Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects

PEEREA

In-Depth Review of the Energy Efficiency Policy of the Kyrgyz Republic

INTERNATIONAL ENERGY CHARTER
2018

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ACRONYMS

Acronyms

ADB	Asian Development Bank
BAU	business as usual
C2E2	Copenhagen Centre on Energy Efficiency
CA	Central Asia
CAPS	Central Asian Power System
CASA	Central Asia and South Asia
CENEf	Centre for Energy Efficiency
CHP	combined heat and power
CIS	Commonwealth of Independent States
DH	district heating
DSM	demand-side management
EBRD	European Bank for Reconstruction and Development
EE	energy efficiency
EECCA	Eastern Europe, the Caucasus and Central Asia
EESL	Energy Efficiency Services Limited
EEU	Eurasian Economic Union
EHC	Energy Holding Company
EMS	energy management system
EMV	evaluation, monitoring and verification
EPBD	Energy Performance in Building Directive
EPC	energy performance certificate
ESCO	energy service company
EU	European Union
FDI	foreign direct investment
FIT	feed-in tariff
Gcal	gigacalorie
GDP	gross domestic product
GEF	Global Environment Facility
GHG	greenhouse gas
GoK	Government of Kyrgyzstan
GWh	gigawatt-hour
HOB	heat-only boilers
HPP	hydropower plant
IEA	International Energy Agency

IRENA	International Renewable Energy Agency
INR	Indian rupee
JSC	joint stock company
KfW	Kreditanstalt für Wiederaufbau (Reconstruction Credit Institute)
KGS	Kyrgyz som
KKPIK	Coordinating Commission on Climate Change
KPI	key performance indicator
Ktoe	kilotonne of oil equivalent
KWh	kilowatt-hour
KyrSEFF	Kyrgyzstan Sustainable Energy Financing Facility
KR	Kyrgyz Republic
LED	light-emitting diode
LPG	liquefied petroleum gas
ME	municipal enterprise
MEPR	minimum energy performance requirement
MEPS	minimum energy performance standard
Mtce	million tonnes of coal equivalent
$MtCO_2e$	million metric tons of carbon dioxide equivalent
Mtoe	million tonnes of oil equivalent
MTTP	Medium-Term Tariff Policy
MW	megawatt
NEEAP	national energy efficiency action plan
OJSC	open joint stock company
OPEX	operational expenditure
PPP	purchasing power parity
RES	renewable energy source
SAEPF	State Agency for Environment Protection and Forestry
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SARFEC	State Agency for Regulation of the Fuel and Energy Complex
SCIES	State Committee on Industry, Energy and Subsoil
SD	sustainable development
SEMISE	Support to Energy Market Integration and Sustainable Energy in the NIS
SHPP	small hydropower plant
TFC	total final consumption
tce	tonnes of coal equivalent

toe	tonnes of oil equivalent
TPES	total primary energy supply
TWh	terawatt-hour
UJALA	Unnat Jyoti Affordable LEDs for All
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States dollar
VAT	value added tax
WB	World Bank

EXECUTIVE SUMMARY

Executive Summary

Background

In 2016, the population of the Kyrgyz Republic consisted of about 6 million people, more than 66% of whom were living in rural areas. Following two major political crises in 2005 and 2010, the affordability and reliability of the energy supply remain very sensitive issues. The three largest sectors of the economy are domestic trade, industry and agriculture, though agriculture employs the largest share of the working population (29%).

The GDP of the country significantly depends on foreign sources of revenue, such as worker remittances (about 30% of the GDP) and exports of gold produced by the Kumtor Gold Company (about 10% of the GDP). The shadow economy is significant, accounting for 40–60% of the GDP.

In 2017, Kyrgyzstan was ranked seventy-fifth out of 190 countries by the World Bank's Overall Ease of Doing Business Index, falling from the seventy-third position in the previous year, the main barriers to business being an unreliable energy supply, a lack of electricity system capacity for the connection of new consumers, a complicated and non-transparent tax system, inadequate judicial processes and inefficient cross-border trade bureaucracy. The country also has a relatively low rating for other internationally recognised indicators:

- Global Competitiveness Index 2016–2017: rank 111 out of 138 countries, declining from 102 in the previous year;
- Corruption Perceptions Index 2016: rank 136 out of 176 countries, declining from 123 in the previous year.

Most foreign direct investment (FDI) inflows are related to manufacturing and trade, and the largest shares of investments come from Canada and China. To date, the energy sector has benefited little from foreign private sector investment. The poorly designed and executed tariff policy is a primary explanatory factor, as the tariffs do not achieve full cost recovery and hence the revenues for the repayment of investments are insufficient.

In 2014, the level of the energy intensity of Kyrgyzstan's economy was lower than that in Turkmenistan and Uzbekistan but higher than that in Tajikistan. At the same time, the energy intensity of the country was twice that of the EU average.

Energy Supply and Demand

In 2014, approximately equal shares of coal, oil and hydro combined to dominate Kyrgyzstan's total primary energy supply (TPES). Over the past decade, the domestic coal production and coal consumption have increased by six and three times, correspondingly, resulting in decreased dependence on coal imports. The local production of natural gas is insignificant, and most gas is imported. The consumption of natural gas has declined by a factor of three during the last ten years, mainly for political reasons associated with reducing the gas imports from Uzbekistan. Kyrgyzstan has been largely dependent on imports of oil products, though the recent Chinese investment in two new refineries has increased the domestic production of gasoline, mazut and diesel significantly.

Despite the fact that the Kyrgyz Republic has significant hydropower potential, the share of hydro in primary energy has decreased from 42.7% to 30.1% since 2005, whereas the share of coal and oil has increased significantly over the same period. Between 2006 and 2015, the

domestic electricity generation decreased by 11.5%, whereas the consumption of electricity grew by 52%.

In 2014, the residential, transport and industry sectors respectively represented 36%, 26% and 20% of the total final consumption (TFC). Of the consuming sectors, the transport sector experienced the highest level of growth during the last decade because of the growth in the country's vehicle fleet.

The public sector and households represented more than 70% of the country's electricity demand in 2015. The ageing of assets, the significant growth of the energy demand, more than 50% since 2010, and the lack of funds for maintaining and developing the network have combined to influence the service quality and the reliability of the electricity supply negatively. The reliability of the supply is particularly low during the heating season in the winter, when the peak electricity demand is three times higher than during the summer.

The 10% decrease in heat consumption during the last decade was mainly related to the decreasing energy demand of industrial consumers. In 2015, about 95% of heat energy was consumed by municipal and residential buildings.

Market Structure

In 2016, the Government established a new state-owned company, the OJSC "Energy Holding Company" (OJSC "EHC"), which combined all the major market actors of the electricity sector into a single company: two electricity-producing companies, a transmission system operator, four distribution companies and a heat distribution and supply company. The country essentially returned to the pre-2001 vertically integrated market structure model.

JSC "KyrgyzNefteGaz" is the only upstream natural gas and oil enterprise in the country. Since 2014, JSC "Gazprom Kyrgyzstan" has operated the transmission and distribution networks for natural gas. The district heating (DH) sector of Kyrgyzstan is mainly represented by state- and municipally owned enterprises operating in the capital and other big cities of Kyrgyzstan.

Over the past decade or so, there has been a shift away from regional cooperation towards energy independence, which has resulted in considerable inefficiencies. Future developments under the Eurasian Economic Union and further implementation of the CASA-1000 project could reverse this trend, providing an opportunity to reap the benefits of more coordinated, integrated and competitive energy markets.

Energy-Pricing Policy

The State Agency for Regulation of the Fuel and Energy Complex under the Government of the Kyrgyz Republic (SARFEC) is the energy regulator of the country. A number of changes related to the status and functions of the regulator have been made during the last decade. While the SARFEC is officially responsible for calculating and setting energy tariffs, the Mid-Term Energy Tariff Policy, which aims to achieve cost-reflective electricity and heat tariffs by the end of 2017, has not yet been implemented. According to the available estimates, the current consumer energy tariffs achieve partial cost recovery as follows: 63% in the electricity sector; 60% in the natural gas sector; and 13–50% in the district heating sector.

Kyrgyzstan's consumer energy tariffs, particularly for electricity, are relatively low. Only 25% of heat consumption is metered, and the billing for consumers without meters is based on calculated values that are not linked to energy consumption, providing neither price signals for efficient energy use nor incentives to install energy meters.

Since 2014, the SARFEC has used the performance indicator "maximum level of energy losses (normative losses)" in its methodology to calculate the allowed revenues and tariffs of the natural monopolists. The distribution companies recognise the importance of the reduction of losses for the improvement of their economic situation, but in many cases they simply do not have sufficient funds to invest in the modernisation of their networks. Tariff design reforms could better align the motivations of the natural monopolists and regulated companies with the public policy objectives and customers' requirements, using key performance indicators (KPIs) as a means of measuring, rewarding and penalising performance.

Environmental taxes are not applied to fuels, and no tax incentives exist to encourage the importing and production of energy-efficient equipment. There is, however, a custom duty/tax on imported vehicles that is structured by age and engine capacity.

Energy and Energy Efficiency Policy

The Fuel and Energy Complex Development Strategy of the Kyrgyz Republic to 2025 provides a fairly sound basis on which to build. A longer-term vision and well-defined target outcomes, to perhaps 2040 or 2050, would help to direct shorter-term strategies and action plans. These strategies and plans need to incorporate effective evaluation, monitoring and verification (EMV) and must be updated in a timely manner to ensure consistent implementation and progress towards long-term objectives.

In general, the effective implementation of the adopted laws and strategies has been hampered by a lack of political will to undertake reforms and weak governance. Particularly problematic has been the lack of progress in the implementation of tariff reforms aimed at achieving full cost recovery through cost-reflective tariffs. Electric utilities have consequently suffered severe revenue shortfalls over a prolonged period of time. They have been unable to invest in maintaining their existing assets adequately. This, combined with relatively unchecked growth of the electricity demand, not helped by subsidised consumer tariffs, has exerted a negative impact on the system reliability and the utilities' ability to connect new consumers.

Insufficient cost recovery and cross-subsidisation between different consumer groups and fuels have served to deter private investment in the energy system. The country's ambition to exploit its vast hydropower resources and to become a net exporter have therefore not been realised; instead, the country's position has weakened because of an increase in energy imports and a decrease in electricity exports since 2014.

The legislative framework and policies for energy efficiency are orientated towards short-term targets. To achieve substantial progress in improving energy efficiency, however, longer-term and clearly defined targets will be needed. Kyrgyzstan's energy efficiency legislation will also need substantial development accompanied by robust implementation mechanisms. As yet, only the legislation pertaining to the improvement of energy efficiency in buildings is satisfactory. More comprehensive energy efficiency legislation is urgently needed to introduce mechanisms such as minimum energy performance standards (MEPSs) and energy labelling schemes for energy-using products (including vehicles), energy service companies (ESCOs), energy performance contracts, public procurement and energy audits.

The effective implementation of energy efficiency policies and programmes will require the strengthening of the existing institutional arrangements and the securing of a reliable and consistent source of funding. For example, the Government has not yet established or assigned responsibilities for the following, as required by the Law on Energy Conservation:

- governmental authority responsible for the control and supervision in the area of energy efficiency;
- clear assignment of responsibilities on governmental authorities for the implementation of minimum energy performance requirements and energy performance certificates;
- the establishment of an Energy Conservation Fund.

Water–Energy Nexus and Environmental Management

Kyrgyzstan has a legislative framework in place that contains the basic provisions for the use and management of the country's natural resources. An important environmental challenge for the country relates to the use of the water resources of the Syr Darya Basin and the existence of a strong water–energy nexus. The use of the basin's water resources requires effective management of the trade-offs between sectors and between countries. Poor management of natural resources and their inefficient use have led to environmental degradation and tension between the riparian countries of the basin. The current trends in energy and water consumption, population growth and climate change impacts suggest that the situation is set to deteriorate.

Greater efficiency in Kyrgyzstan can play a major role in improving the management of the basin's water resources. Energy efficiency is also an energy resource that offers multiple benefits, for example improved energy security, power reliability, public health, reduced fuel/energy poverty and wider societal benefits. As achieving multiple objectives is an important consideration of international donors, prioritising energy efficiency investment is a common-sense strategy.

Finance of Energy Efficiency

The Energy Conservation Law (1998) stipulates the creation of an Energy Conservation Fund, but this has not yet been achieved. Nevertheless, the country's energy system, including energy efficiency, has benefited from international funding sources over the years. Such international support accounts for nearly all public investment, with domestic sources constituting just 2.5 to 10% of the total investments between 2006 and 2012. Persistent partial recovery of costs by utilities and a lack of investment over an extended period of time have resulted in deterioration of the country's energy assets. Full cost recovery and a transparent tariff policy are important prerequisites for attracting private investment. Some public funding is also necessary to leverage private investment.

Stable revenue streams are also needed to support the activities of the public administration in developing and implementing energy efficiency strategies and programmes; at present, these are lacking. Public finance could come from various revenue sources, including tariff price increases (public benefit charge), environmental taxes (e.g. transport fuels) and donor organisations.

While bilateral and multilateral donors have committed $59.9 million per year to climate actions in Kyrgyzstan, this amount is five times lower than the average for the countries of Eastern Europe, the Caucasus and Central Asia (EECCA). Kyrgyzstan is therefore not fully exploiting its potential to attract international support. The likely explanatory factors include a lack of administrative capacity and capability as well as Kyrgyzstan's inability to introduce reforms that have repeatedly been recommended by international institutions, such as a tariff reform.

RECOMMENDATIONS

Recommendations

General Recommendations

1. Explore and adopt enforceable policies and measures to deliver energy efficiency improvements so that the energy system can be developed at the least cost. The energy policy of the Government should be understandable, inspiring and attract as much stakeholder support as possible. The Government could establish a vision statement for the country's strategic energy policy that elevates energy efficiency to a top priority. The statement should make it clear that efficiency is a country priority, as it holds the key to least-cost energy system development and the achievement of affordable tariffs that enable cost recovery. The Government should communicate the vision widely through its strategic documents and communications using various types of media and different media organisations.

2. Establish long-term strategic energy efficiency targets, milestones and a clear baseline to enable the evaluation of progress. The targets should be specific, measurable, attainable, realistic and time bound and should be developed by the Research Institute on Energy and Economy under the SCIES KR in close collaboration with international donor organisations. The Government should establish a monitoring and reporting framework to track and evaluate progress.

3. Establish a transparent and efficient institutional framework for the implementation of the energy efficiency policy of the country. A nominated authority should have a clear mandate and responsibility for the achievement of the energy efficiency targets and the coordination of activities with other governmental institutions. This authority must have the necessary powers, capacity, capability and resources to be effective. The roles and responsibilities of all the governmental institutions that are able to contribute to delivering energy efficiency should be clarified by law.

4. Establish stable revenue streams for the activities of the lead energy efficiency institution and for an energy efficiency and renewable energy investment fund to be used to finance the implementation of energy efficiency programmes and projects in both private and public sectors. The revenue streams could come from tariff increases (public benefit charge), environmental taxes (e.g. transport fuels) and donor organisations.

5. Enhance the independence, powers and resources of the State Agency for Regulation of the Fuel and Energy Complex under the Government of the Kyrgyz Republic (SARFEC) so that it can better achieve the Government's energy policy objectives.

6. Ensure that the regulatory frameworks and governance arrangements enable a least-cost and integrated approach to energy system planning and development, fully incorporating energy efficiency on both the supply side and the demand side. The requirements to adopt this approach should apply to the governmental authorities and regulated energy companies/utilities involved in decision making related to energy system planning and energy sector investment.

7. The improvement of the Law on Energy Conservation adopted in 1998 should be prioritised and developed in line with international best practice. The law should: enshrine the provisions of the new EE institutional framework (e.g. roles and responsibilities, including the nominated authority for energy efficiency implementation); require the development

of a national action plan for energy efficiency (e.g. the EU template for National Energy Efficiency Action Plans (NEEAP)); and require the application of the least-cost planning principle.

8. Energy efficiency should be at the heart of the country's energy strategy to gain consumer acceptance of higher tariffs to achieve full cost recovery. This strategy should include many of the recommendations proposed by this review.

9. Scale up and enhance the existing public communications in order to:

    - gain the public's acceptance of the country's need to invest and ensure full cost recovery of energy tariffs but at the same time explain how energy efficiency helps to minimise the total system costs such that the tariffs can be lower than they would otherwise be;
    - explain that, while energy efficiency is often cheaper than supply-side alternatives, it still needs organised upfront investment; and
    - advise people and organisations on the various steps that they can take to reduce their demand and thus their energy bills, including information on the Government's energy efficiency programmes and financial support from which consumers might be able to benefit.

10. Consider possibilities to organise formal consumer engagement and representation in the development of energy policy and tariff regulation. Such consumer representation should be independent of the Government and industry and equipped with appropriate expertise and sufficient capacity to participate in the Government's consultation processes and to communicate effectively through various media channels. For the people of the Kyrgyz Republic, this should serve to: increase their understanding of the energy challenges and their role in achieving cost-effective energy system development in the best interests of the country; build their trust in the institutional and market actors engaged in the development and business of the energy sector; and increase their constructive participation in developing and implementing solutions. The consultation processes should be open to all stakeholders, including international organisations and donors.

Recommendations: Power Sector

11. Allocate priority attention to the efficiency measures that have the greatest potential to contribute to least-cost development and performance improvement of the electricity system, paying particular attention to reliability. Reducing energy losses and electricity peak demand should be prioritised. To realise these objectives, a range of regulatory reform opportunities should be explored, for example utility regulation, system planning, the tariff policy and the design of EE/DSM interventions.

12. Develop and adopt a new medium-term electricity and heat tariff policy that will envisage gradual achievement of tariffs reflecting all the costs related to generation, transmission, distribution and supply. The additional financial resources resulting from the increases to the energy tariffs should be used by the utilities to modernise their networks and reduce energy losses. Relative to 2014, a reduction of losses in electricity networks to the average level in Europe and Central Asia has the potential almost to eliminate the power deficit and reduce the financial deficit of the power system significantly.

13. The SARFEC should take a stronger role in the improvement of the design and implementation of the country's tariff policy. A key objective should be to ensure that the tariff policy drives energy efficiency improvements throughout the energy system, that is, generation, transmission, distribution and consumption. This implies that the methodology for the calculation of allowed revenues should be designed to ensure that the regulated companies are motivated to deliver efficiency improvements and that the tariffs incentivise energy-efficient behaviour of consumers. Specifically:

    a. Improve the methodology relating to the calculation of allowed revenues for regulated energy companies:

        i. Authorities and utilities involved in decision making relating to power system planning, investment and system operation should be required to apply a least-cost approach, with full consideration of EE/DSM.

        ii. Provide more incentives and more ambitious requirements to reduce energy losses. The requirements should be accompanied by the allocation of sufficient funds in the companies' allowed revenues;

        iii. The allowed revenues of transmission and distribution companies should be decoupled from their energy sales with a revenue adjustment mechanism (decoupling regulation) so that companies do not have any incentives to increase their energy sales. On the contrary, they could be required and incentivised to deliver energy efficiency improvements on the demand side. These improvements could be delivered through procurement tenders or utility energy efficiency programmes.

        iv. Introduce more key performance indicators (KPIs) to deliver consumer benefits, including through EE/ DSM, and to help connect the actions of regulated utilities more strongly to consumers' interests, for example reliability, lower bills and customer service.

        v. The regulator could take steps to link DSM actions to export revenues, for example rewarding utilities that implement DSM using a share of the export revenues.

    b. Improve the electricity tariff menu to achieve full cost recovery and to encourage energy-efficient consumption while protecting low-income consumers by ensuring that their minimum energy needs are affordable:

        i. Inclining blocks should be redesigned to achieve full cost recovery, with better targeting of low-income consumers. Minimum/basic energy needs must be defined, and a distinction could be established for the winter and summer.

        ii. Prioritise direct and targeted EE interventions for vulnerable consumers to improve energy efficiency in their homes and to reduce their energy bills;

        iii. To enable consumers' acceptance of tariff increases, the latter should be linked to consumer-focused utility performance in which service quality, energy efficiency/DSM and cost efficiency are prioritised. This linkage should be visible to consumers, enabled by a clear vision statement and narrative, as suggested above in Recommendation 1. This should be supported by the

collection, analysis and publication of data relating to utilities' performance and the reduction of the number of outages.

14. Increase the transparency of expenditure on the energy sector, including accounts of regulated utilities, in line with the best international practice to reduce cross-subsidies, establish and maintain consumer/public confidence and ensure that the energy efficiency vision of the Government is realised.

15. Translate the lessons learned from the implementation of pilot projects into policy/regulatory action, for example the utilisation of smart meters to deliver least-cost reliability (Severelectro).

Recommendations: Industry

16. Require or strongly encourage the take up of international standards for the conducting of energy audits and for the establishment and application of energy management systems, for example ISO 50001;

17. Develop a certification/accreditation scheme for energy auditors. The scheme should be implemented and supervised by the governmental authority responsible for the implementation of the Government's EE policy (see recommendation 3 above).

18. Consider establishing incentive schemes that would motivate industrial enterprises to implement the measures recommended by energy audits.

19. Explore strategies to help establish ESCO schemes that can deliver large-scale EE improvements, including the following:

    a. nominate an authority to support ESCO establishment;

    b. implement tariff reforms;

    c. facilitate easy access to low-cost finance;

    d. create demand and revenue streams for ESCO services to supplement energy prices, for example a utility mandate or public procurement requirements;

    e. adopt a model energy performance contract for public organisations;

    f. review and amend the public finance rules to ensure that authorities are incentivised and not disincentivised to invest in energy efficiency improvements.

20. Facilitate business opportunities to deliver energy-efficient products and services, for example tax incentives for importing or producing EE equipment, such as LED lamps, efficient motors, solar thermal collectors and so on.

Recommendations: Building Sector

21. Continue improving and implementing the existing legislative framework for energy efficiency in buildings. The barriers to the implementation of the minimum energy performance requirements (MEPR) and energy performance certification (EPC) schemes need to be addressed.

22. The EPC scheme should be implemented and supervised by the governmental authority responsible for the implementation of the Government's energy efficiency policy.

23. Require local authorities to develop and implement action plans for conducting energy audits of public buildings and for implementing the measures identified by the audits. Public organisations could be required to use the ESCO model. The Government could require local authorities to report on implementation progress and facilitate the exchange of best practice and learning.

24. Review and amend the public finance rules to ensure that governmental authorities are incentivised and not disincentivised to invest in energy efficiency improvements in buildings.

25. Design the EPC scheme in such a way that it enables the collection of data for metrics necessary to assess the current level of energy efficiency in buildings, to monitor progress and to support decision-making processes.

26. Continue to improve the awareness of consumers about their historical energy consumption and promote no-cost or low-cost measures to reduce their energy bills. The Government could oblige the distribution companies to provide consumers with easy access to information about their past consumption for up to a three-year period. Information about no-cost and low-cost measures to save energy in buildings could be improved based on international best practices and promoted nationwide.

Recommendations: Lighting and Energy-Using Products

27. Prioritise the introduction of minimum energy performance standards (MEPS) for the products with the highest energy savings potential, i.e. transformers, lighting, residential refrigerators and industrial motors. Complement the MEPS with labelling schemes, purchase incentives (e.g. tax relief) and mechanisms to create a demand for efficient products (e.g. a utility mandate and public procurement requirements) to transform the product markets. Establish priorities based on the economic potential and taking full account of the multiple benefits of energy efficiency, including its contribution to the reliability of the energy system.

28. Introduce incentive mechanisms for local authorities to improve energy efficiency and reduce energy bills.

29. Explore the potential for using ESCO schemes that can deliver large-scale replacement of inefficient lighting with LEDs for state/municipal buildings and street lighting.

30. Introduce minimum energy efficiency criteria into the public procurement rules for governmental and local authorities as well as state-owned companies.

31. Continue to improve consumers' awareness of low-cost measures to reduce energy bills, that is, the reduction of bills as a result of replacing incandescent lamps with LEDs and purchasing A+++ household appliances.

Recommendations: District Heating Sector

32. Develop the DH system cost effectively, aligned with the achievement of public policy objectives (see recommendation 13 above). The additional financial resources received from the increased heat tariffs should be used to modernise the DH networks, install energy meters and reduce losses.

33. Translate the lessons learned from the implementation of pilot projects in the DH sector

into policy/regulatory action. For example, based on the results of the renovation of the "Gagarin" boiler house, the utilisation of solar thermal collectors while modernising the DH system and substituting old HOBs (Bishkekteploset), the Government may develop a standardised methodology and require all DH companies to carry out a cost–benefit analysis with respect to the following:

a. potential for the utilisation of high-efficiency cogeneration plants;

b. potential for the utilisation of solar thermal collectors;

c. potential for supplying hot water during 12 months of the year.

34. Alongside the implementation of the tariff policy, require regulated companies to install heat meters and approve the inclusion of costs in the allowed revenues. Incentives could also be introduced to motivate consumers to install energy meters (the consumer tariff reforms would contribute to this objective). As a priority, develop a programme targeting the installation of heat meters for all boiler houses and buildings.

Recommendations: Transport

35. Introduce policy packages to restrict the importing of energy-inefficient vehicles, promote the sale of more efficient vehicles and promote more efficient use of vehicles. This could involve setting minimum standards for imports of used cars and linking fiscal measures to fuel economy, fuel use or polluting emissions. Consumer information provision requirements should also be part of any policy package (e.g. labelling and maintenance guidance).

36. Any revenues collected from taxes on cars, diesel, petrol or other fuels causing negative environmental impacts can be labelled as "environmental" and channelled to investment in efficient, low-emission public transport or to the Fund on Energy Efficiency so that the public can be reassured that taxes are being reinvested for their benefit, assisting with the political acceptance of taxes.

37. Improve the quality of urban planning, including the transport infrastructure and traffic management, by implementing the following measures:

    a. Improve the comfort, efficiency, accessibility and affordability of the existing public transport system;

    b. Increase parking fees in areas with a high concentration of cars and resultant air pollution and congestion issues;

    c. Develop bicycle and public transport lanes when designing, constructing or renovating roads.

КРАТКИЕ ОСНОВНЫЕ ВЫВОДЫ

Краткие основные выводы

Исходная информация

В 2016 г. население Кыргызской Республики (Кыргызстана) составляло около 6 млн. человек, из которых более 66% проживали в сельской местности. После двух глубоких политических кризисов 2005 и 2010 гг. доступность и надежность энергоснабжения продолжают оставаться очень чувствительными вопросами. Тремя наиболее крупными отраслями экономики являются внутренняя торговля, промышленность и сельское хозяйство, однако в сельском хозяйстве работает наибольшая доля трудоспособного населения (29%).

ВВП страны в значительной степени зависит от таких иностранных источников получения дохода, как денежные переводы от работающих за рубежом (около 30% ВВП) и экспорт золота, добытого предприятием «Кумтор» (около 10% ВВП). Теневая экономика – существенная и составляет порядка 40-60% ВВП.

Согласно индексу легкости ведения бизнеса Всемирного банка, в 2017 году Кыргызстан занимает 75 место среди 190, опустившись с 73 места годом ранее. Основными препятствиями для ведения бизнеса являются: ненадежное энергоснабжение, недостаточная мощность электросетей для новых потребителей, сложная и непрозрачная система налогообложения, ненадлежащие судебные процессы и низкоэффективная бюрократическая структура трансграничной торговли. Страна также относительно низко оценивается по шкале иных всемирно признанных показателей:

- Глобальный индекс конкурентоспособности 2016–2017 гг.: 111 место из 138, снижение с 102 места годом ранее;
- Индекс восприятия коррупции 2016 г.: 136 из 176 стран, падение с 123 места годом ранее.

Большая часть поступлений прямых иностранных инвестиций связана с промышленным производством и торговлей, причем большинство инвестиций поступает из Канады и Китая. До настоящего времени энергетика получила очень незначительные выгоды от иностранных частных инвестиций. Плохо спланированная и проводимая тарифная политика является основным объясняющим фактором данной тенденции, так как тарифы не достигают уровня возмещения всех затрат и не обеспечивают достаточных поступлений для возврата заемных средств.

В 2014 г. энергоемкость экономики Кыргызстана была ниже, чем в Туркменистане и Узбекистане, но превышала удельное энергопотребление в Таджикистане. В то же время, энергоемкость в стране в два раза превышает среднее значение данного показателя в ЕС.

Предложение и спрос на энергию

В 2014 г. уголь, нефть и гидроэнергия приблизительно в равных долях доминировали в общих поставках первичной энергии (ОППЭ). За последнее десятилетие внутренняя добыча и потребление угля возросли в три и шесть раз соответственно, что привело к существенному снижению зависимости от импорта угля. Добыча природного газа в стране незначительна, поэтому большая часть газа импортируется. Потребление природного газа сократилось в три раза за последние десять лет, в основном по политическим причинам, связанным с сокращением импорта газа из Узбекистана. Кыргызстан в значительной мере зависит от импорта нефтепродуктов, хотя благодаря последним китайским инвестициям

в два НПЗ, значительно возросло внутреннее производство бензина, мазута и дизельного топлива.

Несмотря на то, что Кыргызская Республика обладает значительным потенциалом гидроэнергии, доля ГЭС в производстве первичной энергии с 2005 г. снизилась с 42,7% до 30,1%, а доля угля и нефти за этот же период существенно возросла. С 2006 г. по 2015 г. внутреннее производство электроэнергии снизилось на 11,5%, тогда как потребление электроэнергии выросло на 52%.

В 2014 г. доли жилого сектора, транспорта и промышленности в общем конечном потреблении (ОКП) составляли 36%, 26% и 20% соответственно. Из-за увеличения численности автомобилей, транспорт имел наибольший рост средств среди потребительских отраслей за последнее десятилетие.

В 2015 году более 70% потребления электроэнергии в стране приходилось на государственный сектор и домашние хозяйства. Старение активов, значительный рост энергопотребления на более чем 50% с 2010 года и нехватка средств для обслуживания и развития сети – все это негативно влияет на качество предоставляемых услуг и надежность электроснабжения. Надежность электроснабжения является особенно низкой в отопительный сезон, когда пиковое потребление электроэнергии втрое превышает потребление электроэнергии в летний период.

За последние десять лет снижение потребления тепловой энергии на 10% было связано с уменьшением спроса на энергию промышленными потребителями. В 2015 году около 95% тепловой энергии потреблялось муниципальными и жилыми зданиями.

Структура рынка

В 2016 г. Правительство создало новую государственную компанию ОАО «Национальная энергетическая холдинговая компания», которая объединила в одну компанию всех основных участников рынка электроэнергетической отрасли: две электрогенерирующие компании, оператора системы передачи электроэнергии, четыре распределительные компании и одну теплоснабжающую компанию. Фактически страна вернулась к модели вертикально-интегрированного рынка, существовавшего до 2001 года.

АО «Кыргызнефтегаз» является единственной нефтегазодобывающей компанией в стране. С 2014 года АО «Газпром Кыргызстан» эксплуатирует передающие и распределяющие сети природного газа. Сектор централизованного теплоснабжения (ЦТС) в Кыргызстане, в основном, представлен государственными или коммунальными предприятиями, работающими в столице и других крупных городах Кыргызстана.

За последние десять лет наметился отход от регионального сотрудничества в сторону достижения энергетической независимости, что повлекло за собой существенное снижение эффективности. Дальнейшее развитие в рамках Евразийского экономического союза и последующая реализация проекта «CASA-1000» теоретически могут изменить данную тенденцию и предоставить возможность получения преимуществ от более скоординированных, комплексных и конкурентных энергетических рынков.

Политика ценообразований на энергоресурсы

Государственное агентство по регулированию топливно-энергетического комплекса при Правительстве Кыргызской Республики (ГАРТЭК) является органом регулирования энер-

гетики в стране. За последнее десятилетие в его статус и функции были внесены ряд изменений. Несмотря на то, что ГАРТЭК официально отвечает за проведение расчета и установление тарифов на энергоносители, среднесрочная тарифная политика, направленная на достижение к концу 2017 г. тарифов на электрическую и тепловую энергию, отражающих расходы, не была реализована. В настоящее время, согласно доступным оценкам, тарифы на энергоресурсы только частично отражают расходы: в электроэнергетическом секторе на 63%, в секторе природного газа – на 60%, секторе ЦТС – на 13-50%.

Тарифы для потребителей энергии в Кыргызстане, особенно тарифы на электроэнергию, являются относительно низкими. Только 25% потребления тепловой энергии учитывается приборами учета. Выставление счетов для потребителей, не имеющих приборов учета, производится на основе расчетных значений. Это не создает ни ценовых сигналов для более эффективного использования, ни стимулов для установки приборов учета.

В своей методике расчета разрешенных доходов и тарифов естественных монополий ГАРТЭК с 2014 года использует показатель «максимального уровня потерь энергии» (нормативные потери. Распределительные компании признают важность снижения потерь для улучшения своего экономического положения, но во многих случаях компании просто не имеют достаточных средств для инвестирования в модернизацию сетей. Реформирование тарифообразования с использованием ключевых показателей эффективности (КПЭ) может лучше согласовывать мотивы естественных монополий и регулируемых компаний с целями государственной политики и требованиями потребителей. КПЭ является важным инструментом для измерения, вознаграждения или наложения штрафа, в зависимости от эффективности операционной деятельности энергетической компании.

Экологические налоги не применяются к разным видам топлива, как и не предоставляются налоговые льготы для поддержки импорта энергоэффективного оборудования. В то же время, существует таможенный сбор/налог на импортные автомобили, который зависит от возраста и объема двигателя.

Энергетическая политика и политика в области энергоэффективности

Стратегия развития ТЭК до 2025 года представляет собой достаточно прочную стратегическую базу для дальнейшего развития Кыргызской Республики. В то же время, разработка более долгосрочного видения и стратегических целей, например, до 2040 или 2050 годов, поможет лучше координировать краткосрочные стратегии и планы действий. Данные стратегии и планы должны включать эффективную оценку, контроль и проверку. Для обеспечения согласованной реализации и прогресса в достижении долгосрочных целей они должны обновляться своевременно.

В целом, главным препятствием для эффективного внедрения принятых законов и стратегий является недостаточная политическая воля и неэффективное управление. Особенно проблематичным является недостаточный прогресс в реализации тарифных реформ, направленных на достижение полного возмещения затрат через тарифы. Из-за этого электроэнергетические компании продолжительное время испытывают серьезное сокращение доходов. Они не в состоянии на достаточном уровне инвестировать в обслуживание существующих сетей. Это, совместно с относительно неуправляемым ростом потребления электроэнергии, в том числе, за счет субсидируемых потребительских тарифов, оказывает негативное воздействие на надежность системы и способность компаний подключать новых потребителей.

Недостаточное возмещение затрат и перекрестное субсидирование различных групп потребителей и видов топлива способствовали сдерживанию частных инвестиций в энергетическую систему страны. Поэтому стремление страны использовать свои огромные гидроэнергетические ресурсы и стать нетто-экспортером электроэнергии не было достигнуто. Вместо этого позиция страны с 2014 года ослабевает из-за увеличения импорта энергоресурсов и сокращения экспорта электроэнергии.

Законодательная база и политика в области энергоэффективности направлены на достижение краткосрочных плановых показателей. Между тем, для достижения значительных успехов в повышении энергоэффективности, необходимы долгосрочный прогноз и четкие стратегические цели. Законодательство Кыргызстана по энергоэффективности требует существенной доработки, сопровождаемой полноценными механизмами реализации. На данный момент только законодательство по энергоэффективности зданий отвечает современным требованиям. Необходимо срочно разработать комплексное законодательство по энергоэффективности для внедрения таких механизмов, как минимальные стандарты энергоэффективности (МСЭЭ) и схемы энергетической маркировки для энергопотребляющих изделий (в т. ч., для транспортных средств), энергосервисные компании (ЭСКО) и контракты на повышение энергоэффективности, государственные закупки и энергоаудиты.

Эффективная реализация политики и программ в области энергоэффективности будет требовать усиления существующих институциональных механизмов и обеспечения надежного и постоянного финансирования. Например, Правительство не создало или не распределило обязанности, как это предусмотрено Законом об энергосбережении для таких учреждений:

- Государственного органа, отвечающего за контроль и надзор в области энергоэффективности;
- Четкого распределения обязанностей государственных учреждений для внедрения минимальных требований по энергоэффективности и сертификатов энергоэффективности зданий;
- Создание Фонда энергосбережения.

Взаимосвязь водных и энергетических ресурсов и экологический менеджмент

В Кыргызстане существует законодательная база, предоставляющая основные положения использования и управления природными ресурсами страны. Главный экологический вызов страны связан с водными ресурсами бассейна р. Сырдарья и взаимосвязью между водоснабжением и энергетикой. Использование данных водных ресурсов требует эффективного управления компромиссными решениями между секторами и между странами. Низкий уровень управления природными ресурсами и их неэффективное использование приводит к ухудшению состояния окружающей среды и напряженности между странами региона, которые примыкают к реке. Нынешние тенденции относительно динамики потребления энергии и воды, рост населения и воздействие изменений климата предполагают, что ситуация будет ухудшаться.

Повышение эффективности в Кыргызстане может сыграть основную роль в улучшении управления водными ресурсами данного бассейна. Энергоэффективность также является источником энергии, который предоставляет многочисленные преимущества, например,

повышение энергетической безопасности, надежности электроснабжения и здоровья людей; снижение топливной/энергетической бедности; и более широкую социальную пользу. Учитывая то, что достижение многочисленных целей является важным критерием для международных доноров, приоритетность инвестиций в энергоэффективность для них это обычная стратегия.

Финансирование энергоэффективности

Закон «Об энергосбережении» (1998 г.) предусматривал создание Фонда энергосбережения, но он так и не был создан. Впрочем, энергосистема Кыргызстана, включая энергоэффективность, извлекла пользу от международных источников финансирования за эти годы. Такая международная помощь, однако, лежит в основе почти всех государственных инвестиций, внутренние источники составляют от 2,5 до 10% всех инвестиций с 2006 по 2012 гг. Устойчивое частичное возмещение затрат энергетическими предприятиями и недостаточные инвестиции на протяжении длительного времени привели к ухудшению состояния энергетических активов страны. Полное возмещение затрат и прозрачная тарифная политика являются важными предварительными условиями для привлечения частных инвестиций. Необходимы также и немалые государственные средства для дополнения частных инвестиций.

В данный момент отсутствуют стабильные источники финансирования для обеспечения работ государственными органами в части разработки и реализации программ по энергоэффективности. Финансирование может поступать из различных источников доходов, в т. ч. повышение тарифов (отчисления на общественные нужды), экологические налоги (напр., налог на автомобильное топливо) и донорские организации.

Хотя двухсторонняя и многосторонняя донорская помощь Кыргызстану на сохранение климата составляла 59,9 млн. дол. США в год, она в пять раз меньше средней суммы для стран Восточной Европы, Кавказа и Центральной Азии (ВЕКЦА). Поэтому Кыргызстан не в полной мере использует свой потенциал для привлечения международной поддержки. Одной из причин сложившейся ситуации могут быть недостаточные административные возможности и ресурсы, а также неспособность Кыргызстана внедрить неоднократно рекомендованные международными организациями реформы, напр., тарифная реформа.

РЕКОМЕНДАЦИИ

Рекомендации

Общие рекомендации

1. Изучить и принять обязательные к выполнению политические решения и меры по повышению эффективности использования энергии для того, чтобы энергосистема могла развиваться при минимальных затратах. Политика правительства в области энергетики должна быть понятной, вдохновлять к действию и привлекать как можно больше поддержки со стороны заинтересованных сторон. Правительству рекомендуется подготовить заявление о видении национальной стратегической политики в области энергетики, в котором энергоэффективность указана в качестве первоочередной задачи. В заявлении следует четко указать, что эффективность использования энергии является национальным приоритетом, поскольку она служит ключевым элементом в развитии энергосистемы с наименьшими затратами и обеспечении экономически доступных тарифов, позволяющих возместить затраты. Видение необходимо распространить среди широких кругов общественности посредством стратегических документов и обращений правительства, используя различные организации и средства массовой информации.

2. Установить долгосрочные стратегические цели в области энергоэффективности, основные промежуточные цели и четкую базовую ситуацию для оценки прогресса. Цели должны быть конкретными, измеримыми, достижимыми, реалистичными, иметь привязку ко времени и могут быть разработаны ГКПЭН КР, Научно-исследовательским институтом энергетики и экономики при ГКПЭН КР в тесном сотрудничестве с международными донорскими организациями. Правительству следует разработать систему мониторинга и отчетности для отслеживания и оценки прогресса.

3. Создать в стране прозрачную и эффективную институциональную основу для реализации политики энергоэффективности. Назначить ответственный орган, который будет иметь чётко обозначенный круг полномочий и нести ответственность за достижение поставленных целей в области энергоэффективности и координацию деятельности с другими правительственными учреждениями. Для обеспечения эффективной деятельности такого органа его следует обеспечить необходимыми полномочиями, кадровым потенциалом, функциональными возможностями и ресурсами. Следует на законодательном уровне разъяснить чётко обозначенные функции и обязанности всех правительственных органов, способных внести свой вклад в обеспечение энергоэффективности.

4. Обеспечить стабильные денежные поступления для финансирования деятельности основного органа в области энергоэффективности, а также для Инвестиционного фонда по энергоэффективности и возобновляемым источникам энергии, которые будут использоваться для финансирования реализации программ и проектов в области энергоэффективности в частном и в государственном секторах. Источниками таких поступлений могут быть повышение тарифов (отчисления на общественные нужды), введение экологических налогов (например, на транспортное топливо), а также поступления от донорских организаций.

5. Укрепить независимость, расширить полномочия и ресурсы Государственного агентства по регулированию топливно-энергетического комплекса при Правительстве Кыргызской Республики (ГАРТЭК), что позволит Агентству способствовать достижению целей энергетической политики правительства.

6. Гарантировать возможность для реализации наименее затратного и комплексного подхода к планированию и развитию энергетической системы в разрезе нормативно-правовой базы и механизмов управления, наряду с полноценным включением энергоэффективности, как на стороне предложения, так и на стороне спроса. Требования относительно принятия такого подхода необходимо предъявлять к государственным органам и регулируемым энергетическим компаниям/ коммунальным предприятиям, участвующим в процессе принятия решений, связанных с планированием энергетической системы и инвестициями в энергетический сектор.

7. Важным приоритетом должно стать усовершенствование Закона «Об энергосбережении», принятого в 1998 году, и его актуализация в соответствии с передовой международной практикой. Этот закон должен: закреплять положения новой институциональной структуры в области энергоэффективности, например, функции и обязанности, включая назначенный орган по внедрению энергоэффективности; предусмотреть обязательные требования по разработке национального плана действий в сфере энергоэффективности (например, см. шаблон ЕС для национальных планов действий в области энергоэффективности (НПДЭЭ)); предусмотреть обязательные требования относительно применения принципа планирования с минимизацией затрат.

8. Энергоэффективность должна быть в центре энергетической стратегии страны, чтобы потребители приняли повышение тарифов в целях достижения полного возмещения затрат. Данная стратегия должна включать ряд рекомендаций, предложенных в этом обзоре.

9. Расширить масштабы и улучшить существующие средства информирования общественности, для того чтобы:

    - общественность признала необходимость инвестирования и обеспечения полного возмещения затрат через энергетические тарифы, - но в то же время разъяснить, каким образом энергоэффективность помогает минимизировать общие затраты на уровне системы, в результате чего тарифы находятся на более низком уровне, чем могли бы быть;

    - разъяснить, что, несмотря на то, что энергоэффективность зачастую обходится дешевле, чем альтернативные варианты со стороны предложения, она тем не менее требует организованных авансовых инвестиций; а также

    - рекомендовать частным лицам и организациям различные меры по снижению собственного потребления, и, соответственно, снижения суммы оплаты за электроэнергию, в том числе информацию о правительственных программах в области энергоэффективности и финансовой поддержке, на которую потребители могут рассчитывать.

10. Предусмотреть возможность организации официально признанного участия и представления интересов потребителей в разработке энергетической политики и тарифного регулирования. Такое представление интересов потребителей должно быть независимым от правительства и отрасли, а также обладать соответствующим опытом деятельности и достаточным кадровым потенциалом для участия в процессах консультаций с правительствами и поддерживать эффективную коммуникацию посредством различных каналов СМИ. Для жителей Кыргыз-

ской Республики подобная мера должна оказать положительное воздействие на следующее: более глубокое понимание вызовов в сфере энергетики и их роли в достижении экономически эффективного развития энергетической системы во благо государства; укрепление доверия к институциональным и рыночным субъектам, участвующим в развитии и деятельности энергетического сектора; увеличение их конструктивного участия в разработке и внедрении решений. Процессы консультаций должны быть открыты для всех заинтересованных сторон, включая международные организации и доноров.

Рекомендации: Электроэнергетический сектор

11. Уделить приоритетное внимание тем мероприятиям по повышению эффективности, которые имеют наивысший потенциал для содействия разработке минимизации затрат и повышению эффективности работы системы электроснабжения, уделяя особое внимание надежности сети. Сокращение потерь энергии и снижение спроса на электроэнергию должны стоять на первом месте. Для реализации этих целей необходимо изучить ряд возможностей в области регуляторной реформы, например, регулирование деятельности энергетических предприятий, системное планирование, тарифную политику и разработку мер по управлению спросом на стороне потребителя.

12. Разработать и утвердить новую тарифную политику, которая будет предусматривать постепенное достижение тарифов покрывающих все затраты, связанные с выработкой, передачей, распределением и поставкой. Дополнительные финансовые ресурсы, связанные с увеличением тарифов на энергию, должны использоваться энергетическими предприятиями для модернизации сетей и сокращения потерь. Сокращение потерь в электроэнергетических сетях по сравнению с 2014 г. до среднего уровня в Европе и Центральной Азии сможет практически полностью устранить дефицит электроэнергии и значительно сократить финансовый дефицит энергосистемы.

13. ГАРТЭКу следует принять на себя более активную роль в совершенствовании подготовки и реализации тарифной политики страны. Основная задача должна заключаться в том, чтобы тарифная политика способствовала повышению энергоэффективности всей энергетической системы, т.е. генерации, передачи, распределения, потребления. Это указывает на необходимость разработки методологии расчета допустимых доходов, чтобы регулируемые компании имели мотивацию для повышения эффективности и тарифы обеспечивали стимулы для эффективного использования энергии потребителями. В частности необходимо:

    a. Совершенствовать методологию расчета разрешенных доходов регулируемых энергетических компаний:

        i. Органы власти и энергетические предприятия, участвующие в процессе принятия решений в отношении планирования, инвестиций и эксплуатации энергосистем, должны применять подход минимизации затрат с полным учетом эффективности использования энергии и управления спросом.

ii. Обеспечить дополнительные стимулы и более амбициозные требования по сокращению потерь энергии. Требования должны сопровождаться достаточным финансированием, которое выделяется из разрешенных доходов компаний;

iii. Разрешенные доходы передающих и распределительных компаний должны быть отделены от объемов поставленной энергии с помощью механизма корректировки доходов (регулирование с разделением), чтобы у предприятий не было стимулов для увеличения объемов отпуска энергии. Наоборот, для этих компаний можно предусмотреть требования и стимулы по повышению ЭЭ на стороне потребителя. Эти усовершенствования можно реализовать за счет закупочных тендеров или программ энергоэффективности для энергетических предприятий.

iv. Внедрение дополнительных показателей эффективности, которые помогут обеспечить выгоду для потребителей, в том числе, благодаря энергоэффективности и управлению спросом, и укрепить взаимосвязь между деятельностью регулируемых энергетических предприятий и интересами потребителей, например, в отношении надежности, управления спросом, обслуживания клиентов.

v. Регулирующий орган может предпринять шаги, чтобы связать управление спросом с доходами от экспорта, например, предусмотреть вознаграждение энергетических предприятий, которые ведут деятельность по управлению спросом, используя долю доходов от экспорта как вознаграждение.

b. Улучшить тарифную сетку на электроэнергию, для того чтобы добиться полного возмещения затрат и стимулировать энергоэффективное потребление, при этом, защищая потребителей с низкими доходами и обеспечивая минимальные энергетические потребности:

i. Следует пересмотреть структуру ступенчатых тарифов, чтобы добиться полного возмещения затрат, с большей ориентацией на потребителей с низким доходом. Необходимо определить минимальные/основные потребности в энергии и установить различные ступени для зимнего и летнего сезона.

ii. Уделить первоочередное внимание непосредственным и адресным энергоэффективным мерам по отношению к уязвимым потребителям в целях повышения энергоэффективности в их домах и сокращения счетов за энергию;

iii. Чтобы обеспечить принятие потребителями повышения тарифов, следует установить взаимосвязь тарифов с качеством обслуживания потребителей энергетическими предприятиями, где приоритет отдается качеству обслуживания, энергоэффективности / управлению спросом и эффективности затрат. Эту взаимосвязь необходимо довести до сведения потребителей с помощью четкого видения и диалога, как предложено выше в Рекомендации 1. Такие шаги необходимо подкреплять сбором, анализом и публикацией данных об эффективности деятельности энергетических предприятий и снижении числа аварий.

14. Повысить прозрачность расходов компаний в энергетическом секторе, включая счета регулируемых энергетических предприятий, в соответствии с передовой международной практикой в целях сокращения перекрестного субсидирования, установления и поддержания доверия потребителей/общественности и обеспечения реализации государственной стратегии в области энергетической эффективности.

15. Применить опыт, извлеченный из реализации «пилотных» проектов и трансформировать его в нормативно-правовые акты. К примеру, использование интеллектуальных приборов учета для обеспечения минимизации затрат в повышении надежности электросетей («Северэлектро»).

Рекомендации: Промышленность

16. Обязать или активно рекомендовать принятие международных стандартов проведения энергоаудитов, а также разработку и применение систем энергоменеджмента, например, ISO 50001;

17. Разработать схему сертификации/аккредитации для энергоаудиторов. Реализацию и надзор за функционированием схемы следует поручить государственному органу, который несет ответственность за проведение государственной политики в области энергоэффективности (см. выше Рекомендацию 3).

18. Рассмотреть возможность создания схем поощрения, которые будут стимулировать промышленные предприятия к осуществлению рекомендуемых мер по энергоаудиту.

19. Изучить стратегии, помогающие разработать схемы ЭСКО, которые могут обеспечить значительные улучшения энергоэффективности, в том числе:

    a. назначить орган, который будет предоставлять поддержку в создании ЭСКО;

    b. осуществлять тарифные реформы;

    c. облегчить доступ к недорогому финансированию;

    d. создавать спрос на услуги ЭСКО и потоки доходов в дополнение к ценам на энергоносители, например, мандат для энергетических предприятий; требования к проведению государственных закупок;

    e. утвердить типовой контракт на повышение энергоэффективности для общественных организаций;

    f. пересмотреть и скорректировать правила государственного финансирования, направленные на поощрение инвестиций в повышение энергоэффективности.

20. Содействовать развитию бизнеса в сфере предоставления энергоэффективных продуктов и услуг (например, налоговые льготы для импорта или производства энергоэффективного оборудования: светодиодные лампы, двигатели с высоким КПД, солнечные тепловые коллекторы и т. д.)

Рекомендации: Здания

21. Продолжать совершенствовать и внедрять существующую законодательную базу в отношении энергоэффективности в зданиях. Необходимо устранить препятствия

на пути реализации схем минимальных стандартов энергоэффективности (МСЭЭ) и сертификатов энергоэффективности (СЭЭ).

22. Схема СЭЭ должна осуществляться и контролироваться государственным органом, ответственным за реализацию политики правительства в области энергоэффективности.

23. Требовать от местных органов власти разработки и реализации планов действий по проведению энергоаудитов общественных зданий и реализации мер, определенных по результатам проверок. Можно ввести обязательное требование для общественных организаций использовать модель ЭСКО. Правительство может потребовать от местных органов власти отчитываться о ходе реализации и содействовать обмену передовым опытом и наработками.

24. Пересмотреть и внести изменения в правила государственного финансирования с целью поощрения, а не дестимулирования инвестиций в повышение энергоэффективности зданий.

25. Разработать схему выдачи сертификатов энергоэффективности (СЭЭ) таким образом, чтобы она позволяла обеспечить сбор данных для оценки показателей текущего уровня энергоэффективности в зданиях для возможности отслеживать прогресс и обеспечивать поддержку в принятии решений.

26. Продолжать работу по информированию потребителей о динамике потребления ими энергии и популяризировать бесплатные или малозатратные меры по сокращению расходов на электроэнергию. Правительство может ввести обязательное требование для распределительных компаний обеспечивать легкий доступ потребителей к информации о количестве потребленной ими энергии в прошлых периодах (вплоть до трех лет). Подачу информации о бесплатных и малозатратных мерах энергосбережения в зданиях можно совершенствовать в соответствии с передовой международной практикой и распространять в масштабах всей страны.

Рекомендации: Осветительные и энергопотребляющие приборы

27. Уделить первоочередное внимание внедрению минимальных стандартов энергоэффективности (МСЭЭ) для энергопотребляющих приборов с наивысшим потенциалом экономии энергии, таких как трансформаторы, осветительные приборы, бытовые холодильники и промышленные двигатели. Дополнить МСЭЭ схемами маркировки, стимулами для покупки (например, налоговые льготы) и механизмами для создания спроса на энергоэффективные продукты (например, обязательства для энергетических предприятий, требования к государственным закупкам). Установить приоритеты, исходя из экономического потенциала и с учетом многочисленных преимуществ энергоэффективности, в том числе положительное воздействие на надежность энергосистемы.

28. Внедрить механизмы стимулирования местных органов власти для повышения энергоэффективности и сокращения расходов на электроэнергию.

29. Изучить потенциал использования схем ЭСКО, которые могут обеспечить масштабную замену неэффективного освещения светодиодными лампами для государственных/муниципальных зданий и уличного освещения.

30. Внедрить минимальные критерии энергоэффективности в правила государственных закупок для государственных и местных органов власти, а также государственных компаний.

31. Продолжать повышение осведомленности потребителей о низкозатратных мерах по сокращению счетов за электроэнергию, т.е. сокращение суммы платежа благодаря замене ламп накаливания на светодиодные лампы и покупке высокоэффективных бытовых приборов

Рекомендации: Сектор централизованного теплоснабжения (ЦТС)

32. Развивать системы ЦТС с учетом принципа покрытия всех затрат потребителями, согласованного с достижением целей государственной политики (см. Рекомендацию 13 выше). Дополнительные финансовые ресурсы, полученные от повышения тарифов на тепло, должны использоваться для модернизации сетей ЦТС, установки приборов учета энергии и снижения потерь.

33. Использовать результаты «пилотных» проектов в секторе ЦТ, для усовершенствования политики/регулирования. Например, на основе результатов реконструкции котельной «Гагарин», с использованием солнечных тепловых коллекторов, в ходе модернизации системы ЦТС и замены старых тепловых котлов (Бишкектеплосеть), правительство может разработать стандартизованную методологию и потребовать от всех компаний ЦТС проводить анализ потенциальных затрат-выгод в отношении следующего:

    a. использования высокоэффективных когенерационных установок;

    b. использования солнечных тепловых коллекторов;

    c. обеспечения круглогодичного горячего водоснабжения.

34. Наряду с реализацией тарифной политики обязать регулируемые компании организовать установку теплосчетчиков и включить эти затраты в разрешенные доходы. Как первоочередной приоритет, разработать программу, предназначенную для установки теплосчетчиков на всех котельных и зданиях. Также можно предусмотреть стимулы для мотивации потребителей к установке приборов учета энергии (реформы в области потребительских тарифов будут способствовать достижению этой цели).

Рекомендации: Транспорт

35. Внедрение комплексов политических мер для ограничения импорта неэффективных транспортных средств, содействие продаже более эффективных транспортных средств и их эффективному использованию. Это может включать установление минимальных стандартов для импорта подержанных автомобилей и увязывание фискальных мер с экономией топлива, его потреблением или загрязняющими выбросами от автомобилей. Требования по предоставлению информации потребителям также должны входить в состав любого комплекса политических мер (например, маркировка, руководство по техническому обслуживанию).

36. Любые доходы, полученные от налогов на автомобили, дизельное топливо, бензин или другие виды топлива, оказывающие негативное воздействие на окружающую

среду, могут быть обозначены как «экологические» и направляться на инвестиции в энергоэффективный общественный транспорт с низким уровнем выбросов или в пользу Фонда по энергоэффективности. Это позволит продемонстрировать общественности, каким образом налоги реинвестируются в их пользу, и это будет содействовать принятию налогов на политическом уровне.

37. Улучшить качество градостроительной деятельности, включая транспортную инфраструктуру и управление дорожным движением, путем осуществления следующих мер:

    a. Повышение комфорта, эффективности, физической и финансовой доступности существующей системы общественного транспорта;

    b. Увеличение платы за парковку в районах с высокой концентрацией автомобилей и связанного с этим загрязнением воздуха и перегруженностью дорог;

    c. Выделение отдельных полос для велосипедного и общественного транспорта при проектировании, строительстве или ремонте дорог.

1. BACKGROUND

1. Background

1.1. Country Overview

The Kyrgyz Republic (Kyrgyzstan) is a landlocked mountainous country in the north-east of Central Asia. The country borders Uzbekistan to the west, Kazakhstan to the north, China to the east and Tajikistan to the south. The total area of the country is approximately 200,000 km^2, and it is divided into 9 administrative areas, including 7 provinces and the 2 main cities, Bishkek, the capital, and Osh, the second-largest city.

About 80% of the country is mountainous. The rest of the territory is represented by valleys and basins. The climate is continental, with strongly defined seasons. The rugged topography, with large differences in altitude, determines the variety of climatic conditions and temperatures in different regions of the country. The annual average sunshine level in Kyrgyzstan, 2,100–2,900 hours per year, is similar to that of Turkey and Greece.

The population of Kyrgyzstan has grown by 72.4% since the country gained its independence in 1991. As of January 2016, there were 6,019 million people in the country, with 15.9% living in the capital, 18.9% in other cities and 66.3% in rural areas.[1] The average life expectancy for the male population is 67 years, and for females it is 75 years. The poverty level in the country is 30.6%, which is the second-highest level in the Central Asia region after Tajikistan (32%).[2]

The unstable political situation and low level of economic development are considered to be two major contributing factors to two political crises: the first and second Tulip Revolutions, which occurred in 2005 and 2010, respectively. Increases to electricity tariffs and the obscure privatisation processes of energy companies have also been among the factors contributing to social unrest and instability in Kyrgyzstan in recent decades. The affordability and reliability of the energy supply remain very sensitive issues.

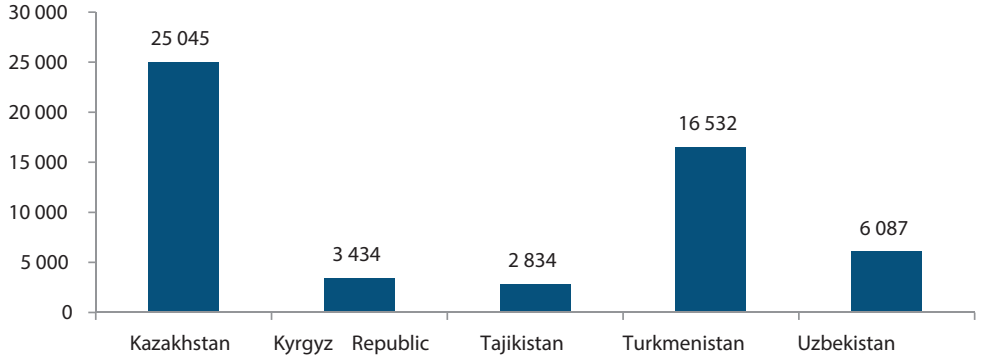
1.2. Economic Background

Kyrgyzstan is one of the lower-middle-income countries in the Central Asia region (Figure 1). Even though the retrospective analysis shows positive growth of the gross domestic product (GDP) per capita during the period 1996–2015, except for the crisis year of 2010, the GDP growth rate for Kyrgyzstan was significantly lower than those of Kazakhstan, Turkmenistan and Uzbekistan (Figure 2).

1 http://www.stat.kg/ru/statistics/naselenie/ (accessed June 2017).

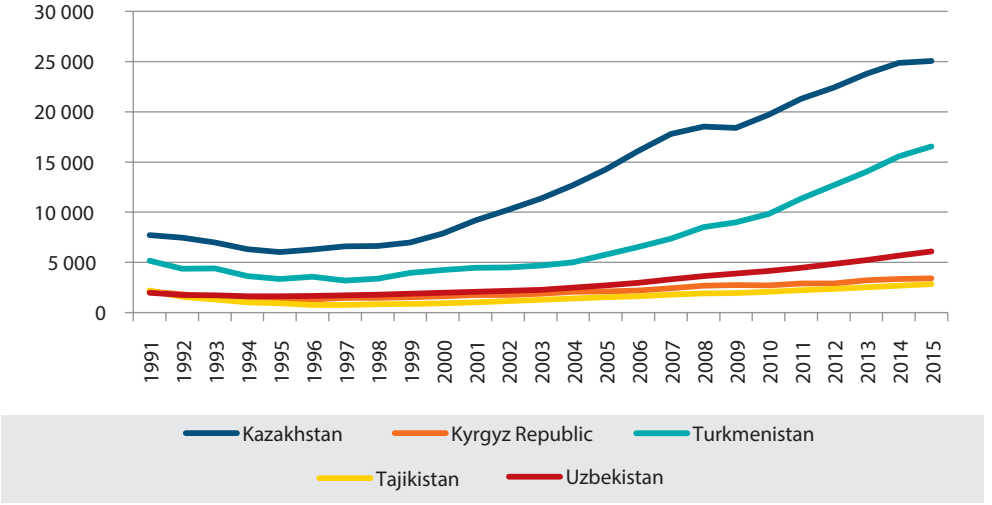
2 https://www.adb.org/countries/kyrgyz-republic/poverty (accessed June 2017).

Figure 1: GDP per capita, PPP (current international $) in Central Asia in 2015.



Source: World Bank, International Comparison Program database, http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD.

Figure 2: Dynamics of GDP per capita, PPP (current international $) during the period 1991–2015 in Central Asia.



Source: World Bank, International Comparison Program database, http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD.

An analysis of the macroeconomic indicators of Kyrgyzstan over the last 5 years (Table 1) shows the contraction of the economy since 2013, when the country enjoyed record GDP growth of 10.5%. The GDP growth was steady at 3.5–3.6% during the period 2014–2015 but is projected to decline by more than half in 2016 due to both internal and external factors, such as the depreciation of the local currency at the end of 2015 and the short-term challenges associated with accession to the Eurasian Economic Union (EEU).

Table 1: Macroeconomic indicators of Kyrgyzstan in 2012–2016

	2012	2013	2014	2015	2016 projected
GDP growth	-0.9	10.5	3.6	3.5	1.6
Inflation (average)	2.8	6.6	7.5	6.5	3.5
Government balance/GDP	-5.9	-3.7	1.9	-1.2	-4.5
Current account balance/GDP	3.7	-1.1	-17.8	-10.4	-14.9
Net FDI/GDP [neg. sign = inflows]	-4.4	-8.5	-4.7	-10.6	-8.9
External debt/GDP	79.3	71.9	76.3	89.4	n.a.
Gross reserves/GDP	30.7	31.8	29.7	26.9	n.a.
Credit to private sector/GDP	12.9	15.4	18.0	14.2	n.a.

Source: European Bank for Reconstruction and Development (2017).

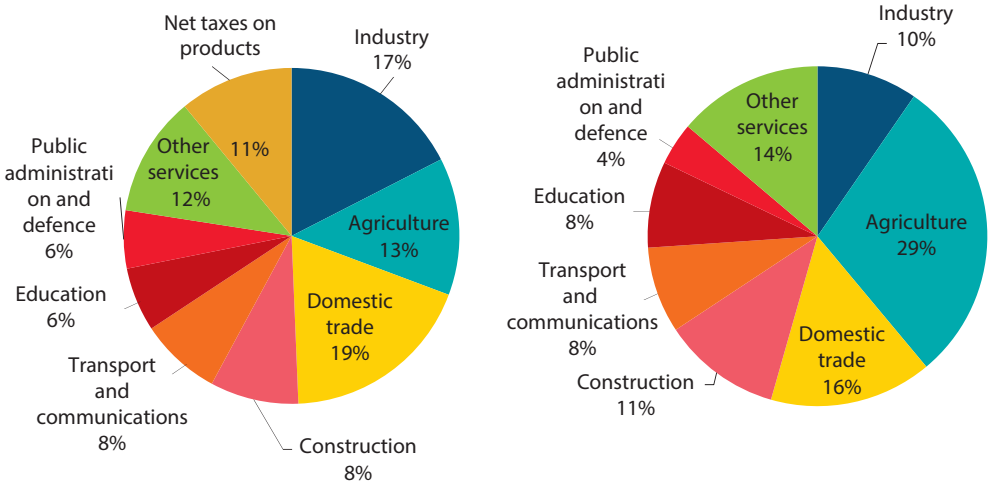
In August 2015, the Kyrgyz Republic officially joined the EEU with Armenia, Russia, Belarus and Kazakhstan. This resulted in changes to the country's customs duties enacted as part of the EEU accession process, which negatively affected Kyrgyzstan's trade with countries outside the Union. At the same time, the domestic industries could not exploit new opportunities to increase their exports to EEU countries, because the Government was not prepared to adapt its infrastructure and systems (e.g. for the certification of veterinary and other quality standards) to the requirements necessary for exporting goods to the EEU. It should also be noted that the slowdown of the Kazakh and Russian economies negatively affected the economic growth of the country due to decreasing remittances from these countries. Employee remittances were equivalent to about 30% of the GDP for 2011–2015.[3]

In 2016, the three major GDP-generating sectors of the country's economy were domestic trade, including the repair of vehicles (19%); industry (17%); and agriculture, forestry and fishing (13%) (Figure 3, on the left). Energy generation, transmission, distribution and supply are included in the industrial sector of the economy and accounted for about 1.5% of the GDP.[4]

3 http://www.worldbank.org/en/country/kyrgyzrepublic/overview (accessed June 2017).

4 http://www.stat.kg/ru/publications/doklad-socialno-ekonomicheskoe-polozhenie-kyrgyzskoj-respubliki/ (accessed June 2017).

Figure 3: Comparison of the components of the GDP (%), 2016 (left), and the structure of the Kyrgyz labour market (%), 2016 (right).



Source: National Statistic Committee of the Kyrgyz Republic (2017).

The two largest sectors contributing to the country's GDP, domestic trade and industry, employ about 16% and 10%, respectively, of the working population. The agriculture sector employs the largest share of the working population, 29%, though this sector is only the third largest in terms of its contribution to the GDP (Figure 3, on the right). The significant difference between these sectors as regards the number of employees and the contribution to the GDP is explained by the existence of a large informal economy in the agriculture sector and the comparatively low level of income for workers in this sector. The electricity, gas and steam generation, transmission, distribution and supply sub-sectors employ 1.2% of the total working population of the country or about 13% of industrial workers.

Despite the contraction of the economy, the physical volume of products produced by industry grew by 5% in 2016 in comparison with the previous year. The economic output of the sector was about 2.8 billion euros in 2016, including: mining and processing of gold and other metals (50.1%); energy supply (15.4%); food, beverages and tobacco products (11.9%); production of non-metal, rubber and plastic products (6.8%); extraction of coal, oil, gas and other minerals (5.6%); and textiles, shoes and leather products (2.5%).[5]

It should also be noted that the Kyrgyz economy is heavily dependent on gold exports. The "Kumtor" gold-mining project is one of the most significant commercial ventures in Kyrgyzstan that not only represented 47.4% of the total economic output of the industry sector but also generated about 10% of the country's GDP in 2016.

Cotton, tobacco, wool and meat are the main agricultural products that are primarily exported to neighbouring countries. During recent decades, the agricultural sector has mostly been dominated by small farms. With a semi-subsistence orientation, they help to ensure food security for rural households. The share of agriculture in the economy has significantly declined in recent decades – from 37% of the GDP in 1990 to 13% of the GDP in 2016.[6]

5 http://www.stat.kg/ru/publications/doklad-socialno-ekonomicheskoe-polozhenie-kyrgyzskoj-respubliki/ (accessed June 2017).

6 http://www.stat.kg/ru/publications/doklad-socialno-ekonomicheskoe-polozhenie-kyrgyzskoj-respubliki/ (accessed June 2017).

In general, the Kyrgyz economy is dominated by small economic entities (farmers, individual entrepreneurs and small enterprises), most of which operate in the informal (shadow) economy. The informal economy is currently estimated by the UNDP to account for as much as 40–60% of the GDP.[7] According to the results of an analysis conducted by Kyrgyz authorities, the level of the informal economy was 39% in 2012; therefore, the State Programme for the Transition of the Kyrgyz Republic to Sustainable Development in 2013–2017 aims to reduce the shadow economy to 25% of the GDP by 2017.[8] However, there is no publically available information about the progress made towards achieving this target.

A number of international organisations are providing or have recently provided assistance to the Government of Kyrgyzstan with the aim of improving the country's economic performance. The analysis that follows suggests that there is insufficient political will to tackle the country's main challenges to improving the country's business climate: corruption, weak governance arrangements and poor energy security.

The World Bank's Ease of Doing Business indicators[9] shed some light on the key obstacles to improving Kyrgyzstan's business climate (Figure 4). Closer inspection of the methodology and sub-indicators reveals the following to be particularly problematic: lengthy grid connection procedures; an unreliable energy supply; a complicated and non-transparent tax system; inadequate judicial processes for the enforcement of contracts; and inefficient cross-border trade bureaucracy. At the same time, it is relatively easy to start a new business.

7 http://www.kg.undp.org/content/kyrgyzstan/en/home/countryinfo.html (accessed June 2017).

8 http://nbkr.kg/contout.jsp?item=2465&lang=RUS&material=44771 (accessed June 2017).

9 http://www.doingbusiness.org/data/~/media/WBG/DoingBusiness/Documents/DTF-Calculator/DB/DB17-DTF-Calculator.xlsx (accessed June 2017).

Figure 4: Rank of Kyrgyzstan in the "Ease of Doing Business" indicators (190 countries), 2017.

Source: http://www.doingbusiness.org/rankings.

Based on ten aggregated indicators (Figure 4), the World Bank has ranked Kyrgyzstan seventy-fifth out of 190 countries for the overall ease of doing business in 2017, a fall from the seventy-third position in the previous year.[10] It should also be noted that, although the rating of the country is significantly lower than that of its neighbour, Kazakhstan (rank 35), the Kyrgyz business climate is more advanced than that of its other neighbouring countries, Uzbekistan (rank 87) and Tajikistan (rank 128).[11]

The ratings of Kyrgyzstan for other internationally recognised indicators, including governance and transparency, are also relatively low:

Global Competitiveness Index 2016–2017: rank 111 out of 138 countries, declining from 102 in the previous year;[12]

Corruption Perceptions Index 2016: rank 136 out of 176 countries, declining from 123 in the previous year.[13]

The decline of Kyrgyzstan's rankings for these indices relating to the ease of doing business, global competitiveness and corruption perceptions may be correlated with the slowdown of the country's GDP growth in 2016 (see Table 1). That said, progress had been made in earlier years. Indeed, the adoption of the Kyrgyz Anticorruption Law and Strategy in 2012 was followed by a period of relatively more stable GDP growth during the period 2013–2015 (Table 1) and an improvement in the international rankings for Kyrgyzstan. During the period 2012–2015, for example, the country's ranking in the global competitiveness index rose from 127 to 102 and in the corruption perceptions index the country climbed from position 154 to position 123. The significant decline of both indices in 2016 suggests that it may be more

10 http://www.doingbusiness.org/rankings (accessed June 2017).
11 Turkmenistan is not included in the WB's Ease of Doing Business rating.
12 http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf (accessed June 2017).
13 http://www.transparency.org/news/feature/corruption_perceptions_index_2016 (accessed June 2017).

politically challenging to combat corruption during an economic recession and that increased corruption might contribute to the economic recession. There can be no doubt, however, that increased corruption worsens the investment climate of the country.

Due to the country's location, opportunities to access the large markets of Kazakhstan and the Russian Federation and low labour costs and energy prices, Kyrgyzstan has vast opportunities to attract foreign direct investment (FDI) across various sectors of the economy.[14] An FDI boom started in the mid-2000s, led by the exploitation of gold. Since then, most FDI inflows have been primarily directed towards manufacturing and trade. Canada's investment in the Kumtor gold mine accounts for most of the country's investment in Kyrgyzstan (Table 2). The current government statistics show FDI increasing yearly, though this is largely due to growing Russian and Chinese infrastructure investment in recent years.[15]

Table 2: Top five sources/destinations for FDI to/from Kyrgyzstan, million USD, as of 2016.

Inward direct investment			Outward direct investment		
Total Inward	3,235	100%	**Total Outward**	2	100%
Canada	913	28%	Tajikistan	2	91%
China	747	23%	Kazakhstan	0	4%
United Kingdom	354	11%	Turkey	0	3%
Russian Federation	237	7%	Russian Federation	0	1%
Kazakhstan	195	6%	British Virgin Islands	0	0%
Figures are rounded to +/- USD 500,000.					

Source: US Department of State (2016).

As regards the investment needs of the energy sector, the ADB estimated that the rehabilitation and construction of thermal and hydropower plants and transmission and distribution assets will require around $6 billion of investment during the period 2012–2022.[16] Unfortunately, a poorly designed and executed tariff policy has prevented most potential investments in the energy sector, as the tariffs do not achieve full cost recovery and thus the revenues for the repayment of investments are insufficient. Underinvestment has led to a decline in the reliability of the energy system, which has negatively affected other sectors of the economy in recent decades.

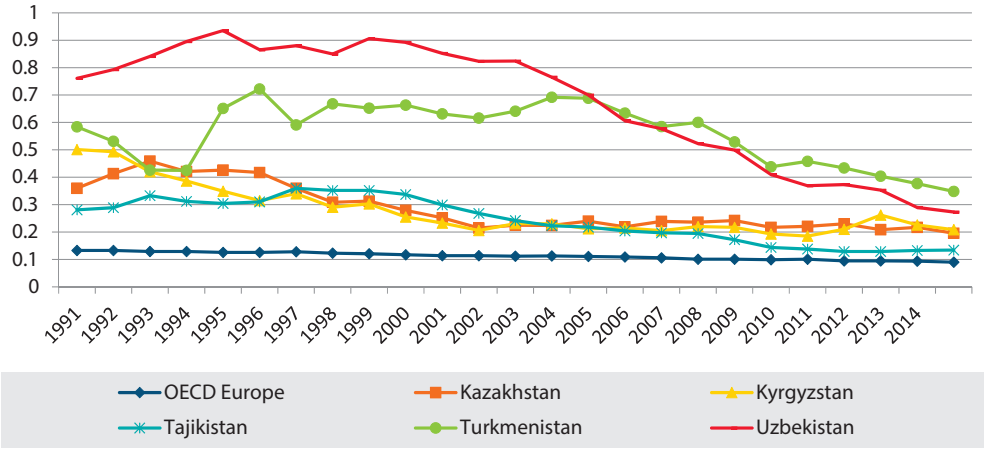
The energy intensity of Kyrgyzstan's economy decreased by 53%, from 0.493 to 0.23 toe per thousand USD PPP, during the period 1991–2003 and fluctuated within the range of 0.18–0.21 during the last decade (Figure 5). The sharp decrease in energy intensity after the collapse of the Soviet Union was related to an economic recession, whereas the fluctuation of this indicator during 2004–2014 suggests that economic growth and energy consumption were correlated (see Figure 6). In general, the economies of Kyrgyzstan and Kazakhstan have a similar level of energy intensity, though the GDP per capita and total primary energy supply were 7 times higher for Kazakhstan than for Kyrgyzstan in 2015 (see Figure 1).

14 http://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=1436 (accessed June 2017).

15 Kyrgyz Republic investment climate statement: https://www.state.gov/e/eb/rls/othr/ics/investmentclimatestatements/index.htm?year=2016&dlid=254483#wrapper (accessed June 2017).

16 http://www.carecprogram.org/index.php?page=kyrgyz-republics-power-sector-rehabilitation-project (accessed June 2017).

Figure 5: Energy intensity, TPES/GDP (toe per thousand 2010 USD PPP) in CA, 1991–2014.



Source: Database of the International Energy Agency (2017).

Figure 5 also shows that the level of energy intensity of Kyrgyzstan's economy in 2014 was lower than that of Turkmenistan and Uzbekistan but still higher than that of Tajikistan. At the same time, the energy intensity of the country was more than twice that of the EU average. In general, Kyrgyzstan's economy is energy-intensive due to a high rate of energy losses, an out-of-date energy infrastructure and inefficient energy-consuming equipment. The energy-saving potential in Kyrgyzstan is therefore significant. For example, the State Programme on Energy Savings and EE Policy for 2015–2017[17] estimates that the implementation of energy efficiency measures on the demand side could provide up to 25% savings in electricity and 15% in heat.

17 Approved by Government Decree #601, dated 25 August 2015.

Summary: Background

In 2016, the population of the country was about six million people, more than 66% of whom were living in rural areas. Following two major political crises in 2005 and 2010, the affordability and reliability of the energy supply remain very sensitive issues. The three largest sectors of the economy are domestic trade, industry and agriculture, though agriculture employs the largest share of the working population (29%).

Kyrgyzstan is one of the poorest countries in the Central Asia region. The GDP of the country significantly depends on foreign sources of revenue, such as worker remittances (about 30% of the GDP) and the exporting of gold produced by the Kumtor enterprise (about 10% of the GDP). The shadow economy is significant, accounting for 40–60% of the GDP.

In 2017, Kyrgyzstan was ranked seventy-fifth out of 190 countries by the World Bank's Overall Ease of Doing Business index, falling from seventy-third place in the previous year, with the main barriers to business being an unreliable energy supply, a lack of electricity system capacity for the connection of new consumers, a complicated and non-transparent tax system, inadequate judicial processes and inefficient cross-border trade bureaucracy. The country also has a relatively low rating for other internationally recognised indicators:

- Global Competitiveness Index 2016–2017: rank 111 out of 138 countries, declining from 102 in the previous year;
- Corruption Perceptions Index 2016: rank 136 out of 176 countries, declining from 123 in the previous year.

Most FDI inflows are related to manufacturing and trade, in which the largest shares of investments come from Canada and China. The energy sector has not benefited from foreign private sector investment. The poorly designed and executed tariff policy is a primary explanatory factor, as the tariffs do not achieve full cost recovery and hence the revenues for the repayment of investments are insufficient.

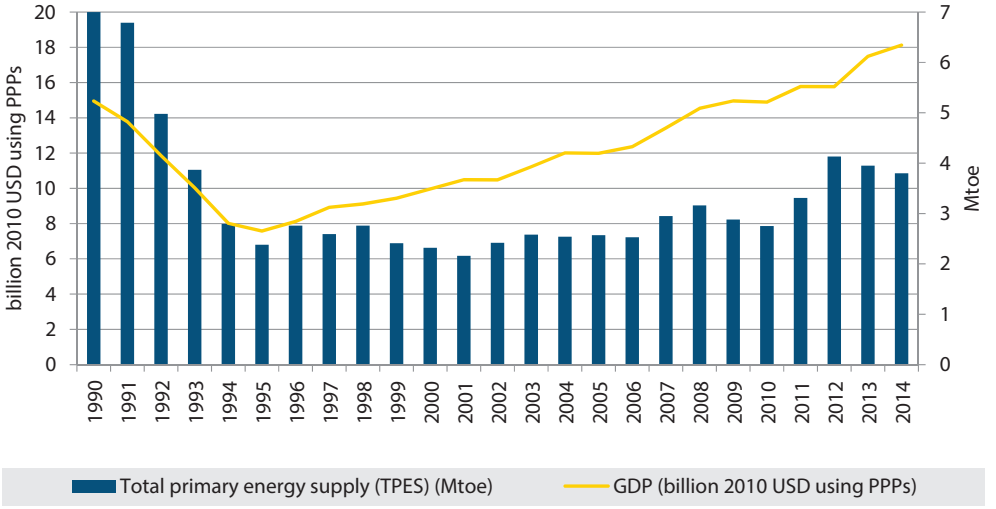
In 2014, the level of the energy intensity of Kyrgyzstan's economy was lower than that of Turkmenistan and Uzbekistan but still higher than that of Tajikistan. At the same time, the energy intensity of the country was twice that of the EU average.

2. ENERGY SUPPLY AND DEMAND

2. Energy Supply and Demand

During the last 25 years, the total primary energy supply (TPES) of the Kyrgyz Republic has generally correlated with the country's GDP growth, except during the periods 1998–2001, 2008–2010 and 2012–2014, when the GDP growth was accompanied by a declining TPES (Figure 6).

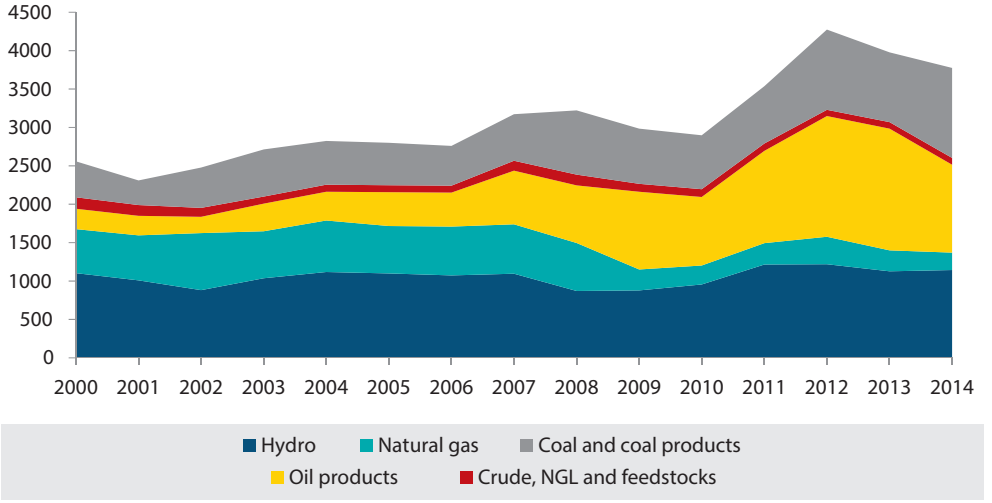
Figure 6: TPES and GDP (toe per thousand 2010 USD PPP) in Kyrgyzstan, 1991–2014.



Source: Database of the International Energy Agency (2017).

The last decade was characterised by the economic crisis and social unrest of the country in 2010 followed by a boom in economic growth that resulted in an increased energy demand. Indeed, the TPES of the country increased from 2.75 million tonnes of oil equivalent (Mtoe) in 2010 to 4.13 Mtoe in 2012 (Figure 7). However, during the period 2012–2014, the growth trend reversed, as the TPES decreased to approximately 3.8 Mtoe in 2014. In total, the TPES increased by 47% during the period 2005–2014.

Figure 7: Total primary energy supply (TPES), 2005–2014, Ktoe.

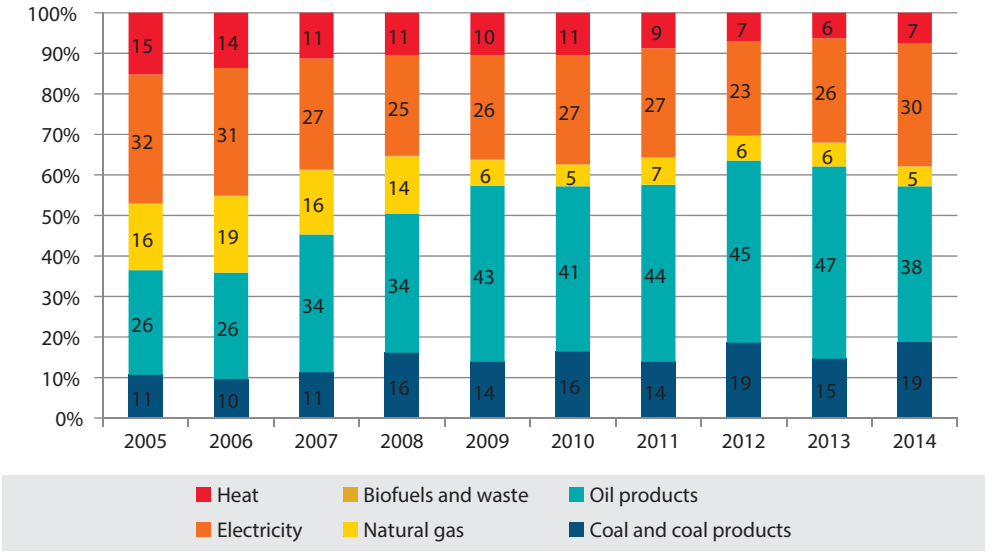


Source: Database of the International Energy Agency (2017).

In 2014, the shares of coal, oil and hydro were almost equal, and each represented about 30% of the TPES. Despite the fact that the Kyrgyz Republic has significant hydropower potential, the share of hydro in primary energy has decreased since 2005 from 42.7% to 30.1%, whereas the share of coal and oil has increased significantly over the same period. This can be explained by the fact that a very limited amount of hydroelectric capacity was put into operation during the period 2010–2014, namely Kambarata HPP-2 (120 MW), and a number of small HPPs (with total capacity of about 4 MW). During the same period, the country significantly increased its consumption of coal and mazut for heat energy production, and expansion of the supply of oil fuels was required to fuel the country's growing vehicle fleet.

In 2014, the country's total final consumption (TFC) was split into approximately 38% for oil products, 30% for electricity and 19% for coal (Figure 8). During the period 2005–2014, the growth in the shares of oil and coal in the TFC was slower than their shares in the TPES. This, together with the fluctuation of the electricity share within the range of 23–32%, reflects the increase in electricity generation from less environmentally friendly coal and mazut in comparison with hydro. Another negative trend is the reduction of the share of heat energy in the TFC, revealing that the country did not fully utilise the potential of its two CHPs in Bishkek and Osh and the district heating systems in other small cities.

Figure 8: Total final consumption (TFC), 2005–2014, %.

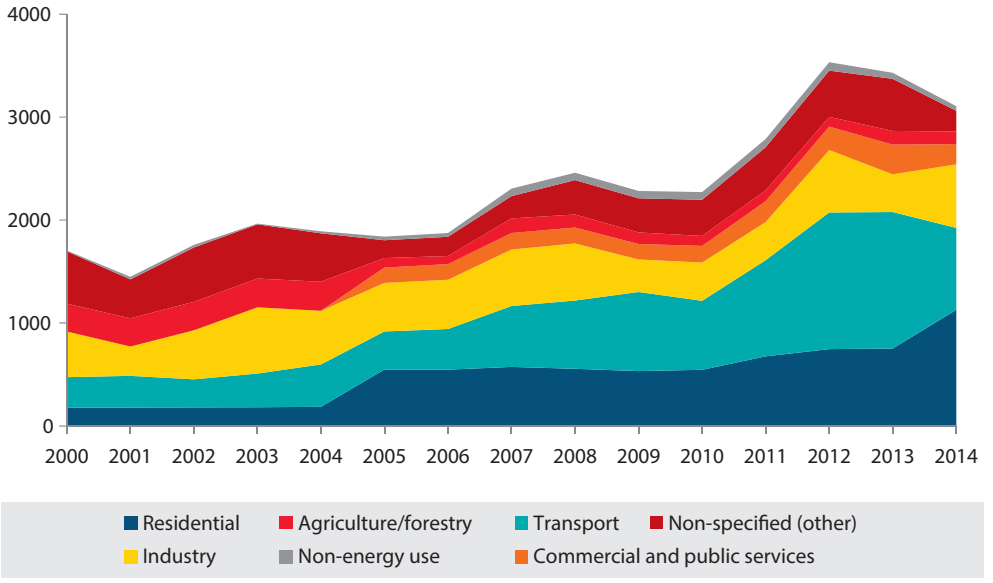


Source: Database of the International Energy Agency (2017).

The analysis of the TFC per consumer group shows that the residential, transport and industry sectors were the largest consumers of energy and represented 36%, 26% and 20%, respectively, of the TFC in 2014 (Figure 9). The energy consumption in the industry sector has experienced significant fluctuation following changes in economic activity, with the sector's energy consumption growing by 17% from 2005 to 2008 before decreasing by 45% in 2009 and varying from 366 to 617 Ktoe from 2010 to 2014. The energy consumption by the residential sector, on the other hand, has grown consistently, increasing by 37% during the period 2005–2013 and experiencing a recent sharp increase in growth between 2013 and 2014. The energy consumption of the transport sector grew by more than 3.5 times from 2005 to 2012, plateaued in 2013 and declined by 40% in 2014. Almost all diesel and gasoline is used for transport; according to the C2E2 estimates,[18] gasoline and diesel represented 99% of the sector's fuel consumption in 2013.

18 C2E2 – Copenhagen Centre on Energy Efficiency (2015), "Accelerating Energy Efficiency: Initiatives and Opportunities – Eastern Europe, the Caucasus and Central Asia". Copenhagen, Denmark.

Figure 9: Total final consumption per consumer group, 2005–2014, Ktoe.



Source: Database of the International Energy Agency (2017).

2.1. Electricity

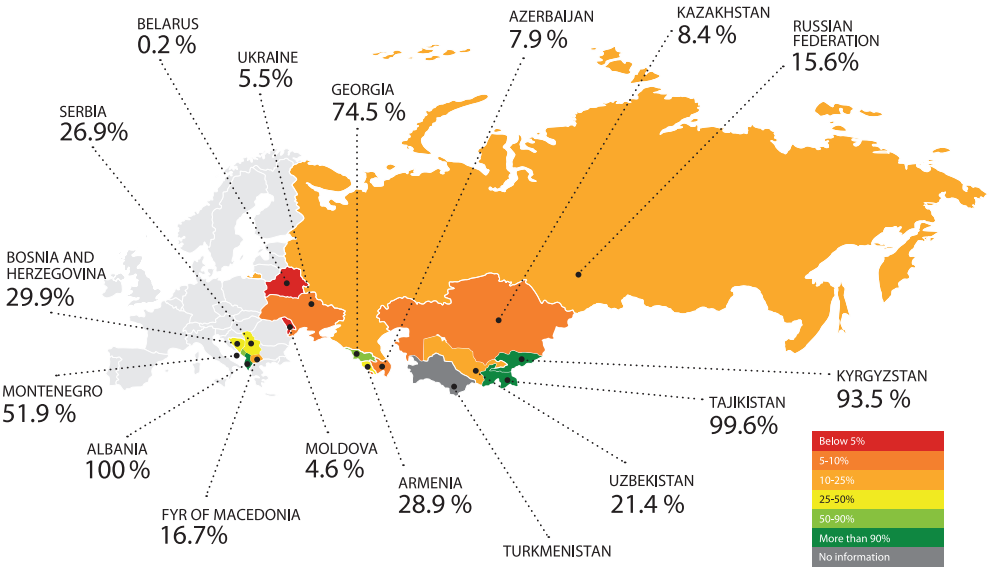
The electricity generation sector of the country is represented by 23 power plants, with a total installed capacity of 3791.2 MW, including the following:

- 8 large HPPs with total capacity of 3030.2 MW (from 40 MW to 1200 MW, located on the Naryn River)[19];
- 13 small HPPs with total capacity of 45 MW (8 plants from 0.4 to 6.4 MW located on the Alamedin River, an 8.7 MW plant on the Chu River and 4 plants with total capacity of 6.6 MW on other small rivers)[20];
- 2 CHPs with total capacity of 716 MW (in Bishkek, 666 MW, and Osh, 50 MW)[21].

Hydropower is the country's dominant electricity source, and Kyrgyzstan, after Albania and Tajikistan, was rated third among non-EU countries in the region for its share of hydropower in the total electricity production in 2012 (Figure 10). Both Tajikistan and Kyrgyzstan have significant potential for exporting electricity produced from hydro sources to the South Asia Regional Electricity Market once the CASA-1000 project has been implemented.[22]

19 OJSC "Power Plants", available at http://www.energo-es.kg/ (accessed June 2017).
20 OJSC "Chakan GES", available at http://www.chakanges.kg/ (accessed June 2017).
21 Electricity capacity only, SCIES, available at http://www.energo-es.kg/?page=article&read=47 (accessed June 2017).
22 http://www.casa-1000.org/1)Techno-EconomicFeasbilityStudy_MainRep_English.pdf (accessed June 2017).

Figure 10: Share of hydropower in the total power production, 2012.

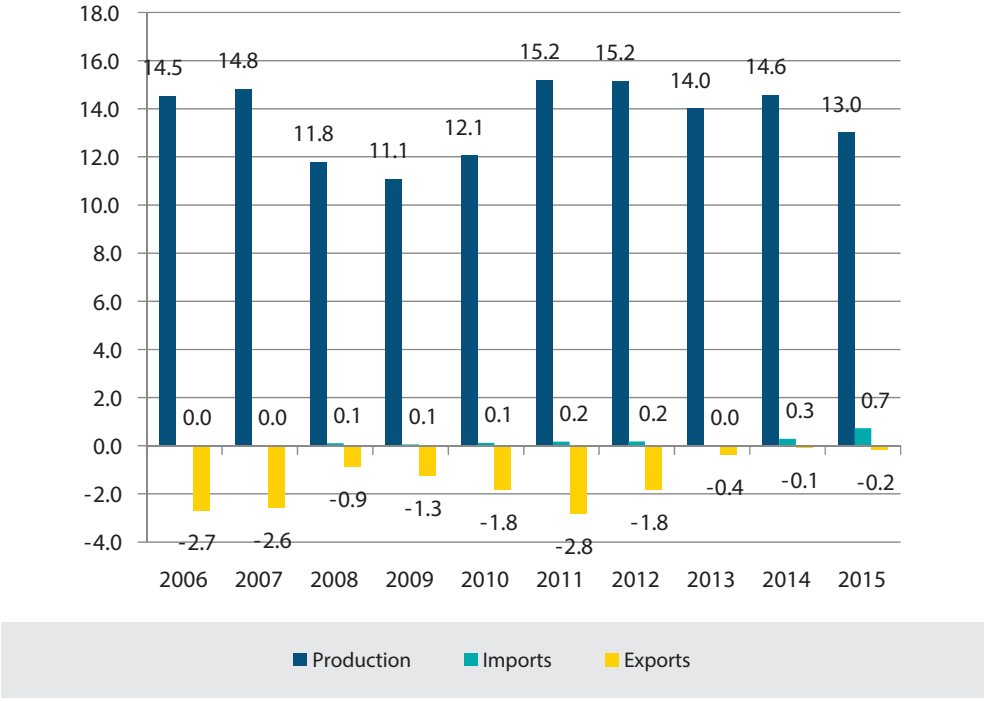


Source: REN21 UNECE Renewable Energy Status Report 2015.

The country's energy production from hydropower fluctuates seasonally, which significantly affects the power reliability. In previous years, the power supply has typically been most reliable during the spring and summer period, when it satisfied the national energy demand and provided electricity exports. During the autumn–winter period, the country imports electricity (mainly from Kazakhstan) because of the low level of water in the rivers and the consequent reduction in power generation from hydropower plants. Since 2012, however, the following factors have caused a significant reduction of electricity production in the Kyrgyz Republic and a consequent shift in the export–import balance with neighbouring countries (Figure 11):

- significant growth in the domestic electricity demand (Figure 12), which is poorly managed on both the supply side and the demand side and is not matched by the addition of new electricity-generating capacity;
- the low annual average water level in rivers in 2013–2015 in comparison with 2012; and
- deterioration in the performance of the existing electricity-generating and -distributing capacities.

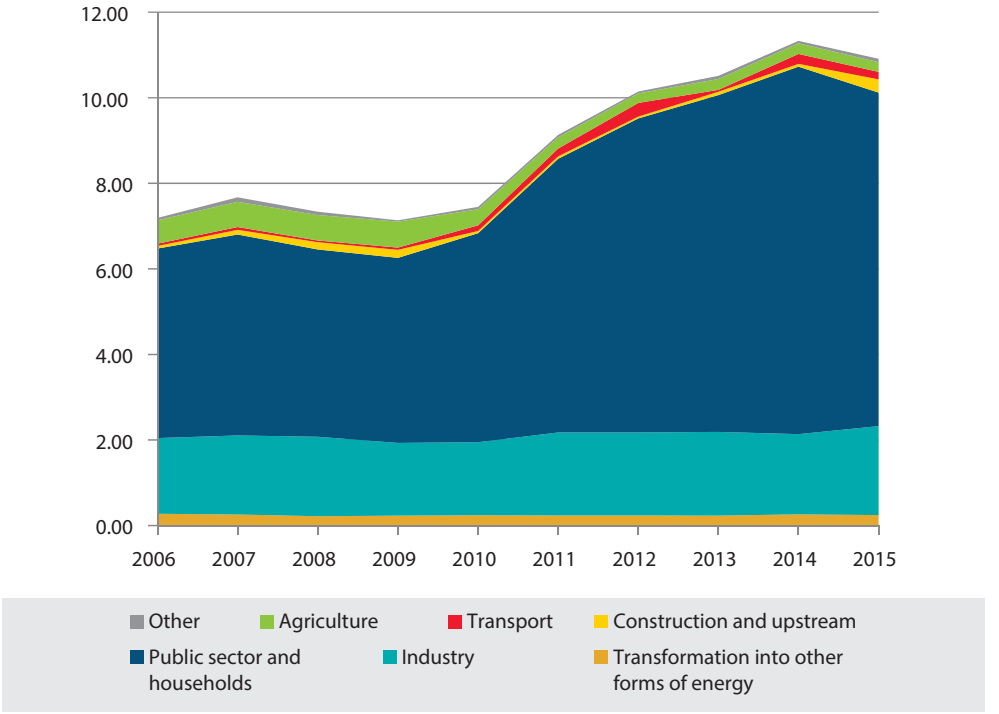
Figure 11: Electricity generation, imports and exports in 2006–2015, TWh.



Source: National Statistic Committee of the Kyrgyz Republic (2017).

Figure 12 shows that the electricity demand of the country has grown by 52% during the last decade. The public sector and households account for nearly all of this growth and represented more than 70% of the country's electricity demand in 2015. The electricity consumption in the agriculture sector decreased by 59% during the period 2006–2015, and the amount of electricity used for district heating purposes (transformation into other forms of energy) declined by 12% during this period.

Figure 12: Electricity consumption by sectors, 2006–2015, TWh.



Source: National Statistic Committee of the Kyrgyz Republic (2017).

It should also be mentioned that an adequate and transparent regulatory framework to facilitate cross-border electricity trade in the region does not exist. The arrangements for imports–exports depend on political relations and agreements (see the chapter "Electricity, Natural Gas and Heat Market Structure").

The JSC "Energy Holding Company" has recently implemented a number of projects to develop the transmission and distribution networks, with the support of international donor organisations:

- Rehabilitation of distributed electricity networks, 33.5 million EUR funded by the KfW;
- Construction of the Datka–Kemin transmission line, 380 million USD funded by the Export–Import Bank of China (see Chapter 3.1);
- Improvement of the electricity supply in Bishkek and Osh cities, 16 million USD, funded by the Islamic Development Bank;
- Development of the electricity sector, 44.8 million USD, Asian Development Bank.[23]

As the current electricity tariffs do not fully recover the costs (according to OJSC "EHC", the cost recovery was 63% in 2016[24]), it is not clear how the above loans provided by international donors will be repaid (see Chapter 4.1). Repayments of recent loans are yet to begin, as a grace

23 http://www.energo.gov.kg/ru/acsioner/realizuemye_proekty/162 (accessed June 2017).
24 http://www.energo.gov.kg/ru/infografika/ (accessed June 2017).

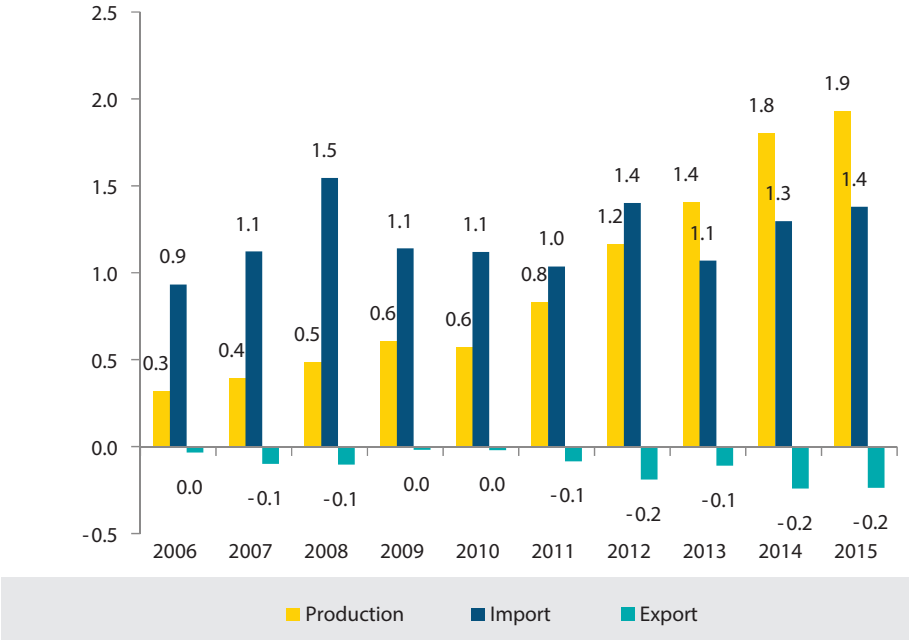
period is typically applied. In the absence of tariff increases, these new investments will serve to increase the proportion of costs not recovered through tariffs.

2.2. Coal

Kyrgyzstan has significant coal reserves, and the country is ranked fourth for the size of its coal deposits among the former Soviet Union countries, after Russia, Kazakhstan and Ukraine. The known, probable and possible resources are estimated at 6.73 billion tons of hard and bituminous coal and lignite. The recoverable coal resources are estimated at 1.3 billion tons. Currently, almost half of coal is extracted by the open-cut method. All the coal mines are operated by the state-owned enterprise "Kyrgyz Coal", which has increased the production of coal by more than 6 times in the last decade (Figure 13).

The largest consumer of coal in the country is Bishkek CHP. The plant, built during the Soviet era, was designed for a specific type of coal available from a particular deposit in neighbouring Kazakhstan. As a consequence, Kyrgyzstan has been dependent on imported coal since the collapse of the Soviet Union in 1991. Renovation of the plant, however, which is due to be completed in June 2017, will make it possible to use locally produced coal and will increase the installed capacity from 666 MW to 816 MW.

Figure 13: Coal production, imports and exports, 2006–2015, million tonnes.



Source: National Statistic Committee of the Kyrgyz Republic (2017).

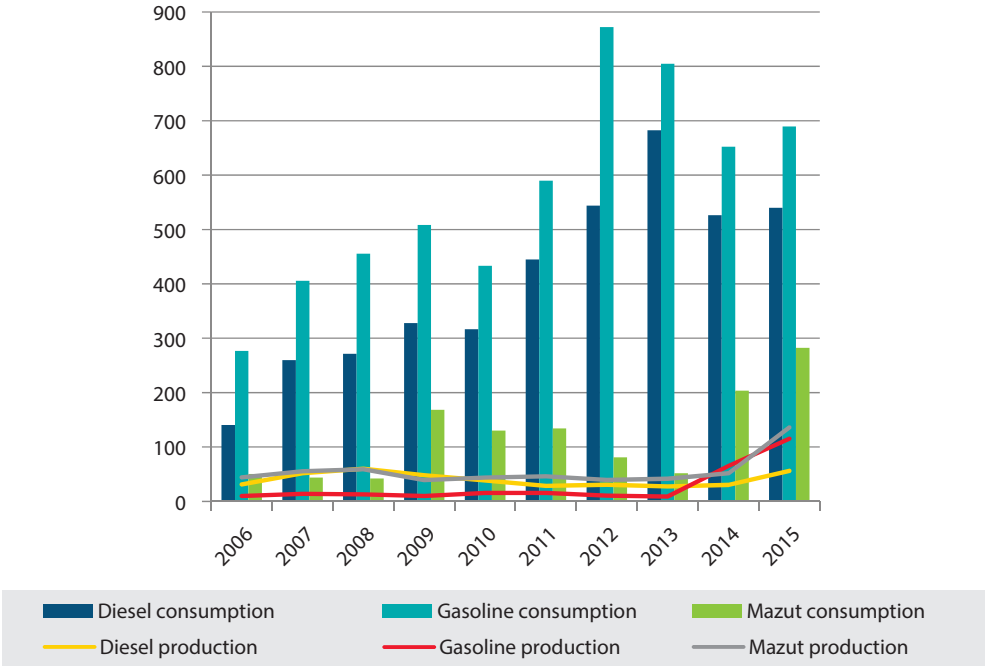
2.3. Oil Products

According to official Kyrgyz statistics,[25] the annual gasoline and diesel consumption was about 690 and 540 thousand tonnes, correspondingly, in 2015. Converting these figures into commensurable quantities, the total consumption by vehicles was about 1.27 Mtoe, with gasoline accounting for a share of 57% and diesel for the remainder.

Figure 14 provides more details on the consumption of different oil products, revealing that the consumption of gasoline and diesel increased by factors of approximately five and three, respectively, during the period 2006–2013. This growth in consumption was followed by a decline in the consumption of gasoline from 2012 and of diesel from 2013. The consumption of gasoline, however, appears to be increasing again, according to the data for the last recorded year of 2015.

The recent decline in the consumption of both gasoline and diesel cannot be explained using the available data. According to the official Kyrgyz statistics,[26] the number of privately owned vehicles increased steadily from 14 to 22 per 100 households during the period 2008–2015 or by 57% in total. The gasoline prices also followed a general increasing trend from 2006 to 2015, with the price changes being correlated weakly, if at all, with consumption.[27]

Figure 14: Oil products – consumption and local production, 2006–2015, thousand tonnes.



Source: National Statistic Committee of the Kyrgyz Republic (2017).

25 National Statistic Committee of the Kyrgyz Republic.

26 National Statistic Committee of Kyrgyz Republic, http://stat.kg/ru/publications/sbornik-kyrgyzstan-v-cifrah/.

27 Data retrieved from https://kloop.kg/blog/2014/09/29/infografika-rost-tsen-na-benzin-v-kyrgyzstane-za-poslednie-12-let/ (accessed June 2017). Diesel prices tend to follow gasoline prices, and no taxes are applied to these fuels.

There are three refineries in the Kyrgyz Republic, including two new plants, Djunda and Tokmok, which were financed by Chinese investors and have been operational since 2013 and 2015, respectively. As a result, the local production of gasoline, mazut and diesel has increased considerably in recent years (Figure 14). With a capacity of about one million tonnes per year, the two new refineries will meet a significant share of the domestic demand and export fuel to the neighbouring countries.

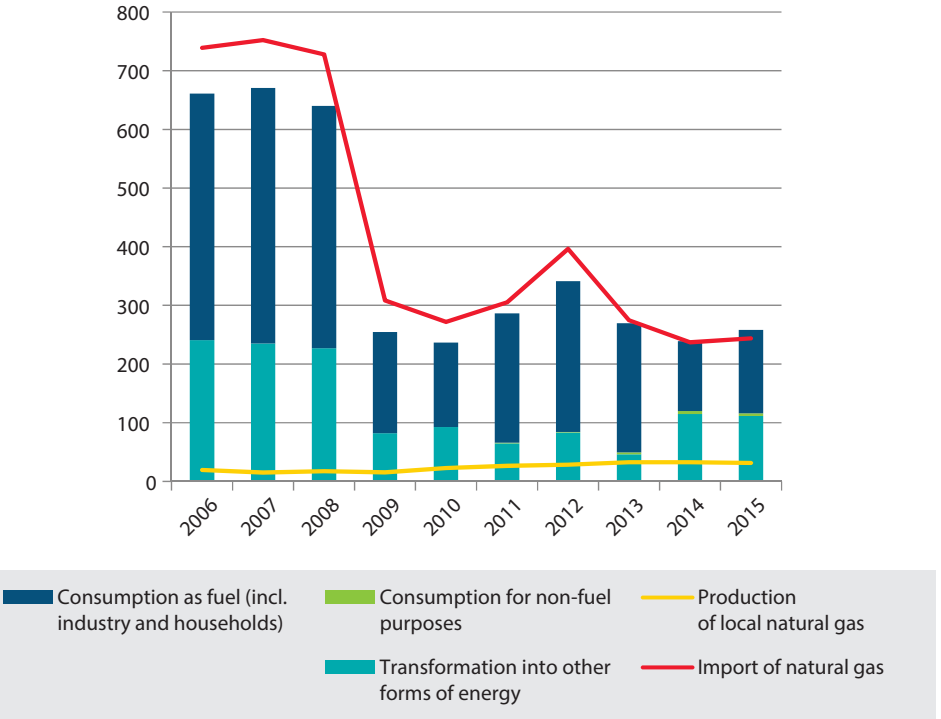
2.4. Natural Gas

The domestic gas production of the Kyrgyz Republic meets 13% of the country's needs, rising from 2% in the previous decade. The remaining needs are covered by imported gas from Uzbekistan (Figure 15). The increase in the share of local gas production during the period 2006–2015 was the result of the following factors:

- a significant drop in the natural gas imports from 2009 to 2015;
- an increase of 63% in the locally produced natural gas during the analysed period.

For political reasons, the gas imports from Uzbekistan have declined by more than three times since 2006, and this contributed to the increase in the demand for coal and mazut over the same period (see Figure 8). The reduction in gas imports was particularly acute between 2008 and 2009, falling from 727 million m^3 to 308 million m^3 in this period (Figure 15). In 2015, the major consumers of natural gas were households (42%) and the country's district heating (DH) sector (40.5%).

Figure 15: Local production, consumption and imports of natural gas, 2006–2015, million cubic metres.



Source: National Statistic Committee of the Kyrgyz Republic (2017).

2.5. Heat

2.5.1 Overview of the Heat Supply

In Kyrgyzstan, heat is provided by various technologies and fuels. Small heat-only boilers (HOBs) provide heat for buildings that are not connected to the DH system. Nearly 300 HOBs are operated by DH companies (see Table 4), half of which are fuelled by coal, and around a further 2,500 small HOBs are owned and operated by public institutions to heat public buildings.[28] These are largely fuelled by coal and electricity in fairly equal shares.

Stoves, often fuelled by wood or coal, are the main source of heating for rural households and urban households outside Bishkek (see Table 3). These stoves tend to be inefficient, and indoor air pollution is an issue. The World Bank reports that Kyrgyzstan is comparable to India in terms of indoor air pollution-influenced mortality.[29] In Bishkek, 43% of households rely on DH as the main source of heat.

Table 3: Households' main sources of heating by settlement type.

	DH	Stoves/ boilers	Electric radiators	Other electric heating	Gas
Urban (non-Bishkek)	9%	50%	31%	6%	3%
Rural	1%	73%	20%	5%	2%
Poor	4%	68%	19%	5%	3%
Non-poor	11%	56%	24%	5%	4%
Bishkek	43%	22%	18%	3%	14%

Source: World Bank (2015), "Keeping Warm: Urban Heating Options in the Kyrgyz Republic".

2.5.2. Centralised District Heating Services

There are two CHPs, located in the cities of Bishkek and Osh, and 272 heat-only boilers (HOB) generating heat energy for the DH systems in the capital and other big cities of Kyrgyzstan (see Table 3). The CHP located in Bishkek is fuelled by coal, and the CHP based in Osh has mostly been performing as a heat-only boiler since the early 1970s because of the change of fuel from natural gas to mazut. Four types of fuels are used by the DH systems: coal, mazut, electricity and natural gas.

Most of the DH system and HOBs were originally designed for gas but, following the collapse of the Soviet Union, which led to gas becoming scarcer and more expensive, were later converted to run on coal, mazut or electricity. The DH companies, however, have recently initiated a number of projects to switch fuels from coal, mazut and electricity to natural gas. This is largely because the availability and affordability of gas has improved since Gazprom acquired the majority stake in Kyrgyzgas (see section 3.2). There is high potential to incorporate renewable energy sources too, as demonstrated by the DH company Bishkekteploenergo, which successfully established a combined solar and natural gas pilot project (see section 7.2).

28 World Bank (2015), "Keeping Warm: Urban Heating Options in the Kyrgyz Republic".

29 Ibid. Note: measured in terms of daily adjusted life years, proportionate to the population.

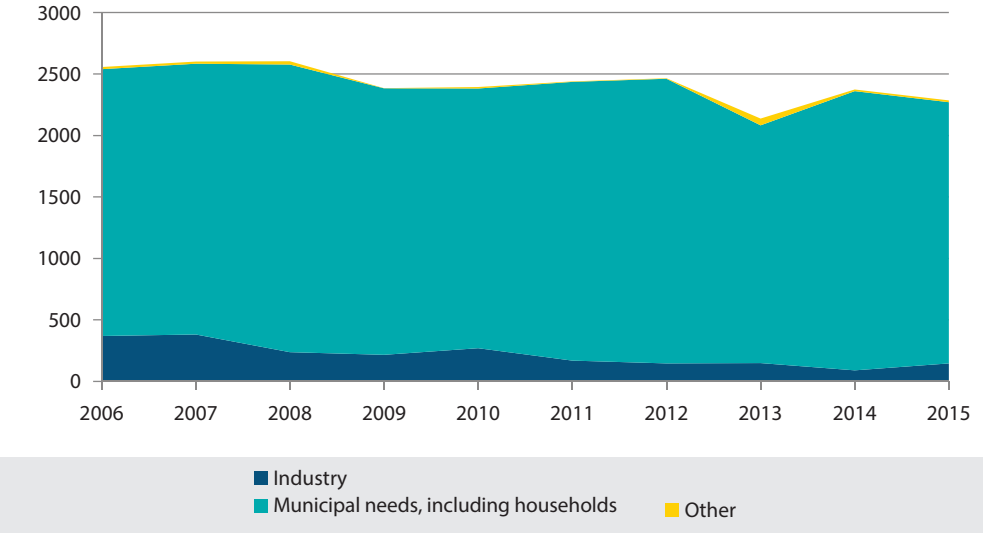
Table 4: Distribution of HOBs by type of fuel.

City	Boiler houses in total	Fuel			
		Natural gas	Mazut	Coal	Electricity
Bishkek	65	27		26	12
Talas	4		1	3	
Chuy	41	13	15	10	3
Jalal-Abad	26	6	8	9	3
Naryn	24			5	19
Issyk-Kul	31		3	21	7
Osh	81			65	16
Total in Republic:	272	46	27	139	60

Source: Government Resolution #215, dated 23 April 2016, "On the Preparation for 2016 –2017 Heating Season"

About 95% of the heat energy provided by the country's DH systems is consumed for municipal needs, including those of households. The total consumption of heat energy supplied by DH systems has decreased by about 10% in the last decade. This is explained by the decreasing demand of industrial consumers, deterioration of the DH network and lack of development of the DH network during this time (Figure 16). The decline in consumption is not due to residential customers disconnecting from the system; as prices are subsidised, customers have remained connected to the DH system even when purchasing individual boilers. The sharp decrease in heat energy consumption in 2013 was related to an unusually cold winter in 2012 and a warm winter in 2013.

Figure 16: Consumption of heat energy provided by DH systems, 2006–2015, Gcal.



Source: National Statistic Committee of the Kyrgyz Republic (2017).

Poor reliability of the services provided by the DH system and inefficient pricing (see section 4.3) have caused many consumers to switch to individual electric heating systems to ensure a continuous supply, thus worsening the reliability issues of the power sector and the financial situation of DH companies. Around 35% of households in urban areas rely on electricity for heating, and electricity for domestic heating has been the main driver of the recent growth in residential electricity consumption in the winter.[30]

During the 2013 heating season, DH customers in Bishkek experienced more than 300 network breakdowns, a sixfold increase compared with the 1990s.[31] The citizens of Bishkek and Osh cities can access a hot water supply all year round, except during one summer month, when the boiler houses are offline for tests and maintenance. The citizens of other regions of Kyrgyzstan, however, can only access the DH hot water supply during the winter period. This is largely because it is economically unattractive for a DH company to provide the service in the summer. The boiler systems are old and inefficient due to inadequate cost recovery over many years, but their efficiency is particularly poor when operating with low load factors, which typically occur in the summer.

2.5.3 Space Heat Supply–Demand Gap

Access to reliable and affordable heat is critical to the good health and well-being of the people of Kyrgyzstan. A heating assessment conducted by the World Bank for the year 2012[32] revealed the existence of a significant supply–demand gap due to an insufficient and unreliable heat and electricity supply in the winter. The social impact is no doubt severe given that the winters are cold and long, lasting for 4 to 6 months of the year. A detailed analysis for the cities of Bishkek and Tomkok revealed this gap to be 19% and 24%, respectively, as a percentage of the heat demand (Table 5).

Table 5: Space heat supply–demand gap in Bishkek and Tokmok (2012).[33]

	Space heat demand*	Space heat supply	Supply–demand gap	Supply–demand gap (% of the demand)
	Gcal/yr			%
Multi-apartment buildings	702,573	678,105	24,468	3
Individual family houses	1,371,427	1,007,217	364,210	27
Total – Bishkek	**2,074,000**	**1,685,322**	**388,678**	**19**
Multi-apartment buildings	58,978	58,605	373	1
Individual family houses	166,763	113,873	52,890	32
Public buildings	16,280	10,423	5,857	36
Total – Tokmok	**242,022**	**182,900**	**59,122**	**24**

* This table shows demand numbers that have been adjusted from the baseline to account for the colder than average winter in 2012.

Source: World Bank (2015), "Keeping Warm: Urban Heating Options in the Kyrgyz Republic"

30 World Bank (2015), "Keeping Warm: Urban Heating Options in the Kyrgyz Republic".
31 Ibid.
32 Ibid.
33 Ibid.

Summary: Energy Supply and Demand

In 2014, approximately equal shares of coal, oil and hydro combined to dominate Kyrgyzstan's total primary energy supply (TPES). The domestic coal production and coal consumption increased by six and three times, correspondingly, which resulted in decreased dependence on coal imports. The local production of natural gas is insignificant, and most gas is imported. The consumption of natural gas has declined by a factor of three during the last ten years, mainly for political reasons associated with reducing the gas imports from Uzbekistan. Kyrgyzstan has been largely dependent on imports of oil products, though recently Chinese investment in two new refineries has increased the domestic production of gasoline, mazut and diesel significantly.

Despite the fact that the Kyrgyz Republic has significant hydropower potential, the share of hydro in primary energy has decreased from 42.7% to 30.1% since 2005, whereas the share of coal and oil has increased significantly over the same period. During the period 2006–2015, the domestic electricity generation decreased by 11.5%, whereas the consumption of electricity grew by 52%. Consequently, the position of the country as an electricity exporter has weakened because of the increase in electricity imports and the decrease in electricity exports since 2014.

In 2014, the residential, transport and industry sectors respectively represented 36%, 26% and 20% of the total final consumption (TFC). Of the consuming sectors, the transport sector experienced the greatest growth during the last decade because of the growth in the country's vehicle fleet.

The public sector and households represented more than 70% of the country's electricity demand in 2015. The ageing of assets, the significant growth of the energy demand of more than 50% since 2010 and the lack of funds for maintaining and developing the network have combined to influence the service quality and the reliability of the electricity supply negatively. The reliability of the supply is particularly low during the heating season in the winter, when the peak electricity demand is three times higher than during the summer.[34]

The 10% decrease in heat consumption during the last decade was mainly related to the decreasing energy demand of industrial consumers. In 2015, about 95% of heat energy was consumed by municipal and residential buildings.

34 According to the Program on Transition of the Kyrgyz Republic to Sustainable Development 2013–2017, approved by Government Resolution #218, dated 30 April 2013.

3. MARKET STRUCTURE FOR ELECTRICITY, NATURAL GAS AND HEAT

3. Market Structure for Electricity, Natural Gas and Heat

3.1. Electricity

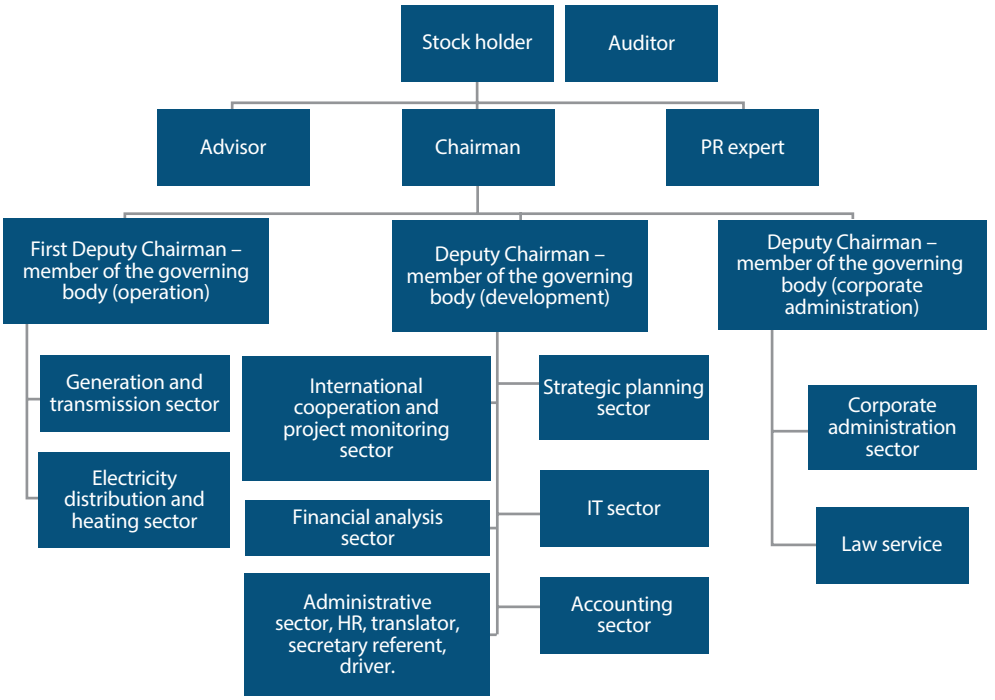
Until 2001, the Kyrgyz electricity system was operated by a vertically integrated state-owned company, Kyrgyzenergo, responsible for all power generation, transportation, distribution and supply. From 1997 to 2001, the Kyrgyz electricity sector was legally unbundled into the following companies, which operated until the end of 2015:

- Two generating companies:
    - JSC "Electric Power Stations",
    - JSC "Chakan HPP";
- One transmission company responsible for dispatch and market operation:
    - JSC "National Electric Grid of Kyrgyzstan";
- Four distribution and supply companies:
    - JSC "Severelectro",
    - JSC "Vostokelectro",
    - JSC "Oshelectro",
    - JSC "Jalal-Abadelectro";
- One heat distribution and supply company:
    - JSC "Bishkekteploset".

In 2016, however, the power sector of the country underwent a new reform aiming to increase the operational efficiency of the power system, including a reduction in the number of managers duplicating each other's functions. As part of this reform, the Government established a new company, the OJSC "Energy Holding Company" (OJSC "EHC"), which once again combined all electricity producers and transmission and distribution companies into one company. As part of the 2016 reforms, the Ministry of Energy and Industry was also terminated, and its functions were delegated to the newly created State Committee on Industry, Energy and Subsoil.

The structure of the new OJSC "EHC" (Figure 17) shows that competitive and natural monopoly activities are not separated. This will no doubt hamper the achievement of the objective of the Energy Strategy of Kyrgyzstan (to 2025) to develop a competitive electricity market (see the chapter "Strategic Framework").

Figure 17: Structure of the OJSC "Energy Holding Company".



Source: OJSC "Energy Holding Company" (2017).

De facto, as of April 2017, all the above-mentioned eight companies, created as part of the unbundling reforms during the period 1997–2001, still exist. Their stocks, however, belong to the OJSC "Energy Holding Company". At the same time, all the stocks of the OJSC "EHC" belong to the Government of the Kyrgyz Republic.

Electricity Generation

The generating sector of the OJSC "EHC" still includes the following companies:

- JSC "Electric Power Stations" – the company operates 8 large HPPs with total capacity of 3030.2 MW located on the Naryn River and two CHPs located in Bishkek, 666 MW (coal), and Osh, 50 MW (mazut).
- JSC "Chakan HPP" – the company operates 9 small HPPs with total capacity of 38.4 MW, including 8 plants with capacities ranging from 0.4 to 6.4 MW located on the Alamedin River and an 8.7 MW plant on the Chu River.

Apart from the state-owned generators, there are a number of privately owned small HPPs, but there is no publicly available information on the exact number, installed capacity and annual output of these SHPPs.

Electricity Transmission

The JSC "National Electric Grid of Kyrgyzstan" is the system operator of the transmission network

at voltages of 110 kV, 220 kV and 500 kV. The transmission network is comprised of about 10,000 km of cable and 190 substations.

The Kyrgyzstan transmission network is part of the Central Asian Power System (CAPS). The country has the technical capacity to export electricity to Kazakhstan and Uzbekistan when the water reserves are sufficient. The CAPS was designed during the Soviet era in such a way as to enhance the efficiency of electricity generation, network frequency control and water management in the region. During the summer period, Kyrgyzstan used its hydropower resources at maximum capacity to meet the water demand for agricultural irrigation in the CA region, and the surplus electricity produced was exported to neighbouring CA countries. During the winter period, Kyrgyzstan covered its electricity deficit by importing electricity from these countries. However, the volume of CAPS trade decreased from 25 GWh to 2.3 GWh over two decades, from 1990 to 2010, mainly due to the disconnection of Turkmenistan and Tajikistan from the CAPS in 2003 and 2009, correspondingly.[35] In 2014, the electricity trade did not exceed 3.2% of any Central Asian country's domestic energy consumption.[36] This shift away from regional cooperation towards energy independence has resulted in considerable inefficiencies, causing higher power consumption, greater emissions of carbon dioxide and other air pollutants, unreliability, safety risk and ultimately higher costs than would otherwise be the case with more coordinated and integrated markets. The future opening of the common EEU electricity market, which is envisaged for the third quarter of 2018,[37] and the further implementation of the CASA-1000 project could reverse this trend, providing the opportunity to put in place harmonised market rules and supranational market control mechanisms.

Until 2014, JSC "National Electric Grid of Kyrgyzstan" had to transmit electricity from the generating capacities located in the south to the consumers in the north via Uzbekistan, Tajikistan and Kazakhstan. The situation changed in 2015, when the company finished the construction of the new Datka–Kemin 500 kV transmission line (Figure 18) developed as part of the CASA 1000 project. The new 405 km line enabled the connection of the southern and northern parts of Kyrgyzstan, avoiding the transmission of electricity through neighbouring countries. Despite the successful construction of the Datka–Kemin line, much more investment is required, as the depreciation level of the power system of the country reached 65% in 2016 and would have been even higher, 70–75%, without the new line.[38]

Given that around 95% of all electricity is hydroelectricity, the country's electricity production is significantly dependent on the water level in the rivers. During the winter period, the existing hydropower capacities are typically unable to meet all the local electricity demand, whereas in the summer period, when the glaciers in the mountains start to melt, the electricity supply exceeds the demand, despite the high demand for irrigation downstream during the growing season. An important water–energy nexus exists in the region, and the shared use of the water resources of the Syr Darya Basin (by Kyrgyzstan, Uzbekistan, Tajikistan and Kazakhstan) is currently unsustainable (see Chapter 8.3).

35 http://www.carecprogram.org/uploads/events/2013/ESCC-Meeting-KAZ/005_104_209_Issues-of-Power-Exchange-and-Development-of-Regional-Electric-Power-Trade-in-Central-Asia-RU.pdf (accessed June 2017).

36 UNECE, "Reconciling Resource Uses in Transboundary Basins: Assessment of the Water –Food –Energy –Ecosystems Nexus in the Syr Darya River Basin", 2017, available at https://www.unece.org/fileadmin/DAM/env/europe/monitoring/19th_Meeting/Syr-Daria-FINAL-WEB-.pdf (accessed June 2017).

37 According to Decision No. 12 on the Concept of the Creation of the Common EEU Electricity Market adopted by the Highest Eurasian Economic Council on 8 May 2015.

38 Source: http://www.nlkg.kg/ru/interview/ajbek-kaliev-ya-prizyvayu-obshhestvo-verit-nam_-proizvodstvennikam_-a-ne-boltunam (accessed June 2017).

Figure 18: New Datka–Kemin transmission line (blue) and CAPS loop (green).

Source: Energy Charter Secretariat.

Electricity Distribution

The distribution sector of the OJSC "EHC" includes four companies: JSC "Severelectro", JSC "Vostokelectro", JSC "Oshelectro" and JSC "Jalal-Abadelectro". Until 2016, the market involved bilateral contracting between generators and network operators based on the regulated tariffs. Since the very beginning of the major electricity sector reforms starting in 1997, however, neither generation nor end-user tariffs have been cost reflective. This has resulted in a chronic shortage of financial resources available for any investment in the rehabilitation of ageing power system assets. The latter, combined with the growing demand for electricity (see the chapter "Energy Supply and Demand"), largely explains why the country is rated among the worst countries in the world with respect to the reliability of the electricity supply and the ease of obtaining electricity (Figure 4).[39]

3.2. Natural Gas

JSC "KyrgyzNefteGaz" is the only upstream natural gas and oil enterprise in the country. The natural gas transmission and distribution networks of the country are operated by JSC "Gazprom Kyrgyzstan".

Before 2013, the natural gas networks belonged to the state-owned company KyrgyzGaz. In July 2013, the Government of Kyrgyzstan sold the company to Gazprom for 1 USD, in exchange for a takeover of USD 38 million of debt and a pledge to invest USD 600 million in Kyrgyzstan's gas network over a 25-year period. JSC "Gazprom Kyrgyzstan" officially started operating the assets in October 2014. As the tariffs have changed little since the sale of the company, all costs not recovered through the tariffs have been covered directly by Gazprom.

In 2015, Gazprom officially announced its plans to invest more than USD 1.5 billion in the rehabilitation and extension of Kyrgyz's gas network, referring to an intergovernmental

39 http://www.doingbusiness.org/rankings (accessed June 2017).

agreement stipulating a 12% rate of return on the planned investments.[40] However, as the Government of the Kyrgyz Republic did not increase the gas tariffs to reach the expected profitability on new investments in the network, Gazprom Kyrgyzstan significantly curtailed its plans.

3.3 Heat and Hot Water

The district heating (DH) sector of Kyrgyzstan is mainly represented by state- and municipally owned enterprises operating in the capital and other big cities of Kyrgyzstan (Table 6).

Table 6: District heating systems in Kyrgyzstan.

City	Connection rate	Heat generation	Distribution and supply
Bishkek (eastern part)	85%	Bishkek CHP (100% of shares belong to OJSC "EHC") Heat-only boiler "NUR" (private)	JSC "Bishkekteploset" (80% of shares belong to "EHC" and 20% to private owners)
Bishkek (western part)		Municipal enterprise (ME) "Bishkekteploenergo" (belongs to Bishkek City Council)	
Osh	40%	Osh CHP (100% of shares belong to OJSC "EHC") Osh communal heat supply (belongs to Osh City Council)	
Tokmok	25%	Tokmok communal heat supply (belongs to Tokmok City Council) ME "Kyrgyzzhilkommunsoyuz" (State enterprise under the State Committee)	
Kyzyl-Kiya	60%	ME "Kyrgyzzhilkommunsoyuz" (State enterprise under the State Committee)	
Karakol	26%		
Other small cities	N/A		

Source: Energy Charter Secretariat.

40 http://24.kg/reportazhi/14984_chuyskaya_postup_gazproma/ (accessed June 2017).

Summary: Market Structure

In 2016, the Government established a new state-owned company, the OJSC "Energy Holding Company" (OJSC "EHC"), which combined all the major market actors of the electricity sector into a single company: two electricity-producing companies, a transmission system operator, four distribution companies and a heat distribution and supply company. The country essentially returned to the pre-2001 vertically integrated market structure model.

JSC "KyrgyzNefteGaz" is the only upstream natural gas and oil enterprise in the country. Since 2014, JSC "Gazprom Kyrgyzstan" has operated the transmission and distribution networks for natural gas. The district heating (DH) sector of Kyrgyzstan is mainly represented by state- and municipally owned enterprises operating in the capital and other big cities of Kyrgyzstan.

Over the past decade or so, there has been shift away from regional cooperation towards the energy independence of CA countries, which has resulted in considerable inefficiencies. Future developments under the Eurasian Economic Union and further implementation of the CASA-1000 project have the potential to reverse this trend, providing an opportunity to reap the benefits of more coordinated, integrated and competitive energy markets.

4. ENERGY-PRICING POLICY

4. Energy-Pricing Policy

The State Agency for Regulation of the Fuel and Energy Complex under the Government of the Kyrgyz Republic (SARFEC) is the energy regulator of the country. During the period 2009–2014, the role of the energy regulator was fulfilled by the State Department of Regulation of Fuel and Energy, which was part of the Ministry of Energy and Industry, reorganised into the State Committee on Industry, Energy and Subsoil Use as part of the 2016 reforms.

When the regulator acquired the status of a state agency, under the Government of the Kyrgyz Republic, in 2014, the responsibility for setting and negotiating tariffs was placed on the regulator, whereas previously (2012–2014) the responsibility had been shared between the regulator and the anti-monopoly authorities. The responsibilities of the agency are envisaged by the statute of SARFEC, approved by Governmental Decree #650, dated 14 November 2014.

Despite the fact that the SARFEC is officially responsible for setting the energy tariffs, decisions on the tariff policy (particularly the price levels) are de facto undertaken by the Government. For example, in 2016 and 2017, the President and the Prime Minister correspondingly sent official letters to the SARFEC, requesting the agency not to increase the energy tariffs. These governmental requests contradicted the official Mid-Term Energy Tariff Policy for 2014–2017 adopted by Government Decree #660, dated 20 November 2014, which scheduled gradual price increases to achieve cost-reflective electricity and heat tariffs by the end of 2017.

The Medium-Term Tariff Policy (MTTP) envisages the following main principles:

- Tariffs should reflect the full costs of production, transmission and distribution, including the costs of operation and maintenance as well as capital costs, return on investments and repayment of loans;
- Tariffs and levels of service should be non-discriminatory for those consumers who belong to the same category, have a similar consumption pattern and are supplied by the same distribution company;
- Vulnerable consumers should be subsidised through block inclining tariffs and the implementation of social programmes;
- Imported electricity should be provided to consumers based on weighted average tariffs and not based on the real import price;
- Tariffs should stimulate the efficient use of electricity, the enhancement of energy efficiency and the improvement of the quality of the supply.

The energy tariff menu is presented in Table 7, whereas Annex 1 shows the existing level of the tariffs.

Table 7: Energy tariff menu in Kyrgyzstan as of April 2017

Consumer group	Electricity	Heat	Hot water	Gas
Households	Inclining block tariffs[41]: First block: <700 per kWh/month Second block: >700 per kWh/ month	With meters: single-rate tariff, per Gcal Without meters: calculated tariffs, per m^2	With meters: single-rate tariff, per m^3 Without meters: calculated tariffs, per dweller	Single-rate tariff, per m^3
Commercial and public consumers	Single-rate tariff, per kWh	With meters: single-rate tariff, per Gcal Without meters: calculated consumption according to the energy supply agreement	With meters: single-rate tariff, per m^3 Without meters: calculated consumption according to the energy supply agreement	Single-rate tariff, per m^3

Source: Energy Charter Secretariat based on information provided in Annex 1.

4.1. Electricity

The calculation of electricity tariffs is based on the methodology for the determination of costs and the calculation of electricity tariffs, adopted by SARFEC Order #4, dated 24 November 2016. The methodology is used to calculate the allowed revenues for electricity generation, transmission and distribution companies, for which the volumes are more than 100 million kWh per year. The main objectives of the methodology can be summarised as follows:

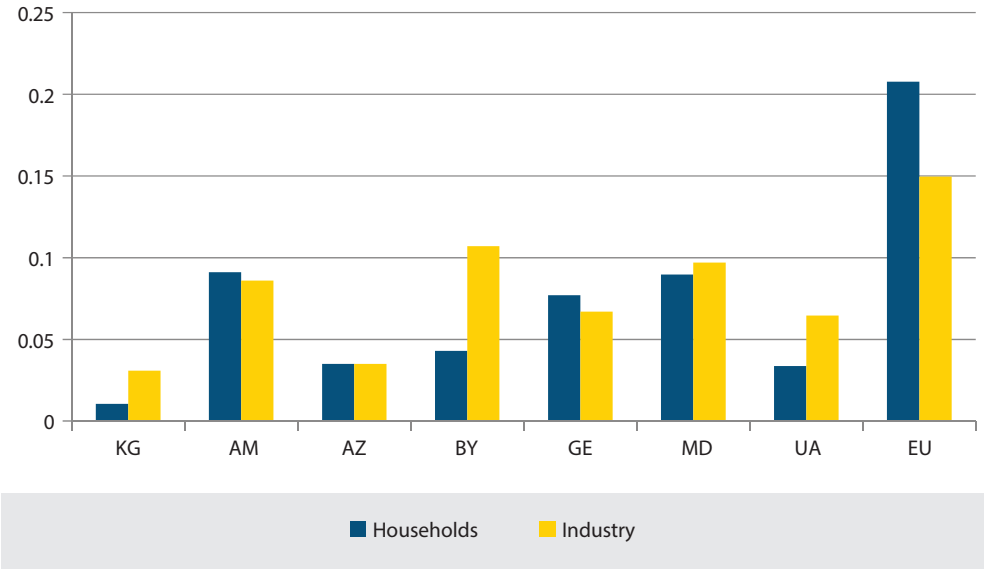
- Technical justification of all the costs needed for a reliable and secure electricity supply;
- Reflection of the real costs related to generation, transmission, distribution and supply;
- Feasibility evaluation of all planned capital costs; and
- The determination of common rules for all the companies in the electricity sector.

Despite the fact that the methodology envisages cost-reflective tariffs, the average electricity tariffs are not cost reflective and, according to OJSC EHC, covered only 63% of the real costs in 2016.[42] Households' tariffs are also subsidised partially by industrial consumers and partially by reducing the operational costs for network maintenance. Thus, the existing tariffs do not fully cover the operational cost related to the generation, transmission and distribution of electricity, let alone the capital costs and return on investments. The vertically integrated OJSC "Energy Holding Company" can neither maintain the network efficiently nor attract investment for the rehabilitation of the ageing network. A comparison of the average electricity tariffs in Kyrgyzstan with those in countries of the Eastern Partnership and EU shows that Kyrgyzstan's electricity tariffs are relatively low (Figure 19).

41 For mountainous areas, the limit is set to 1000 kWh per month.

42 http://www.energo.gov.kg/ru/infografika/ (accessed June 2017) with information provided by the SARFEC.

Figure 19: Electricity tariffs, euro/kWh, as of March 2016.



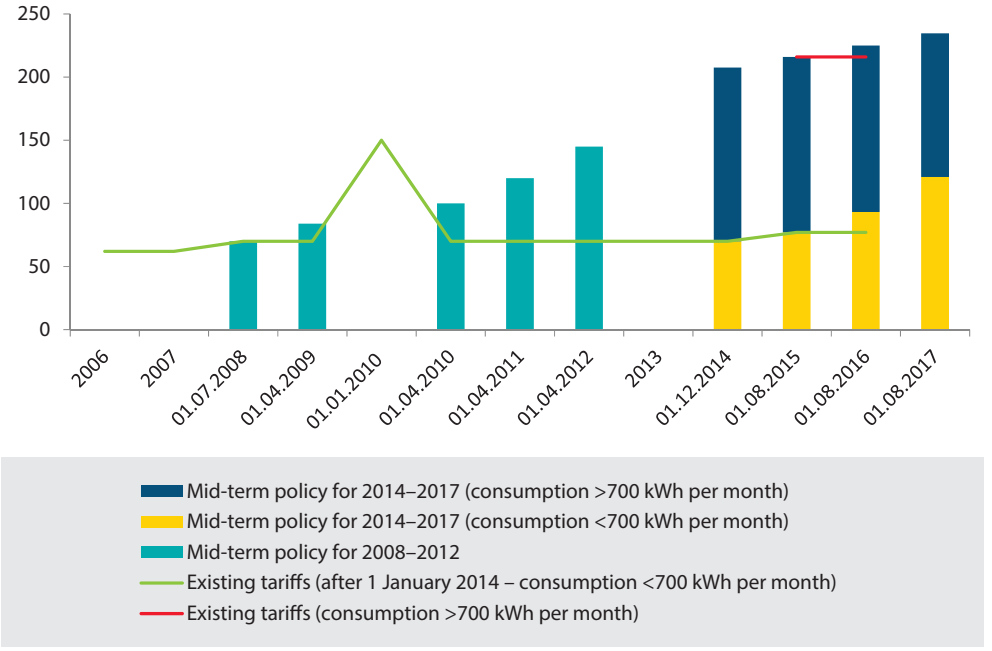
Source: INOGATE Updated Baseline Survey, April 2016.

Regulated distribution companies also face revenue erosion, as private distribution companies are allowed to exist. There is evidence that the latter have been able to extend their networks and poach large consumers from the state-owned distribution companies. This regulatory approach of allowing competition in the network infrastructure fundamentally contradicts the international best practice on the regulation of natural monopolists.

Residential Electricity Tariffs

The Government attempted to achieve cost-reflective tariffs by developing and adopting a Mid-Term Tariff Policy that envisaged the gradual increase in electricity tariffs over time. The regulator, part of the Ministry of Energy and Industry until 2014, did not follow the schedule envisaged by this policy for 2008–2012 and instead increased the electricity tariffs for households far more dramatically than planned (from 70 to 150 KGS/kWh in January 2010, Figure 20). This was followed by social unrest that caused the Government to backtrack to the previous tariff of 70 KGS/kWh in April 2010. These residential tariffs remained unchanged for more than four years.

Figure 20: Tariff policy and actual electricity tariffs for households, 2006–2017, KGS/kWh.



Source: Energy Charter Secretariat based on Mid-term Policies and SARFEC's Regulation.

The new Mid-Term Tariff Policy of the Kyrgyz Republic for 2014–2017 was intended to revitalise the Government's efforts and gradually to increase the electricity tariffs for households to the cost-reflective level by August 2017. Yet again, the regulator did not follow the Mid-Term Tariff Policy and increased the residential tariffs only once instead of three times as planned in the schedule set down in the policy for 2014–2016:

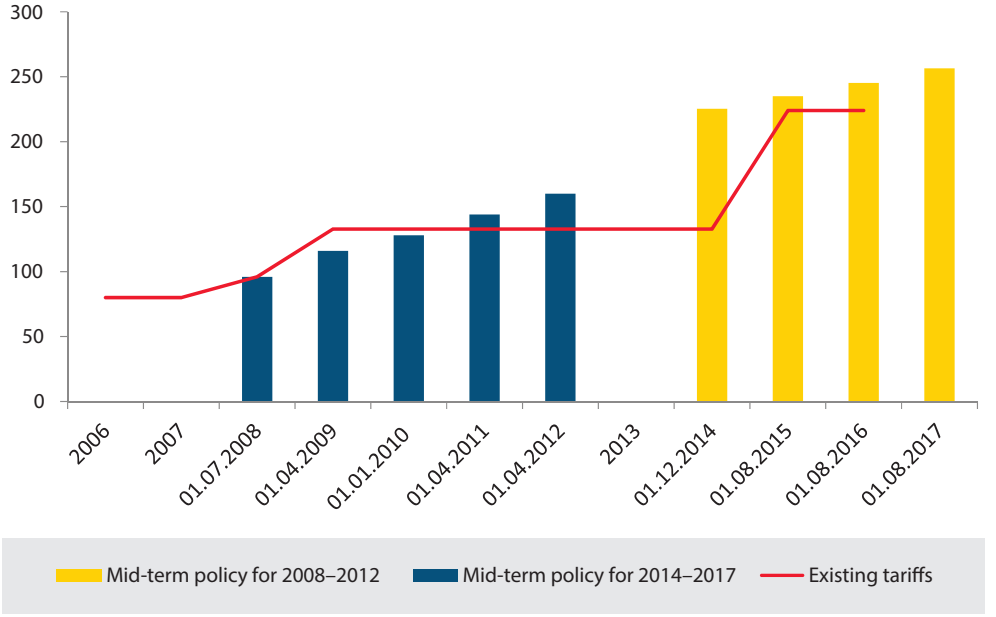
- No introduction of inclining block tariffs on 1 December 2014 as envisaged by the policy;
- The introduction of inclining block tariffs on 1 August 2015 according to the policy;
- No increase in tariffs on 1 August 2016 as envisaged by the policy.

Industrial Electricity Tariffs

In contrast to residential tariffs, there was no such sharp change to the industrial electricity tariffs in 2010. As of January 2010, the tariff for industrial consumers was already higher than the tariff envisaged in the Mid-Term Tariff Policy for 2008–2012, explained by the fact that it covered additional costs for households through cross-subsidies between industrial and residential consumers (Figure 21). After the above-mentioned social unrest in 2010, however, the tariffs for industrial consumers remained unchanged until 2014.

For the time period 2014–2017, the regulator did not follow the Mid-Term Tariff Policy for either households or industry and increased the industrial tariffs only once instead of three times as planned in the 2014–2016 schedule. In August 2015, the regulator increased the industrial tariff by 68% (from 132.7 to 224 KGS/kWh).

Figure 21: Tariff policy and actual electricity tariffs for industrial consumers, 2006–2017, KGS/kWh.



Source: Energy Charter Secretariat based on Mid-term Policies and SARFEC's Regulation.

The issue relating to the affordability of electricity tariffs remains very sensitive. The poor implementation of the Mid-Term Tariff Policy of the Kyrgyz Republic for 2014–2017 may be explained by the reluctance of the Government to adopt unpopular decisions. Parliamentary elections were held in October 2015, and presidential elections are scheduled for October 2017.

4.2. Natural Gas

The tariff policy for natural gas is primarily based on the bilateral agreement between the Government of the Kyrgyz Republic and the Government of the Russian Federation, "On Cooperation in the Area of Transportation, Distribution and Supply of Natural Gas", signed on 26 July 2013. According to the agreement (see Chapter 3.2), approximately 60% of operational and capital costs related to the purchase, transmission, distribution and supply of natural gas to Kyrgyz consumers is covered by the existing gas tariffs and about 40% is covered by Gazprom.

The methodology for the determination of costs for the calculation of natural gas tariffs, adopted by SARFEC Order #5, dated 8 December 2016, envisages five main objectives that can be summarised as follows:

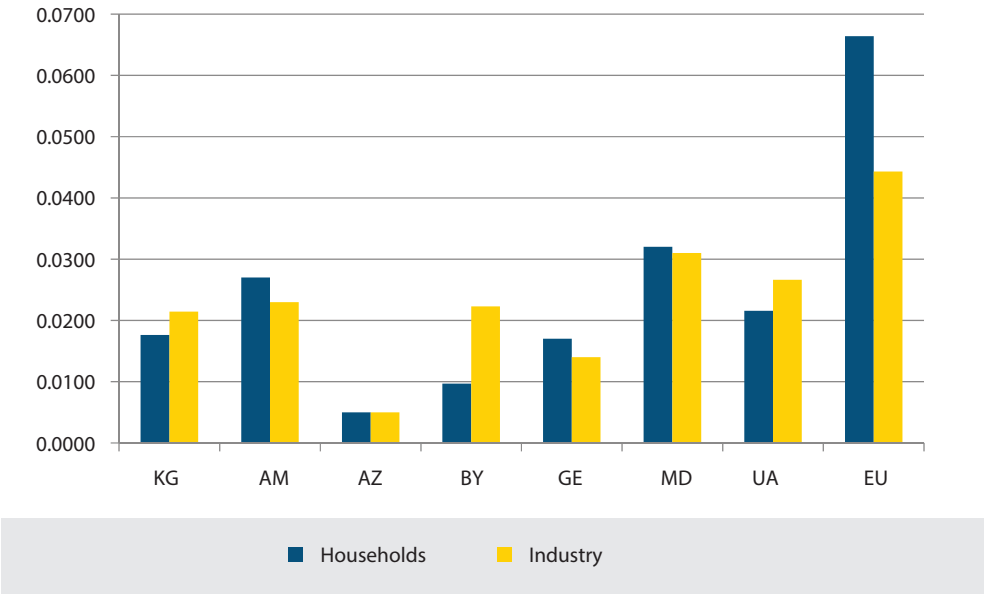
- Reflection of the real costs related to the transmission, distribution and supply;
- Enhancement of the reliability of the supply;
- Enhancement of the efficiency on the demand side;
- Attraction of investment for modernising the network;
- Ensuring financial viability of the natural gas sector.

This methodology is mainly used for the calculation of the allowed revenues for JSC "Gazprom Kyrgyzstan" to conduct its activities. The methodology does not have any provisions for the calculation of (subsidised) customer tariffs. The current end-user natural gas tariffs include the following elements:

- Purchased price at the Kyrgyz border – 150 USD/1000m^3;
- Allowed "normative" natural gas losses at 11.1%, according to Resolution of the Government #284, dated 31 May 2016;
- Revenue needed for providing operational activities;
- About 25 million USD of an annual deficit of costs that are covered by "Gazprom";
- Monthly adjustment of the tariffs depending on the KGS/USD exchange rate, according to SARFEC's Orders #85 and #86, dated 1 April 2015; and
- VAT and sales taxes relevant to the consumer groups.

A comparison of the natural gas tariffs for Kyrgyzstan with the tariffs of the countries of the Eastern Partnership and the EU shows that, despite the high level of subsidies covered by Gazprom, the natural gas tariffs in Kyrgyzstan have been higher than the tariffs in Azerbaijan, Belarus and Georgia (March 2016, Figure 22). This is in contrast to the situation for electricity, as the electricity tariffs in Kyrgyzstan are the lowest among the countries in the region (see Figure 19).

Figure 22: Natural gas tariffs, euro/kWh, as of March 2016.



Source: INOGATE Updated Baseline Survey, April 2016.

4.3. Heat and Hot Water

The calculation of heat tariffs is based on the "Methodology on the Determination of Costs and Calculation of Heat Tariffs", adopted by SARFEC Order #2, dated 14 March 2016. The methodology is used to calculate the allowed revenues of the JSC "Electric Power Stations", JSC "Bishkekteploset", the municipal enterprise "Bishkekteploenergo", "Kyrgyzzhilkommunsoyuz" and other heat supply enterprises. The main objectives of the methodology are similar to those applied to the electricity sector (see Chapter 4.1), specifically technical justification of costs, cost reflectivity, feasibility evaluation of capital costs and common rules for all the companies operating in the heat sector.

Despite the fact that the methodology envisages cost-reflective tariffs, the existing heat tariffs are not cost reflective and the residential heat tariffs only cover around 13% to 50% of the actual costs.[43] Households' heat tariffs are partially subsidised by industrial consumers, by local municipalities and through cross-subsidies between electricity and heat tariffs. Only 25% of heat consumption is metered, such that normative tariffs, based on a set of standard assumptions relating to average consumption, are used for billing consumers without meters.

The billed cost for unmetered heat is equal to the product of the following factors:

- the total floor area of the heated premises;
- the calculated energy in Gcal needed to heat 1 square metre of the premises to 18 °C;
- the official tariff (KGS/Gcal).

The billed cost for unmetered hot water is equal to the product of the following factors:

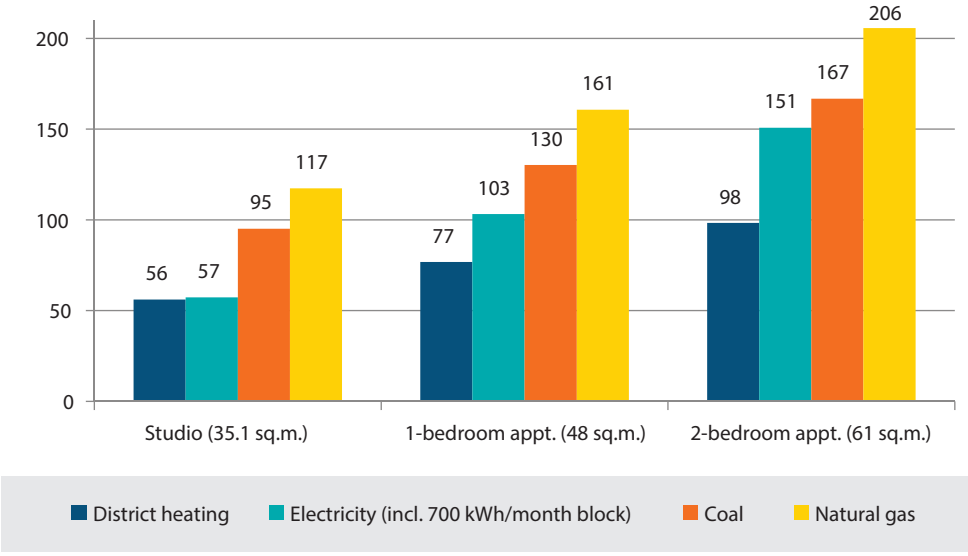
- the number of dwellers;
- the assumption of 160 litres/person/day[44];
- the number of days in a month;
- the calculated energy in Gcal needed to heat 1 litre of water to 57 °C;
- the official tariff (KGS/Gcal for water heating).

Unfortunately, the tariffs for consumers without heat meters provide neither price signals for efficient use of energy nor incentives to install meters to reduce the heating bills. The residential tariffs for electricity, gas and the DH network do not achieve full cost recovery. However, Figure 23 below reveals that the DH network provides households with the cheapest source of heat, followed by electricity, while natural gas is the most expensive option.

43 World Bank (2015), "Keeping Warm: Urban Heating Options in the Kyrgyz Republic".

44 The norm of 160 litres per person per day was approved for Bishkek city by Resolution of Bishkek City Council No. 319, dated 2 July 1996.

Figure 23: Comparison of costs for heating as of 1 January 2017,[45] EUR/year.



Source: Bishkekteploset (2017).

Consumers are also not incentivised to use DH compared with individual electric boilers. The cost of the heat energy supplied from the DH system compared with the supply from an individual electricity boiler is almost the same for those living in small apartments (see Figure 23). Both DH tariffs and electricity tariffs do not fully recover the costs, nor do they reflect the scarcity of the supply. As DH heat energy and hot water are generally not metered, while electricity consumption is metered, consumers who are interested in reducing their energy bills may be incentivised to use an individual electric boiler instead of the DH system. Improving the energy efficiency of the apartment and the energy-using equipment within it will only serve to strengthen this incentive. This can be resolved by metering consumers' DH consumption and implementing a tariff reform for electricity, gas and DH.

4.4. Incentivising Utilities to Deliver Energy Efficiency

The regulator, the SARFEC, uses only one performance indicator, "maximum level of energy losses (normative losses)", in the calculation of the allowed revenues and tariffs of the natural monopolists. The SARFEC started applying the normative losses indicator for the calculation of the allowed revenues of regulated companies in 2014, after the adoption of the Mid-Term Energy Tariff Policy for 2014–2017,[46] and later, in 2016, this performance indicator was referenced in relevant legislative acts.

For the natural gas sector, the normative losses are set by the Resolution of the Government #284, dated 31 May 2016, currently at 11.1% of input. For the electricity and heat sectors, the regulator sets different levels of normative losses for each company and follows the methodologies on tariff calculation approved by the SARFEC's Order #4 for electricity, dated 24 November 2016, and Order #2 for heat, dated 14 March 2016.

45 The official exchange rate as of 1 January 2017 is 72.8439 KGS per 1 EUR.

46 Adopted by Government Decree #660, dated 20 November 2014.

Both methodologies state the maximum percentage of losses that can be included in the tariff calculation. Each year, the SARFEC decreases the threshold of the percentage of losses to be included in the calculation of the allowed revenues, based on information provided by the SCIES. Thus, in this way, the regulator stimulates energy companies to improve the efficiency of the transmission and distribution of electricity and heat.

The regulator does not use indicators to provide any incentives for the distribution companies to improve other aspects of performance, such as the reliability of the supply using the System Average Interruption Duration Index (SAIDI) or System Average Interruption Frequency Index (SAIFI), which are commonly applied in other jurisdictions. The ageing of assets, the significant growth of the energy demand of more than 50% since 2010 (see Figure 12) and the lack of funds for maintaining and developing the network have combined to influence the service quality and the reliability of the electricity supply negatively. The reliability of the supply is particularly low during the heating season in the winter, when the peak electricity demand is three times higher than during the summer.[47] Despite the insufficient funding and lack of effective regulatory incentives, the distribution companies have managed to improve the quality of the service in recent years. For example, for the period 2009–2012, the consolidated distribution companies reported an average of 43 outages per day on an annual basis.[48] In 2016, the number of outages decreased to 18 per day, according to OJSC EHC.[49]

It should also be noted that the existing tariff policy methodology provides clear incentives for the natural monopolists to increase their energy output to maximise their revenues. The motivation to increase the energy output is strongly supported by the constant deficit of the financial resources that companies desperately need for the effective operation of the energy system. At the same time, the inefficient tariff policy incentivises district heating companies not to supply hot water during the summer period, and this reduces the efficiency of the district heating sector and the energy system as a whole.

Tariff design reforms could better align the motivations of regulated companies with public policy objectives and customers' requirements, using key performance indicators (KPIs) as a means to measure, reward and penalise performance. At the same time, the distribution companies recognise the importance of the reduction of losses for the improvement of their economic situation, but in many cases the companies simply do not have sufficient funds for the modernisation of their networks.

47 According to the Programme on Transition of the Kyrgyz Republic to Sustainable Development 2013–2017, approved by Government Resolution #218, dated 30 April 2013.

48 Including the emergency shut-down of transmission and distribution lines because the network had insufficient capacity to meet the high winter demand, especially in Bishkek – reported in WB (2014), Power Sector Policy Note for the Kyrgyz Republic.

49 According to information provided by the OJSC "Energy Holding Company".

Summary: Energy-Pricing Policy

The State Agency for Regulation of the Fuel and Energy Complex under the Government of the Kyrgyz Republic (SARFEC) is the energy regulator of the country. A number of changes related to the status and functions of the regulator have been made during the last decade. Despite the fact that the SARFEC is officially responsible for calculating and setting energy tariffs, the Government has intervened in the tariff policy at different times, particularly in setting consumer prices, overruling the existing policy as set out in the Mid-Term Energy Tariff Policy that aims to achieve cost-reflective electricity and heat tariffs by the end of 2017. At present, however, the energy tariffs achieve partial cost recovery as follows, according to the available estimates: 63% in the electricity sector; 60% in the natural gas sector; and 13–50% in the district heating sector.

Kyrgyzstan's consumer energy tariffs, particularly for electricity, are relatively low. Only 25% of heat consumption is metered, and the billing for consumers without meters is based on calculated values, providing neither price signals for efficient use nor incentives to install meters to reduce the bills for heating.

Since 2014, the SARFEC has used the performance indicator "maximum level of energy losses (normative losses)" in its methodology to calculate the allowed revenues and tariffs of the natural monopolists. The distribution companies recognise the importance of the reduction of losses for the improvement of their economic situation, but in many cases they simply do not have sufficient funds to invest in the modernisation of their networks. Tariff design reforms could better align the motivations of regulated companies with the public policy objectives and customers' requirements, using key performance indicators (KPIs) as a means to measure, reward and penalise performance.

5. ENERGY AND ENERGY EFFICIENCY POLICY

5. Energy and Energy Efficiency Policy

5.1. Strategic Framework

There are three main documents that establish the strategic framework for the development of the energy sector of the country:

1. The National Energy Programme of the Kyrgyz Republic for 2008–2010 and Fuel and Energy Complex Development Strategy until 2025, approved by Government Resolution #47, dated 13 February 200850;
2. The Mid-Term Power Sector Development Strategy for 2012–2017, approved by Government Resolution #330, dated 28 May 2012;
3. The National Sustainable Development Strategy for 2013–2017, approved by President Decree #11, dated 21 January 2013.

In relation to the latter two documents, the Government of Kyrgyzstan is in the process of updating the strategies for 2018–2022.

The Fuel and Energy Complex Development Strategy to 2025

The Government's longer-term vision for the energy sector is set out in the "National Energy Programme of the Kyrgyz Republic for 2008–2010 and Fuel and Energy Complex Development Strategy until 2025". The main priority of this energy strategy is to achieve the rational and efficient use of energy resources and scientific and human potential for enhancing energy security, economic development and improved quality of life for the population. The main objectives of the long-term strategy can be summarised as follows:

- The development of generation and network capacities in such a way as to ensure energy security and the self-sufficiency of the power sector of the country;
- The provision of a reliable supply of electric and heat energy for domestic consumers;
- The development of a fully fledged competitive electricity market;
- The enhancement of the efficiency of electricity and heat generation, transmission and distribution to the level of the world's developed countries;
- The development of new generating and transmission capacities for electricity exports; and
- Integration into the pan-Eurasian competitive electricity market.

However, since the adoption of the strategy in 2008, the progress in achieving the above objectives has been very limited. Table 8 below compares ten key challenges of the energy sector of the Kyrgyz Republic identified at the time of the development of the strategy in 2007 with the current state of play. It is evident that many challenges remain unresolved and have negatively affected the country's energy sector during the last decade.

50 Government Resolution #47, dated 13 February 2008, in fact approves both the National Energy Programme for 2008–2010 and the Energy Strategy until 2025, the latter remaining a main long-term strategy of the country.

Table 8: Comparison of the main challenges of the energy sector identified in 2007 with the state of play in 2016.

Main challenges identified in the Energy Complex Development Strategy until 2025 (as of 2007)	Review team's assessment of the current status of the same challenges as of 2017
1. Lack of a legislative framework and the political will to create a competitive electricity market.	There is still a lack of political will to reform the electricity sector in a planned and sustainable way. The establishment of a new single state-owned vertically integrated electricity company, OJSC "EHC", as part of the 2016 power sector reforms is not aligned with the objective of the Fuel and Energy Complex Development Strategy until 2025 with respect to creating a competitive electricity market.
2. Financial difficulties of electricity distribution companies: collection rate – 85.7%, consumer debts – 3528 million KGS (69.6 million EUR).	The collection rate rose to 99.1% in 2016 and consumer debts decreased to 1,788 million KGS (24.5 million EUR).
3. High losses (36.2% of electricity input) of electricity distribution networks. High level of energy thefts.	According to the information provided by the regulator, the electricity losses in the distribution networks accounted for 12.3% of the electricity input in 2016.
4. No specific measures on the promotion/installation of smart meters.	Some IFIs are cooperating with governmental institutions to tackle this issue (e.g. KfW has financed the installation of about 110,000 smart meters).
5. Low energy tariffs that do not cover the costs related to generation, transmission and distribution.	The adopted tariff reforms aimed at achieving full cost recovery through cost-reflective tariffs (see Figure 20) have not been implemented effectively. Over a prolonged period, utilities have suffered severe revenue shortfalls, and significant cross-subsidisation between different consumer groups and fuels has occurred. The inefficient tariff policy has led to: - the inability of electricity utilities to invest in maintaining their existing assets, demand-side management and new assets; - the inability of the Government to attract private investments in electricity generation and distribution, except small HPPs; - large growth in the electricity demand in the public sector and households; - no available capacity for new consumers; and - an unreliable power supply for existing consumers.
6. Cross-subsidies hampering the attraction of investments.	
7. Constant growth of the electricity demand without relevant price signals and the management of the electricity system's bottlenecks.	
8. A constant decrease in the level of financing for the rehabilitation of the ageing network and generating capacities during the last 15 years. The depreciation level of generating capacities is about 50%.	
9. Lack of investments to continue constructing the generation plants started more than 15 years ago, specifically Kambarata HPP-1 (1900 MW), Kambarata HPP-2 (360MW) and Bishkek CHP-2 (460 MW).	
10. Lack of a balanced policy on managing electricity and water flows in the CA region.	There is still a lack of balanced policy and tariff methodology for managing electricity and water flows in the CA region.

Source: Energy Charter Secretariat.

Table 8 reveals that, while some progress has been achieved in reducing losses and increasing the collection rate, the power sector still faces the same challenges as ten years ago. The analysis of the challenges also suggests that the lack of political will to implement the adopted tariff reforms consistently, with the aim of achieving full cost recovery through cost-reflective tariffs, has been the key bottleneck for the development of the energy sector during the last decade (see Figure 20).

Consequently, electric utilities have suffered severe revenue shortfalls over a prolonged period. They have been unable to invest in maintaining their existing assets to the extent that the

depreciation level of generating capacities reached 70–75%[51] in 2016. This, combined with the relatively unchecked growth of the electricity demand, has negatively affected the system reliability and the utilities' ability to connect new consumers. Kyrgyzstan was rated among the worst countries in the world in 2017 with respect to the ease of obtaining electricity and the reliability of the electricity supply (Figure 4).

An important opportunity to implement tariff reforms to ensure cost recovery while at the same time strengthening consumer price signals to help manage the electricity demand was missed. Instead of implementing the Mid-Term Tariff Policy for 2008–2012, the prices for households were suddenly increased in 2010 with a step change that was significantly larger than originally planned and communicated to the public. This contributed to anti-Government protests and social unrest. The Government immediately reacted by reducing the tariffs to the original low level. Unfortunately, the household tariffs remained at this low (subsidised) level for the next four years while the demand for electricity grew significantly (Figure 12), with much of this growth attributable to households.

The insufficient cost recovery and cross-subsidisation between different consumer groups and fuels have served to deter private investment in electricity generation and distribution, except small HPPs. All the major power sector projects, like Kambarata HPP-2 (120 MW only) and the Datka–Kemin 500 kV transmission line, were funded by IFIs. Implementing tariffs that fully recover the costs is a prerequisite for achieving the main objectives of the long-term strategy.

The Mid-Term Power Sector Development Strategy for 2012–2017

The Mid-Term 2012–2017 Power Sector Development Strategy, adopted in 2012, recognised the importance of tariff reforms and envisaged a gradual move towards achieving full cost recovery through tariffs by 2016. However, as of June 2017, the electricity tariffs for households still recover only 63% of the real costs.

The development of the energy conservation policy was mentioned as one of the tasks of the Mid-Term Strategy. To achieve this task, the document set out the following measures:

- the development of incentive programmes for the reduction of electricity and heat losses;
- the establishment of limits and mandatory energy conservation requirements;
- the enhancement of awareness among the local population; and
- the establishment of a monitoring group to monitor the implementation of this energy conservation policy.

It should also be noted that, as of June 2017, none of the above activities have been implemented in practice. The Mid-Term Strategy also stressed that resolving the strategic problems of the energy sector requires significant investment in new generation and transmission capacities and emphasised the significant potential of the energy sector to contribute to the sustainable economic growth and social stability of the country.

National Sustainable Development (SD) Strategy for 2013–2017

The National Sustainable Development Strategy for 2013–2017, adopted in 2013, considers the energy sector to be of strategic importance for sustainable development and underlines that, as of 2012, the Kyrgyz Republic had developed only 8–9.5% of the country's hydropower

51 http://www.nlkg.kg/ru/interview/ajbek-kaliev-ya-prizyvayu-obshhestvo-verit-nam_-proizvodstvennikam_-a-ne-boltunam (accessed June 2017).

potential, including 3% of the small hydropower potential. The rationale underpinning the strategy is that, provided that favourable conditions for investors and the supply of finance are created, the development of hydropower can boost the economy, enhance the security of the supply and increase the exporting of electricity to other countries, especially once the CASA-1000 project has been implemented.

The main objective of the SD strategy envisaged that the energy sector could become a large producer of electricity in the region, covering all the domestic electricity needs and increasing the electricity exports by 2017. However, the analysis presented above (section 2.1) showed that the exports have been declining and the imports increasing, with a 15% decrease in the country's hydroelectricity production during the period 2011–2015 (Figure 11).

5.2. Legislative Framework for Energy Efficiency

The review of Kyrgyzstan's legislative framework on energy efficiency is presented in this section according to the following structure:

- Law on EE and other laws that regulate the improvement of EE;
- Energy performance in buildings;
- Minimum energy performance standards and energy labelling;
- Other EE regulations (i.e. incentive schemes, industrial energy audits, vehicle fuel efficiency standards, energy service companies, energy performance contracts, etc.).

Overarching Legal Framework

The main principles of the organisation and regulation of economic activities in the fuel and energy sector are set out by the Energy Law adopted in 1996.[52] The primary objective of the law is to enhance the economic efficiency and reliability of the energy sector as well as to protect the interests of producers and consumers. The law also envisages that energy efficiency and energy conservation should be taken into account in the development of the national energy programmes (see section 5.3).

The Law on Energy Conservation,[53] adopted in 1998, aims to increase the energy efficiency in the production, transmission and distribution of energy. The law includes a number of important provisions for establishing effective institutional and regulation frameworks for energy efficiency; unfortunately, most of those provisions have not been enforced or adopted in the form of secondary legislative acts (Table 9).

52 Law on Energy #56, dated 30 October 1996.

53 Law on Energy Conservation #88, dated 7 July 1998.

Table 9: Provisions of the Energy Conservation Law and the status of their implementation.

Provisions of the Energy Conservation Law #88, dated 7 July 1998, with the latest changes dated 6 July 2016	Review team's assessment of the current status of the implementation of the provisions of the Law, as of June 2017
Assigning to a governmental authority the responsibility for the development of the EE policy	Government Decree #653, dated 12 December 2016, assigns the development of the EE policy to the State Committee on Industry, Energy and Subsoil (SCIES)
Assigning to a governmental authority the responsibility for control and supervision in the area of EE	Not assigned
State inspection of enterprises and completion of energy passports	The work in this area was recommenced in 2016 by the Research Institute on Energy and Economics under the SCIES
EE standards of energy-related equipment	A number of Eurasian Economic Union Standards on EE were adopted by the Kyrgyz Republic before accession to the EEU. After the official accession of the EEU in August 2015, all EEU standards became applicable on the territory of the Kyrgyz Republic
State control on minimum energy performance standards	There is no secondary legislation in place to implement this provision
State support of energy efficiency measures	There is no secondary legislation in place to implement this provision
Creation of the Energy Conservation Fund	Not created

Source: Energy Charter Secretariat.

Table 9 reveals the significant gap between the provisions of the law and the enforcement and/or adoption of the secondary legislation needed to implement this law. For example, the law stipulates the creation of the Energy Conservation Fund, which is expected to be financed from savings achieved as a result implementing the energy efficiency measures. However, the fund has never been created.

The poor enforcement of the law is partly attributable to the fact that the law does not specify which authorities and market actors are responsible for the implementation of each provision. As a result, there have not been any significant improvements with regard to energy efficiency since the adoption of this law in 1998. In fact, as of June 2017, there is neither secondary legislation in place nor a clear understanding of the distribution of responsibilities, strategies and incentives for the implementation of the energy efficiency measures in the country.

It is also necessary to note that the legislative framework does not assign any requirements or obligations to market actors, including the utilities. For example, no legislative requirements or incentives exist to improve the quality of electricity services to be provided to customers (e.g. the System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI) and technical and commercial quality indicators) or to deliver demand-side management. At the same time, the introduction of requirements or obligations for market actors to maintain and develop the energy system efficiently while achieving a certain level of service quality or public policy objectives requires the existence of a tariff policy that enables cost recovery. In reality, Kyrgyzstan's utilities have neither the incentives nor the

means to improve the development and operation of their networks in the most efficient way.

Energy Performance in Buildings

The Law on Energy Efficiency in Buildings is a relatively new and progressive legislative act that was developed with the technical assistance of the UNDP and GEF[54] and came into force in February 2012. The law is aligned with the EU best practice and based on the key requirements of the EU's Energy Performance in Building Directive (EPBD). Kyrgyzstan's Law on Energy Efficiency of Buildings contains a number of important provisions for establishing effective institutional and regulatory frameworks. Despite the adoption of the secondary legislation required by this law, its requirements have not been implemented or enforced effectively (Table 10).

Table 10: Provisions of the Law on Energy Efficiency of Buildings and the status of their implementation.

Provisions of the Energy Efficiency in Building Law #137, dated 26 July 2011, with the latest changes dated 18 October 2013	Review team's assessment of the implementation of the provisions of the Law, as of June 2017
Assigning a governmental authority the responsibility for the improvement of buildings' energy performance	The State Agency for Architecture, Construction, Housing and Communal Services under the Government of the Kyrgyz Republic
Minimum energy performance requirements (MEPRs) for new and renovated buildings	The following legislative documents have been approved but not implemented in practice: - "Regulation on Energy Certification of the Buildings" and "Regulation on Regular Inspection of Boilers, Heating and Hot Water Systems" adopted by Governmental Decree #531, dated 2 August 2012; - Building codes and regulations 23-01: 2013 KG "Building Heat Engineering (Thermal Protection of Buildings)", 2013
Regular inspection of heating and hot water supply systems	
Issuance of energy performance certificates (EPCs)	
Display of energy performance certificates (EPCs)	
Accreditation of experts, independent control and awareness raising	No secondary legislation is set out by the law. It should be developed by a governmental authority that has not been assigned yet

Source: Energy Charter Secretariat.

Table 10 shows that, despite the fact that the Government has adopted secondary legislation on both MEPRs and EPCs, the provisions of the law have not been implemented in practice. The State Agency for Architecture, Construction, Housing and Communal Services determines that all design documentation for new buildings must comply with the MEPRs. However, at the stage of construction, the energy performance requirements are often neglected, as compliance with the MEPRs is not requested by the State Inspectorate on Ecological and Technical Security that commissions new buildings.

Thus, it is clear that the responsibilities necessary to implement the law have not been assigned to the appropriate governmental authorities. At the same time, this barrier could be removed by establishing, in law, a single governmental body responsible for the improvement of EE in the country.

54 UNDP/GEF project "Improving Energy Efficiency in Buildings".

There is also no accreditation scheme in place to confirm which experts can issue EPCs, making it practically impossible to fulfil the requirement of the law to issue EPCs for all new and rented buildings.

Minimum Energy Performance Standards and Energy Labelling

There are a number of Eurasian Economic Union Standards on EE and minimum energy performance standards for industrial energy-consuming appliances, such as motors and pumps. These standards were adopted by the Centre for Standardisation and Metrology under the Ministry of Economy (Kyrgyzstandard) prior to the Kyrgyz Republic's accession to the EEU in August 2015. Following the country's official accession to the EEU, all EEU standards became applicable on the territory of the Kyrgyz Republic.

There are currently no laws or minimum energy performance standards (MEPSs) and energy labelling schemes for household appliances in the Kyrgyz Republic. The EEU, however, is currently developing a common legislative framework in this area.

Energy Service Companies (ESCO) and Energy Performance Contracts

There are no provisions for ESCOs in Kyrgyzstan's legislative framework. There are also no incentives for governmental and municipal authorities to reduce their energy consumption, as the state and local budget allowances cover energy bills based on the actual energy consumption. The budget legislation of Kyrgyzstan does not allow state and local authorities to use achieved energy savings for the repayment of investments in energy efficiency measures.

Energy Efficiency Requirements for Public Procurement

The State Programme on Energy Savings and EE Policy for 2015–2017[55] provides for the introduction of energy efficiency criteria for public procurement. However, there is no publically available information or relevant provisions in secondary legislation on the mandatory application of EE criteria in public procurement processes. In practice, the main principle of public procurement is the lowest purchase price without consideration of life cycle costs and benefits.

Other EE Regulations (i.e. Incentive Schemes, Industrial Energy Audits, Vehicle Fuel Efficiency Standards)

There is currently no legislation in this area in the Kyrgyz Republic.

5.3. Government Programmes and Action Plans

There are two main programmes in the field of energy efficiency in Kyrgyzstan:

1. The Programme on Energy Conservation and Energy Efficiency Policy for 2015–2017, approved by Governmental Decree #601, dated 25 August 2015;
2. The Programme on Transition of the Kyrgyz Republic to Sustainable Development for 2013–2017, approved by Government Resolution #218, dated 30 April 2013.

Programme on Energy Conservation and Energy Efficiency Policy for 2015–2017

The 2015–2017 EE Programme establishes a short-term EE target for the Kyrgyz Republic, namely to ensure the GDP growth of the country without a significant increase in energy consumption by 2017. It is clear that this target is not specific or measurable and does not

55 Approved by Government Decree #601, dated 25 August 2015.

allocate to any governmental body the responsibility for its achievement. According to the programme, this target should be achieved through four main priorities:

1. Achieving energy savings equal to 2.23 million tons of coal equivalent through the effective institutional support of the implementation of energy efficiency measures by 2017;
2. Achieving energy savings equal to 4.1 million tons of coal equivalent through incentives targeting the development and use of efficient appliances, technologies and materials for the production, transmission and consumption of electricity and natural gas by 2020;
3. Achieving a cumulative decrease in energy intensity by 30% and an annual decrease in electricity consumption by 5%, resulting in energy savings equal to 8 million tons of coal equivalent, through the structural reforms of the economy during the period 2015–2025;
4. Achieving a reduction of CO2 emissions by 20%.

The time frames of the above-mentioned "target" and "priorities" are clearly not aligned, and a detailed analysis of the document suggests that there is a lack of clarity and possible confusion with respect to the terminology, projections and baseline. To achieve the high-level target, the programme highlights the importance of the development of specific EE instruments that are included in the current legislative framework but have not been implemented in practice (i.e. the creation of the Energy Conservation Fund) and the development of incentive mechanisms (see section 5.2) as well as new economic instruments targeting the implementation of EE measures:

- A reduction in customs rates for imported EE equipment;
- Additional preferences for investments in EE projects;
- Including EE requirements in public procurement calls/tenders;
- Ensuring the repayment of EE investments through energy tariffs.

As of June 2017, none of the above economic instruments have been implemented in practice.

The Programme on Transition of the Kyrgyz Republic to Sustainable Development for 2013–2017

The main energy-related objective of the Programme on Transition of the Kyrgyz Republic to Sustainable Development for 2013–2017 is to achieve energy security for the country and develop export potential. The programme identifies a number of key challenges in relation to the energy sector, summarised as follows:

- Bottlenecks in the transmission system (65% of electricity is consumed in the northern part of the country, whereas the largest capacities are located in the south);
- Outages and overloading of the electricity grid (the peak electricity demand during the winter is three times higher than that during the summer. Because of perverse price signals, a number of households and DH systems have switched their heating systems from gas and coal to electricity. In 2012, 60% of all consumed electricity was used for heating purposes);

- An inefficient and poorly implemented tariff policy (the average annual shortage of operational expenditures (OPEX) for electricity system maintenance was about 2 billion KGS (approximately 45 million EUR) during the period 2008–2012. Residential customer tariffs covered only 60% of the real costs related to the generation, transmission and distribution of electricity in 2012);
- A lack of investments in the rehabilitation of the ageing network and generating capacity (the depreciation level of electricity sector assets was about 50–70% in 2012, but the companies could not attract investments due to the inefficient and poorly implemented tariff policy);
- Poor utilisation of the significant hydropower potential of the country (the share of SHPP was about 1% of the electricity produced in 2012).

To overcome these barriers, the programme proposes four priority directions:

1. The improvement of the regulatory framework, including the independence of the energy regulator and the enhancement of the financial stability of companies through tariff reform;
2. The development of incentives for EE, including the establishment of a governmental body responsible for EE and the promotion of EE measures;
3. The development of RESs by increasing the RES share in the energy balance and enhancing the utilisation of small hydropower potential;
4. Sustainable development of the energy sector (improving the reliability and security of the supply, improving metering discipline, etc.)

The programme identifies sound priorities for achieving the main objective of the programme, of which the first priority is the improvement of the regulatory framework, the second is energy efficiency, the third is RESs and the fourth is the development of other low-carbon sources.

5.4. Institutional Framework

The State Committee on Industry, Energy and Subsoil of the Kyrgyz Republic (SCIES) (prior to 2016 named the Ministry of Energy and Industry) is a governmental authority responsible for the development and implementation of state policies in the following sectors: industry (except food processing), fuel, energy and subsoil. The regulation of the State Committee[56] assigns specific responsibility to this authority for the development of the country's EE policy but does not assign any responsibility for the control and implementation of EE measures and the achievement of the targets. The structure of the committee includes a division responsible for renewable energy and energy efficiency that mainly deals with the development of small hydro projects and the improvement of energy efficiency on the supply side, that is, upstream, generation, transmission and distribution. As of June 2017, the division comprised a head and three experts.

The Research Institute on Energy and Economics under the SCIES (prior to December 2015 under the Ministry of Economy) is an energy think tank producing research and analysis on the Kyrgyz energy markets and economy. According to the legal provisions relating to the Research Institute,[57] the organisation is responsible for the scientific support of decision-

56 According to and approved by Governmental Decree #401, dated 15 July 2016.

57 Approved by Governmental Decree #687, dated 16 December 2015.

making processes in the energy and economic sectors. The official structure of the institute includes 60 employees, 20 of whom are full-time researchers and administrative staff and 40 of whom are part-time researchers dependent on a self-sustaining budget based on project awards. In 2016, the institute revitalised the work on the energy inspection of large enterprises and the completion of energy passports, as envisaged in the Energy Conservation Law (see Chapter 5.2).

The State Agency for Regulation of the Fuel and Energy Complex under the Government of the Kyrgyz Republic (SARFEC) is the energy sector regulator of the country, which is directly accountable to and not independent of the Government. The authority has undergone a number of reforms and changes in recent years, the most important of which can be summarised as the following:

- from 2009 to 2014, the Agency was part of the Ministry of Industry and Energy of the Kyrgyz Republic;
- from 2011 to 2013, the authority had an independent budget, which was based on 0.15% of the revenue of the regulated companies, but since 2014 the regulator's budget has been subsumed into the Government's general budget;
- from 2012 to 2014, the Kyrgyz legislative framework obliged all regulated companies to negotiate tariffs with both the energy regulator and the anti-monopoly authority; since 2014, regulated companies have only negotiated with the energy regulator.

As of June 2017, the SARFEC comprised about 40 employees. In accordance with the statute of the SARFEC,[58] the institution is required to regulate the energy sector through licensing and tariff setting for electricity, heat and natural gas. According to the natural monopoly law,[59] the SARFEC is also an authorised anti-monopoly agency in the energy and fuel complex.

The State Agency for Architecture, Construction, Housing and Communal Services under the Government of the Kyrgyz Republic is a governmental authority responsible for the development of policy in the construction sector. The regulation relating to the role and responsibilities of the agency[60] stipulates that the agency should consider EE parameters while developing the state policy in the housing sector. The agency has been also assigned responsibility for the improvement of the energy performance of buildings according to the Law on Energy Efficiency in Buildings adopted in 2011 (see Table 10).

OJSC "Energy Holding Company" (OJSC "EHC") is a vertically integrated company that was created in August 2016 and once again combined previously unbundled electricity producers and transmission and distribution companies (see the chapter "Electricity, Natural Gas and Heat Market Structure", Figure 17). The office of the company is located in the same building as the SARFEC.

The State Agency for Environment Protection and Forestry (SAEPF) is a governmental authority responsible for the implementation of the state policy on environmental protection, carrying out the state environmental expertise of the environmental impact assessment (EIA) reports[61] and cooperating with international organisations in the field of environmental protection. According to the statute of the agency, approved by Government Resolution #123,

58 Approved by Governmental Decree #650, dated 14 October 2014.
59 Natural Monopoly Law #149, dated 8 August 2011.
60 Approved by Governmental Decree #385, dated 14 July 2014.
61 The requirements for the EIA in Kyrgyz Republic are approved by Governmental Decree #60, dated 13 February 2015.

dated 20 February 2012, the agency has a wide network of regional units throughout the country.

The Coordinating Commission on Climate Change (KKPIK) is a collegiate authority that includes the vice prime minister, the head of the SAEPF, ministers and heads of governmental authorities related to the implementation of the United Nations Framework Convention on Climate Change (UNFCCC). According to Governmental Decree #783, dated 21 November 2012, the main goal of the Coordinating Commission is to implement and coordinate the activities of governmental authorities with regard to the obligations of the Kyrgyz Republic under the UNFCCC. The permanent working body of the Coordinating Commission is the SAEPF.

The State Inspectorate on Ecological and Technical Security under the Government of KR is a governmental authority responsible for the state supervision of, control of and compliance with the requirements of regulatory acts and technical regulations.[62] Among other responsibilities, the inspectorate is responsible for the commissioning of new buildings. It primarily controls compliance with seismic and fire regulations but not compliance with the minimum energy performance requirements detailed in Standard 23-01: 2013KG "Building Heat Engineering (Thermal Protection of Buildings)".

62 According to the statue of the agency approved by Governmental Decree #136, dated 20 February 2012.

Summary: Energy and Energy Efficiency Policy

Relative to the development level of the country, the Fuel and Energy Complex Development Strategy to 2025 provides a fairly sound basis on which to build. A longer-term vision and well-defined target outcomes, to perhaps 2040 or 2050, would help to direct shorter-term strategies and action plans. These strategies and plans need to incorporate effective evaluation, monitoring and verification (EMV) and must be updated in a timely manner to ensure consistent implementation and progress towards long-term objectives.

In general, the effective implementation of the adopted laws and strategies has been hampered by a lack of political will to undertake reforms and weak governance. Particularly problematic has been the lack of progress with the implementation of tariff reforms aimed at achieving full cost recovery through cost-reflective tariffs. Electric utilities have consequently suffered severe revenue shortfalls over a prolonged period of time. They have been unable to invest in maintaining their existing assets adequately. This, combined with the relatively unchecked growth of the electricity demand, not helped by subsidised consumer tariffs, has negatively affected the system reliability and the utilities' ability to connect new consumers.

Insufficient cost recovery and cross-subsidisation between different consumer groups and fuels have served to deter private investment in the energy system. The country's ambition to exploit its vast hydropower resources and to become a net exporter have therefore not been realised; instead, the position of the country as an electricity exporter has weakened since 2014.

The legislative framework and policies for energy efficiency are orientated towards short-term targets. To achieve substantial progress in improving energy efficiency, however, longer-term and clearly defined targets are necessary. Kyrgyzstan's energy efficiency legislation will also need substantial development accompanied by robust implementation mechanisms. As yet, only the legislation pertaining to the improvement of energy efficiency in buildings is satisfactory. More comprehensive energy efficiency legislation is urgently needed to introduce mechanisms such as minimum energy performance standards (MEPSs) and energy labelling schemes for energy-using products (including vehicles), energy service companies (ESCOs) and energy performance contracts, public procurement and energy audits.

The effective implementation of energy efficiency policies and programmes will require the strengthening of the existing institutional arrangements and the securing of a reliable and consistent source of funding. For example, the Government has not yet established or assigned responsibilities for the following, as required by the Law on Energy Conservation:

- governmental authority responsible for the control and supervision in the area of energy efficiency;
- clear assignment to governmental authorities of responsibilities for MEPR and EPC implementation; and
- the establishment of an Energy Conservation Fund.

6. ASSESSMENT OF THE ENERGY EFFICIENCY POTENTIAL AND POLICIES AT THE SECTORAL LEVEL

6. Assessment of the Energy Efficiency Potential and Policies at the Sectoral Level

6.1. General Assessment

6.1.1. Overview of the Total Energy Efficiency Potential

As presented earlier (Figure 9), the largest energy-consuming sectors in 2014 were residential (36%), transport (26%) and industry (20%). The State Programme on Energy Savings and EE Policy for 2015–2017[63] reports that the highest EE potential can be achieved on the demand side, on which the potential energy savings are estimated to be 20–25% of the electricity consumption and 15% of the heat demand.

A recent report[64] prepared by the Centre for Energy Efficiency (CENEf) in Moscow for the Copenhagen Centre on Energy Efficiency (C2E2[65]) provides estimates of the market, economic and technical energy-saving potential in Kyrgyzstan. The market potential, as of 2013, is estimated at the level of 0.5 Mtce, whereas the total technical energy efficiency potential is estimated at 2.7 Mtce (Figure 24, left blue bar) or 48% of the TPES. Much more of the technical potential could be achieved by overcoming the market barriers with the effective implementation of the tariff policy, energy efficiency policies and programmes and governance and structural reforms, as recommended by this review.

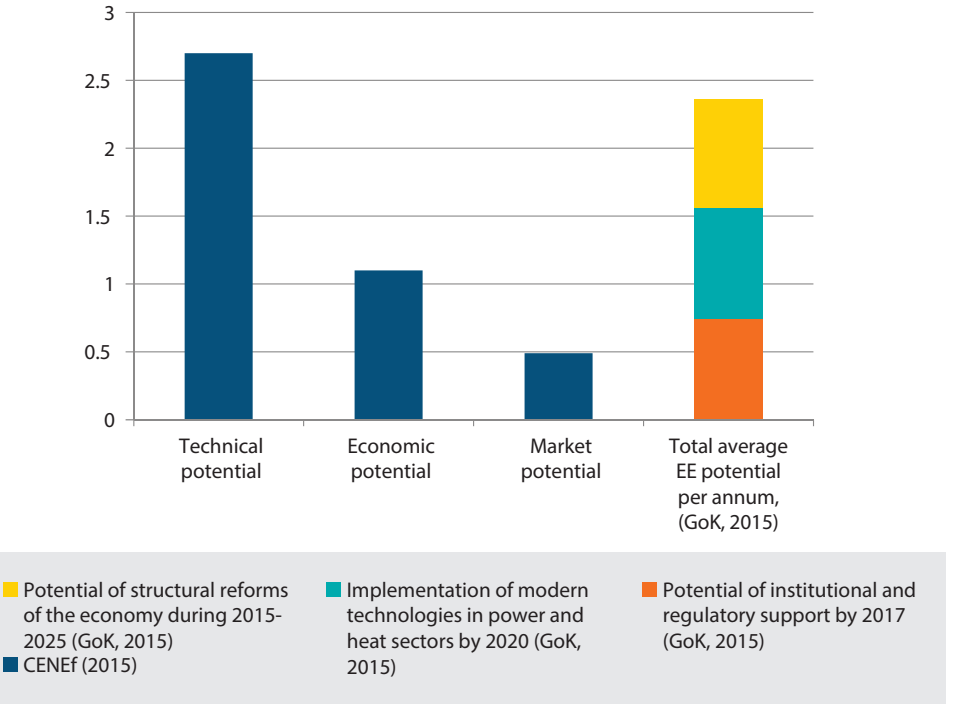
The State Programme on Energy Savings and EE Policy for 2015–2017 envisages that improvements to institutional and regulatory support for energy efficiency could deliver 2.2 Mtce of energy savings by 2017. The programme also estimates that 4.1 Mtce could be saved through the implementation of modern technologies in the power and heat sectors and 8 Mtce by structural reforms of the economy by 2020 and 2025, respectively. The comparison of the assessment of the average annual energy efficiency potential estimated by the CENEf and the Government of the Kyrgyz Republic is illustrated in Figure 24.

63 Approved by Government Decree #601, dated 25 August 2015.

64 C2E2 – Copenhagen Centre on Energy Efficiency (2015). Accelerating Energy Efficiency: Initiatives and Opportunities – Eastern Europe, the Caucasus and Central Asia. Copenhagen, Denmark.

65 The C2E2 is the energy efficiency hub of the UN SE4ALL initiative.

Figure 24: Estimates of the average energy efficiency potential for Kyrgyzstan, Mtce.



Source: Energy Charter Secretariat based on CENEf (2015) and the State Programme on Energy Savings and EE Policy for 2015–2017.

Saving money on energy bills is usually the only benefit of an energy efficiency investment or measure that is assessed and valued by a policymaker. A wide range of other benefits, however, can result from energy efficiency improvements, as illustrated in Figure 25 below.

Figure 25: The multiple benefits of energy efficiency improvements.

Source: IEA (2014), Capturing the Multiple Benefits of Energy Efficiency.

Given Kyrgyzstan's economic development priorities mentioned earlier in the report, energy security, in terms of improving power system reliability and reducing imports or maximising exports, is likely to involve high-value co-benefits. Closely connected to energy security are positive macroeconomic impacts, in particular improved industrial competitiveness, employment opportunities and poverty alleviation. Crucial to capturing these benefits will be the putting in place of mechanisms or the adaption of existing mechanisms to reveal the value of energy efficiency. For example, in energy sector planning and investment decision-making and assessment processes, decision makers should evaluate whether greater energy efficiency, including that on the demand side, can deliver the desired outcomes at a lower cost than energy generation.

Examples from around the world show that global leaders in both developed and developing countries are recognising the much wider benefits of energy efficiency and are introducing reforms to try to capture this value on a large scale. Such examples can be found in the US, where the value of energy efficiency as firm capacity has been recognised,[66] in China, where the value of energy efficiency in improving air quality[67] has been recognised, and in the EU,

66 R. Cowart, "Unlocking the Promise of the Energy Union: 'Efficiency First' is Key", December 2014, RAP, available at https://www.raponline.org/wp-content/uploads/2016/05/rap-cowart-efficiencyfirst-2014-dec-04.pdf (accessed June 2017).

67 IEA (2016), Energy Efficiency Market Report, available at https://www.iea.org/eemr16/files/medium-term-energy-efficiency-2016_WEB.PDF (accessed June 2017).

where the aim of unlocking the multiple benefits of energy efficiency underpins the European Commission's proposals for EU energy sector reforms[68].

6.1.2. Main Barriers Identified

Summarising and drawing from the findings and conclusions obtained in previous chapters, the following cross-sectoral barriers to energy efficiency can be identified:

- The country's energy efficiency policy lacks a long-term vision and long-term targets;
- A lack of political will to undertake the reforms required by the adopted laws and regulations, particularly in relation to the tariff policy and energy efficiency;
- Utilities are financially unviable, as the tariffs do not recover the costs and they have neither the means nor the incentives to improve energy efficiency, particularly on the demand side. Indeed, energy demand reduction would reduce utilities' revenues;
- Social resistance to tariff increases and a lack of public understanding that cost recovery is a prerequisite for maintaining and developing the energy system and that energy efficiency has a major role to play in keeping the total costs down;
- Weak governance arrangements severely hamper effective implementation. The overarching responsibility for developing Kyrgyzstan's energy efficiency policy is assigned to the SCIES KR, but the responsibility for ensuring and coordinating its implementation has not been assigned. The roles and responsibilities of the various authorities that are able to contribute to improving energy efficiency are in general not clearly defined and set down in law. The energy regulator, the SARFEC, is not sufficiently empowered and resourced to ensure effective regulation of the utilities, including the tariff policy and prioritisation of energy efficiency in utilities' energy resource portfolios.
- There is lack of a reliable and consistent funding stream for energy efficiency programmes and investments;
- As yet, only the primary legislation pertaining to the improvement of energy efficiency in buildings is sufficiently developed. More comprehensive energy efficiency legislation is urgently needed in other areas of energy efficiency (see sectoral barriers/ recommendations).

68 European Climate Foundation, Introduction by Maroš Šefčovič, European Commission Vice President for Energy Union, in "Efficiency First: A New Paradigm for the European Energy System", available at https://europeanclimate.org/wp-content/uploads/2016/06/ECF_Report_v9-screen-spreads.pdf (accessed June 2017).

General Recommendations

1. Explore and adopt enforceable policies and measures to deliver energy efficiency improvements so that the energy system can be developed at the least cost. The energy policy of the Government should be understandable, inspiring and attract as much stakeholder support as possible. The Government could establish a vision statement for the country's strategic energy policy that elevates energy efficiency to a top priority. The statement should make it clear that efficiency is a country priority, as it holds the key to least-cost energy system development and the achievement of affordable tariffs that enable cost recovery. The Government should communicate the vision widely through its strategic documents and communications using various types of media and different media organisations.

2. Establish long-term strategic energy efficiency targets, milestones and a clear baseline to enable the evaluation of progress. The targets should be specific, measurable, attainable, realistic and time bound and should be developed by the Research Institute on Energy and Economy under the SCIES KR in close collaboration with international donor organisations. The Government should establish a monitoring and reporting framework to track and evaluate progress.

3. Establish a transparent and efficient institutional framework for the implementation of the energy efficiency policy of the country. A nominated authority should have a clear mandate and responsibility for the achievement of the energy efficiency targets and the coordination of activities with other governmental institutions. This authority must have the necessary powers, capacity, capability and resources to be effective. The roles and responsibilities of all the governmental institutions that are able to contribute to delivering energy efficiency should be clarified by law.

4. Establish stable revenue streams for the activities of the lead energy efficiency institution and for an energy efficiency and renewable energy investment fund to be used to finance the implementation of energy efficiency programmes and projects in both private and public sectors. The revenue streams could come from tariff increases (public benefit charge), environmental taxes (e.g. transport fuels) and donor organisations.

5. Enhance the independence, powers and resources of the State Agency for Regulation of the Fuel and Energy Complex under the Government of the Kyrgyz Republic (SARFEC) so that it can better achieve the Government's energy policy objectives.

6. Ensure that the regulatory frameworks and governance arrangements enable a least-cost and integrated approach to energy system planning and development, fully incorporating energy efficiency on both the supply side and the demand

side. The requirements to adopt this approach should apply to the governmental authorities and regulated energy companies/utilities involved in decision making related to energy system planning and energy sector investment.

7. The improvement of the Law on Energy Conservation adopted in 1998 should be prioritised and developed in line with international best practice. The law should: enshrine the provisions of the new EE institutional framework (e.g. roles and responsibilities, including the nominated authority for energy efficiency implementation); require the development of a national action plan for energy efficiency (e.g. the EU template for National Energy Efficiency Action Plans (NEEAP)); and require the application of the least-cost planning principle.

8. Energy efficiency should be at the heart of the country's energy strategy to gain consumer acceptance of higher tariffs to achieve full cost recovery. This strategy should include many of the recommendations proposed by this review.

9. Scale up and enhance the existing public communications in order to:

    - gain the public's acceptance of the country's need to invest and ensure full cost recovery of energy tariffs but at the same time explain how energy efficiency helps to minimise the total system costs such that the tariffs can be lower than they would otherwise be;
    - explain that, while energy efficiency is often cheaper than supply-side alternatives, it still needs organised upfront investment; and
    - advise people and organisations on the various steps that they can take to reduce their demand and thus their energy bills, including information on the Government's energy efficiency programmes and financial support from which consumers might be able to benefit.

10. Consider possibilities to organise formal consumer engagement and representation in the development of energy policy and tariff regulation. Such consumer representation should be independent of the Government and industry and equipped with appropriate expertise and sufficient capacity to participate in the Government's consultation processes and to communicate effectively through various media channels. For the people of the Kyrgyz Republic, this should serve to: increase their understanding of the energy challenges and their role in achieving cost-effective energy system development in the best interests of the country; build their trust in the institutional and market actors engaged in the development and business of the energy sector; and increase their constructive participation in developing and implementing solutions. The consultation processes should be open to all stakeholders, including international organisations and donors.

6.2. Power Sector

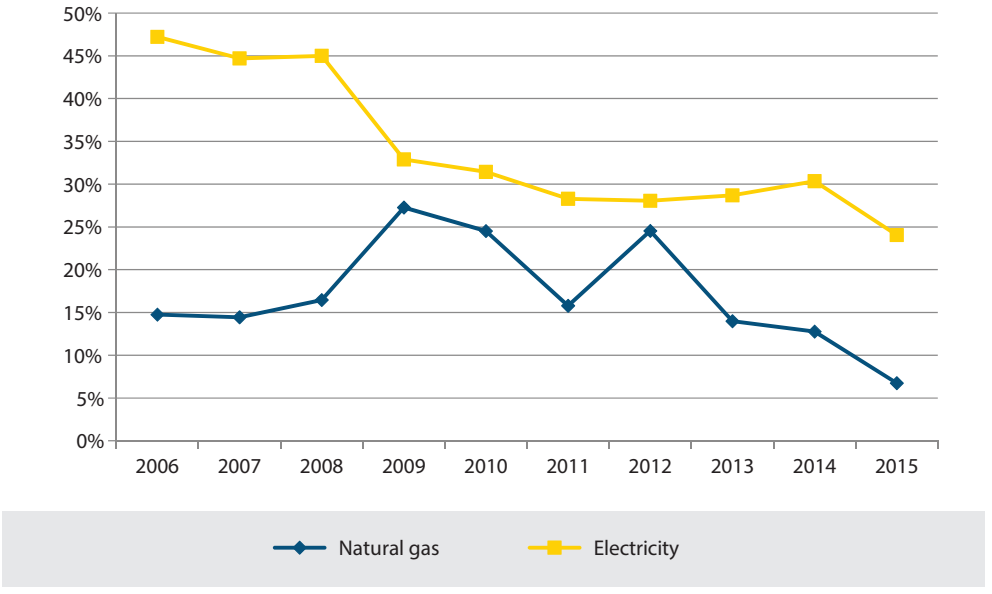
6.2.1. Sector Overview and Energy Consumption Trends

From 2001 to 2015, the power sector was legally unbundled, but it has been operating under the state-owned vertically integrated market model since 2016. In 2014, electricity accounted for around 30% of the total final consumption (TFC). Hydropower dominates Kyrgyzstan's power mix, with over 80% of the installed capacity. The remaining capacity is provided by two CHPs in Bishkek (666 MW, coal) and Osh (50 MW, mazut), the latter having been used as reserve capacity, mainly producing heat energy, since the early 1970s. Hydropower, however, is seasonal, such that it can be scarce in the winter when the river levels are low, sometimes exacerbated by climate change. Furthermore, the two CHPs are ageing and consequently suffer from reliability issues. In the winter, the power reliability can be poor, and the country's dependency on electricity imports is increasing. Without the recent unchecked growth in the electricity demand (over 50% between 2010 and 2014; see Figure 12), the country could be in a stronger position to export electricity following the implementation of the CASA-1000 projects.

The recent growth in the electricity demand occurred in the public sector and households, for which the electricity consumption as of 2015 stood at 70% of the country's total electricity consumption. That said, a notable reduction in the electricity demand for the public sector and households occurred between 2014 and 2015, which could be a result of the electricity tariff increase and the introduction of block tariffs in 2015 (see Figure 20). The energy demand for industry has remained fairly constant since 2005, accounting for around one-sixth of the total electricity consumption.

The dynamics of the energy losses from 2006 to 2015, shown in Figure 26, illustrates the significant reduction of energy losses in transmission and distribution networks. Between 2014 and 2015, all networks' losses decreased sharply. This is explained by the introduction of "normative losses" as a performance indicator in the calculation of the revenue and tariffs of utilities in 2014.

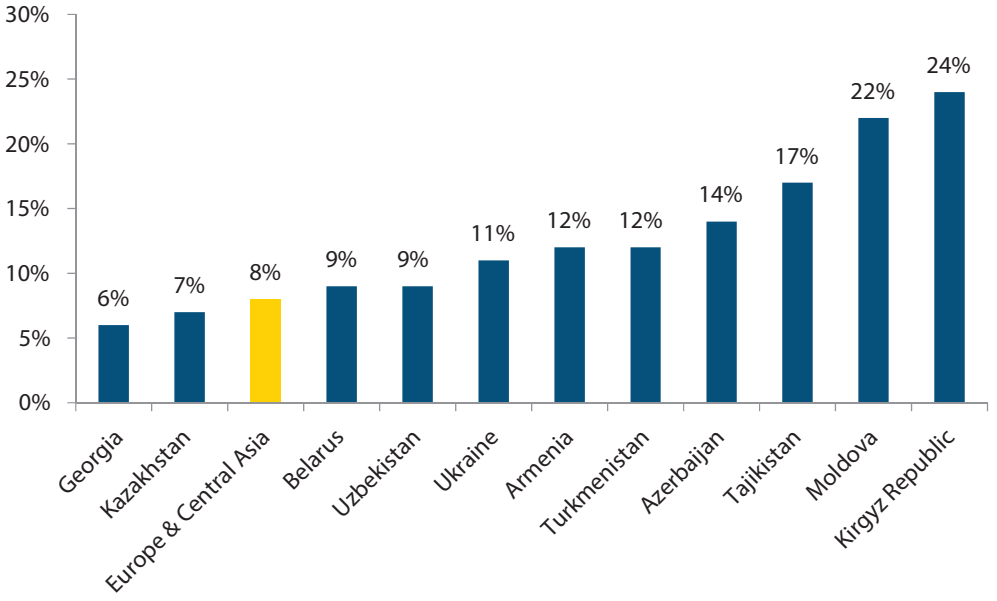
Figure 26: Dynamics of energy losses in 2006–2015, % of output.



Source: National Statistic Committee of the Kyrgyz Republic (2017).

Despite the lack of financial resources for investment in the maintenance of the energy system, some electricity distribution companies have achieved consistent progress with regard to improving their energy efficiency. For example, DSO "Severelectro" decreased the level of losses from 23% in 2012 to 11.6% in 2016 and the number of outages from 2259 to 890 over the same period.[69] Despite these improvements, the Kyrgyz Republic still has very high transmission and distribution losses compared with other countries in the CA, Caucasus and Eastern Europe regions. Figure 27 shows that the level of electrical losses in the country was three times higher than the average indicator for the Europe and Central Asia region in 2014.

Figure 27: Transmission and distribution losses in 2014, % of output.



Source: World Development Indicators, WB, http://wdi.worldbank.org/table/5.11#.

6.2.2. Assessment of the Existing Energy Efficiency Potential

Figure 27 highlights the Kyrgyz Republic's considerable scope, relative to other countries in the region, to reduce the electricity losses from transmission and distribution networks. The CENEf 2015 assessment also concludes that reducing electricity transmission and distribution losses has the greatest potential for delivering cost-effective energy savings in the power sector.

Provided that the distribution companies are adequately incentivised and have access to sufficient funds, reducing electricity losses in the system can significantly and quickly improve the economic situation of network companies. Table 11 compares the current financial and production deficit of the electricity system with respect to three scenarios:

Scenario 1: Reduction of electricity losses to 12%, the level of Armenia and Turkmenistan (see Figure 27);

Scenario 2: Reduction of electricity losses to 8%, the average level in Europe and Central Asia (see Figure 27);

Scenario 3: Scenario 2 + exporting of the achieved electricity savings.

69 According to the information provided by JSC "Severelectro" during the fact-finding mission on 26–29 June 2017.

Table 11: Potential results of electricity loss reduction.

Indicator	Current situation[70]	Scenario 1	Scenario 2	Scenario 3
Electricity losses, 2015, TWh	2.7	1.3	0.9	0.9
Electricity losses, 2015, % of output	24%	12%	8%	8%
Electricity deficit, TWh[71]	2.4	1.1	0.6	0.6
Reduction of electricity deficit in comparison with the current situation, TWh	-	*-56%*	*-74%*	*-74%*
Average cost-reflective tariff, EUR/kWh	0.017	0.017	0.017	-
Average export tariff, EUR/kWh	-	-	-	0.025
Deficit of financial resources with current non cost-reflective tariffs, million EUR (i.e. 0.01 EUR/kWh)	93.1	70.8	63.4	
Deficit of financial resources with cost-reflective tariffs, million EUR (i.e. 0.017 EUR/kWh)				48.6
Reduction of the financial deficit in comparison with the current situation, million EUR	-	*-24%*	*-32%*	*-48%*

Source: Energy Charter Secretariat.

The results presented in Table 11 reveal that reducing electricity losses to 12% (Scenario 1) can significantly reduce the electricity production deficit by 56% and the financial deficit by 24%. The reduction of electricity losses to 8% (scenario 2), the average level of Europe and Central Asia, can potentially reduce the electricity deficit by 4 times and decrease the financial deficit by 32%, from 93.1 to 63.4 million euros less the cost of implementing the measures. If the utilities could export the electricity savings achieved through the reduction of losses (Scenario 3), the financial deficit could be decreased significantly. Indeed, there are costs involved in reducing the losses that will offset the benefits to a certain degree, but the example above makes it clear that considerable potential exists, which should be assessed and exploited properly.

6.2.3. Efficient Balancing of Supply and Demand

Inadequate development and rehabilitation of ageing network capacities, coupled with significant growth of the electricity demand, have resulted in deteriorating power system reliability performance.[72] While electricity companies have achieved some progress in reducing the number of outages (see Chapter 4.4), the reliability of the electricity system is still poor in comparison with the average indicators for Europe and Central Asia. Energy efficiency and demand-side management (DSM), in which demand reduction or load shifting is targeted at certain points in time or certain locations, could provide low-cost reliability solutions. These involve incorporating the consideration of energy efficiency and DSM solutions into

70 According to OJSC "EHC", available at http://www.energo.gov.kg/ru/infografika/ (accessed June 2017).

71 It is assumed that the electricity deficit, described as "Essence of Power System Crisis" – presented in the infographics available at http://www.energo.gov.kg/ru/infografika/ (accessed June 2017) – relates to unmet electricity demand, whereby the energy demand exceeds the available capacity at certain times throughout a studied time period, though assumptions and details are not known.

72 According to the Programme on Transition of the Kyrgyz Republic to Sustainable Development for 2013–2017, approved by Government Resolution #218, dated 30 April 2013.

the decision-making procedures and methodologies relating to energy system planning and investment.

For example, a study by the World Bank[73] shows that simple measures, like changing four incandescent lightbulbs to CFLs, could save about 60 kWh per month per household and thus reduce the average household monthly bill by 10% and decrease the household peak load demand by 21%. If such measures were geographically targeted, they could be a cost-effective way to improve grid reliability issues, saving money at both the household level and the system level, with the system-level savings helping to reduce the cost recovery gap. Such demand-side measures should therefore be evaluated routinely against supply-side options in network planning and resource adequacy or reliability assessment processes. Utilities could be required to seek out the least-cost options, with full consideration of energy efficiency investment opportunities, to improve the system reliability when developing the system capacity and improving the system operation. Even though these requirements and processes identify cost-effective energy efficiency or DSM potential, however, mechanisms are still needed for their delivery.

Kyrgyz utilities could be mandated to deliver energy efficiency improvements on the demand side in a similar way to many regulated utilities being mandated to deliver energy savings around the world, for example in some US states, Brazil, China and South Africa. Utilities could deliver their mandates through procurement tenders or utility energy efficiency programmes. A significant advantage in mandating utilities is the fact that they have deep knowledge of the status of the power system, including the timing and geography of network congestion. An effective energy efficiency mandate would also force utilities to include DSM in their portfolio of energy resources, enabling more efficient system management, as at present utilities only manage the supply to meet the energy demand and not the reverse.

Currently, the allowed revenue of utilities is collected through tariffs that do not achieve full cost recovery. Revenues are linked to sales such that a reduced demand for electricity results in reduced revenues for the utilities. This clearly presents utilities with a significant disincentive to engage in DSM. Any mandate to promote DSM would need to be accompanied by regulatory mechanisms that decouple utilities' revenues from energy sales and that adjust utilities' revenues when appropriate to ensure timely cost recovery (decoupling regulation). It should also be possible to include demand-side efficiency investments in the allowed revenue calculation.

Table 12 provides the estimates on the potential increase in utilities' revenues resulting from the exporting of the achieved energy savings. The figures assume the implementation of the CASA-1000 project and estimate the demand-side savings at the level of 1.5%, 4.5% and 9% relative to the electricity output.

73 "Understanding Energy Efficiency and Electricity Reliability", World Bank Policy Research Working Paper, November 2016.

Table 12: Potential increase in utilities' revenues resulting from demand-side energy savings and increased availability of exports.

	Current situation (2015)	Potential electricity savings, %		
		1.5%	4.5%	9%
Electricity output, 2015, TWh	10.9	10.7	10.4	9.9
Potential electricity savings, TWh	-	0.1	0.4	0.7
Additional revenue for utilities, million EUR*	-	2.5	7.4	14.7

* Calculated as the difference between the average export tariff (0.025 EUR/kWh) and the tariff for households consuming less than 700 kWh per month (0.01 EUR/kWh) multiplied by the potential electricity savings.

Source: Energy Charter Secretariat.

Summarising the results of the illustrative scenarios presented in Table 11 and Table 12, the implementation of energy efficiency measures could help to reduce swiftly the financial deficit stemming from non-cost-reflective tariffs by reducing the energy losses and peak demand and by increasing the energy exports. If the latter were combined with the implementation of an effective tariff policy, the financial deficit could be reduced significantly in the short term.

A 33.6 million EUR pilot project in Bishkek, supported by KfW,[74] illustrates the potential for distribution companies to decrease their losses and improve their reliability cost-effectively using smart meters. The project, involving carefully targeted installation of 110,000 smart meters, enabled the company to decrease its losses, outages and peak energy demand by 20% and the number of inspectors by 50% over a 4-year period from 2012 to 2016. To scale up the results of this project, however, the existing regulatory framework must be reformed to ensure that distribution companies are well supported and motivated to deliver such results.

As previously mentioned in Chapter 6.1, the State Programme on Energy Savings and EE Policy for 2015–2017[75] identifies the greatest EE potential on the demand side, with potential energy savings from the reduced electricity consumption of 20–25%. The findings of the UN-GEF Project "Improvement of Energy Efficiency in Buildings"[76] indicates that there is a low level of awareness among residential consumers of no-cost or low-cost measures to reduce their energy bills, yet households could easily achieve a reduction of around 10% to 30% in their energy bills by following simple energy efficiency advice.

6.2.4. Social tariffs and protection of vulnerable households

Governments in many countries allow discounts for low-income consumers, as it is recognised that energy is crucial to societal development and welfare. The design of such discounts and support varies widely, for example explicit discounts based on income qualifications (common in the United States) and separate tariffs that are only available to very small users of power, usually low-income users (Indonesia and South Africa).

The design of Kyrgyzstan's customer tariffs is based on the inclining block model. This approach encourages energy-efficient consumption, as customers pay per unit of consumption and higher consumption is charged at higher rates once block thresholds are reached. The issue

74 http://www.energo.gov.kg/ru/acsioner/realizuemye_proekty/162 (accessed June 2017).

75 Approved by Government Decree #601, dated 25 August 2015.

76 UNDP/GEF project "Improving Energy Efficiency in Buildings".

in Kyrgyzstan is that a very large share of electricity consumption in the residential sector falls within the first block, the rate for which is very low and below the cost per unit of electricity. Under Kyrgyzstan's current tariff design, many households that do not have a low income benefit from subsidised tariffs and much non-essential electricity consumption is subsidised. The latter is positively encouraged by very low tariffs.

In many developing countries where inclining block tariffs are applied, regulators design the first block(s) or a separate "social" block to protect vulnerable consumers. Thus, the key question for the regulator is, "What are the minimum needs of our vulnerable consumers throughout the year?" Consideration of this question should take into account learning, experience and guidance from elsewhere in the world, for example UN SE4ALL.

Many developing countries successfully target social support while still achieving cost recovery for utilities by drawing tight boundaries around low-income energy consumers. Indeed, such a tariff design assumes that most low-income households are low energy consumers. Some low-income households, particularly those housing large families, may be relatively high energy consumers. Such vulnerable households, however, should be prioritised for low-income assistance programmes and energy efficiency improvement programmes.

For example, in Indonesia, residential tariffs vary by the maximum connected demand, and consumers on the social tariff are constrained, by the application of load limiters, to a maximum demand of either 450 VA[77] or 950 VA. Connected demand above 1300 VA is no longer considered part of the "social tariff" and so tariffs applicable to larger households with more appliances apply.[78] Therefore, many consumers invest in EE or choose efficient appliances to stay on the social tariff.[79] It should also be noted that the lowest tariff in Indonesia is 415 rupees/kwh, equivalent to 0.03 USD/kwh and almost three times higher than the lowest tariff applied to Kyrgyzstan's households consuming under 700 kWh per month.

Another example can be taken from India, where the local Andhra Pradesh Central Power Distribution Company designs the tariff menu to help the poorest citizens to afford to meet their most basic needs. Table 13 shows that the social tariff in this region is twice as high as the lowest residential tariff in Kyrgyzstan and is provided only for the consumers who consume less than 100 kWh per month. For comparison, a residential consumer consuming 600 kWh per month in India will pay 12 times more than the equivalent consumer in Kyrgyzstan.

77 VA (volt-amperes), approximately the same as Watts.

78 http://www.pln.co.id/statics/uploads/2017/06/Permen-ESDM-No.-28-Tahun-2016.pdf (accessed June 2017).

79 RAP Global Best Practice Series, April 2013, "Rate Design Where AMI Has Not Been Fully Deployed", available at http://www.raponline.org/wp-content/uploads/2016/05/rap-lazar-ratedesignconventionalmeters-2013-apr-8.pdf (accessed June 2017).

Table 13: Tariff menu for residential consumers in Andhra Pradesh, India.

KWh/month	Rupees/kwh	USD/kwh
Consumers with monthly consumption up to 50 kWh/ month	1.45	0.02
Consumers with monthly consumption between 50 and 100 kwh/month		
First 50 units	1.45	0.02
51–100 units	2.6	0.04
Consumers with monthly consumption between 100 and 200 kwh/month		
First 50 units	2.6	0.04
51–100 units	2.6	0.04
101–150 units	3.6	0.05
151–200 units	3.6	0.05
Consumers with monthly consumption more than 200 kwh/month		
First 50 units	2.6	0.04
51–100 units	3.25	0.05
101–150 units	4.88	0.07
151–200 units	5.63	0.08
201–250 units	6.38	0.10
251–300 units	6.88	0.10
301–400 units	7.38	0.11
401–500 units	7.88	0.12
500+ units	8.38	0.13

Source: http://www.apcpdcl.org.in/tariffs.php.

6.2.5. Main Barriers Identified

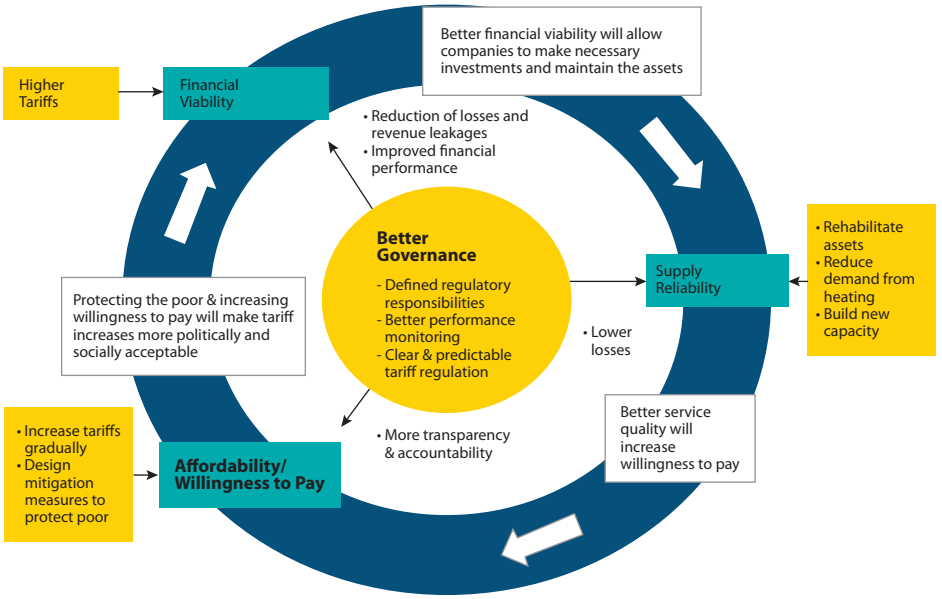
The dominating barrier preventing energy efficiency improvements in the power sector relates to the tariff policy, which is poorly designed and executed. Shortfalls in cost recovery, year on year, have resulted in insufficient funds being available for the maintenance and modernisation of the power system, explaining the existence of high energy losses. The below-cost consumer tariffs also explain the substantial growth in the energy demand in recent years, particularly within the residential sector. Large numbers of residential consumers who are able to pay benefit from tariffs that do not achieve full cost recovery.

The methodology for calculating utilities' allowed revenues, combined with the fact that costs are not recovered through the tariffs, does not incentivise utilities to facilitate or deliver demand-side management. The incentives to reduce transmission and distribution energy losses could be stronger.

Indeed, a vicious circle exists, connecting consumers' acceptance of tariff increases, utility performance and utility financial viability (Figure 28). It follows that, to facilitate consumers' acceptance of tariff reforms that can provide sufficient funds for developing the electricity system cost-effectively, tariff increases should be linked to a consumer-focused energy policy

and utility performance. Given the multiple consumer and societal benefits of energy efficiency, improving energy efficiency and demand-side management should be at the heart of such a strategy. Public awareness of this connection may be limited due to a lack of transparency on utility costs and performance as well as a poor understanding of how regulatory choices, including those that prevent or promote energy efficiency and DSM, influence consumer outcomes.

Figure 28: Vicious circle involving consumers' acceptance of tariff increases, utility performance and utility financial viability.



Source: World Bank (2014).

Recommendations: Power Sector

11. Allocate priority attention to the efficiency measures that have the greatest potential to contribute to least-cost development and performance improvement of the electricity system, paying particular attention to reliability. Reducing energy losses and electricity peak demand should be prioritised. To realise these objectives, a range of regulatory reform opportunities should be explored, for example utility regulation, system planning, the tariff policy and the design of EE/DSM interventions.

12. Develop and adopt a new medium-term electricity and heat tariff policy that will envisage gradual achievement of tariffs reflecting all the costs related to generation, transmission, distribution and supply. The additional financial resources resulting from the increases to the energy tariffs should be used by the utilities to modernise their networks and reduce energy losses. Relative to 2014, a reduction of losses in electricity networks to the average level in Europe and Central Asia has the potential almost to eliminate the power deficit and reduce the financial deficit of the power system significantly.

13. The SARFEC should take a stronger role in the improvement of the design and implementation of the country's tariff policy. A key objective should be to ensure that the tariff policy drives energy efficiency improvements throughout the energy system, that is, generation, transmission, distribution and consumption. This implies that the methodology for the calculation of allowed revenues should be designed to ensure that the regulated companies are motivated to deliver efficiency improvements and that the tariffs incentivise energy-efficient behaviour of consumers. Specifically:

    a. Improve the methodology relating to the calculation of allowed revenues for regulated energy companies:

        i. Authorities and utilities involved in decision making relating to power system planning, investment and system operation should be required to apply a least-cost approach, with full consideration of EE/DSM.

        ii. Provide more incentives and more ambitious requirements to reduce energy losses. The requirements should be accompanied by the allocation of sufficient funds in the companies' allowed revenues;

        iii. The allowed revenues of transmission and distribution companies should be decoupled from their energy sales with a revenue adjustment mechanism (decoupling regulation) so that companies do not have any

incentives to increase their energy sales. On the contrary, they could be required and incentivised to deliver energy efficiency improvements on the demand side. These improvements could be delivered through procurement tenders or utility energy efficiency programmes.

iv. Introduce more key performance indicators (KPIs) to deliver consumer benefits, including through EE/ DSM, and to help connect the actions of regulated utilities more strongly to consumers' interests, for example reliability, lower bills and customer service.

v. The regulator could take steps to link DSM actions to export revenues, for example rewarding utilities that implement DSM using a share of the export revenues.

b. Improve the electricity tariff menu to achieve full cost recovery and to encourage energy-efficient consumption while protecting low-income consumers by ensuring that their minimum energy needs are affordable:

i. Inclining blocks should be redesigned to achieve full cost recovery, with better targeting of low-income consumers. Minimum/basic energy needs must be defined, and a distinction could be established for the winter and summer.

ii. Prioritise direct and targeted EE interventions for vulnerable consumers to improve energy efficiency in their homes and to reduce their energy bills;

iii. To enable consumers' acceptance of tariff increases, the latter should be linked to consumer-focused utility performance in which service quality, energy efficiency/DSM and cost efficiency are prioritised. This linkage should be visible to consumers, enabled by a clear vision statement and narrative, as suggested above in Recommendation 1. This should be supported by the collection, analysis and publication of data relating to utilities' performance and the reduction of the number of outages.

14. Increase the transparency of expenditure on the energy sector, including accounts of regulated utilities, in line with the best international practice to reduce cross-subsidies, establish and maintain consumer/public confidence and ensure that the energy efficiency vision of the Government is realised.

15. Translate the lessons learned from the implementation of pilot projects into policy/ regulatory action, for example the utilisation of smart meters to deliver least-cost reliability (Severelectro).

6.3. Industry

6.3.1. Sector Overview and Consumption

The economic output of the industry sector was about 2.8 billion euros in 2016, including: mining and processing of gold and other metals (50.1%); energy supply (15.4%); food, beverages and tobacco products (11.9%); production of non-metal, rubber and plastic products (6.8%); extraction of coal, oil, gas and other minerals (5.6%); and textiles, shoes and leather products (2.5%).[80] Industry represented around 20% of the total final energy consumption in 2014 (see Figure 9).

6.3.2. Assessment of the Existing Energy Efficiency Potential

The CENEf's estimate of the technical energy efficiency potential for industry is 98 thousand tce or about 11.2% of the sector's annual energy consumption (C2E2, 2015). Table 14 provides a breakdown of the CENEF's estimates, based on global practice. The CENEf remarks, however, that the data provided are subject to many assumptions and should be used mainly for indicative purposes.

Table 14: Energy efficiency potential in industry in Kyrgyzstan (as of 2013).

Integrated technologies of goods, work, and services production	Units	Scale of economic activity	Units	Specific consumption in 2010	Practical minimum	Actual consumption abroad	Comments	Estimated technical potential, 1000 tce
Oil and gas condensate produstion	10^3 t	79	kWh/t	130	40		Global practice	0.9
Natural gas production	10^6 m^3	29	kgce/ 1000 m^3	8.7	5.9		Expert estimate	0.08
Coal production	10^3 t	1164	kgce/t	14.0	3.0		Global practice	12.8
Pulp	10^3 t	14	kgce/t	790	404	485	Global practice	5.5
Paper	10^3 t	2	kgce/t	360	241	320	Global practice	0.2
Cardboard	10^3 t	0.03	kgce/t	343	237	266	Global practice	0.01
Cement production	10^3 t	1240	kgce/t	24	11	13	Global practice	16.1
Meat and meat products	10^3 t	7	kgce/t	211	50		Chelyabinskaya Oblast	1.2
Bread and bakery	10^3 t	109	kgce/t	157	89		Tambovskaya Oblast	7.4

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80 http://www.stat.kg/ru/publications/doklad-socialno-ekonomicheskoe-polozhenie-kyrgyzskoj-respubliki/ (accessed June 2017).

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Integrated technologies of goods, work, and services production	Units	Scale of economic activity	Units	Specific consumption in 2010	Practical minimum	Actual consumption abroad	Comments	Estimated technical potential, 1000 tce
Efficient motors	10^6 units.	0.3	kWh/ motor	9,956	8,507		Global practice	45.0
Variable speed drives	10^6 units	0.1	kWh/driv	9,956	9,356		Global practice	8.4
Efficient industrial lighting	10^6 units	0.01	kWh/ lighting unit	247	160		Global practice	0.1
Total industry								98

Source: CENEf as quoted in C2E2 (2015).

Based on the analysis of the CENEf's findings, improving the efficiency of motors emerges as a clear priority for the industry sector given the large technical potential and economic attractiveness of this measure. Improving efficiency in coal production also offers significant technical potential and is particularly economically attractive. While considerable technical potential has been identified in industries such as cement or pulp production, they are as yet economically unattractive at the current level of energy tariffs. Nevertheless, the application of effective energy management systems will identify discrete measures in these industries that will make economic sense to implement.

An example of such a discrete measure is the replacement of inefficient motor systems with modern ones that on average consume up to 40% less energy. Indeed, the potential for high energy efficiency from replacing motors is significant in many countries, as about 30% of global electricity consumption is used in industrial electric motor-driven systems.[81]

According to the IEA, almost nine out of ten industrial electric motors sold globally are already covered by mandatory efficiency standards with various levels of stringency. The Kyrgyz Republic has adopted a number of EEU Standards on EE, including some minimum energy performance standards on energy motors and pumps (see Chapter 5.2). However, this policy measure pertains to new appliances only. Therefore, the main challenge for the improvement of the efficiency of industrial motor systems in Kyrgyzstan is to determine how to improve the efficiency of existing motor systems or accelerate cost-effective replacement of old, inefficient motors with energy-efficient ones.

International practice shows that the most effective incentives for industry to implement EE measures are price signals, easy access to low-cost finance, such as soft loans for EE improvements provided by the government or international financial institutions, the introduction of mandatory energy audits at the state level, the promotion of energy management systems (EMS) and incentives to implement opportunities identified by audits or EMSs. For example, since June 2014, energy audits have been mandatory in EU Member States for all large enterprises[82] that employ over 250 persons or have an annual turnover exceeding 50 million euros and/or an annual balance sheet total exceeding 43 million euros.

81 2016 IEA World Energy Outlook.

82 Large enterprises are defined according to Commission Recommendation 2003/361/EC of 6 May 2003.

Such mandatory audits are required to be conducted every 4 years, though companies employing a certified energy and environment management system can be exempted from this obligation.

In Kyrgyzstan, there is neither an energy audit certification scheme nor a governmental authority responsible for setting up such a scheme. The INOGATE Programme project, "Support to Energy Market Integration and Sustainable Energy in the NIS (SEMISE)", provided assistance to the Government of Kyrgyzstan in 2011 to create a training centre for certified energy auditors. However, there is no publicly available information indicating whether such a centre was actually created.

From the State's point of view, energy audits should be considered not only as a tool for improving a company's energy efficiency performance but as a tool to identify potential DSM opportunities for the energy system, to improve the competitiveness of the national economy and to attract new investments. One of the requirements of international energy audit standards such as ISO 50001 ("Energy Management Systems – Requirements with Guidance for Use") is that the recommendations of energy audits should be based on a life cycle cost analysis to take account of long-term energy savings, residual values of investments and discount rates. Thus, the results of energy audits can be used directly for the attraction of investments. For example, the EBRD-funded KyrSEFF project financed more than 850 projects targeting EE improvements in Kyrgyzstan during the period 2013 –2017,[83] including 70 projects in the business sector involving 23 million euros of direct investments and a 3 million euro grant component.

6.3.3. Existing Policies and Implementation

The State Committee on Industry, Energy and Subsoils is the main governmental body responsible for improving energy efficiency in industry. The main EE objective for industry, which was introduced by the Programme on Energy Conservation and Energy Efficiency Policy for 2015 –2017, is to achieve a cumulative decrease of 30% in energy intensity through structural reforms of the economy during the period 2015 –2025.

Among other measures (see Chapter 5.3), the programme provides specific economic instruments targeting the implementation of EE measures in industry: the reduction of customs rates for imported EE equipment and preferences for investments in EE projects. However, as of 2017, the Government has not undertaken any reforms targeting the improvement of energy efficiency, except the introduction of a sharp increase of 68% in the electricity tariff for industrial consumers in August 2015.

In 2016, the Government of Kyrgyzstan introduced plans to privatise more than 40 state enterprises and to attract investments in different sectors of the economy.[84] This initiative could be supported by the development of additional incentives for potential investors in the companies producing EE equipment, such as LED lamps, efficient motors or solar thermal collectors.

There are no provisions relating to energy service companies (ESCOs) in the legislative framework of the Kyrgyz Republic. However, the lack of demand for the services of ESCOs is no doubt the most significant issue. The demand for ESCO services would be increased with

83 The KyrSEFF offers loans and grants for the improvement of energy and resource efficiency of residential buildings and industrial enterprises, available at http://www.kyrseff.kg/en/ (accessed June 2017).

84 http://zanoza.kg/doc/339743_kakie_predpriiatiia_kyrgyzstan_predlagaet_razvivat_kitaycam_spisok.html (accessed June 2017).

reforms to the tariff policy to recover costs fully and with requirements or incentives for utilities to manage the demand or for industry or the public sector to reduce the energy consumption.

China provides perhaps the best global example of how ESCO activity has been driven by mandates applied to industry.[85] Since 2006, a mandatory, target-based energy-saving programme has been in place for the largest, most energy-intensive enterprises. This programme was expanded to over 16,000 enterprises in 2011 and generated net annual savings of 216 Mtoe in 2014. The largest efficiency gains were in the cement, chemicals and light manufacturing sub-sectors.

In India, an ESCO scheme executed by Energy Efficiency Services Limited (EESL) – a super-ESCO under the Ministry of Power, Government of India – has had extraordinary success in achieving large-scale roll-out of LEDs in the residential sector.[86] The programme, known as Unnat Jyoti by Affordable LEDs for All (UJALA), is the world's largest zero-subsidy domestic lighting replacement programme. ESSL's investment in UJALA is approximately 2.3 INR (2.5 KGS) per kWh saved, while the cost of electricity from a coal power plant in India is about 5.2 (5.7 KGS) INR per kWh generated. UJALA has replaced 100 million old, wasteful lamps with modern, efficient and longer-lasting LED lamps, without the need for any government subsidies, and aims to replace a further 670 million by 2019. UJALA's LED bulbs cost only 50 INR (54 KGS), and UJALA allows the consumers to buy them for an initial payment of 10 INR (11 KGS), the balance being paid through the consumer's electricity bills in equal monthly instalments of 10 INR (11 KGS). UJALA has delivered tangible multiple benefits, like peak demand reduction, energy savings, avoided carbon dioxide emissions, reduced consumer bills (by 15%) and temporary employment for 35,000 people so far, and has stimulated LED bulb manufacturing in India.

ESCO activity and the provision of energy efficiency services can play a significant role in the creation of new jobs and new business opportunities. In some countries and companies, growth in this sub-sector is significant. For example, the energy management division of Siemens accounted for 53 thousand employees worldwide, and the total revenue of the company's business was more than 10 billion euros in 2014.[87] Companies such as Siemens recognise opportunities for supplying packages of products and services to reduce the energy demand in buildings through energy performance contracts.

6.3.4. Main Barriers Identified

Summarising the key findings and conclusions of the previous chapters, the following main barriers have been identified:

- the absence of international standards for the conducting of energy audits or for the establishment and application of energy management systems, for example ISO 50001;
- no formal certification or training mechanisms for energy auditors;
- a lack of legislative provisions for the establishment of ESCOs;
- a weak demand for ESCO services due to below-cost tariffs and a lack of requirements or incentives for utilities to manage the demand or for industry or the public sector to reduce the energy consumption;

85 IEA reference.

86 IEA, EESL, "India's Ujala Story", available at https://eeslindia.org/writereaddata/Ujala%20Case%20study.pdf (accessed June 2017).

87 Information presented during the ITS combined event on ESCO in Sweden, February 2016.

- the public finance rules do not allow state and local authorities to use the achieved energy savings for the repayment of investments in energy efficiency measures;
- no tax incentives for importing and producing EE equipment.

Sometimes barriers directly prevent actions. For example, Kyrgyzstan's public finance accounting rules do not allow state and local authorities to use the achieved energy savings for the repayment of investments in energy efficiency measures, as the budget lines are restricted to the actual energy costs (see Annex 2).

Recommendations: Industry

16. Require or strongly encourage the take up of international standards for the conducting of energy audits and for the establishment and application of energy management systems, for example ISO 50001;

17. Develop a certification/accreditation scheme for energy auditors. The scheme should be implemented and supervised by the governmental authority responsible for the implementation of the Government's EE policy (see recommendation 3 above).

18. Consider establishing incentive schemes that would motivate industrial enterprises to implement the measures recommended by energy audits.

19. Explore strategies to help establish ESCO schemes that can deliver large-scale EE improvements, including the following:

    a. nominate an authority to support ESCO establishment;

    b. implement tariff reforms;

    c. facilitate easy access to low-cost finance;

    d. create demand and revenue streams for ESCO services to supplement energy prices, for example a utility mandate or public procurement requirements;

    e. adopt a model energy performance contract for public organisations;

    f. review and amend the public finance rules to ensure that authorities are incentivised and not disincentivised to invest in energy efficiency improvements.

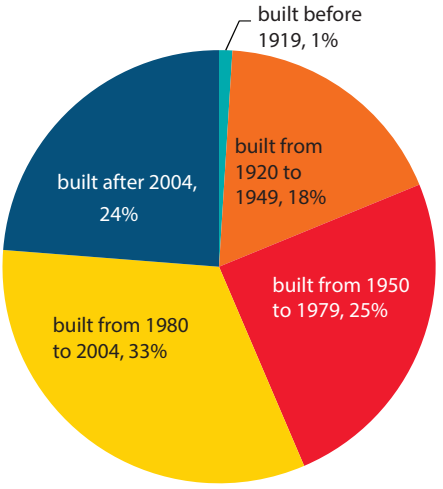
20. Facilitate business opportunities to deliver energy-efficient products and services, for example tax incentives for importing or producing EE equipment, such as LED lamps, efficient motors, solar thermal collectors and so on.

6.4. Buildings

6.4.1. Sector Overview and Energy Consumption Trends

The construction industry accounts for 8% of the GDP and 11% of the country's labour market (see Figure 3). Data for the key metrics relevant to energy consumption in buildings are generally lacking. For example, there are no official statistics on the total floor space of residential and public buildings, energy use per unit of floor space or average household size in the Kyrgyz Republic. According to the survey conducted by the EBRD-funded KyrSEFF project, 76% of building stock in the country was built before 2004 and has low energy performance.

Figure 29: Number of residential buildings depending on the year of construction.



Source: KyrSEFF (2014).

According to the IEA figures,[88] the annual consumption in residential and public buildings amounted to 1,325 thousand toe in 2014, equivalent to 15.4 TWh. Taking into account the UNDP/GEF[89] estimates of 86 million square metres of total floor area, the average energy consumption would be approximately 179 kWh/m^2 per year. During a regular energy efficiency review for Kyrgyzstan conducted by the Energy Charter Secretariat in 2010, it was estimated that space heating requires 140 kWh/m^2 in apartment buildings and 180 kWh/m^2 in private housing.

6.4.2. Assessment of the Existing Energy Efficiency Potential

The C2E2 estimates the technical energy efficiency potential for residential buildings, including appliances, to be 936 thousand tce, equal to 88.1% of the annual energy consumption by the sector. This technical potential is broken down into more detailed categories, as illustrated in Table 15 below.

88 IEA database (2017).

89 UNDP/GEF project "Improving Energy Efficiency in Buildings".

Table 15: Energy efficiency potential in the buildings sector (as of 2013).

Integrated technologies of goods, work, and services production	Units	Scale of economic activity	Units	Specific consumption in 2010	Practical minimum	Actual consumption abroad	Comments	Estimated technical potential, 1000 tce
Residential buildings								
Renovation of centrally heated multifamily buildings	10^3 m^2	15,761	kgce/m^2	22.00	7.1		60% of 2012 buildings codes requirements	77.5
Renovation of single-family buidings	10^3 m^2	36,567	kgce/m^2	22.00	4.9		Passive houses	259.6
Renovation of hot water use	10^3 people	1555	tce/ person	0.207	0.073	0.12	Global practice	208.5
Replacemet of appliances with most efficient models	10^3 people	5,777	tce/ person	0.110	0.055	0.12	Global practice	317.7
Lighting renovation	1,000 light fixtures	5,151	W	50.85	20.00	35.0	Global practice	10.8
Renovation of cooking equipment	10^3 m^2	30,903	kgce/m^2	3.50	1.50	2.80	Global practice	61.8
Total residential buildings								**936**

Source: CENEf as quoted in C2E2 (2015).

For public and commercial buildings, the C2E2 estimates the technical energy efficiency potential at 151 thousand tce, equal to 46.4% of the annual consumption. Based on a 6% discount rate and the current energy prices, the C2E2 study concludes that only the following EE measures are economically viable:

- replacement of appliances with efficient models;
- procurement of efficient equipment (commercial);
- renovation of residential lighting;
- renovation of DHW systems;
- cooking equipment modernisation and commercial cooking.

Based on the same set of assumptions, the renovation of buildings is not yet economically attractive. However, the technical potential for building renovation in the residential sector

is particularly large, and cost –benefit calculations depend on the depth of the renovations. Thus, shallower renovation or specific renovation measures or packages (e.g. the installation of automatic control systems) could be economically attractive.

As mentioned at the beginning of this chapter, tariff policy reform and consequent price increases would change the economics of building renovation. Furthermore, there are various co-benefits that should be taken into account, including energy security and reliability, fuel/energy poverty, public health and the benefits of urban regeneration (e.g. attracting business, tourism and investment).

The findings of the UN-GEF project[90] also indicate that there is a low level of public awareness regarding no-cost or low-cost measures to reduce energy bills. The results of this project reveal that households can easily reduce their energy bills by following simple EE advice.

6.4.3. Existing Policies and Implementation

There are no governmental programmes or plans for renovating public buildings in the Kyrgyz Republic. The State Agency for Architecture, Construction, Housing and Communal Services is a governmental authority responsible for the development of policy in the construction sector. The regulation relating to the role and responsibilities of the agency stipulates that it should consider EE parameters while developing the state policy in the housing sector. The agency has also been assigned responsibility for the improvement of the energy performance of buildings according to the Law on Energy Efficiency in Buildings adopted in 2011 (see Table 10).

The analysis of the existing policies and recommendations presented in Chapter 5.2 shows that a comprehensive legislative framework exists that is based on provisions very similar to the EU's Energy Performance of Buildings Directive. However, despite the adopted secondary legislation on both minimum energy performance (MEPRs) and energy performance certificates (EPCs), the provisions of the law have not been implemented in practice.

Unclear or absent allocation of responsibilities to different governmental authorities is an important identified barrier to its implementation. For example, the State Agency for Architecture, Construction, Housing and Communal Services determines that design documentation for new buildings must comply with the MEPRs. At the construction stage, however, the MEPRs are often neglected, as compliance with the MEPRs is not requested by the State Inspectorate on Ecological and Technical Security that commissions new buildings. The allocation of responsibilities to different governmental authorities responsible for different aspects of the whole regulatory process needs to be set out clearly in the appropriate law or regulation. These governmental authorities must have sufficient human capacity and capability and financial resources to meet their responsibilities effectively; at present, however, this is not the case.

As no accreditation scheme exists for experts who can issue EPCs, the law's requirement to issue EPCs for all new and rented buildings is also not implemented in practice. To improve the situation, the State Agency for Architecture, Construction, Housing and Communal Services, in cooperation with donor organisations, has already developed and submitted to the Government for approval the following documents:

- A road map on the creation of conditions for the practical implementation of legislation on the energy efficiency of buildings of the Kyrgyz Republic for 2017 –2019;

90 Based on the results of the fact-finding mission on 27 –29 June 2017.

- A regulation on monitoring the quality of the work on issuing energy performance certificates and regular inspection of boilers, heating and hot water systems;
- Regulations on the state register of energy performance certificates and reports on regular inspection;
- A regulation on rules and procedures for the certification of specialists in energy performance certification of buildings and regular inspection of boilers, heating and hot water systems.

6.4.4. Main Barriers and Policy Assessment

Summarising the key findings and conclusions of the previous chapters, the following main barriers have been identified:

- Significant gaps in the official statistics, as data are not collected for many metrics necessary for the effective monitoring of energy efficiency in buildings, for example the floor space of residential and public buildings, energy use per unit of floor space and average household size.
- A lack of or unclear allocation of responsibilities to different governmental authorities for different aspects of the regulatory process;
- Insufficient human capacity and capability, as well as financial resources, allocated within the administration to design and deliver energy efficiency strategies and programmes;
- A lack of secondary regulation and supporting measures for the implementation of the Law on EE in Buildings;
- Local decision makers are unaware of the potential, benefits and practical implementation of EE in buildings;
- The absence of governmental programmes or plans to renovate public/government buildings;
- Low awareness of residential consumers of no-cost or low-cost measures to reduce their energy bills.

Recommendations: Building Sector

21. Continue improving and implementing the existing legislative framework for energy efficiency in buildings. The barriers to the implementation of the MEPR and EPC schemes need to be addressed.

22. The EPC scheme should be implemented and supervised by the governmental authority responsible for the implementation of the Government's energy efficiency policy.

23. Require local authorities to develop and implement action plans for conducting energy audits of public buildings and for implementing the measures identified by the audits. Public organisations could be required to use the ESCO model. The Government could require local authorities to report on implementation progress and facilitate the exchange of best practice and learning.

24. Review and amend the public finance rules to ensure that governmental authorities are incentivised and not disincentivised to invest in energy efficiency improvements in buildings.

25. Design the energy performance certification (EPC) scheme in such a way that it enables the collection of data for metrics necessary to assess the current level of energy efficiency in buildings, to monitor progress and to support decision-making processes.

26. Continue to improve the awareness of consumers about their historical energy consumption and promote no-cost or low-cost measures to reduce their energy bills. The Government could oblige the distribution companies to provide consumers with easy access to information about their past consumption for up to a three-year period. Information about no-cost and low-cost measures to save energy in buildings could be improved based on international best practices and promoted nationwide.

6.5. Lighting and Energy-Using Products

6.5.1. Sector Overview and Energy Consumption Trends

No official statistics on electricity consumed by lighting and energy-using products exist in Kyrgyzstan. However, the National Statistic Committee provides some information on the average number of energy-consuming products per 100 citizens (Table 16).

Table 16: Energy-consuming products, units per 100 citizens.

	2008	2009	2010	2011	2012	2013	2014	2015
TV sets	110	112	114	119	113	107	109	111
Washing machines	51	55	59	60	60	63	64	67
Refrigerators	63	66	68	69	69	77	80	82
Vacuum cleaners	17	19	22	23	24	32	33	35
Personal computers	-	-	-	5	5	7	8	9
Mobile phones	-	-	-	137	146	191	198	209

Source: National Statistic Committee of the Kyrgyz Republic (2017), http://stat.kg/ru/publications/sbornik-kyrgyzstan-v-cifrah/.

The table above shows the increase in ownership of some main energy-related products during the period 2008–2015. Interesting observations include the increase in the number of vacuum cleaners by a factor of two, refrigerators and washing machines by 30% and mobile phones by at least 50%. Unfortunately, there is no publicly available information on the growth rate of the number of air conditioners and individual electric water boilers; these particular products have significantly contributed to the growth of electricity consumption in the last decade (see Figure 12).

6.5.2.. Assessment of the Existing Energy Efficiency Potential

According to the United for Efficiency (U4E), Kyrgyzstan can achieve up to 750 GWh or about 86 thousand tce of cumulative energy savings in 2030 from the introduction of minimum energy performance standards (MEPS) for just five product groups, where lighting accounts for 29% of potential savings, residential refrigerators 24%, air conditioners 1%, transformers 38% and industrial electric motors 9%[91].

For a wider range of energy products compared to the U4E analysis, C2E2,estimates the technical energy efficiency potential for energy-using products in households to be about 390 thousand tce and that more than 80% of all the potential belongs to the replacement of appliances with more efficient models (Table 15). The C2E2 study also indicates that all measures related to the improvement of efficiency in lighting and energy-related appliances are economically viable even at the current low level of energy prices and assuming a 6% discount rate. As an example, Table 17 compares the calculation of the simple costs of lighting using incandescent, fluorescent and LED lamps.

91 For more information, see: http://united4efficiency.org/wp-content/uploads/2017/05/KGZ_U4E-Country-Assessment-Report.pdf (accessed June 2017).

Table 17: Comparison of the cost of lighting per 50,000 hours of work.

Indicator	Incandescent lamp	Fluorescent lamp	LED lamp
Lifetime, hours	1,000 (3 months)	10,000 (2.5 years)	50,000 (10 years)
Lamp wattage, W	100 W	21 W	10 W
Cost of the bulb, KGS	30 KGS	110 KGS	220 KGS
Number of bulb replacements per 50,000 hours of operation	50	4	1
Total cost of bulbs (replacement of bulbs)	1500 KGS	440 KGS	220 KGS
Energy consumed, kWh	5000 kWh	1050 kWh	500 kWh
Total cost of energy*, KGS	3 850	808.5	385
Total cost* (replacement of bulbs + energy)	5 350 KGS (73 EUR)	1 248.5 KGS (17 EUR)	605 KGS (8 EUR)

* Calculated based on the lowest tariff, that is, for households consuming less than 700 kWh per month (0.77 KGS/kWh).

Source: Energy Charter Secretariat.

6.5.3. Existing Policies and Implementation

The analysis of the existing policies and recommendations presented in Chapter 5.2 revealed that there are no MEPS, import restrictions, labelling schemes or pricing signals to promote the purchase of efficient energy-using products or to reduce purchases or encourage retirements of inefficient products. Furthermore, no requirements to comply with any energy efficiency criteria for the public procurement of appliances exist. It was also pointed out in previous sections that the public finance accounting rules disincentivise governmental and local authorities from investing in efficient energy-using products and using ESCO schemes.

Given the above, it is clear that policies are needed to drive the take-up of efficient appliances and to demote or retire inefficient appliances. There is also a significant body of international evidence indicating that product policies can quickly deliver very large benefits for consumers and wider society. An ambitious product policy, applying strict MEPSs and accelerating the turnover of inefficient stock using performance criteria, financial incentives and information, can be a core strategy to relieve pressure on politically sensitive tariff increases. As previously mentioned in section 6.2, utilities can implement programmes using ESCO schemes to accelerate the turnover of inefficient appliances to provide low-cost reliability solutions. For example, a study by the World Bank[92] shows that simple measures, like changing four incandescent lightbulbs to CFLs in a house, could save about 60 kWh per month per household and thus reduce the average household monthly bill by 10% and decrease the household peak load demand by 21%. The effect of the installation of LED lamps can be even greater. The UJALA case study, set out in section 6.3, provides a good example.

Energy labelling and ecodesign (the EU definition of minimum energy performance standards (MEPSs)) are among the most effective tools in the EU to deliver cost-effective energy savings. These policies are expected to deliver almost half of the region's 20% energy efficiency target and decrease the dependency on imported natural gas and coal by 23% and 37%, respectively, by

92 "Understanding Energy Efficiency and Electricity Reliability", World Bank Policy Research Working Paper, November 2016.

2020.[93] In addition to environmental benefits, the ecodesign and energy labelling measures are estimated to save consumers some 100 billion euros per year by 2020 through lower utility bills.

The EU's Ecodesign legislation[94] sets minimum energy performance standards and other requirements[95] for equipment sold in the EU. The Ecodesign requirements apply to a wide range of domestic and industrial energy-consuming appliances, including light bulbs, washing machines, transformers and industrial furnaces. The Ecodesign requirements were tightened incrementally over time, giving manufacturers and importers enough time to ensure products' compliance with the new requirements of the legislation. For example, the schedule for introducing the Ecodesign requirements for lighting in the EU was as follows:

- Sept. 2009 – incandescent light bulbs of 100 W and above as well as frosted incandescent light bulbs phased out;
- Sept. 2010 – 60 W incandescent bulbs phased out;
- Sept. 2012 – 40 W and 25 W incandescent bulbs phased out;
- Dec. 2012 – all incandescent light bulbs phased out;
- Dec. 2016 – halogen bulbs phased out, minimum energy rating "B".[96]

Many CA countries have also recognised the benefits of the ban on incandescent lamps for the improvement of the efficiency of the energy system, the reduction of consumer bills and the creation of new business opportunities. For example, 25 W incandescent lamps were phased out in Kazakhstan from January 2014.[97] The successful experience was also followed by Uzbekistan, which banned incandescent lamps of 40 W and higher from January 2017. By creating a demand for CFL and LED lamps, this policy measure could help to spur local production.[98]

6.5.4. Main Barriers Identified

Consumers, utilities and local manufacturing could benefit greatly from the transformation of Kyrgyzstan's energy-using product markets towards much higher energy efficiency performance. Evidence from around the world shows that policies are needed to drive such a transformation. Given the high level of growth in the energy demand in recent years, the power system's capacity deficit and reliability issues and the political sensitivity around tariff increases, a product policy offers a clear opportunity to make progress on all these fronts. Political will is needed, however, to put the right policy package in place to promote the purchase of efficient energy-using products and to reduce the purchases or encourage the retirement of inefficient products. Much guidance, however, is available from international sources.

Attention will also need to be paid to the details of the implementation processes, as barriers can easily hold back progress. For example, the public finance accounting rules, mentioned in Section 5.2, currently disincentivise governmental and local authorities from investing in efficient energy-using products and using ESCO schemes. The implementation of policy measures will also be assisted by improvements to official statistics, as more data are needed for the decision-making process on electricity consumed by lighting and energy-using products, including the average number of electric hot water boilers and air conditioners per 100 citizens.

93 https://ec.europa.eu/energy/sites/ener/files/documents/1_EN_ACT_part1_v5.pdf (accessed June 2017).
94 http://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficient-products/lighting (accessed June 2017).
95 Such as the lamp survival factor, lumen maintenance, number of switching cycles before failure, starting time, lamp warm-up time, premature failure rate, colour rendering and consistency.
96 http://www.leds.de/en/The-Incandescent-Light-Bulb-Ban-in-EU/ (accessed June 2017).
97 https://tengrinews.kz/kazakhstan_news/kazahstane-budut-shtrafovat-ispolzovanie-prodaju-lamp-298050/ (accessed June 2017).
98 http://ut.uz/ru/obshestvo/teper-lampochki-ilicha-v-uzbekistane-pod-zapretom/ (accessed June 2017).

Recommendations: Lighting and Energy-Using Products

27. Prioritise the introduction of minimum energy performance standards (MEPSs) for the products with the highest energy savings potential, i.e. transformers, lighting, residential refrigerators and industrial motors. Complement the MEPSs with labelling schemes, purchase incentives (e.g. tax relief) and mechanisms to create a demand for efficient products (e.g. a utility mandate and public procurement requirements) to transform the product markets. Establish priorities based on the economic potential and taking full account of the multiple benefits of energy efficiency, including its contribution to the reliability of the energy system.

28. Introduce incentive mechanisms for local authorities to improve energy efficiency and reduce energy bills.

29. Explore the potential for using ESCO schemes that can deliver large-scale replacement of inefficient lighting with LEDs for state/municipal buildings and street lighting.

30. Introduce minimum energy efficiency criteria into the public procurement rules for governmental and local authorities as well as state-owned companies.

31. Continue to improve consumers' awareness of low-cost measures to reduce energy bills, that is, the reduction of bills as a result of replacing incandescent lamps with LEDs and purchasing A+++ household appliances.

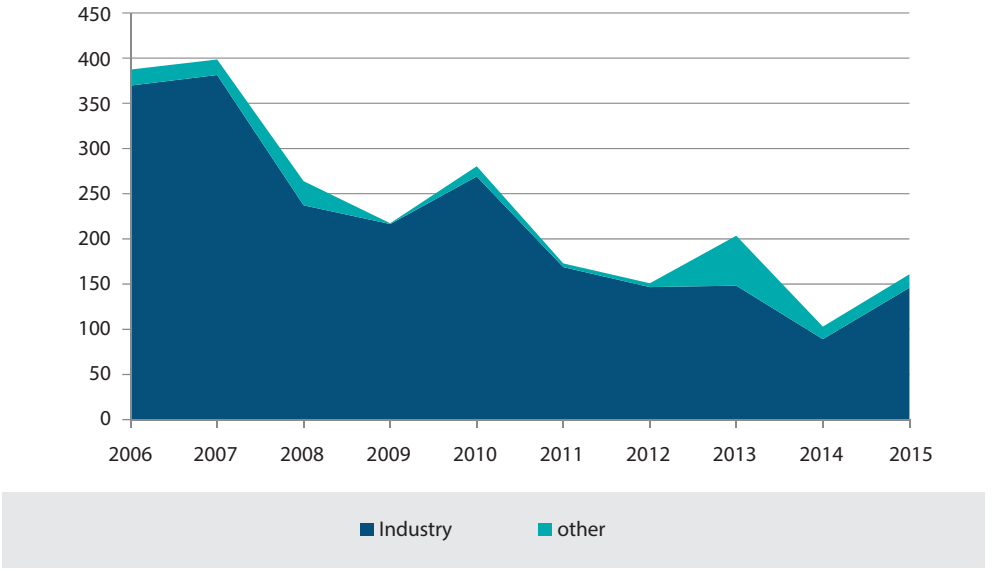
6.6 District Heating

6.6.1. Sector Overview and Energy Consumption Trends

Every year, Kyrgyzstan produces more than 3.1 million GCal of heat, including 76% by CHPs in Bishkek and Osh, 20% by the "Kyrgyzzhilkomunsoyuz" state enterprise and the remainder by "Bishkekteploenergo".[99] Alongside the two CHPs, some 272 heat-only boilers (HOBs) generate heat energy for the country's district heating system (Table 4). While the district heating sector accounted for 40.5% of the country's gas consumption in 2015, these HOBs use a variety of fuels, including natural gas, mazut and electricity, though around half use coal.

Nearly all the heat (95%) generated by the district heating sector is consumed for municipal needs, including households, though this demand has decreased by about 10% in the last decade, largely due to the decreased demand of industrial consumers and the lack of development of the network (see Figure 16). The heat consumption by industry has decreased by about 60% over the last decade (Figure 30).

Figure 30: Consumption of heat energy by industry in 2006–2015, Gcal.

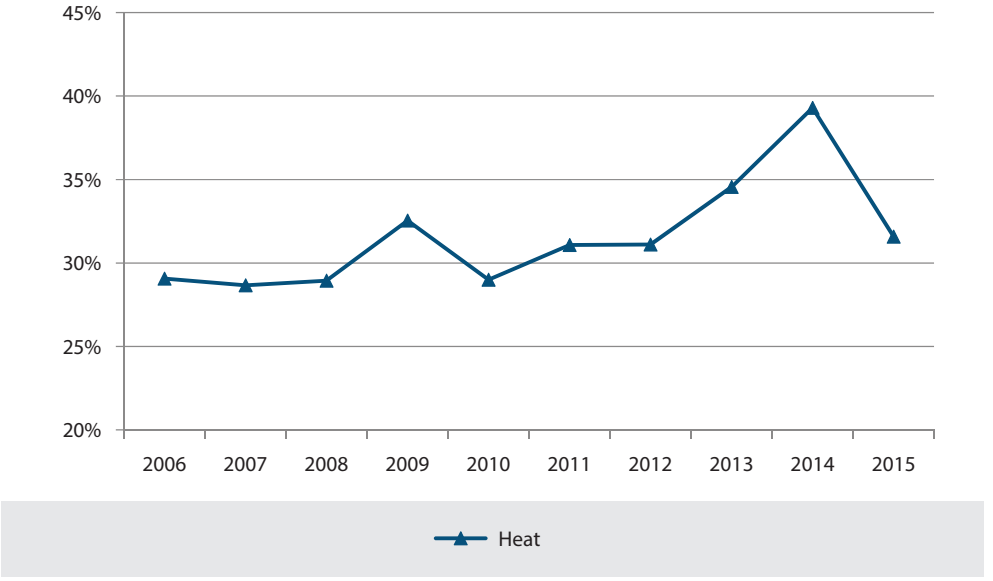


Source: National Statistic Committee of the Kyrgyz Republic (2017).

The dynamics of energy losses from 2006 to 2015 is illustrated in Figure 31. The heat losses of the DH system were fairly constant at 30% from 2006 to 2012, before a relatively sharp rise and fall, returning to more or less the same level between 2012 and 2015. The 2015 fall could be explained by the regulator's introduction of normative losses as a performance indicator in the calculation of utilities' allowed revenues (see Section 4.4).

99 C2E2 (2015).

Figure 31: Dynamics of energy losses in district heating, 2006–2015, % of output.



Source: National Statistic Committee of the Kyrgyz Republic (2017).

6.6.2. Assessment of the Existing Energy Efficiency Potential

The State Programme on Energy Savings and EE Policy for 2015–2017[100] estimates the potential energy savings of this sector to be around 10–15% of the heat demand. To achieve such savings, however, investment of about USD 225 million would be needed in the short term and about USD 550 in the medium to long term.[101] The modernisation of the DH sector would need to proceed in parallel with the implementation of residential heat tariff reforms given the insufficient cost recovery through the current tariffs (see Chapter 6.2).

The C2E2 study reports that considerable potential for energy savings could be delivered through the renovation of Kyrgyzstan's coal-fired CHP. Indeed, this potential is recognised by the JSC "Energy Holding Company", which is currently renovating the Bishkek CHP, and the work should be finished in 2017. The renovation is financed by the Export–Import Bank of China, and the total costs are 386 million USD,[102] which adds to the financial deficit that needs to be recovered by tariffs in the future.

The modernisation of the plant will not only increase the efficiency of combined heat and power generation but will also increase the installed capacity from 666 MW to 816 MW and reduce the country's dependence on imported coal, as the CHP will be able to use locally produced coal once renovated. The World Bank warns, however, that, in the absence of critical investments in networks in Bishkek, the network will not be able to absorb the additional heat supplied by the modernised CHP plant.[103]

100 Approved by Government Decree #601, dated 25 August 2015.
101 World Bank (2015), "Keeping Warm: Urban Heating Options in the Kyrgyz Republic".
102 http://www.energo.gov.kg/ru/acsioner/realizuemye_proekty/162 (accessed June 2017).
103 World Bank (2015), "Keeping Warm: Urban Heating Options in the Kyrgyz Republic".

In 2015, the World Bank proposed an investment action plan for Kyrgyzstan's heating sector with recommended measures for Bishkek and Tokmok in both the short term (the next 24 months) and the medium term (two to five years) (see Table 18). A detailed levelised cost assessment, conducted as part of the same study, indicates that the heat supplied by the CHP continues to be an economically viable heating solution for the buildings currently served by the DH system (2015). Recommended investments include: the rehabilitation of the DH network; the construction or gradual replacement of small HOBs; the implementation of a scaleable programme to replace inefficient individual heating systems; and the implementation of a national EE programme for buildings. A clear message from the related analysis, however, is that the implementation of the tariff reforms of the MTTP is a prerequisite for investment, alongside improvements to the tariff methodology and a targeted social assistance programme. In addition, the customer base needs to be maintained; otherwise, a critical point will be reached when the future restoration of the DH will become unviable. The DH system should therefore not be allowed to deteriorate further.

Table 18: Estimated investment costs for the heating sector – Bishkek and Tomkok (USD million).

Recommended measures	Bishkek		Tomkok		Combined benefits for Bishkek and Tomkok – short-term measures
	Short term	Medium/ long term	Short term	Medium/ long term	
DH reliability and efficiency measures					
Building-level substations, including metering	37	18		7	17% heat and hot water savings; increased lifetime and capacity of the network; avoid under/over heating
Temperature regulation, consumption-based billing		71		6	
Replacement and reinsulation of network pipelines	40	58		22	23% reduction in heat losses; 25% reduction in water leakages
Variable speed drive pumps	3	1		1	33% electricity savings
Programme for efficient individual heating systems					
Efficient small coal stoves and boilers	14	30	3	3	
Gas-fired stoves and boilers	43	42	3	3	35% reduction in coal consumption; 70% reduction in electricity consumption; reduced air pollution; improved comfort levels; 20–50% fuel savings; improved comfort levels; emission reduction
Efficient heat pumps	9	9	1	1	
Construction of small HOBs with gas-fired small HOBs	30	-	n/a	n/a	
Construction of small HOBs with gas-fired large HOBs*				8	
Energy efficiency programme for buildings					
Public buildings	38	58	4		30–50% reduction in heat losses; improved comfort levels
Residential buildings		210		18	
TOTAL	214	497	11	69	

* The economic and financial viability of the continued operation of large HOBs needs to be determined based on detailed feasibility studies for each case. For the purpose of the investment cost estimates, it was assumed that large HOBs will be replaced by modern gas-fired large HOBs.

Source: World Bank (2015), "Keeping Warm: Urban Heating Options in the Kyrgyz Republic".

The C2E2 similarly identified significant technical energy savings potential that could be achieved by renovating gas-fired boiler houses. Renovating the centralised district hot water supply is identified as being economically attractive, and the technical potential for reducing heat distribution losses is assessed as being relatively small.

6.6.3. Main Barriers Identified

The financial state of DH companies is precarious, with heat tariffs only recovering around 13–50% of the actual heat supply costs[104] (see Chapter 4.1). The DH companies are not able to invest appropriately in their networks, and even the recovery of operational expenditures falls short.

Inefficient pricing and below-cost tariffs are causing consumers and market actors to make decisions that are sub-optimal from a wider societal perspective. The tariffs for consumers without meters are based on fixed parameters, the only variables being the number of people for hot water and floor surface area for space heating. Thus, heat tariffs do not provide price signals to encourage efficient use of heat energy or to reduce energy bills.

While the State Programme on Energy Savings and EE Policy for 2015–2017[105] identifies the installation of energy meters and the control of energy consumption as immediate priorities, only 25% of heat consumption is currently metered. The implementation of the existing law is an issue that could be due to a lack of political will and/or inadequate capacity or capability of the administration.

104 http://www.worldbank.org/en/news/feature/2015/02/25/urban-heating-options-for-the-kyrgyz-republic (accessed June 2017).
105 Approved by Government Decree #601, dated 25 August 2015.

Recommendations: District Heating Sector

32. Develop the DH system cost effectively, aligned with the achievement of public policy objectives (see recommendation 13 above). The additional financial resources received from the increased heat tariffs should be used to modernise the DH networks, install energy meters and reduce losses.

33. Translate the lessons learned from the implementation of pilot projects in the DH sector into policy/regulatory action. For example, based on the results of the renovation of the "Gagarin" boiler house, the utilisation of solar thermal collectors while modernising the DH system and substituting old HOBs (Bishkekteploset), the Government may develop a standardised methodology and require all DH companies to carry out a cost–benefit analysis with respect to the following:

    i. potential for the utilisation of high-efficiency cogeneration plants;

    ii. potential for the utilisation of solar thermal collectors;

    iii. potential for supplying hot water during 12 months of the year.

34. Alongside the implementation of the tariff policy, require regulated companies to install heat meters and approve the inclusion of costs in the allowed revenues. Incentives could also be introduced to motivate consumers to install energy meters (the consumer tariff reforms would contribute to this objective). As a priority, develop a programme targeting the installation of heat meters for all boiler houses and buildings.

6.7. Transport

6.7.1. Sector Overview and Energy Consumption Trends

The transport sector accounted for around a quarter of the total final energy consumption in 2014 (see Figure 9). Nearly all the fuel consumed by the sector is either gasoline or diesel, the share of gasoline being slightly larger than that of diesel. The growth in vehicle ownership and the population growth explain much of the growth in the consumption of gasoline and diesel over the last decade.

6.7.2. Assessment of the Existing Energy Efficiency Potential

The CENEf estimate of the technical energy efficiency potential for the transport sector is 0.788 Mtce (2013), equivalent to 41.5% of the annual consumption by the sector (Table 19). In addition, based on global practice, the CENEf estimates that the technical potential for the improvement of tractors' fuel efficiency is 0.352 Mtce.

Table 19: Energy efficiency potential in transport (as of 2013).

Integrated technologies of goods, work, and services production	Units	Scale of economic activity	Units	Specific consumption in 2010	Practical minimum	Actual consumption abroad	Comments	Estimated technical potential, 1000 tce
Railroad electric traction	10^7 tkm gross	1,234	kgce/ 10^4 tkm gross	12.0	10.0		Values for some Russian regions	2.5
Diesel locomotives	10^7 tkm gross	2310	kgce/ 10^4 km gross	62.2	40.0		2020 target for Russia	51.3
Tram electric traction	10^6 tkm gross	7	kgce/ 10^3 km gross	6.5	4.3		Moscow	0.02
Gas pipeline transport	10^6 m^3 km	9.878	kgce/10^6 m^3 km	28.2	25.00		2020 target for Russia	31.6
Eco-driving	10^3 tce	632	kgce/10^6 m^3km	100%	95%		Global practice	31.6
Shifting to hybrid light-duty vehicles	10^3 vehicles	601	tce/ vehicles/ year	1.23	0.74		Global practice	295.5
Shifting to hybrid buses	10^3 buses	32	tce/ buses/ year	6.5	3.91		Global practice	83.2
Shifting to hybrid heavy-duty vehicles	10^3 vehicles	93	tce/ vehicles/ year	7.5	4.52		Global practice	279.9
Air transport	10^6 passenger-km	2099	kgce/ passenger-km	60.3	54.27		Global practice	12.7
Total transport								**788**

Source: CENEf as quoted by C2E2 (2015).

Based on the CENEf's estimates of the technical energy efficiency potential, it is clear that the policy priorities should include improving the fuel economy of light- and heavy-duty vehicles, including the promotion of hybrid powertrains.

In March 2017, according to the Hydrometeorological Service of Kyrgyzstan,[106] the nitrogen dioxide content in the Bishkek air exceeded the norm by 50% and by a factor of 2 in the central parts of the city experiencing high traffic volumes. At this time, some 400,000 cars were registered in Bishkek, which is 1 vehicle for every 2 residents living in the city. The high levels of vehicle ownership and use are important contributors to the city's air pollution.

106 http://vesti.kg/index.php?option=com_k2&view=item&id=46229:ryinok-gsm-kyirgyizstana-v-ozhidanii-evro-5&Itemid=127 (accessed June 2017).

Potential energy savings from increasing passenger occupancy and achieving a modal shift, moving passengers from private cars to public transport, bikes or walking, is not within the scope of the previously mentioned C2E2 study. However, such strategies are important for the transport sector and should be encouraged through policy. For example, one bus can carry the same number of people as thirty cars while only occupying the road space of three cars.[107]

As mentioned at the beginning of this chapter, there are various co-benefits that should be taken into account in policy assessments, including the health benefits associated with improved safety and reduced air and noise pollution. Public transport can also bring additional macroeconomic benefits for the economy, such as enhanced productivity associated with reduced congestion, reduced fuel costs, reduced dependence on fuel imports and greater mobility for those who are not able to own or drive cars, who would benefit from increased access to services.

6.7.3. Existing Policies and Implementation

There are no governmental programmes or plans directly targeting the energy efficiency of the transport sector in the Kyrgyz Republic. There is also no publicly available information on national or regional strategies to develop, renovate or improve the existing public transport system, on government interventions aiming to reduce traffic congestion or air pollution caused by transport or on developing road space and facilities for public transport, bicycles or pedestrians.

While no fuel efficiency standards for vehicles exist, there is a custom duty on imported vehicles that is linked to engine capacity and age, though the rationale underpinning the linkage of the duty to age is not clear and is not easy for a consumer to understand (Table 20). There are no restrictions on the age of imported cars, but the duty is highest for vehicles aged 9 years or older, which does serve to encourage the turnover of older stock, and newer stock tends to be more efficient. Furthermore, there are two sets of duties for cars less than or more than 2,500 cm^3, and the rate is applied per cm^3 of engine capacity. Engine capacity does tend to correlate with fuel economy, though not proportionally, and there are other factors and exceptions to consider. However, if the objective is to reduce emissions from vehicles or improve the fleet's fuel economy, it would be better to link duties more directly to these variables. For example, since January 2015, Chile has applied a tax to new car purchases based on both CO2 and NOx emissions.[108] In other countries, such as Saudi Arabia, import restrictions on used passenger cars are linked to fuel economy standards (passenger cars: 10.3 km/l; light trucks: 9.0 km/l).[109] Adding labelling requirements to the policy package, alongside fuel economy standards and fiscal measures, will help to transform the efficiency of the whole vehicle fleet. The Government can also play a key role in raising public awareness of energy-efficient driving techniques.

107 https://www.mapon.com/en/blog/2014/10/20-amazing-facts-about-traffic-and-traffic-jams (accessed June 2017).

108 GFEI Global Fuel Economy Initiative, "Fuel Economy State of the World 2016: Time for Global Action", available at www.globalfueleconomy.org (accessed June 2017).

109 www.saso.gov.sa/en/mediacenter/Used_Car_Campaign/Pages/default.aspx (accessed June 2017).

Table 20: Single customs duty and tax rate for imported vehicles.

Age of the car	Combined rate for customs duty and tax, USD per cubic cm of engine capacity	
	Less than 2,500 cubic cm	More than 2,500 cubic cm
1 year	2.9	4.35
2 years	2.8	4.20
3 years	2.7	4.05
4 years	2.15	3.23
5 years	2.05	3.08
6 years	2.4	3.60
7 years	2.3	3.45
8 years	2.2	3.30
9 years	3.6	5.40
10 years	3.6	5.40
11–12 years	3.6	5.40
13 years and more	3.6	5.40

Source: http://www.customs.kg/index.php/ru/oncalc.

The differential between the lowest and the highest rate for each engine capacity group is about 75%, which, based on international experience, is not sufficient to sway purchase decisions. By comparison, Kenya adopted an age-based taxation scheme for imported second-hand vehicles that raised the tax by 150% for vehicles older than 3 years.[110]

Many countries apply a tax to fuel purchases, sending a price signal to consumers to purchase more efficient cars and to drive less or more efficiently. For example, in the UK, the fuel duty is fixed at 57.95 pence (52.25 KGS) per litre and value added tax (VAT) of 20% is applied to the sum of the wholesale cost of the fuel and the fuel duty. The combined tax and duty represent a very significant share of the final retail price of petrol and diesel in the UK, fluctuating between 50% and 75% during the last 15 years.[111]

Car purchases or fuel tax revenues can be hypothecated or earmarked for investment in measures that will help to address the negative impacts of the vehicle fleet on the environment and society, for example public transport, energy efficiency or alternative technologies of reduced impact.

6.7.4. Main Barriers Identified

There is a lack of political will to introduce a policy framework or measures to address energy efficiency in the transport sector, despite the country's strong dependence on imports of oil products. Many OECD markets as well as major non-OECD markets, such as Brazil, China and India, have light-duty vehicle economy policies and standards in place that are tightening over time. This is driving accelerated technological development in global markets, resulting in wide availability of efficient vehicles and wide consumer choice, even for used cars. Policies and incentives, however, will be needed to inform and direct consumer choices. Weak capacity and capability of the administration and absence of sufficient and reliable funding streams, particularly for the development of public transport, can also hamper progress.

110 Ibid.

111 http://www.racfoundation.org/data/taxation-as-percentage-of-pump-price-data-page (accessed June 2017).

Recommendations: Transport

35. Introduce policy packages to restrict the importing of energy-inefficient vehicles, promote the sale of more efficient vehicles and promote more efficient use of vehicles. This could involve setting minimum standards for imports of used cars and linking fiscal measures to fuel economy, fuel use or polluting emissions. Consumer information provision requirements should also be part of any policy package (e.g. labelling and maintenance guidance).

36. Any revenues collected from taxes on cars, diesel, petrol or other fuels causing negative environmental impacts can be labelled as "environmental" and channelled to investment in efficient, low-emission public transport or to the Fund on Energy Efficiency so that the public can be reassured that taxes are being reinvested for their benefit, assisting with the political acceptance of taxes.

37. Improve the quality of urban planning, including the transport infrastructure and traffic management, by implementing the following measures:

    a. Improve the comfort, efficiency, accessibility and affordability of the existing public transport system;

    b. Increase parking fees in areas with a high concentration of cars and resultant air pollution and congestion issues;

    c. Develop bicycle and public transport lanes when designing, constructing or renovating roads.

7. RENEWABLE ENERGY POLICY

7. Renewable Energy Policy

7.1. Background and Potential of Renewable Energy Sources

The Kyrgyz Republic has significant potential for the development of renewable energy resources (RESs), particularly given its hydropower resources. As set out in section 2.1, around 3075 MW of electricity capacity is provided by 8 large HPPs and 12 small HPPs. Indeed, hydropower dominates Kyrgyzstan's power mix, providing over 80% of installed capacity. In 2014, electricity accounted for around 30% of the total final consumption (TFC), but the position of the country as an electricity exporter has weakened in recent years. As explained in previous sections, this is due to significant growth in the domestic electricity demand, which is poorly managed, and deterioration in the performance of the existing electricity-generating and distribution capacities. The country's National Sustainable Development Strategy for 2013–20 indicates that only 3% of the country's small hydro potential has been exploited so far.

While reducing the energy demand should be a priority for the country, there are likely to be considerable growth opportunities for the supply given the ageing asset base, the possibility to export electricity and the possibility for consumers to switch from less sustainable energy resources to efficient use of electricity generated from renewable sources. Alongside detailed projections of the future energy demand and of the potential of energy efficiency and demand-side management to meet this demand cost-effectively, Kyrgyzstan is in need of a technical assessment of the potential of different renewable energy resources that can contribute cost-effectively to meeting the residual energy demand.

Since its establishment in 2009, IRENA has been conducting assessments of renewable energy potential all around the world. The organisation has yet to assess Kyrgyzstan, though it is active in Central Asia, engaging in stakeholder dialogue .[112] Kyrgyzstan is a signatory of the IRENA Statute but has not yet ratified it. To attract large foreign direct investments successfully to exploit its renewable energy resources, however, Kygyzstan will need to implement tariff reforms to ensure full cost recovery and remove inefficient subsidies.

In Kyrgyzstan, hydropower is typically most plentiful and reliable during the spring and summer period. The need for electricity imports is greater in the autumn–winter period, when the water levels in the rivers are relatively lower. The water levels in the rivers can also unexpectedly deviate from the average, as they did from 2013 to 2015. During the winter, the heat needs are considerable, and they are largely met by the centralised district heating system, which is dominated by coal but also fuelled by gas, mazut and electricity reliant on hydropower and fossil fuels.

Kyrgyzstan has proven reserves of geothermal energy in the north of the country,[113] but there is no publicly available information on the use of geothermal energy for hot water, heat energy or electricity production or of the potential for such use.

7.2. Renewable Energy Sources: Policies and Measures

The National Programme on Sustainable Development for 2013–2017[114] sets an RES target for the country that is a 1.5% share of renewable energy in the total energy consumption by 2017 and stipulates the following measures to facilitate the achievement of this target:

112 http://www.irena.org/asiapacific/Central-Asia-regional-initiative (accessed June 2017).
113 http://ec.europa.eu/transport/themes/strategies/doc/2011_white_paper/white_paper_2011_ia_full_en.pdf (accessed June 2017).
114 Approved by Governmental Decree #218, dated 30 April 2013.

- The development and implementation of feed-in tariffs (FITs);
- The development of wind, solar and biogas atlases;
- The development of a concept for SHPPs' development;
- The organisation of an investment tender for the construction of four SHPPs within EBRD projects.

As of June 2017, there is no publicly available information regarding the extent to which the Government of Kyrgyzstan has achieved the key target of a 1.5% share of renewables in its total energy consumption by 2017.

7.2.1. Development and Implementation of Feed-In Tariffs

FITs were introduced in the Kyrgyz Republic in August 2012, when the amendments to the Law on Renewable Energy were approved by the Parliament.[115] According to the law, the FITs are calculated as a specific coefficient depending on the type of RES multiplied by the highest end-user electricity tariff at the time of commissioning of the plant (Table 21).

Table 21: Calculation of feed-in tariffs, as of June 2017.

Source	Coefficient	Highest end-user electricity tariff (June 2017[116])	FIT, US cents/ kWh
Small hydro (less than 30 MW)	1.2	3.3 US cents/kWh	3.9
Solar	6		19.6
Biomass	2.75		9.0
Wind	2.5		8.2
Geothermal	3.35		10.9

Source: Energy Charter Secretariat based on Kyrgyz Law on Renewable Energy.

The law also stipulates the following incentives for potential investors:

- Guaranteed purchase of the produced electricity by the distribution company;
- A guaranteed payback period within 8 years;
- Non-discriminatory access and connection to the network;
- No need for licencing activities in the RES sector.

As part of a least-cost approach to system development, consideration should be given to the relative costs and benefits of subsidies supporting all energy resources, including energy efficiency and DSM.

7.2.2. Development of Wind, Solar and Biogas Atlases

As of June 2017, there is no publicly available information on action taken to implement this element of the National Programme on Sustainable Development for 2013–2017.

7.2.3. Development of a Concept for SHPPs' Development

115 According to the Law on Changes and Amendments to the Law on RES #148, dated 3 August 2012.
116 1 USD = 68.6069 KGS (official exchange rate as of 31 March 2017).

The Concept on SHPPs' Development until 2017,[117] adopted in July 2015, stresses that, despite the adoption of the Law on Renewable Energy in 2012, there have not been any significant changes with regard to the attraction of new investments in RES projects, except the construction of several micro HPPs and solar panels for in-house needs or the implementation of projects using donor funds during the period 2012–2015. The concept also identifies the main barriers to RES development:

- The Law on Renewable Energy stipulates the guaranteed purchase of electricity produced by the distribution company, but there is no mechanism for the distribution companies to pass through the costs related to the purchase of electricity using FITs to the final consumers. Thus, there is clear resistance of the distribution companies to purchasing electricity from RES;
- There are no clear rules or guidelines on the approval procedures related to the construction of RES installations. There is also no standard agreement for the purchase of electricity using FITs;
- There are no clear rules for RES connection to the grid;
- There are no instruments for the mitigation of risks related to the depreciation of the local currency, as FITs are not accompanied by adjustment mechanisms that can respond to exchange rate and inflation rate fluctuation;
- The Government failed to implement the previous programme on the SHPPs' development that envisaged the construction of 41 new SHPPs during the period 2008–2012.

The concept also indicates that, 50 years ago, Kyrgyzstan had a very developed small HPP sector that accounted for more than 100 SHPPs and 32.7% of the total electricity generation. However, after the collapse of the Soviet Union, most of these plants were either closed down or removed from operation. The national energy programme of the Kyrgyz Republic for 2008–2010 and the Fuel and Energy Complex Development Strategy until 2025 propose the ambitious target of rehabilitating many of these old SHHPs as well as building new ones to achieve a total capacity of 178 MW, capable of producing about 1 TWh or 10% of the present national electricity demand.

7.2.4. Tender for the Construction of SHPPs

In June 2017, the State Committee on Industry, Energy and Subsoil of the Kyrgyz Republic officially conducted a tender for the construction of 14 SHPPs from 3 to 20 MW.[118] The tender was open to both national and foreign companies interested in investing in small hydro, whereas the SCIES assumed the responsibility for facilitating the obtaining of the necessary permits and licences, including land permits.

As a result of the tender, the SCIES selected winners for 11 SHPP projects. However, the official announcement of the winners was followed by a number of controversial statements by members of the parliaments requesting the Government to annul the results of the tender.[119] As mentioned in Chapter 4.1, the reliability and affordability of the energy supply remain very sensitive, resulting in the politisation of all the processes in the country's energy sector. For example, it was announced that Czech companies had signed contracts for the construction of 15 SHPPs in Kyrgyzstan in 2016, but in 2017 the Ministry of Economy officially announced

117 Approved by Government Decree #507, dated 20 July 2015.

118 http://knews.kg/2017/06/uspeshno-proveden-pervyj-v-istorii-kyrgyzstana-tender-na-malye-ges/ (accessed June 2017).

119 http://www.gkpen.kg/index.php/2017-01-11-10-19-24/2017-01-11-10-19-25/214-2017-06-08-04-48-37 (accessed June 2017).

that these projects would not be implemented.[120]

7.2.5. Supported Pilot Projects

Taking into account the fact that Kyrgyzstan has a very high level of solar radiation (see Chapter 1.1), the Government should avail itself of the lessons learned from the implementation of pilot projects related to solar energy by developing and implementing appropriate regulatory reforms that can facilitate further take-up of technologies.

In 2017, Bishkekteploenergo began operating its combined solar and natural gas pilot project as part of the refurbishment of the "Gagarin" boiler house. The refurbishment involved the substitution of two old coal-fired boilers with modern oil- and gas-fired units combined with an installation of 800 m^2 of solar heating panels on the roof of a boiler house and hot water storage capacity of 40 m^3. The renovation of the boiler house allows only solar energy to be used for the hot water supply during the summer period and significantly decreases the gas consumption during other periods of the year.

120 https://rus.azattyk.org/a/28502912.html (accessed June 2017).

8. ENVIRONMENTAL AND CLIMATE CHANGE POLICIES RELATED TO ENERGY

8. Environmental and Climate Change Policies Related to Energy

8.1. Legislative Framework for Environmental Protection

The legislative framework for environmental protection in Kyrgyzstan includes the following laws (not exhaustive):

- Environmental Protection Act (1999);
- Law on Ecological Appraisal (1999);
- Law on Specially Protected Nature Territories (2011);
- Law on Common Technical Regulations to Ensure Environmental Safety (2009);
- Law on Licensing and Permitting System (2013);
- Law on Water (1995) and the Water Code (2005);
- Law on Protection of Atmospheric Air (1999);
- Law on State Regulation and Policy Emission and Absorption of Greenhouse Gases (2007).

These laws set out the basic provisions for the use and management of the country's natural resources, including the rules and regulations relating to charging for their use. The legislative framework also covers, among other areas, the competence of the public authorities, the rights and duties of natural resource users, environmental pollution, environmental monitoring, ecological standards, environmental impact assessment (EIA) and environmental monitoring. According to Governmental Decree #60, dated 13 February 2015, "On the Approval of Regulation on the Procedures for Conducting EIA in Kyrgyz Republic", all energy-related projects need to undergo an environmental impact assessment. The state environmental expertise of the EIA reports is implemented by the State Agency for Environment Protection and Forestry (SAEPF). It should also be noted that it is beyond the scope of this report to comment on the quality and effectiveness of these laws. The Kyrgyz Republic is also party to 13 international environmental conventions and 3 protocols.

8.2. Climate Change Impacts, Mitigation and Adaptation

In 2013, Kyrgyzstan's total GHG emissions were 15.5 million metric tons of carbon dioxide equivalent (MtCO2e), largely resulting from activity in the energy sector (61.1% GHG emissions), followed by emissions from agriculture (28.4%), industrial processes (5.7%) and waste (4.8%).[121] Within the energy sector, transportation and other fuel combustion were responsible for approximately 71% of the emissions. In its Intended Nationally Determined Contribution (INDC),[122] the Kyrgyz Republic commits to reducing its GHG emissions unconditionally in the range of 11.5% to 13.8% compared with the business-as-usual (BAU) scenario by 2030 through actions in energy, agriculture, forestry and other land use, industry and waste. The 2030 target, however, could be expanded to reductions of 29.0% to 30.9% with international financial support.

Kyrgyzstan ratified the UNFCCC Kyoto Protocol in 2005, though it is not an Annex I or Annex II country and did not have a specific commitment under the protocol. Kyrgyzstan signed the UNFCCC Paris Agreement on 21 September 2016. The SAEPF is responsible for the

121 USAID factsheet, "Greenhouse Gas Emissions in Kyrgyzstan", 2013, available at https://www.climatelinks.org/resources/greenhouse-gas-emissions-factsheet-kyrgyzstan (accessed June 2017).

122 http://www4.unfccc.int/submissions/INDC/Published%20Documents/Kyrgyzstan/1/Kyrgyzstan%20INDC%20_ENG_%20final.pdf (accessed June 2017).

implementation of the commitments under the UNFCCC. The Climate Change Coordination Commission, headed by the First Vice Prime Minister of the Kyrgyz Republic and established in 2012, coordinates all the activities in the Kyrgyz Republic related to climate change. The CCCC is composed of all heads of key ministries and divisions and representatives of the civil, academic and business sectors. The Centre for Climate Change of the Kyrgyz Republic, established in 2005 by the Ministry of Ecology and Emergency Situations of the Kyrgyz Republic, assists the Government in the implementation of international commitments and national action on climate change.[123]

Actions on climate change are reflected in the "National Sustainable Development Strategy of the Kyrgyz Republic for 2013–2017" and the "Programme of the Kyrgyz Republic on Transition to Sustainable Development for 2013–2017". Kyrgyzstan's per capita greenhouse gas emissions, however, are well below the world average, though economic development in the absence of action could change this significantly.[124] The per capita GHG emissions in 2010 were slightly over 2 tons/person, which is low compared with Kazakhstan, where the GHG emissions per capita equated to over 16.7 t/person in 2011.[125] The high proportion of hydropower in Kyrgyzstan's power mix is an important explanatory factor.

The Kyrgyz Republic is regarded as being vulnerable to the impacts of climate change, and the observed climate change to date has been significant, with warming and reduced precipitation, and this situation is predicted to continue in the future.[126] The temperature regime is also noted for a significant non-linear increase in the temperature change speed.[127] The volume of glaciers in Kyrgyzstan in 2000 compared with 1960 was reduced by 18%, and glacial areas are predicted to reduce significantly or disappear by 2100.[128] The country has established priority actions to manage adaptation and mitigate impacts effectively.[129]

8.3. Energy–Water Nexus

Kyrgyzstan shares the Syr Darya River Basin with Kazakhstan, Tajikistan and Uzbekistan. Consequently, an important water–food–energy–ecosystem nexus exists. In 2015, the UNECE published[130] the results of a comprehensive and participatory assessment[131] of the main challenges and issues associated with the sharing of the basin's water resources.

The operation schedule of the reservoirs on the Naryn River (a major tributary located in

123 http://climatechange.kg/en/ky-rgy-zstan-i-izmenenie-klimata/kkpik/ (accessed June 2017).

124 http://www4.unfccc.int/submissions/INDC/Published%20Documents/Kyrgyzstan/1/Kyrgyzstan%20INDC%20_ENG_%20final.pdf (accessed June 2017).

125 UNDP/GEF/State Agency for the Environment Protection and Forestry (KR), "Third National Communication of the Kyrgyz Republic under the UN Framework Convention on Climate Change", Bishkek, 2016, available at http://unfccc.int/national_reports/non-annex_i_natcom/items/10124.php (accessed June 2017).

126 UNDP and State Agency for the Protection and Forestry under the Government of the Kyrgyz Republic, "Climate Profile of the Kyrgyz Republic", 2013, available at http://climatechange.kg/wp-content/uploads/2014/12/Climate-ENG.pdf (accessed June 2017).

127 UNDP/GEF/State Agency for the Environment Protection and Forestry (KR), "Third National Communication of the Kyrgyz Republic under the UN Framework Convention on Climate Change", Bishkek, 2016, available at http://unfccc.int/national_reports/non-annex_i_natcom/items/10124.php (accessed June 2017).

128 WHO (2013), "Protecting Health from Climate Change", the World Health Organization, available at www.euro.who.int/__data/assets/pdf_file/0019/215524/PROTECTING-HEALTH-FROM-CLIMATE-CHANGE-A-seven-country-initiative.pdf (accessed June 2017).

129 "Priority Directions for Adaptation to Climate Change in the Kyrgyz Republic till 2017", sectorial action plans on adaptation to climate change in the Kyrgyz Republic, available at www.nature.gov.kg, www.climatechange.kg.

130 UNECE "Reconciling Resource Uses in Transboundary Basins: Assessment of the Water–Food–Energy Ecosystems Nexus", 2015, available at https://www.unece.org/fileadmin/DAM/env/water/publications/WAT_Nexus/ece_mp.wat_46_eng.pdf (accessed June 2017).

131 The participatory assessment process following a methodology developed under the "Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention)". The assessment's main objectives were to foster transboundary cooperation by joint identification of inter-sectoral synergies and measures to reduce tensions and assist countries in their resource use optimisation with an improved knowledge base and capacity.

Kyrgyzstan and Uzbekistan), in particular the Toktogul Reservoir in Kyrgyzstan, is critical for the provision of water to the large irrigation schemes downstream (to the Fergana Valley and further downstream in Uzbekistan and Kazakhstan), as well as for electricity production upstream, mainly in Kyrgyzstan, though Uzbekistan's thermal power plants and oil refineries are reliant on water for cooling and other energy production needs.

Around 90% of the basin's flow is regulated by reservoirs. Kyrgyzstan operates reservoirs in a mode adapted to meet a winter peak power demand, resulting from heating needs. The water discharges from upstream dams therefore tend to be larger than the natural flow in the winter and smaller in the spring and summer. This limits the access to water for irrigation during the growing season, required by all the countries in the basin. Table 22 illustrates the riparian countries' dependency on the basin for water resources.

Table 22: The resource base in the Syr Darya Basin and the riparian countries' dependence on it.

	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan
Country areas in the basin (as per cent of total country areas)	12.7	55.3	11.0	13.5
Country areas in the basin of total country area (hectares)	345,000 272,490,000	110,570 19,995,000	15,680 14,255,000	60,400 44,740,000
Population living in the basin (as per cent of total national population)	20.0	56.6	21.2	51.4
Population living In the basin of total national population (inhabitants)	3,406,000 17,037500	3,237,000 5,719,500	1,739,000 8,207,800	15,537,000 30,241,100
Surface water resources in the basin (as per cent of total resources at country level)	13.3	24.1	6.7	36.5
Total (actual) Surface Water Resources (RSWK) (km^3/year): within the Syr Darya Basin of the national total	13.3% of 99.63	5.1% of 21.15	1.3% of 18.91	15.4% of 42.07
Irrigated land In the basin (as per cent of total irrigated land at country level)	59.3	37.3	39.3	54.4
Irrigated land in the basin of total irrigated land at country level (hectares)	750 000 1 265 000	381,000 1,021,000	265,000 674,400	2,012,000 3,700,000
Hydropower produced in the basin area (as per cent of total national hydropower production)	3.3	98.6	3.1	87.6
Hydropower produced in the basin area of total national hydropower production (GWh)	418 12 525	12,663 12,847	560 18,144	5,754 6,566
Thermal power produced in the basin area (as a share of total national thermal production)	9.03	0.00	0.00	87.1
Thermal power produced in the basin area of total national thermal production (GWh)	6 455 of 71 466	0 of 751	0 of 863	40,836 of 46,864

Source: UNECE (2015), "Reconciling Resource Uses in Transboundary Basins: Assessment of the Water–Food–Energy–Ecosystems Nexus".

A scenario exercise at a UNECE-led regional workshop revealed expert consensus on three key uncertainties that may affect the future energy–water dynamics: the spirit of regional cooperation and geopolitics, population movement (migration of the rural population and agricultural workers) and climate change. As regards the climate change impacts, important inter-annual variations in the demand–supply water balance have already been observed in the Syr Darya Basin, as mentioned in the previous section. Water shortages in the summer already affect the hydropower production and thermal power plants in the basin. Furthermore, the flow of the river is mainly fed by glaciers and snowmelt and is therefore highly variable

both seasonally and between years. The freshwater availability in Central Asia, particularly in the large river basins, is projected to decrease due to climate change. Higher temperatures cause greater melting of glaciers, leading to river flows, flooding and glacial lake outbursts and, at the same time, a decrease in water stocked at the source (see Table 23).

Adapting to climate change is an urgent necessity and major challenge facing all riparian countries. This includes adapting to lower levels of water availability as well as ensuring that adequate flows of water maintain the ecological systems.

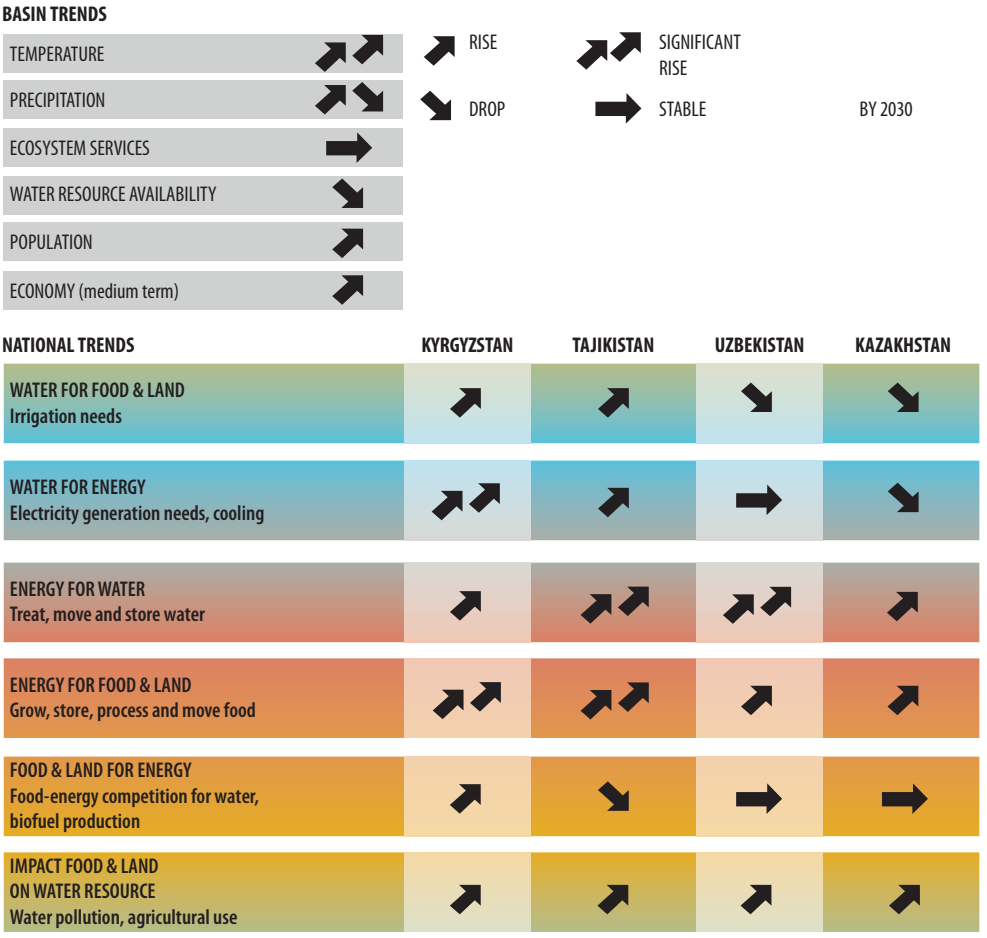
Table 23: Climate change-related projections by 2050 for the Syr Darya Basin.

By 2050	Central Asia (Syr Darya)
Temperature change	+2 °C
Rainfall change (annual)	Precipitation intensity is predicted to increase (but not all models agree on mean annual precipitation)
Runoff change (annual)	Decrease by 12%
Water scarcity aggravated	Acute in some areas at the Syr Darya Basin level

Source: UNECE (2015), "Reconciling Resource Uses in Transboundary Basins: Assessment of the Water–Food–Energy–Ecosystems Nexus".

The trends in Kyrgyzstan relating to energy and water consumption are on the rise, with growth in the demand for water to generate energy and for energy to grow, store, process and move food (see Figure 32). Such trends suggest that the situation is set to worsen in the absence of strengthened cooperation between the riparian countries and requires vastly improved efficiency in the way in which the basin's water resources are managed. Indeed, the combination of a dry growing season with low meltwater availability followed by a cold winter is a recipe for a critical situation for both the agriculture and the energy sector.

Figure 32: Future trends in the Syr Darya Basin and the riparian countries.



Source: UNECE (2015), "Reconciling Resource Uses in Transboundary Basins: Assessment of the Water–Food–Energy–Ecosystems Nexus".

In the Soviet era, the basin's resources were to a significant extent managed in an integrated way, and compensation mechanisms facilitated the acceptance of centralised planning decisions. Since the end of the Soviet era, the cooperation between countries has reduced, despite the establishment of agreements and new regional governance institutions to address the Aral Sea crisis and to enable effective management of the basin's water resources. The 1998 "Agreement on the Use of Water and Energy Resources in the Syr Darya River Basin" provided a framework for energy exchanges and the regulation of water discharges until the early 2000s, but it was never effectively enforced by the parties. The countries have tended to act independently and without coordination to ensure their own economic growth and resource security. This has not only caused transboundary tensions but also increased the exposure of each country to external shocks and river system fragmentation.

Improved transboundary and inter-sectoral cooperation and improving efficiency are the key to improving the situation and central to the UNECE's recommendations for the region.

Transboundary cooperation in the management of basin resources can yield large economic benefits, such as the reduction of input costs, increased value of agricultural production and energy services, reduced costs associated with droughts and power cuts, poverty reduction, employment generation and improved public health. Improved transboundary relations and effective implementation of national efficiency policies would improve the investment conditions and thus increase investor confidence. This would result in greater cross-border trade and investment as well as attracting wider international support and investment for major projects.

Cooperative solutions already exist, and there is much best practice from around the world from which to draw. The challenge is to implement these solutions effectively. As regards the energy sector, the recommendations strongly promoted by the UNECE include the implementation of policies to improve energy efficiency, the diversification of the energy mix by increasing the investment in renewable energy and the development of a regional energy market, which would involve, among other actions, the removal of trade barriers and the introduction of standards and rules for trading.

Unfortunately, as evidenced by this report, little progress has been made in developing and implementing policies and measures to improve the energy efficiency in Kyrgyzstan. In addition, energy trading throughout the region through the Central Asian Power System (CAPS) has significantly declined from 25 GWh to 2.3 GWh over two decades (see Chapter 3.1).

Summary

Kyrgyzstan has in place a legislative framework that sets out the basic provisions for the use and management of the country's natural resources. An important environmental challenge in which the country is deeply involved relates to the use of the water resources of the Syr Darya Basin, and a strong water–energy nexus exists. The use of the basin's water resources involves trade-offs across sectors, resulting in the inefficient use of resources, environmental degradation and tension between the riparian countries of the basin. The current trends in energy and water consumption, population growth and climate change impacts suggest that the situation is set to deteriorate.

Cooperative solutions already exist, and there is much best practice from around the world from which to draw. The challenge, however, is to implement these solutions effectively. As regards the energy sector, the recommendations strongly promoted by the UNECE include the implementation of policies to improve energy efficiency, the diversification of the energy mix by increasing the investment in renewable energy and the development of a regional energy market, which would involve, among other actions, the removal of trade barriers and the introduction of standards and rules for trading.

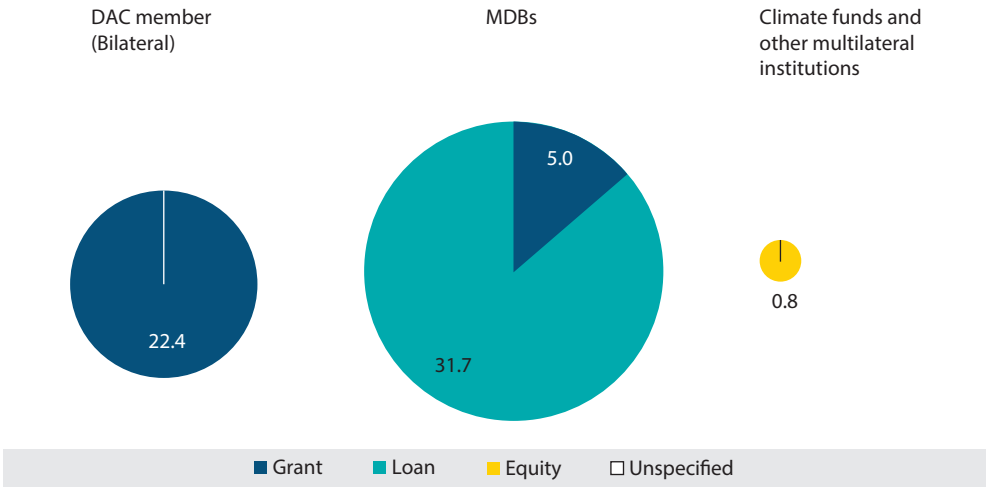
9. FINANCE AND INTERNATIONAL ASSISTANCE

9. Finance and International Assistance

As recommended in section 6.1, the Government should establish stable revenue streams for the activities of the lead energy efficiency institution. An energy efficiency and renewable energy investment fund should also be created to help leverage private investment and finance the implementation of energy efficiency programmes and projects in both the private and the public sector. The public finance could come from various revenue sources, including tariff price increases (public benefit charge), environmental taxes (e.g. transport fuels) and donor organisations.

The total public investment projects funded by domestic sources represent 2.5 to 10% of the total investments between 2006 and 2012, and the rest was financed by international funding sources.[132] Examples of such projects can be found in Table 24. Figure 33 below shows that the Kyrgyz Republic receives grants from the Development Assistance Committee, multilateral development banks (MDBs), some climate funds and other multilateral institutions. All the loans, accounting for just over half of all finance, according to the estimates published in an OECD study in 2016,[133] are largely provided by the two MDBs, the World Bank and the European Bank for Reconstruction and Development (EBRD). Important country donors are Switzerland, Finland and Germany.

Figure 33: Financial instruments used by delivery channel (USD million per year).



* DAC – Development Assistance Committee (countries are members).

Source: OECD (2016), "Financing Climate Action in Kyrgyzstan. Country Study".

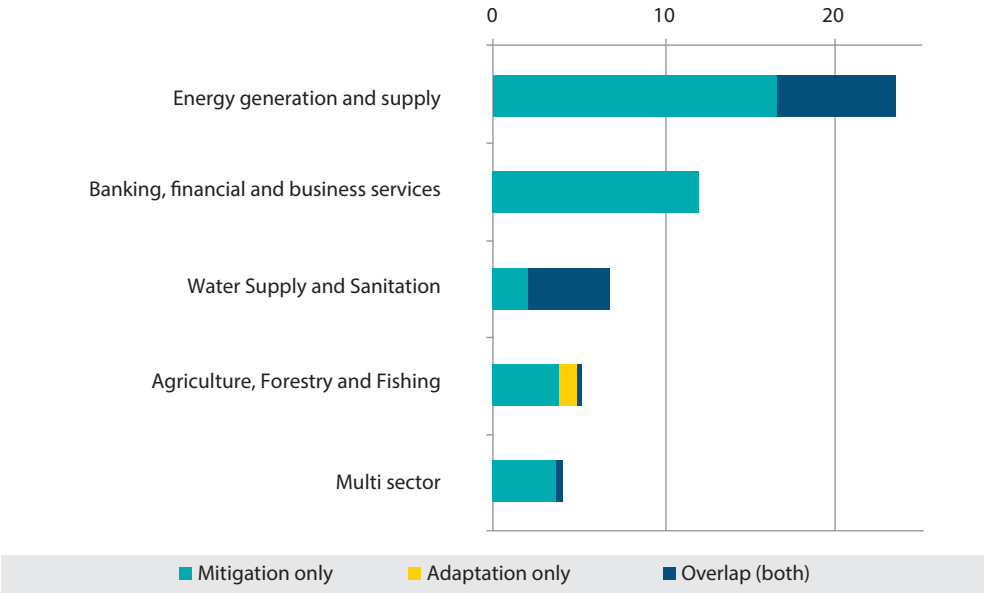
132 World Bank (2014), "Central Asia South Asia Electricity Transmission and Trade Project (CASA-1000)", available at http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2014/03/12/000442464_20140312095302/Rendered/PDF/832500PAD0P145010Box382156B00U0090.pdf (accessed September 2017).

133 OECD (2016), "Financing Climate Action in Kyrgyzstan. Country Study". This country-level study complements OECD (2016), "Financing Climate Action in Eastern Europe, the Caucasus and Central Asia" and was prepared as part of the project "International Climate Finance for EECCA" under the GREEN Action Programme hosted by the OECD. The project was supported by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety.

The same study by the OECD[134] on financing climate action in Kyrgyzstan reports that, while bilateral and multilateral donors committed $59.9 million per year to climate actions in Kyrgyzstan, this amount is 5 times lower than the average for the countries of Eastern Europe, the Caucasus and Central Asia (EECCA). The level of finance is lower than that for Tajikistan (USD 260 million/year) and Moldova (USD 136 million/year), the income levels of which are similar to that of Kyrgyzstan. The committed finance "per capita" is also considerably lower than the EECCA average (USD 10.3 per person vs USD 33.2 per person).

Of the country's economic sectors, the energy sector (energy generation) received the largest amount of climate-related development finance in 2013 and 2014. Of the finance flowing to the energy sector, much addresses both mitigation and adaptation (see Figure 34). Such synergy is possible to realise given the strong energy–water nexus of the Syr Darya Basin. Greater efficiency and diversification of the energy mix can contribute to more effective management of water resources in the basin and reduce the country's greenhouse gas emissions, among other benefits (see section 8.3).

Figure 34: Total climate-related development finance flows by activities.



Source: OECD (2016), "Financing Climate Action in Kyrgyzstan. Country Study".

134 Ibid.

Table 24: Examples of projects supported by international climate-related development finance (committed in 2011–2015).

Project type	Project	Finance provider	Financial instrument and amount	Co-financing by domestic actor	Key domestic institution
Renewable energy	At B3Shy Hydro Power Rehabilitation Programme (2013)	Switzerland (through Swiss State Secretary for Economic Affairs)	Grant (USD 13.7 mln)	N.A.***	Electric Power Plants JSC
	Toktogul Rehabilitation Phase 2 (hydropower) (2014)	ADB. Eurasian Development Bank (EDB)	Grant (ADB: USD 44.5 mln) Concessional loan (ADB: USD 65.5 mln) Loan* (EDB: USD 100 mln)	GoK (USD 40.7 mln) JSC Electric Power Plants (USD 1 mln)	Ministry of Energy and Industry. JSC Electric Power Plants. State Property Fund
Energy efficiency and renewable energy	USAID Regional Energy. Security and Trade Project (RESET) (2011)	United States (through USAID)	Grant (USD 4.4 mln)	N.A.***	The energy companies. Ministry of Energy and Economy.
Energy efficiency (trans mission)	Central Asia South Asia Electricity Transmission and Trade Project (CASA-1000) (2014)	WB (IDA). Islamic Development Bank (IsDB). Arab Coordination Group (ACG), Bilateral donors**	Grant and concessional loan (IDA: USD 45 mln) Grants (Bilateral donors: USD 14 mln) Loan* (IsDB: USD 50 mln) Financing instruments not identified (ACG: USD 40 mln)	Government of Kyrgyzstan (GoK) (USD 33 mln)	JSC National Electric Grid of Kyrgyzstan (NEGK)
	Oshelectro Rehabilitation Project (Distribution networks) (2015)	EBRD	Loan (EBRD: EUR 4mln)	N.A.***	Ministry of Finance. Oshelectro electricity distribution
Energy efficiency (demand side)	Kyrgyzstan Sustainable Energy Financing Facility (KyrSEFF) (2012. 2015)	EBRD. EU	Loan (EBRD: EUR 55 mln as credit lines for two phases) Grant (EU: USD 9.24mln)	N.A.***	Local commercial banks

* Information on concessionality is not available.

** CASA-1000 has received the support of the World Bank Group, Islamic Development Bank, USAID, US State Department, United Kingdom Department for International Development (DFID), Australian Agency for International Development (AusAID) and other donor communities.

*** Information on co-financing from domestic sources is not available.

Source: OECD (2016), "Financing Climate Action in Kyrgyzstan. Country Study".

GLOSSARY

Glossary

Allowed revenues/revenue requirement: These terms relate to the regulated revenues that the regulated utility is allowed to collect. Different methods are used to calculate the allowed revenues. Revenue requirements may be established for different customer classes. Generally speaking, two main approaches are used: rate of return (or cost of service) regulation and incentive-based regulation (including price cap regulation, revenue cap regulation and benchmarking or yardstick regulation).

Capacity: The potential to generate, transport, process or utilise power. Capacity is measured in watts, usually expressed as kilowatts (kW) or megawatts (MW). Generators have rated capacities that describe the output of the generator at its bus bar when operated at its maximum output at a standard ambient air temperature and altitude.

Cogeneration/combined heat and power (CHP): A method of producing power in conjunction with providing process heat to an industry or space and/or water heat to buildings.

Customer class: A collection of customers sharing common usage or interconnection characteristics.

Decoupling regulation: A form of revenue regulation in which the utility's non-variable costs are recovered through a prescribed level of revenues, regardless of the sales volume achieved by the utility. Under traditional regulation, regulators determine a set of customer prices that remain constant (until the next time they are reviewed). As a result, the actual revenues, and implicitly the utility profits, will rise or fall from the expected levels as the sales volumes increase or decrease. Decoupling fixes the amount of revenue to be collected from customers and allows the price charged to float up or down to compensate for variations in the sales volume to maintain the set revenue level. The target revenue is sometimes allowed to increase between tariff reviews on the basis of a fixed inflator or the number of customers served. The effects of abnormal weather can also be removed. Decoupling regulation eliminates the utility management's incentive to increase the profits by increasing the sales and the converse incentive to undermine end-use energy efficiency and customer-sited generation, both of which reduce the sales volume. In many jurisdictions, decoupling has typically been implemented in conjunction with regulator-required, utility-sponsored energy efficiency programmes.

Demand: In theory, the demand is an instantaneous measurement of the rate at which power or natural gas is being consumed by a single customer, a customer class or the entirety of an electric or gas system. The demand is expressed in kW or MW for electricity or therms for natural gas. It is the load-side counterpart to an electric system's capacity.

Demand-side management: Controlling the quantity of energy used at specific times through the modification of consumers' demand – for example, using measures that enable energy efficiency, demand response and energy storage – to reduce the system peak demand, reduce the overall system demand and balance the system supply and demand.

Depreciation: Depreciation, as usually calculated in business accounts, is the systematic and rational allocation of the costs of past expenditures on fixed assets less the estimated salvage value or residual value over subsequent accounting periods corresponding to the assets' estimated useful life. It is necessary to distinguish between *economic depreciation* and *physical, or capacity, depreciation*. The distinction between these two depends on what is eroding or decaying: whether it is the production capabilities of the asset itself or its subsequent

economic value. The *productive efficiency* can be seen as the stream of earnings that the asset will produce over time. As the asset experiences wear and tear, its *productive efficiency* declines and it undergoes a process of *physical depreciation*. *Economic depreciation*, however, is defined as the decline in asset value (or asset price) associated with ageing. The asset value of an asset at any point in time should reflect the expected future earnings – that is, the net present value of the future stream of earnings that is expected from owning the asset. The price decline that occurs each year in an asset's value reflects, in the first instance, the reduction in present value that occurs over a finite service life. In general, an older asset has less opportunity to generate revenue than a younger asset – which reduces the economic value of the former. This decline in asset value, however, will be accelerated if ageing is accompanied by a loss of *productive efficiency*, as all capital assets that suffer wear and tear can be expected to return a lower stream of benefits in any single period. Utilities can use techniques and technologies to uncover information about the equipment's true health or condition to identify the most appropriate measure of asset rehabilitation, replacement or extended deployment.

Economic potential of energy efficiency: The economic potential of energy efficiency forms part of the *technical potential*, which can be implemented cost-effectively using public cost-effectiveness criteria: discount rates, opportunity costs (the export price of natural gas), environmental and other indirect effects and externalities, and so on.

Energy conservation: The use of any device, activity or measure that attempts to reduce energy consumption. Energy conservation is usually meant to denote behavioural changes or changes in patterns of energy use. For example, increasing thermostat settings in the summer or decreasing them in the winter is a form of conservation. Energy conservation may last only as long as the associated behaviour or usage pattern remains in effect.

Energy efficiency: Energy efficiency means the ratio of the output of performance, service, goods or energy to the input of energy. A measure improves energy efficiency if the given energy input achieves greater output or if reduced energy input achieves the given output.

Energy resources: Resources that can be used by the system operator to ensure that the energy supply and demand are met, including generation, demand reduction, load shifting and energy storage.

Externalities: Costs or benefits that are side effects of economic activities and are not reflected in the booked costs of the utility. Environmental impacts are often the principal externalities caused by utilities (e.g., health care costs as a result of air pollution).

Firm capacity: The volume of megawatts guaranteed to be available to provide or reduce energy to the system at any moment in time.

Inclining block tariffs: A form of rate design in which blocks of energy usage have increasing prices as the amount of usage increases. Inclining block rates appropriately, albeit crudely, reflect the fact that increased costs are associated with greater usage. They enhance the economics of energy efficiency by increasing the savings that a customer can achieve by reducing the energy purchases from the utility.

Load: The combined demand for electricity placed on the system. The term is sometimes used in a generalised sense to denote simply the aggregate of customer energy usage on the system or, in a more specific sense, the customer demand at a specific point in time.

Load factor: A measure of the output of a power plant compared with the maximum output that it could produce.

Load shifting/demand response: A broad term to describe intentional actions to adjust electricity use in response to incentives or changes in prices.

Losses/energy losses/technical losses/non-technical losses/commercial losses: The energy (kWh) and power (kW) lost or unaccounted for in the operation of an electric system. Losses generally fall into two categories: "technical losses" in the form of energy lost to heat and "non-technical losses" or "commercial losses", which represent energy theft from illegal connections or tampered meters.

Market potential of energy efficiency: The market potential of energy efficiency forms part of the *economic potential*, which can be implemented cost-effectively using private investment decision-making criteria, given the existing market conditions, prices and restrictions.

Metering discipline: This relates to the use of programmes to manage meters better to prevent electricity theft. Such programmes can incorporate measures: to improve inspectors' access to meters; to verify meter readings; to replace old meters vulnerable to tampering, enabling theft; and to control and monitor the integrity of utility employees.

Payback period: The amount of time required for the net revenues of an investment to return its costs. This metric is often employed as a simple tool for evaluating energy efficiency measures.

Peak demand/peak load: The maximum demand by a single customer, a group of customers located in a particular portion of the electricity system, all of the customers in a class or all of a utility's customers during a specific period of time – hour, day, month, season or year. The system peak demand is the maximum demand placed on the electricity system at a single point in time and may be measured for an entire interconnection, for sub-regions within an interconnection or for individual utilities or service areas.

Reliability: The ability to meet the electricity needs of customers connected to the system over various time scales even when unexpected equipment failures or other factors reduce the amount of available electricity. "Reliability" can be broken down into two general categories – *resource adequacy and system quality*.

- *System quality* refers to the short-term, reliable operation of the power system as it moves electricity from generating sources to retail customers, including the ability of the system to withstand unanticipated disturbances or imbalances in the system while maintaining the required frequency and voltage levels. Balancing and ancillary services contribute to the system quality.
- *Resource adequacy* refers to the presence of enough of the right kinds of resources to match the demand and supply across time and geographic dimensions and to deliver an acceptable level of reliability. In many jurisdictions, reliability standards for resource adequacy are defined, and "loss of load probability" (LOLP) is a commonly used metric.

Seasonal tariffs: A tariff that is higher during the peak-usage months of the year. Seasonal tariffs are intended to reflect the differences in the underlying costs of providing the service associated with different times of the year.

Smart meter: An electric meter with electronics that enable the recording of customer usage in short time intervals and two-way communication of data between the utility and the meter (and, optionally, the customer).

Tariff: A listing of the prices, rates, charges and other terms of service for a utility customer class, as approved by the regulator.

Tariff policy: A broad term used in this paper to refer to the policy, methods and processes related to establishing the allowed revenues for regulated utilities and the tariffs or prices applied to customers to collect these allowed revenues.

Tariff structure/tariff design: Specification of the prices or tariffs used to signal consumers and recover costs. Types of prices or tariffs include inclining block tariffs, seasonal tariffs and time-of-use tariffs.

Tariff review (rate case): A proceeding involving the determination of the rates and policies of a public utility.

Technical (technological) potential of energy efficiency: This is estimated using the assumption that the whole of the existing equipment stock is replaced overnight with the best available models. In other words, specific energy consumption will immediately fall from the "country average" to the "practical minimum". Technological potential only provides hypothetical energy efficiency opportunities; it takes no account of the implementation costs or limitations.

ANNEX 1.

Annex 1

Energy tariffs as of 31 July 2017 (official exchange rate: 80.3617 KGS per 1 EUR[135])

Electricity Tariffs

№	Consumer group	In force from 1 August 2015	
		KGS/kWh	EUR/kWh
1	Households		
1,1	Consuming up to 700 kWh per month (except for the population living in high mountain areas)	0.77	0.0096
1,2	Consuming more than 700 kWh per month (except for the population living in high mountain areas)	2.16	0.0269
1,3	Population living in high mountain areas consuming up to 1000 kWh per month (from October to April)	0.77	0.0096
1,4	Population living in high mountain areas consuming more than 1000 kWh per month (from October to April)	2.16	0.0269
2	Pump Stations	0.779	0.0097
3	Other consumers (industry, agriculture, budget organisations, etc.)	2.24	0.0279

Source: http://www.severelectro.kg/ru/2009-06-12-12-39-17.

Natural Gas Tariffs

№	Consumer group	In force from 01 July 2017	
		KGS/m3	EUR/m3
1	Households	14.48	0.1802
2	Other consumers (industry, agriculture, budget organisations, etc.)	17.75	0.2209

Source: http://kyrgyzstan.gazprom.ru/services/tarif/july2017/.

135 http://www.nbkr.kg/index1.jsp?item=1562&lang=RUS&valuta_id=20&beg_day=31&beg_month=07&beg_year=2017&end_day=01&end_month=08&end_year=2017 (accessed June 2017).

Heat Tariffs*

№	Consumer group	In force from 1 April 2015	
		KGS/ Gcal	EUR/ Gcal
1	Households	1 134.76	14.12
2	Other consumers (industry, agriculture, budget organisations, etc.)	1 695.1	21.09

* See Chapter 4.3 for details of the calculation of energy bills for unmetered heat.

Source: SARFEC's Order No. 46, dated 11 December 2014.

Hot Water Tariffs**

№	Consumer group	In force from 1 April 2015	
Without meters			
		KGS/ Gcal	EUR/ Gcal
1.1	Households	981.76	12.22
2.1	Other consumers (industry, agriculture, budget organisations, etc.)	1 695.1	21.09
With meters			
		KGS/m3	EUR/m3
1.2	Households	64.38	0.80
2.2	Other consumers (industry, agriculture, budget organisations, etc.)	97.19	1.21

** See Chapter 4.3 for details of the calculation of energy bills for unmetered hot water.

Source: SARFEC's Order No. 46, dated 11 December 2014.

ANNEX 2.

Annex 2.

Comparison of conditions for the use of an ESCO in the public sector

Current public finance rules in KG	Changes required for the establishment of the ESCO scheme
1. Usage of *actual* energy consumption per month/year	1. Usage of ***baseline*** energy consumption calculated by average consumption over the last 2–5 years
2. Costs = current prices * actual volume	2. Costs = current prices * *baseline consumption*[136]
3. The budget covers 100% of the costs calculated in Item 2	3. The budget covers lower costs according to energy performance contracts, for example 90–95% of the costs calculated in Item 2 (above)
4. The budget has no savings at all	4. The budget organisation has guaranteed energy savings, for example 5–10% of the costs calculated in Item 2
5. To implement EE measures, it is necessary to provide additional budget funds	5. To implement EE measures, there is no need for budget funds. The costs are covered by the ESCO
6. Actual energy consumption = +- *baseline* energy consumption	6. The actual energy consumption is 30–50% lower than the *baseline* energy consumption
No benefit for the country Extra expenditures on EE measures (see Item 5) If EE is improved, the budget of the organisation is reduced by the amount of expenses saved There are no guarantees or incentives that a certain EE performance will be achieved	Budget savings, for example 5–10% – see item 1 Contribution to the attaining of EE targets – energy is used 30–50% more efficiently Expenses on EE measures are covered by the ESCO The ESCO guarantees EE improvement for the next 10–15 years New job creation The production of EE materials and technologies is incentivised

136 The baseline can be adjusted based on degree-days or a change in the purpose of the building.

Energy Charter Protocol on Energy Efficiency
and Related Environmental Aspects
PEEREA

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