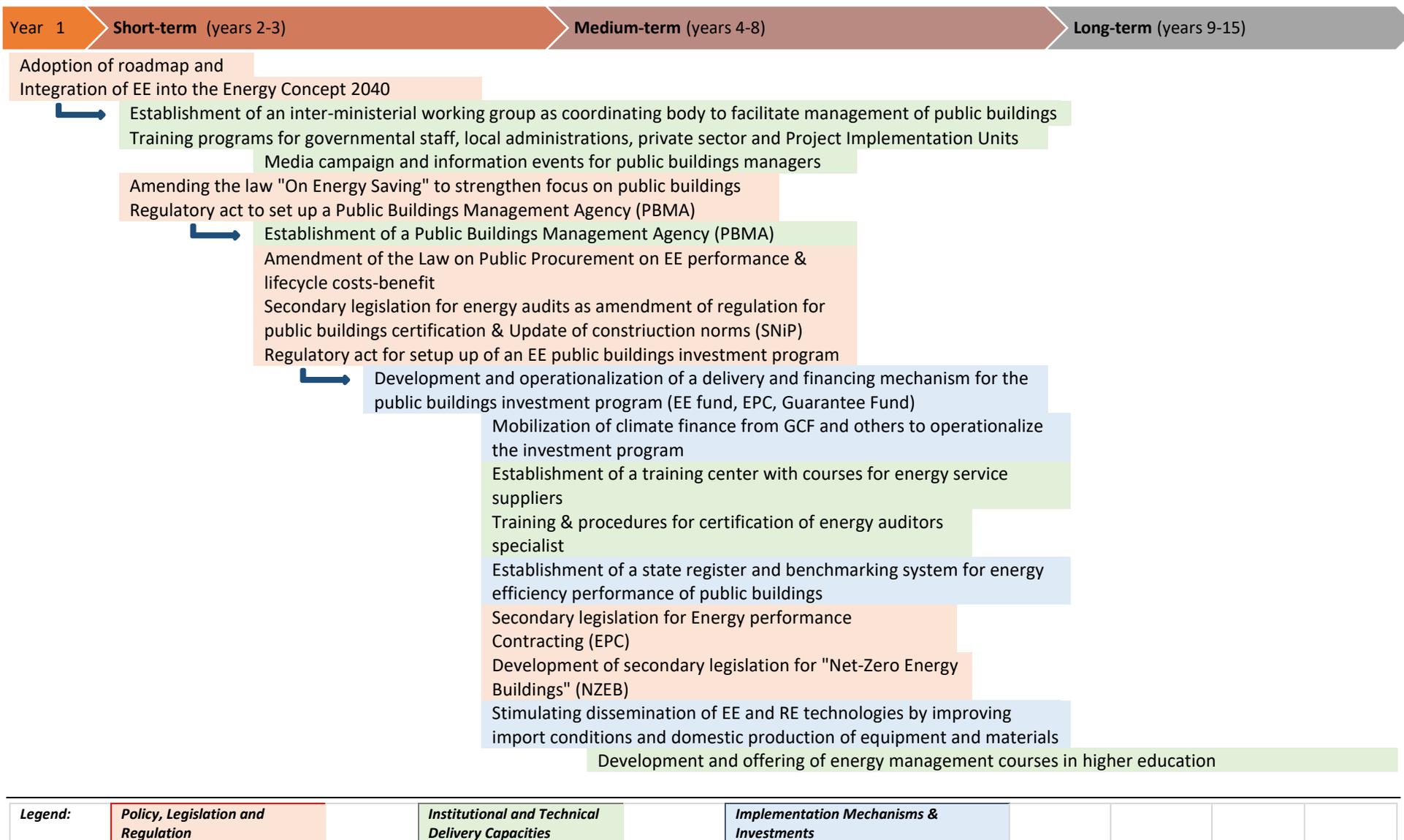
In order to address the identified barriers and operationalize the Vision for an energy efficient public buildings sector it is important to develop a roadmap that sets out the necessary steps and timeframe in order to

- (i) **Improve the political and regulatory framework for EE, first by development and ratifying the Concept for the Fuel and Energy Complex** until 2040 and emphasizing of EE in public buildings, through improved coordination of involved agencies and consequent enhancement;
- (ii) **Strengthening of delivery capacities** by building institutions and enhancing capacities of all sectoral stakeholders and;
- (iii) **Scaling up energy efficiency investments** by developing and implementing instruments, such as a large and staged investment program for EE building retrofit, development of financing mechanisms such as energy performance contracting and other instruments to provide access to finance and to remove market barriers

The following roadmap recommends a time-bound sequence of measures that are grouped according to the three areas **(i) Policy, Legislation and Regulation, (ii) Institutional and Technical Delivery Capacities and (iii) Implementation Mechanisms & Investments** and are structured as short-term (1-3 years), medium term (4-8 years) and long-term (10-15 years) measures.

The State Committee for Industry, Energy and Subsoil Use under the Government of the Kyrgyz Republic plays a crucial role in setting the cross-sectoral framework for EE. Local authorities can stimulate EE investments and accelerate implementation through sound strategies and policies.

Table 15: Roadmap for improving energy efficiency of the public buildings sector



The following catalogue of measures will support to operationalize the roadmap and addresses the previously identified barriers.

Table 16: Catalogue of recommended measures

Policy, Legislative & Regulatory Framework					
Title	Addressed barriers	Measures/outputs	Responsible institution	Required resources	Timeframe
Development of the Concept for the Fuel and Energy Complex 2040 and adoption of the EE public buildings roadmap	RB-1	<ul style="list-style-type: none"> - Approved Concept for the Fuel and Energy Complex 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. 	The State Energy Committee and inter-ministerial working group	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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 5 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	<ul style="list-style-type: none"> - 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)
Regulatory act to set up a Public Buildings Management Agency (PBMA)	IB-2	<ul style="list-style-type: none"> - Governmental decree on "Establishment of Public Buildings Management Agency (PBMA)", its mandate, power and tasks, - Drafting of decree by relevant authorities and release. 	The State Energy Committee and Fund on State Property Management	<ul style="list-style-type: none"> - Stakeholder consultation and agreement, - Development of statute, business and budget plan, staff needs, organigram, supervision board, allocation of annual budget for PBMA. 	Short term (next 1 year)

Policy, Legislative & Regulatory Framework					
Title	Addressed barriers	Measures/outputs	Responsible institution	Required resources	Timeframe
Secondary legislation for energy audits as amendment of regulation for public building certification	RB-3 RB-5 RB-7	<ul style="list-style-type: none"> - 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, retrofit needs, identification of EE potential and assessment of EE measures, as initial step in investment project preparation), - Provisions for a registry of certified energy auditors, - Specific provisions for building certificates: methodology, performance classes, - Methodology for engagement/hiring energy auditors 	Research Center for Energy and Economics/ State Energy Committee	<ul style="list-style-type: none"> - 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)
Regulatory act for setting up of an investment program for EE public buildings	BB-1 FB-2 FB-3	<ul style="list-style-type: none"> - Development of program targets, definition of focus for investment, responsible implementation agency, budget and funding mechanisms - Development draft budget - Definition of Program Management Unit (recommended PBMA) - Development of draft act and parliamentary ratification. 	The State Energy Committee, PBMA	<ul style="list-style-type: none"> - Detailed planning of investment program: scope and priority objects, 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), 	Short term (next 1-2 years)

Policy, Legislative & Regulatory Framework					
Title	Addressed barriers	Measures/outputs	Responsible institution	Required resources	Timeframe
				- Building PIU capacities.	
Amendment of the Law on Public Procurement to consider EE performance and lifecycle costing	RB-4 BB—2 BB-3 FB-1	<ul style="list-style-type: none"> - 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, (iii) enabling public-building owners to commit to long-term contracting of services (5 years as minimum) - Amended law and ratification in parliament 	The State Energy Committee, Ministry of Finance	<ul style="list-style-type: none"> - Technical and legal assessment, development of standardized assessment methodology, - Inter-ministerial consultation and agreement. 	Medium term (next 3-4 years)
Update of technical construction norms (SNIP)	RB-8	<p>Review and amendment of SNiPs:</p> <ul style="list-style-type: none"> - To enable best-practice design of technical system within building retrofit and consideration of high energy performance materials and in particular 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	<ul style="list-style-type: none"> - Update of SNIP with Best Available Techniques in compliance with reference international climate technologies documentation (i.e. the EU BREFs), - Promotion of up-dated SNIP for mandatory application in the design of building retrofit, - Adaptation 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 amendment of the PPP law or separate regulation	RB-9 FB-2	<ul style="list-style-type: none"> - Amendments of budget code and public procurement regulations and procedures for public agencies and municipalities to work with private or public ESCOs 	The State Energy Committee, Ministry of Finance	<ul style="list-style-type: none"> - 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 (year 5-8)

Policy, Legislative & Regulatory Framework					
Title	Addressed barriers	Measures/outputs	Responsible institution	Required resources	Timeframe
Development of secondary legislation for "Net-Zero Energy Building " (NZEB)	RB-2 MB-2	<ul style="list-style-type: none"> - Development of technical standard solutions for NZEB for conditions in KR and provisions for NZEB including buildings integrated renewable energies, - Long-term setting of performance standards for all and new building construction, - Review of regulations for granting of construction permits for NZEB, - Development of the regulation and ratification in parliament. 	GOSSTROY, The State Energy Committee	<ul style="list-style-type: none"> - 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 (year 5-7)

Institutional and Technical Delivery Capacities					
Titel	Addressed barriers	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	<ul style="list-style-type: none"> - Decree or administrative act to formally establish an inter-ministerial working group for public buildings - Adoption of roadmap objectives and measures 	The State Energy Committee involving relevant ministries, and other institutions, e.g. Gosstroy, Research Center for Energy and Economics, PBMA	<ul style="list-style-type: none"> - 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)
Establishment of a Public Buildings Management Agency (PBMA) for managing and implementing EE retrofit programs	IB-2 CB-3 IB-3	<ul style="list-style-type: none"> - 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, 	The State Energy Committee and Fund on State Property Management	<ul style="list-style-type: none"> - Business plan and staffing within existing structures of the State Property Management Fund, - Budget allocation for operation of the PBMA, 	Short term (next 1-2 years)

Institutional and Technical Delivery Capacities					
Titel	Addressed barriers	Measures/outputs	Responsible institution	Required resources	Timeframe
		<ul style="list-style-type: none"> - Strengthening coordination between building operators and decision-makers (LGAs, MOF, MoES, MOH, etc.), - Establishing procedures for monitoring of energy efficiency program. 		<ul style="list-style-type: none"> - Guidelines for public building operators for sources to support TA and funding, 	
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	<ul style="list-style-type: none"> - 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/ The State Energy Committee, PBMA, Universities	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Development of training curricula and manuals, guidelines for monitoring and verification, procurement and supervision, etc. 	Short to medium term (year 1-3)
Improving capacities and procedures for quality certification of energy auditors and buildings energy specialists	RB-2 RB-5 RB-6 CB-4 CB-6	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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 buildings managers on energy efficiency	CB-1 CB-4	<ul style="list-style-type: none"> - Increase awareness of EE opportunities among directors, groundskeepers, facility managers 	Research Center for Energy and Economics/ State Energy	<ul style="list-style-type: none"> - TV spots, newspaper articles, information flyers, newsletter service, combined with 	Medium term (next 2-4 years)

Institutional and Technical Delivery Capacities					
Titel	Addressed barriers	Measures/outputs	Responsible institution	Required resources	Timeframe
		- Increase number of project proposals for building retrofits	Committee	regular educational activities in the regions.	
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	- Set up 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)
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 building repairs, check lists, catalogue of technologies incl. mandatory minimum performance criteria (equipment / window; service/ energy audits) as well as reference cases, - Establishment of training center as department PBMA, - Development of curricula, course manuals, training of trainers, - Set up of roundtable with the private sector to discuss dissemination and co-funding opportunities	Medium-term (year 2-3)
Improve capacity and quality of higher education with respect to buildings 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	- Development of curricula, course manual for teachers, training of trainers, cooperation with the private sector.	Long term (year 5-10)

Institutional and Technical Delivery Capacities					
Title	Addressed barriers	Measures/outputs	Responsible institution	Required resources	Timeframe
			Ministry of Education		

Implementation Mechanisms and Investments					
Title	Addressed barriers	Measure/output	Responsible institution	Resources and activities required	Timeframe
Set up of a state registry and benchmarking system for public buildings	RB-3 RB-7 IB-3 CB-6	<ul style="list-style-type: none"> - 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, Gosstroy as well as oblast and municipal administrations	<ul style="list-style-type: none"> - Development of key performance indicators, defining of data collection responsibilities, guidelines for data management, benchmarking methodology - Development of the registry structure, development of a monitoring methodology and instruments, guideline and standards for certification and reporting 	Short to medium term (next 2-5 years)
Development of an investment program for retrofit of 5,000 public buildings retrofits to performance class "B"	FB-2 FB-3	<ul style="list-style-type: none"> - 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 	The State Energy Committee, Ministry of Finance, PBMA	<ul style="list-style-type: none"> - 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, 	Short-term (next 2-3 years)
Mobilization of climate finance from GCF or other sources to operationalize the investment program	IB-5 FB-2	<ul style="list-style-type: none"> - Request for funding proposal to GCF or other institution that outlines investment demand, mitigation potential, financing mechanism 	The State Energy Committee, Ministry of Finance	<ul style="list-style-type: none"> - Preparation of funding applications 	Short - medium - long term (years 5-20)

Implementation Mechanisms and Investments					
Title	Addressed barriers	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	<ul style="list-style-type: none"> - 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. 	The State Energy Committee and Public Buildings Management Agency (State Property Management Fund), Ministry of Finance	<ul style="list-style-type: none"> - 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 (year 3-5)
Stimulating dissemination of advanced EE and RE technologies and domestic production	MB-2 MB-3 MB-5 CB-7	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Set-up of a catalogue of relevant equipment and high-performance specification (e.g. 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 (year 5-10)

6.1 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 roadmap and implement the numerous measures laid out in the previous roadmap catalogue, 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 Kyrgyzstan to implement the roadmap:

1) Strengthening the coordination of involved agencies

Establishing of a **Coordinating Council for Energy Efficient Public Buildings** as an inter-ministerial working group under the State Energy Committee on the basis of the existing HSIP Project Selection Commission (MES, Ministry of Health, Ministry of Economic Development, Ministry of Finance, SPMF, State Committee on Penalty Control, etc.) with the following functions:

- Sector-wide coordination and consensus-building for development of energy efficiency retrofit investments in the public buildings sector,
- Facilitate necessary measure and regulatory acts to address identified barriers,
- Coordination of support, assistance and funding instruments and projects by international donors on the EE sector,
- Supporting the legislation for EE program of public building and regulation for set-up of dedicated implementation body.

2) Strengthening of regulatory framework

The current draft Concept of the Fuel Energy Sector Development until 2040 offers an opportunity to integrate the findings of this roadmap to showcase the enormous energy saving potentials in the Kyrgyz public building stock. The following urgent amendments are needed to set the right legislative framework for energy efficiency:

- Amendments 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 introduction the obligation for verifying energy efficiency performance of public buildings,
- Regulatory act or drafting of law for a comprehensive energy efficiency investment program in public buildings,
- 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) Establishment of 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, appropriate budget and legitimation 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 focus on energy efficiency) including energy audits,
- for implementation of building retrofit investments, acting as Program Implementation Unit, with the entire task chain of a PIU,
- to implement accompanying information and capacity building measures, such as guidelines and training for sub-ordinated project institutions and suppliers,
- to accumulate the revenues form energy savings and allocate for 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:

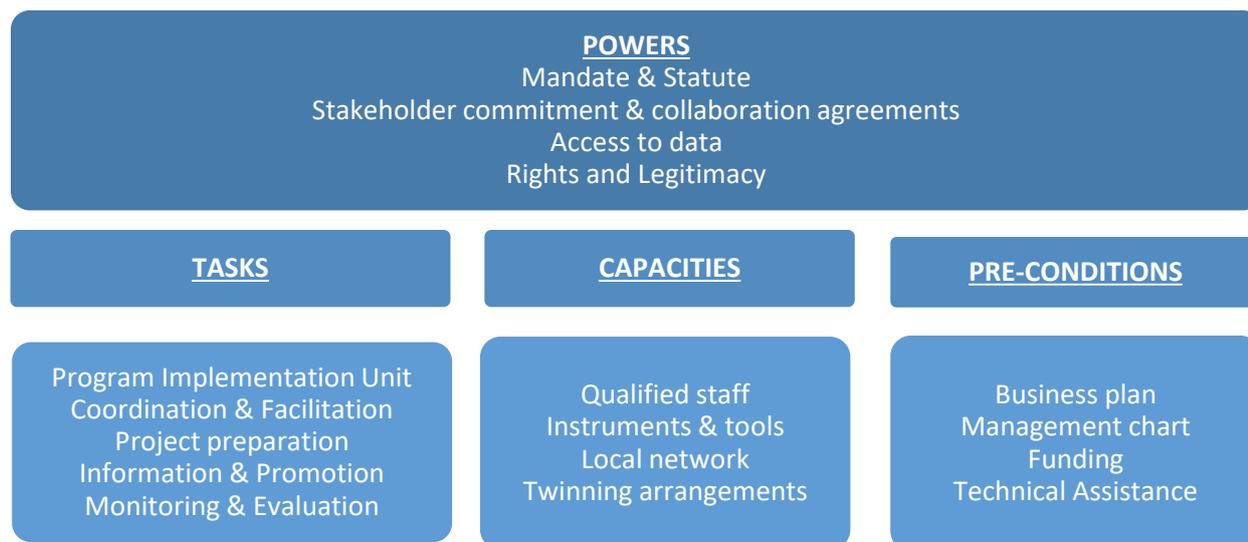
- (i) prepare a regulatory act for setting-up of an agency, provision of a mandate for management of public buildings and tasking it with the necessary responsibilities, supervisory board and functional operations budget, and
- (ii) conduct business planning, including: tasks and targets for preparation and implementation of the program; analysis of the market and extend of the investment program; rules, procedures, instruments and financing mechanisms
- (iii) To engage key staff a) nomination of the supervisory board members and b) key experts of the agency⁴⁹, starting with the director and key engineers and economists

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

- A) a dedicated administrative unit within the Ministry of Energy or State Committee for Industry, Energy and Subsoil Use under the Government of the Kyrgyz Republic (The State Energy Committee)
or
- B) a dedicated administrative unit within the Fund on State Property Management a
or
- C) an independent governmental state enterprises entity in form of an Energy Agency.

⁴⁹ Qualified and motivated staff is the key to success. With salary levels for public officials it might be difficult to stimulate top experts to join the agency.

Figure 9: Key requirements and elements of a public buildings agency



4. Development of financing mechanisms

The results on EE investments from the audits conducted in 14 buildings under the HSIP and UDP projects in Kyrgyzstan, demonstrate solid energy savings of 60-70%. That means implemented techniques will significantly reduce the energy cost for respective central and local governmental agencies. Despite the positive results of these pilots, there is limited replication potential only since grant financing is scarce. There is general recognition 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 different options that can be used to progress with providing financing of public buildings. An important option is energy performance contracting (EPC) and which an energy service company (ESCO) finances energy efficiency investments and, subsequently, gets paid 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 to refinance obligations and also fund other EE interventions. Hence, the EPC could establish a corridor to enable EE savings cash flow from one project to another.

EE investments under the EPC scheme would first need embarking on a few steps to set an adequate ground for project implementation, including development of the EPC framework, setting up guarantees, and outlining expected results following execution of EE measures.

How EPC can help to overcome the key barriers in public sector energy efficiency

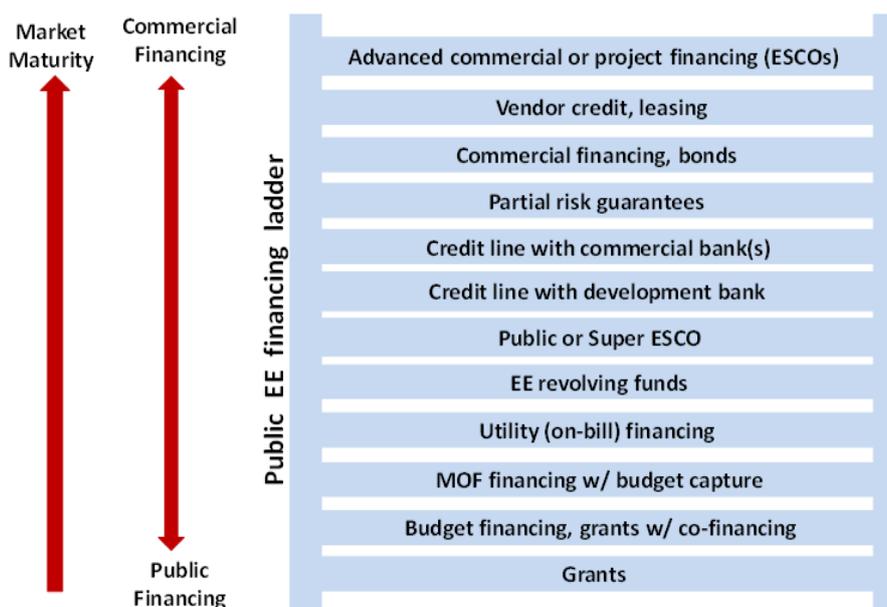
Lack of commercial incentives to reduce operating costs	➤ EPCs cannot deal with fundamental lack of incentives but can help reduce transaction costs and perceived risks by offering a full package of services and assuming project performance risk.
No incentive to save energy (no retention of savings)	➤ EPCs cannot address the principal-agent issue but 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 offering the best value projects to be implemented, 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	➤ EPC allow for multiple smaller public projects to be bundled , since there is common ownership, often with notional audit/baseline information, thus helping to address 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

Private ESCOs can help overcome barriers in scaling-up implementation of EE projects in the public sector. They can (a) offer a range of services throughout energy services value chain and (b) provide the technical skills and resources to identify and implement EE opportunities, execute services using performance-based contracts (reducing the risks to the municipal utilities and public agencies), facilitate access from commercial banks, and enable energy users to pay for services out of the cost savings.

The figure below illustrates the different options in the form of a “financing ladder” for public sector projects. The ladder includes 10 options identified above 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 10: Illustrative Financing Ladder for Public Sector EE Projects



Source: Adapted by authors from World Bank 2013

A brief description of each of the ten options is provided in Annex 2.

5. ANNEXES

Annex 1: Interviewed Stakeholders and Reference Documents

List of documents:

1. The 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 Code on Violations, approved by Parliament March 2, 2017, will enter to force from 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 Development of Green Economy in the Kyrgyz Republic for 2019-2023, by the Ministry of Economy, from 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 the Governmental Decree from 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 Complex 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 ("Road Map") 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 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 Local Self-Government" from July 15, 2011, №101
29. Law of the Kyrgyz Republic "On the State Budget for 2018 and the Forecast for 2019-2020", from December 28, 2017, №218(23);
30. Law of the Kyrgyz Republic "On the State Budget for 2017 and the forecast for 2018-2019", from December 22, 2016, №215

31. Law of the Kyrgyz Republic "On the National Bank of the Kyrgyz Republic, Banks and Banking Activities", from December 16, 2016, №206
32. Law of the Kyrgyz Republic "On the Financial and Economic Foundations of Local Authorities" from September 25, 2003, №215
33. The Kyrgyz Republic Intended Nationally Determined Contribution (INDC), 2017;
34. Priorities for Adaptation to Climate Change in the Kyrgyz Republic till 2017, from October 2, 2013, №549;
35. (outdated) Law of the Kyrgyz Republic "Technical Regulations for the Safety of Buildings and Structures" from June 27, 2011, №57
36. (outdated) Law "Technical Regulations for Fire Safety" from July 26, 2011, №142
37. (draft) Law "Amendments to the Law on Energy Efficiency of Buildings", by the State Agency on Architecture, Construction and Housing, from October, 2018;
38. (draft) Law "Amendment to the Law on Energy Saving" from the State Committee on Energy, Industry and Subsoil Use, from July, 2018;
39. Medium-Term Tariff Policy of the Kyrgyz Republic for Electric Energy for 2014-2017, from November 20, 2014, №660;
40. Medium-Term Tariff Policy of the Kyrgyz Republic for Thermal Energy for 2014-2017, from November 20, 2014, №660;
41. Regulation "On the Rules and Procedures of the Energy Certification of Buildings" from August 2, 2012, №531;
42. 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
43. Sample of Contract on Purchasing Electricity", from April 28, 2017 #1/1;
44. Regulation "On Tender on for the Right to Build Small Hydropower Stations in the Kyrgyz Republic", from March 24, 2017 №175;
45. Regulation "On the State Committee on Energy, Industry and Subsoil Use", from July 15, 2016, №401
46. Regulation "On the State Agency on Architecture, Construction and Housing", from June 24, 2013, №372
47. (suspended) Regulation "On licensing of Certain Types of Activities", from May 31, 2001, №260
48. Regulation "On measures for Stabilize the Situation on Energy and Gas Supply to the Population" from December 25, 2012 № 857, December 6, 2015, №1;
49. (draft) Regulation on rules and procedures for qualification certification of specialists in energy certification of buildings and periodic monitoring of energy efficiency of boilers, heating systems and hot water supply of buildings (June, 2018);
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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, Housing, and Communal Services,
6. Valentina Kasymova, Professor of the Kyrgyz State University named after Razzakov I. (author of the draft Concept of Development of Fuel Energy Complex);
7. Eshimbek Karasartov, the Expert of Committee on 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 KYRSEFF (Kyrgyzstan Sustainable Energy Financing Facility);
10. Rajap Biyaliev, Heat Supply expert;
11. Zuhra Hurova, the Senior Loan Officer of the Optima Bank;
12. Gulnara Abdylidaeva, Bishkek Major 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 “ES Technology” Ltd.,
16. Azamat Akeleev, CEO “Smart Energy Solutions” Ltd.,
17. Kairat Janbaev, CEO “NurSun” Ltd.,
18. Talgat Chinetov, Director “BiFORCE” Ltd.,
19. Aidar Mendeev, Technical Director of Construction Company “SMU”;
20. Rahatbek Asanov, CEO of Construction Company “Evrotechstroy”;
21. Timur Vildanov, General Design Director of Designing Company “Ailunstroy”;

Annex 2: Description of EE Financing Mechanisms in the Public Sector⁵⁰

Budget Financing with Capital Recovery

This approach, also referred further on 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 IFI or donor funds. 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 for energy bills of the public agency in future years (“budget capture”). 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 (ECO-Asia 2009, ACEEE 2011). 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 (World Bank 2014).

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

⁵⁰ This discussion is extracted from previous World Bank studies of international experience with financing options for energy efficiency.

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 functions as an ESCO with two very important functions: (i) implement EE projects for the public sector (hospitals, schools, municipal utilities, government buildings, and other public facilities) using the performance contracting approach; and (ii) support 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 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 (Limaye and Limaye 2011).

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"⁵¹ 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

⁵¹ 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.

sustainable basis.

Commercial Financing, Bonds

Under this option, municipalities 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 who are willing and able to lend to 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, 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: operating lease and finance or capital lease (Lee 2003). 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 (SRC Global 2005):

- ESCOs offer a complete range of implementation services, including design, engineering, construction, commissioning, and maintenance of EE measures, and 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 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Easy to implement • Can directly finance municipal entities and central government agencies 	<ul style="list-style-type: none"> • Sustainability may be questionable, even if repayment is obtained through budget financing 	<ul style="list-style-type: none"> • Who will manage and administer the funds? • Is there sufficient implementation capacity? 	<ul style="list-style-type: none"> • Hungary • Lithuania • FYR Macedonia • Serbia
2. Utility on-bill financing	<ul style="list-style-type: none"> • Requires regulations for utility participation • Strong financial position and financial management of utilities • Payment discipline among public clients, adequate energy pricing and billing practices 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Requires changes in utility regulations and billing systems • Creates potential for monopolistic behaviors • Financing may compete with local banks, • Limited experience with heat utilities 	<ul style="list-style-type: none"> • Are utilities interested and willing? • Do they have capacity and billing systems for on-bill financing? • Is the regulatory system conducive and supportive? 	<ul style="list-style-type: none"> • Brazil • China • India • Mexico • Sri Lanka • Tunisia • U.S.
3. Energy efficiency revolving fund	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • May require new legislation • May be difficult to cover administrative costs of the Fund from its revenues 	<ul style="list-style-type: none"> • Needs a strong and capable fund manager or management team • Needs supporting legislative framework for establishment 	<ul style="list-style-type: none"> • Bulgaria • Romania • Armenia
4. Public ESCO or super ESCO	<ul style="list-style-type: none"> • Immature private sector ESCO industry, but interest/demand to develop ESCO industry • Contracting between public ESCO and public sector entities may be easier 	<ul style="list-style-type: none"> • Can address financing issues and build ESCO capacity 	<ul style="list-style-type: none"> • Need to create a new organization • Need to provide funding 	<ul style="list-style-type: none"> • Where will such a public ESCO be located? • Will donors be interested in 	<ul style="list-style-type: none"> • Ukraine Public ESCO (EBRD) • Croatia HEP ESCO (WB/GEF), • Armenia,

Financing Option	Conditions	Pros	Cons	Issues to be addressed	Examples
	than with private sector service providers		<ul style="list-style-type: none"> Needs to operate efficiently and avoid acting as monopoly 	<ul style="list-style-type: none"> funding such an agency? 	<ul style="list-style-type: none"> Uruguay, EESL (India)
5. Dedicated credit line with development bank	<ul style="list-style-type: none"> Underdeveloped 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Is there a suitable development bank? How many public agencies can borrow and are creditworthy 	<ul style="list-style-type: none"> Brazil India (municipal infrastructure fund) Mexico Turkey (proposed)
6. Dedicated EE credit line with commercial financial institution(s)	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Leveraging of private funds Utilization of existing banking infrastructure for financing public sector 	<ul style="list-style-type: none"> Needs municipalities or ESCOs that have borrowing capacity (credit and collateral) Banks/FIs need to be willing to lend to public sector 	<ul style="list-style-type: none"> Will the participating financial institutions provide loans to municipal utilities & public agencies? How many public agencies are creditworthy and have borrowing capacity? 	<ul style="list-style-type: none"> KfW credit line in Serbia Hungary China Turkey Ukraine Uzbekistan
7. Risk-sharing program (such as partial credit guarantee)	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Has worked well in some Central and Eastern European countries May scale up commercial financing 	<ul style="list-style-type: none"> Needs a relatively mature banking sector and eligible borrowers Poor experience of WB and USAID in some countries with respect to public agencies 	<ul style="list-style-type: none"> Is the banking sector mature enough? How many municipalities are creditworthy? 	<ul style="list-style-type: none"> USAID DCA in FYR Macedonia, Bulgaria and other countries Bulgaria, CEEF (Central/Eastern Europe), China, Croatia, Hungary, Poland

Financing Option	Conditions	Pros	Cons	Issues to be addressed	Examples
8. Commercial financing, bonds	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Only makes sense for very large bundles of projects • Only highly creditworthy agencies can use these schemes • Relatively high transactions costs 	<ul style="list-style-type: none"> • Are financiers willing and able to lend to public sector? • How many public agencies are creditworthy and have borrowing capacity? 	<ul style="list-style-type: none"> • Bulgaria • Denmark • India • U.S.
9. Vendor credit, leasing	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • How many public agencies are creditworthy and have borrowing capacity? 	<ul style="list-style-type: none"> • China • EU • U.S.
10. Leveraging commercial financing using private ESCOs/performance contracts	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Are there any private ESCOs in the market? • Are private ESCOs and/or municipalities creditworthy for commercial project financing? 	<ul style="list-style-type: none"> • WB China ESCO program • Czech Republic • Germany • Hungary • India • Japan • South Korea • U.S. • Canada

Source: Adapted by authors from World Bank 2013

Annex 3: Diffusion of EE Technologies

	Windows	Insulation material Wall / Roof / Floor	Efficient gas and solid fuel boilers	Solar water heaters	Air conditioners with heat pumps	Heat pumps (air-to-air)	Heating system up-grade, dwelling level	Heating system up-grade, building level	Heating system up-grade, building level	Solar building-integrated PV	Water/water and ground/water heat pumps
Basis of sales figures for BAT and CMP equipment	m ² windows	m ² of insulation	Number of boiler units of average capacity of 24 KW	Number of collectors units	Number of AC split units of average capacity of 5 KWth output	# 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 KG	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 (m ² or #) in KG = 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 in the past	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%

