

ADB TA 8727 REG

CAREC: Study for Power Sector Financing Road Map

Mobilizing Financing for Priority Projects

Kyrgyz Republic September 2016



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List of abbreviations

| | |
|-----------|--|
| ADB | Asian Development Bank |
| ADO | Asian Development Outlook |
| Bn | Billion |
| CAREC | Central Asia Regional Economic Cooperation |
| CASA | Central Asia South Asia |
| CHP | Combined Heat and Power |
| CIS | Commonwealth of Independent States |
| CASA-1000 | Central Asia South Asia Electricity Transmission Project |
| EAP | Energy Action Plan |
| EBRD | European Bank for Reconstruction and Development |
| EPP | Electric Power Plants |
| ESCC | Energy Sector Coordinating Committee |
| ESO | Energy Supplying Organizations |
| FDI | Foreign Direct Investment |
| GDP | Gross Domestic Product |
| GWh | Gigawatt Hour |
| HPP | Hydro Power Plant |
| IEA | International Energy Agency |
| IPA | Investment Promotion Agency |
| IPO | Initial Public Offering |
| kWh | Kilowatt-hour |
| Mn | Million |
| MW | Mega Watt |
| NRSE | Non-traditional Renewable Sources of Energy |
| NSSD | National Sustainable Development Strategy |
| PPA | Power Purchase Agreements |
| PPPs | Public Private Partnerships |
| PSMP | Power Sector Master Plan (CAREC Regional) |
| R&M | Repair and Maintenance |
| REC | Regional Electric Grid Companies |
| TBEA | Tebian Electric Apparatus |
| TOE | Tons Of Oil Equivalent |
| TPP | Thermal Power Plant |
| UHV | Ultra-High voltage |
| UNDP | United Nations Development Programme |
| USAID | United States Agency for International Development |

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1. National power sector overview

The power sector is one of the major contributors to the Kyrgyz Republic economy, contributing for about 3.9% of GDP and 16% of industrial production. The majority of the country's current generating capacity is hydropower which serves the purpose of generating electricity and supplying water for irrigation in the Kyrgyz Republic and downstream countries.

In this section, we have provided a brief description of the companies/ agencies involved in the sector, including their roles and ownership structure. Further, we have discussed the historical electricity supply and demand situation in the country along with a description of the regulatory landscape and institutions involved in regulating the sector.

1.1. Industry structure and institutional arrangements

The power industry in Kyrgyz Republic is unbundled into generation, transmission & distribution segments. The sector was restructured in 2001, and OJSC “Kyrgyzenergo”, which acted as a sole authority within a single vertically integrated system, was divided into eight companies as shown below:



The Government of the Kyrgyz Republic owns the controlling stake of OJSC “Electric Stations”, “National Electric System of Kyrgyzstan”, “Severelektro”, “Vostokelektro”, “Oshelektro”, “Jalalabatelektro” & “Bishkekteploset”. However, the companies have been structured/ formed on the lines of a corporate entity so as to bring in enhanced levels of accountability, transparency, efficiency, commercial orientation, and also to mobilise investments and financing for future capital expenditure (capex).

Transmission of electricity from generation companies (GENCOs) to distribution companies (DISCOs) is implemented by JSC “National Electric System of Kyrgyzstan” (NESK). NESK is a power transmitting and dispatch Control Company that consists of 6 local enterprises of high-voltage electrical networks (EHVEN) which exploit the electrical grids of 110-220-500 kV by voltage. State owned DISCOs are often called ‘Great Distribution Companies’. The Kumtor region (gold-mines) has its own distribution network and is not supplied with electricity from the state owned distribution entities. Private sector participation exists in generation & distribution segments; however, their contribution to the power industry in their respective segments is relatively small (e.g. private players contribute only around 1% to the total hydropower generation of the country).

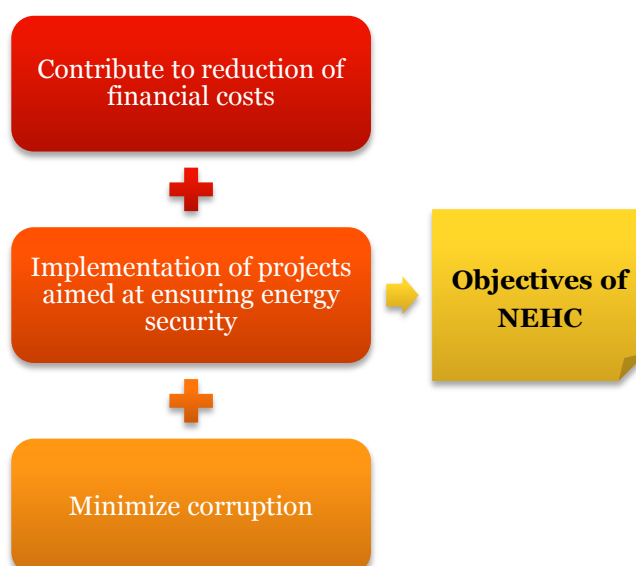
Till November 2015, the State Department for Regulation of the Fuel and Energy Sector (State Department or SDRFEC) under the Ministry of Energy and Industry of the Kyrgyz Republic oversaw planning for the power companies. In addition, based on the existing tariffs for ultimate consumers, the State Department set tariffs for DISCOMs buying electricity from the GENCO and transmitting it via networks of the transmission company. Final settlements between generation, transmission and distribution companies are made through the JSC RSK Bank.

The National Energy Holding Company OJSC

It may be noted that in November 2015, the Kyrgyz government established the National Energy Holding Company OJSC in place of the Ministry of Energy and Industry. This company shall be responsible for the management and promotion of the energy sector of the country.

The idea behind this is to increase the efficiency and flexibility in the management of the industry. The National Energy Holding Company will also help contribute to the reduction of financial costs, minimise corruption and implementation of projects aimed at ensuring energy security of the country. This company is also expected to carry out energy sector governance reforms. National Energy Holding Company OJSC will be 100% state-owned enterprise.

The National Energy Holding, established on 2 February 2016, aimed at managing the energy sector and make it open and transparent. This company is to be responsible for management and promotion of the energy sector of the country. 80.49% of shares of 9 JSCs Electric Power Stations, NESK, DISCOMs, Bishkek heating network, and all shares of the Chakan Hydro Power Plant and the newly established Kyrgyz Energy Settlement Center are to be transferred to the Energy Holding. The Ministry of Economy will oversee the functions of the Energy Holding Company.



Some other recent changes include:

- Up to June 2016, the Ministry of Economy (MoE) was responsible for governing the power sector institutions in the country. Recently, from June 2016, the Government has established the State Committee on Industry, Energy and Subsoil Use, which has taken over the function of a policy-making body for the power sector.
- Previously, the State Department for Regulating the Fuel & Energy Sector under the Ministry of Energy & Industry of the Kyrgyz Republic was responsible for strategic planning, policy development, sector regulation and setting of technical standards. The State Department for Regulating the Fuel & Energy Sector, which acts the regulator for the energy sector, was earlier under MoE, but with effect from November 2014, it is acting as a separate entity. The regulator among other aspects is responsible for setting energy tariffs.

Private participation

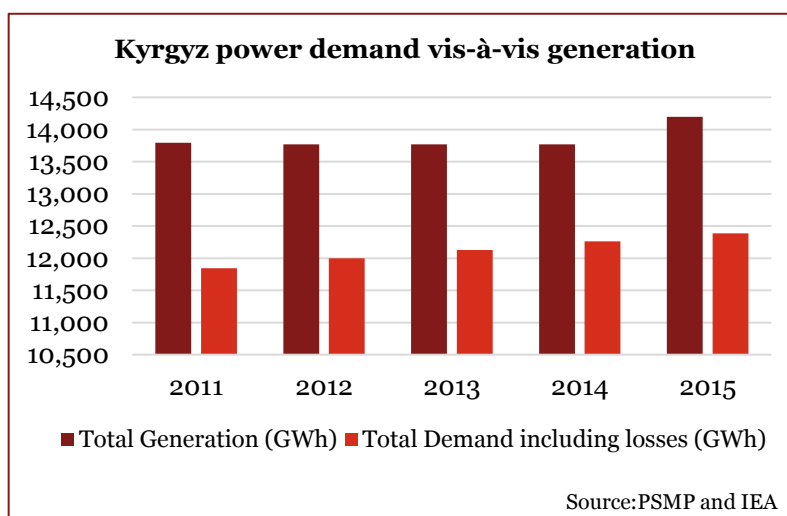
There is minimal private sector participation in the power sector of the Kyrgyz Republic despite institutional restructuring. The state-owned OJSC Electric Power Plants (EPP) account for 98% of the total power produced, leaving only 2% of power generated from privately owned small hydropower plants.

While some private small distributors were initially licensed in 2009 to purchase electricity from power plants and distribute electricity in some regions, these distributors typically operate on low voltage lines. Thus, these companies do not provide users with an effective alternative to the existing state owned regional distribution companies. In addition, there is no market competition among electrical distribution companies, each of which operates in its own territories which do not overlap.

1.2. Power supply and demand

Hydropower plants have the largest share in Kyrgyz Republic's power generation structure. The Kyrgyz power sector faces a major challenge in the form of a widening gap between available winter generation capacity and winter demand. The hydropower capacity is sufficient to address the demand during summer.

The chart alongside captures the overall annual power generation vis-à-vis demand. It is to be noted that hydro power plants (HPPs) in Kyrgyz Republic experience the highest electricity generation during summer when the water flow in rivers is high and this does not contribute much to meeting power demand during the winter season which is exacerbated further by the high losses in the power system.



The increase in power consumption has outstripped the growth in new generating capacities in the last decade. During the period from 1990 to 2011, the maximum load on the grid has increased as a whole throughout the country by 1,214 MWs, including in the north by 784 MW and in the south by 430 MW. Between 2011 and 2015, domestic power consumption grew at an average rate of 7-9%, while the power generation annually stagnated at 13-14 Bn kWh (assuming regular levels of water inflow and the state of its reserves in the Toktogul reservoir).

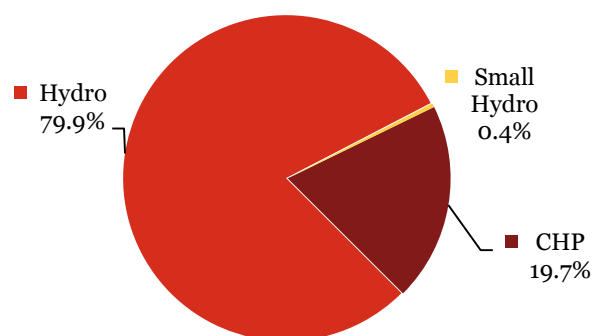
- One of the key objectives for the Kyrgyz Republic will be to leverage high flow; hence, it is required to exhaust the surplus power generated during the summer and be able to export the additional electricity.
- The widening gap between available capacity and peak demand and available winter generation and winter consumption calls for improving peaking capacity and firm base load capacity.
- Increase in the generating capacity is not sufficient to cater to the increasing power demand. Only one 120 MW generating facility has been commissioned since 1991 which is the Kambarata HPP-2, which accounts for only 3% of the total installed capacity of the power system.

1.2.1. Power Supply

Kyrgyz Republic, located in the Pamir and Tien Shan mountains, is blessed with substantial hydro potential. The region's major rivers such as the Naryn, Chu, Talas, Saryjaz, Kara Darya, Chatkal, and others that belong to the Syr Darya and Amu Darya basins find their sources in the Kyrgyz Republic. Naryn river basin is most developed, with a chain of Toktogul HPPs located in the lower reaches of the Naryn river basin. This is the Lower Naryn chain of hydropower plants comprising 6 HPPs. The At-Bashi hydropower plant with installed capacity of 40 MW operates in the upper reaches of the Naryn River. The Chu River basin, with 9 small hydropower plants and a total installed capacity of 38.5 MW, is owned by JSC Chakan HPP with a 100% state shareholding.

The total installed capacity is 3,640 MW. Of this, hydropower capacity accounts for 2,950 MW and thermal capacity accounts for 690 MW. Almost 90% of the total hydropower capacity can be attributed to the Naryn hydroelectric cascade with a large Toktogul reservoir having substantial storage capacity (19 bcm). The operating power plants in Kyrgyz Republic are shown in **Appendix A**.

Installed capacity (MW), 2014
Source: Ministry of Energy & Industry



- HPPs and small HPPs account for 93.5% of power generated, followed by TPPs at 6.5%.
- Kyrgyz Republic's HPPs generate 92% percent of domestically consumed electricity.
- While CHP's account for ~1/5th of the installed capacity, TPPs usually do not use more than 30% of their capacity due to

The available hydropower resources are equivalent to potential capacity of 18,500 MW of which only around 15% (2950 MW) has been harnessed.

The table below captures the electricity production in the Kyrgyz Republic by fuel type:

| Kyrgyz Republic's electricity production over the year (GWh) | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|
| Year→ Fuel Type↓ | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| Coal | 1,595 | 1,335 | 386 | 604 | 635 | 728 | 786 |
| Oil | 114 | 108 | 400 | 207 | 231 | 180 | 101 |
| Gas | 385 | 222 | 80 | 181 | 153 | 81 | 27 |
| Hydro | 12,736 | 10,124 | 10,217 | 11,108 | 14,139 | 14,179 | 13,097 |

Source: IEA

Imports from Kazakhstan and Tajikistan

Power Imports are relied upon during the winter season when the flow of rivers is low unlike the summer season and the power demand is high. In order to cater to the growing power demand during the winter season, Kyrgyz usually imports electricity from Tajikistan in the summer and from Kazakhstan in the winter. Usually,

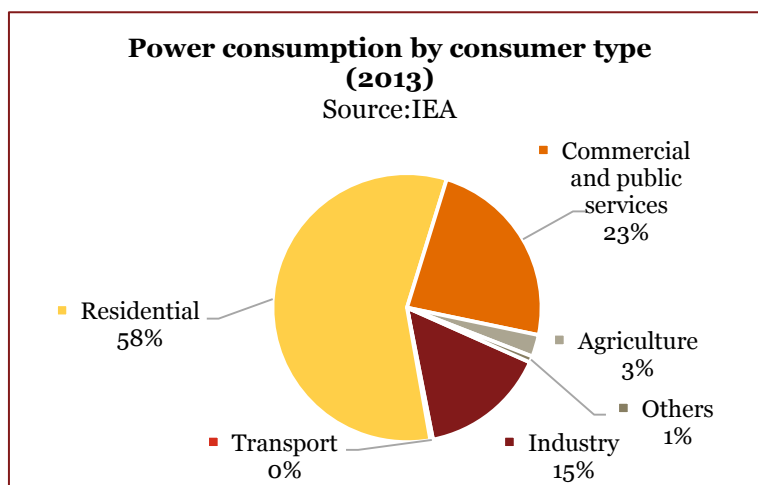
during winter season, Kazakhstan and Uzbekistan, which export power and gas to Kyrgyz Republic, curtail their supplies due to the drop in air temperature, and increase domestic gas consumption. Moreover, the power imported from Kazakhstan in winter is more expensive than in the summer season. In March 2015, Kyrgyz paid about 9 cents per kWh of Kazakhstan's electricity, and in April and May the cost was equal to about 6 cents.

Kyrgyz Energy Crisis of 2007-2009

Electricity generation decreased ominously from 2007 to 2009 as a result of an energy crisis due to low water level in the Toktogul reservoir, further compounded by an unusually cold winter. This saw widespread outages across Kyrgyz Republic and curtailed opportunities for export. Domestic and export demand have increased steadily since the crisis ended, with the majority of domestic demand growth occurring during winter months. Power exports started to increase gradually since 2010. It may be noted that in 2012 the Kyrgyz Republic exported 1,500 GWh of power in stark contrast to 2008 when Kyrgyz Republic exported only 0.54 GWh of power.

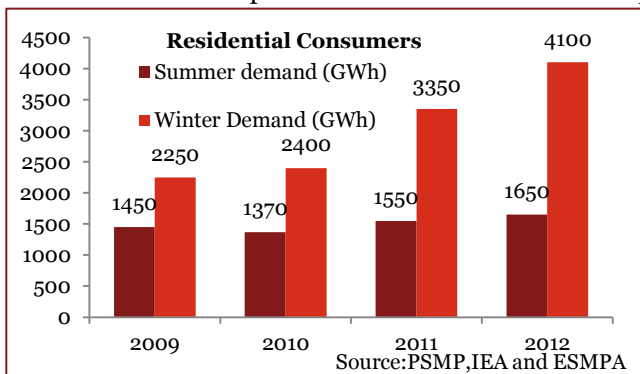
1.2.2. Power demand

The domestic power production in 2013 was pegged at 14,011 GWh, of which only 10,267 GWh was available for domestic power consumption given the losses in the system. Residential power customers formed the largest portion of the power consumers accounting for 58% of the total domestic power consumption followed by the commercial and public services at 23 % and Industry at 15% of the total power consumption.



However, with a large domestic consumer base, the residential share of accounts receivable is consistently larger than the residential share of revenue. The residential and commercial & public services sectors are synonymous with inefficient use of gas, water and heat resources. Industrial power consumers account for 15 % of the total power consumption.

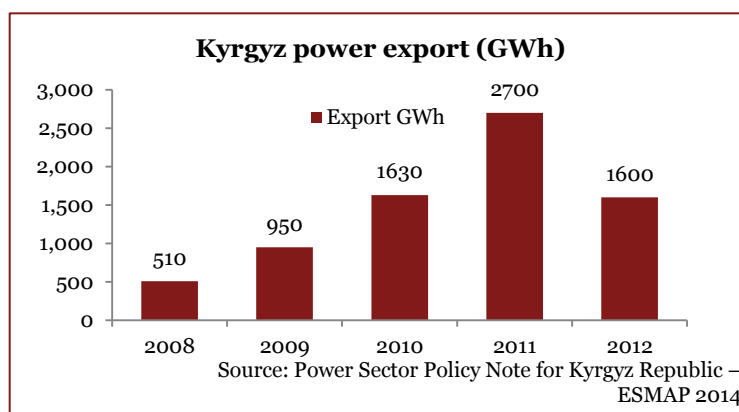
Most of the Central Asian countries experienced a sharp decline in overall electricity demand owing to lack of industrial demand post dissociation of the Soviet Republic. However, the Kyrgyz Republic, which is hydropower dependent, experienced increased consumption of electricity as the tariff was low for hydropower compared to other fuels (such as coal, fuel oil, and natural gas which experienced price fluctuations due to global trends).



GWh and winter demand consumption for residential consumers has shown an increase of 78% from 2009 to

2012. The chart alongside captures the huge difference between winter and summer demand for residential consumers who form the major portion of the power consumers.

Power plants in the Kyrgyz Republic generate 12,000 to 14,000 GWh of power annually of which approximately 2,000 GWh is exported to Kazakhstan, Russia, Tajikistan and Uzbekistan. Export growth is directly linked to the water flow during the summer season and water levels in the Toktogul reservoir. It may be noted further, from the adjacent graph, that the power export volume from Kyrgyz Republic has shown an increasing trend from 2008.



While GDP increased at an average annual growth rate of 3% between 2008 and 2012, the electricity consumption increased at a lower annual average rate of 2.5% over the same period. The same period witnessed a fall in electricity tariffs in real terms. The average summer consumption, however, increased by 1.2% over the same period, which is much slower than the GDP growth. Most of the increase in electricity demand took place during the winter due to heating requirements.

Export demand is projected to grow, especially if the CASA-1000 transmission line connecting the power grids of Tajikistan, the Kyrgyz Republic, Pakistan and Afghanistan comes online. If completed as scheduled, the line would increase export potential from the Kyrgyz Republic to 1,600 GWh by 2020.

In 2013, Kazakhstan imported from Kyrgyzstan 365.6 million kWh of electricity in connection with additional 19 water releases from the Toktogul reservoir (Kyrgyz Republic) in the interests of water users from southern Kazakhstan).

Decline in power exports due to the Energy Crisis of 2008

During the years 2008 and 2009, the power output decreased to 10.3 Bn kWh from 12-14 Bn kWh for two years because of abnormally low inflow in the rivers. The shortage in power in winter time during the 2007-08 season was almost 400-500 MW. Restriction on power consumption in the form of rotating disconnection of consumers was imposed in these years.

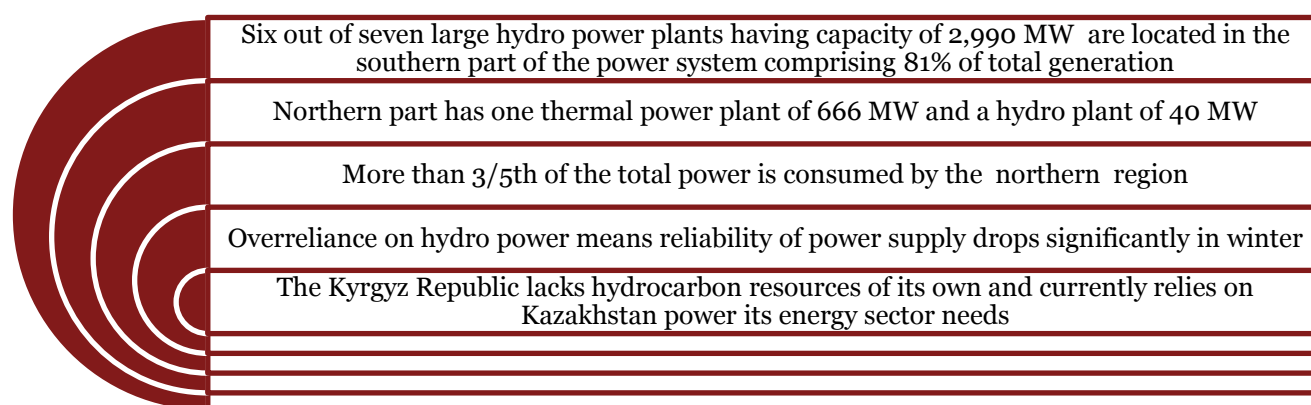
Power generation in 2008 was much below the regular levels, and hence insufficient to meet export demand. As a result, the share of exports dropped from 24% of combined domestic and export consumption in 2007 to 7% in 2008 while export revenue, which more than doubled from 2008 to 2012 as a result of a 175% increase in the volume of power exported on account of high water season during 2011.

The 2014-2015 winter situation experienced significantly reduced water inflows in the Toktogul reservoir on account of insufficient precipitation and glacier melting which was exacerbated by low levels of coal and fuel oil reserves due to the dire financial condition of the energy sector.

Skewed power generation and distribution pattern

Kyrgyz Republic's lopsided distribution of power generation assets and power consumption pattern is clearly evident while comparing the northern and southern regions. A skewed power generation and demand pattern further exacerbates the power condition in Kyrgyz Republic since more than 60% of the power demand can be attributed to the northern region having limited power generation facilities while the southern region with 81 % of the power generation has a lower power demand unlike the northern part.

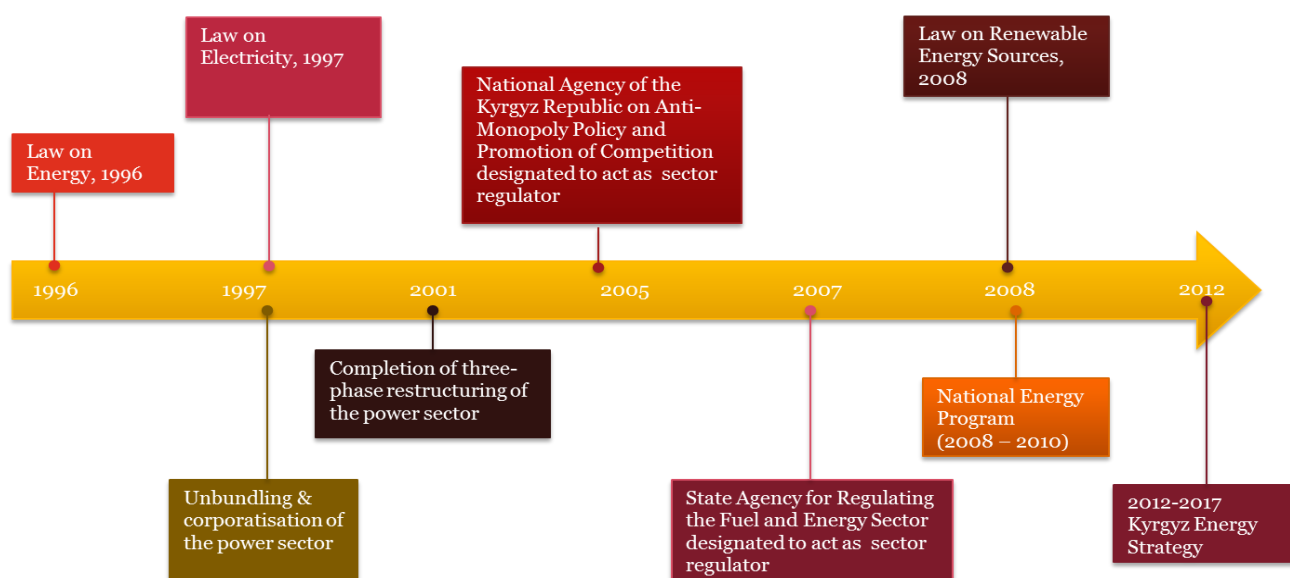
Six out of seven large hydropower plants having a capacity of 2,990 MW are located in the southern part of the power system comprising 81% of total generation, whereas northern part has one thermal power plant of 666 MW and a hydropower plant of 40 MW. The HPPs were installed during the Soviet era and are in need of rehabilitation and modernisation as they were devoid of proper maintenance. The figure below captures the key aspects of the skewed power generation and power demand pattern:



1.3. Sector regulation

1.3.1. Evolution of legal and regulatory landscape

In Kyrgyz Republic, the major regulatory changes in the power sector started after 1990. The key regulatory milestones in the power sector since the 1990s are represented in the schematic diagram below:



1.3.2. Key aspects of the legal and regulatory landscape

Licensing framework

As per the **Electricity Law, 1997**, the functions of generation, transmission, distribution and sale of energy can be taken by any agency only after obtaining separate license for each of these activities. Only the generating stations which are using all the electricity for their own use and are not connected to the National Grid are exempted from obtaining license. All the licenses are issued by the State Agency for Regulating the Fuel & Energy Sector under the Government of the Kyrgyz Republic (State Energy Agency). Further, the Electricity Law clearly specifies the detailed provisions regarding issuance of licenses, processing applications, reasons for refusal, and temporary suspension and withdrawal of license, etc. As per the law, decisions regarding the issue of licenses are to be made within 30 days from the receipt of application and necessary documents.

The section on licensing in the Electricity Law has detailed guidelines with respect to monitoring and compliance of the licensees. The information from licensees is requested by the State Department on a monthly as well as quarterly basis for analysis and control is carried out locally as necessary.

Protection for foreign investors

Article 18 of Law on Energy, 1996 recognises the role to be played by private legal entities or individuals in the sub-sectors of energy and ensures favourable treatment to investors commensurate with their role and contribution. Some of the benefits to foreign investors as per **Law of Investments** are:

- Equal investment rights for local and foreign investors.
- No intervention in business activities by state authorities and officials of local governments.
- The right to freely export or repatriate in fully convertible currency, compensation, as well as income derived from investments.
- The right to freely exercise at their own discretion, the right to possess, use and dispose of their investments, revenues and profits obtained by the said investments, for any purpose not prohibited by the legislation of the Kyrgyz Republic.
- In the case of amendments or additions to the investment, tax or customs legislation of the Kyrgyz Republic, investors have the **right to choose the most favourable** conditions for them within a period of 10 years from the date of implementation of their investment activities (or the period specified by the investment agreement).
- Other guarantees specifically provided in bilateral and multilateral international treaties on the promotion and protection of investment.
- Investors are allowed to obtain insurance (from local/foreign insurance companies) for investments with no interference from the government.

In 2014, the Government of Kyrgyz also established the Agency for Investment Promotion under the Ministry of Economy to function as the one-stop shop for foreign investors.

Policy for promotion of renewable energy

In 2008, the Government of Kyrgyz Republic came up with the legal, organisational, economic and financial framework for Renewable Energy known as **Law on Renewable Energy Sources, 2008**, with the following features:

- Procurement guarantee of the surplus power, i.e. excess of self-consumption generated by the developer, and sale to end-consumer directly.
- Free & non-discriminatory access to the networks of the National Power Grid and the power DISCOMs.
- Setting up of tariff such that RE generators are able to recover initial cost within a recovery period of 8 years. Depending upon the technology, suitable cost recovery mechanism has been developed to enable the recovery of cost for that technology.
- Guarantee of marketing for energy produced by using renewable energy sources.
- Customs duty exemption for import and export of renewable energy equipment, facilities and spare parts.
- Financing of scientific and technical research for renewable energy development and use is provided from the Republican budget.

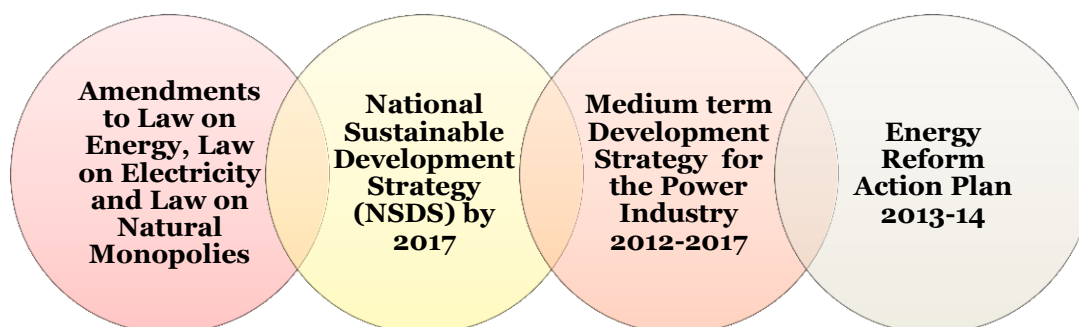
The above provisions make the renewable energy sector attractive for investors. However, there have been issues in implementation of some of the above provisions and regulatory framework needs to be strengthened further for promotion of renewable energy in the country.

Recent government initiatives for energy sector

The Parliament of the Kyrgyz Republic has approved amendments to the Law on Energy, the Law on Electricity and the Law on Natural Monopolies on 19 July 2014. The amendments are aimed at delineating the roles and

responsibilities with respect to ownership, policy-making, economic regulation, and technical inspection. The government approved a resolution on the State Regulatory Agency of the Fuel and Energy Complex (Resolution No.650, dated 14 November 2014) establishing it as the single economic regulator in the energy sector. The resolution prescribes the economic regulatory functions, including licensing, tariff setting, and performance monitoring, entirely and exclusively to the Regulatory Agency. The resolution also specifies the organisational set-up, initial staffing and financing arrangements for the Regulatory Agency.

The few recent initiatives apart from the one listed in the previous sections are as below:



The medium-term development programme of the Kyrgyz Republic for 2010–2014 sets out the government’s social and economic development strategy. The programme is complemented by the short-term energy sector development strategy and priorities for 2009–2012 which sets out reforms and development plans for the energy sector.

New Medium Term Tariff Policy for period 2014-17

A new Medium Term Tariff Policy (MTTP) covering the period from 2014 to 2017 has been adopted in Kyrgyzstan. It aimed at improving the financial stability of the sector and improving the quality of supply by updating the infrastructure. The key features of the Medium Term Tariff Policy are highlighted as below:

| | |
|---------------------------------------|---|
| Two part tariff | •Introduction of two-part hydro tariff and gradually bringing the tariffs for both electric and thermal energy to the cost recovery levels |
| Inflation adjustment in tariff | •Annual tariff adjustment for inflation against the previous year |
| Energy efficiency | •Winter consumption is thrice the summer consumption; thus the new policy aims at reducing winter peak consumption therefore reducing imports |
| Repayment for loans | •Implementation of a repayment mechanism of loans |

The principles of the tariff design as per the new policy are:

- protection for vulnerable customers through the implementation of block tariffs;

- tariffs designed to represent the cost of serving the various classes of customers;
- recovery of the full cost of electricity from the use of electricity that is in excess of the block threshold.

The table below thus shows the end user tariff for Kyrgyz Republic after the introduction MTTP covering the period from 2014 to 2017 with effect from April 2014.

| Year | Residential consumption ≤ 700 kWh/month | Residential consumption > 700 kWh/month | Industrial and Related | Pumping stations |
|-------------|--|---|-------------------------------|-------------------------|
| 2014 | 0.70 | 1.20 | 1.38 | 0.728 |
| 2015 | 0.84 | 1.287 | 1.477 | 0.779 |
| 2016 | 1.01 | 1.377 | 1.580 | 0.833 |
| 2017 | 1.21 | 1.474 | 1.691 | 0.892 |

(Source: *Medium Term Electricity Tariff Policy for 2014-17*)

The table shows that although a roadmap has been set for revising tariff and also for reducing cross subsidies, more efforts are required to bring the tariffs to the level of cost recovery. For example, residential tariff in actual has been only increased to Som 0.77 till August 2017 (contrary to the above mentioned trajectory).

2. Power sector development and investment plan

2.1. Objectives driving sector development

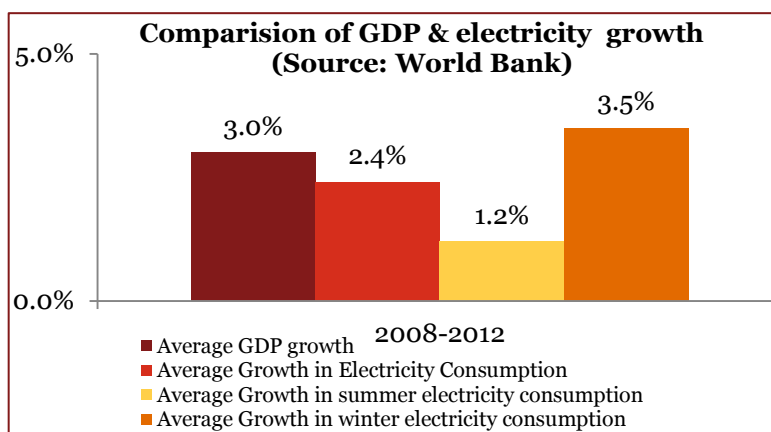
Economic growth in Kyrgyz Republic in the recent years has been driven, on the production side, by rapid expansion of services, particularly in trade and telecommunications. On the demand side, growth has been driven by domestic consumption, which was boosted by high rates of labour migration and workers' remittances.

The medium-term Power Sector Development Strategy (2012-2017) aims to establish a reliable, efficient and transparent energy sector that will meet the needs of Kyrgyz Republic population and its economy in a sustainable manner. The strategy targets to ensure that the energy sector does not remain a financial burden to the state budget rather acts as a financial contributor with sector companies in a position to competitively attract private capital based on the strength of their balance sheets.

In order to achieve these goals, the government adopted the Energy Sector Reform Action Plan for 2013-14, which includes policy actions that will form the foundation for achieving the medium term goals. This Action Plan foresees the development of a Settlement Centre for the transparent operation of the wholesale market, using a tariff-setting methodology and policy that will ensure the achievement of cost-recovery levels of tariffs, adopting a new Energy Law outlining the functions of policy-making, economic regulation, anti-monopoly monitoring, the transparent and competitive procurement of fuel resources, and escrow accounts for power export revenues for the power generation and transmission companies.

The Kyrgyz power sector is grappling with several challenges. The foremost obstacle is reinstating the reliability of the electricity supply, maintenance and rehabilitation of the generation assets and of the transmission and distribution systems. As a result of these issues, the power sector's financial performance has been poor and even though commercial losses have reduced, accumulated debt from earlier periods continue to remain. The risk of a collapse of ageing power generation assets belonging to the Soviet era is high, and the spare parts are no longer manufactured in the Russian Federation. Such a collapse could have severe economic consequences as was evident during the winter of 2008–2009. Kyrgyz Power sector is in need of a thorough financial overhaul as well as needs to rehabilitate and modernise the ageing power assets.

| GDP by sectors (in %) (Source : ADB Outlook) | | | | |
|--|--------------------|-------------|----------|----------|
| Year | Overall GDP growth | Agriculture | Industry | Services |
| 2008 | 8.4 | 0.9 | 14 | 11 |
| 2009 | 2.9 | 6.7 | -0.3 | 2.3 |
| 2010 | -0.5 | -2.6 | 2.5 | -1.1 |
| 2011 | 6.0 | 1.9 | 7.0 | 6.9 |
| 2012 | -0.1 | 1.2 | -11.7 | 6.5 |
| 2013 | 10.9 | 2.6 | 30.5 | 4.7 |
| 2014 | 4.0 | -0.5 | 5.7 | 4.6 |
| 2015 | 3.5 | 6.2 | 1.4 | 3.7 |



Moreover, the financially weak power sector companies have not been able to maintain and invest in their assets, which led to the deterioration of those assets. The deterioration has a cascading effect on power supply reliability and service quality to customers. Customers, as a consequence are unwilling to accept the tariff increases necessary to improve the power companies financial performance. Poorly targeted subsidy schemes also make it difficult to increase tariffs, as some customers are particularly vulnerable to tariff increases

The financial condition of the power sector has improved in recent years, but there is still a large gap between costs and cash collected. Export revenues have helped to disguise the poor performance of the sector domestically. The cost of generation has been consistently higher than the cash collected from domestic consumption. From 2007 to 2012, the sector's actual costs incurred per kWh of domestic consumption were, on average, 35 % higher than the average cash collected from domestic end-users. The schematic below enumerates the key challenges that need to be addressed in the Kyrgyz power sector:



The Kyrgyz National Energy Program

In this context, the National Energy Program outlines the key goals of the power sector up to 2025:

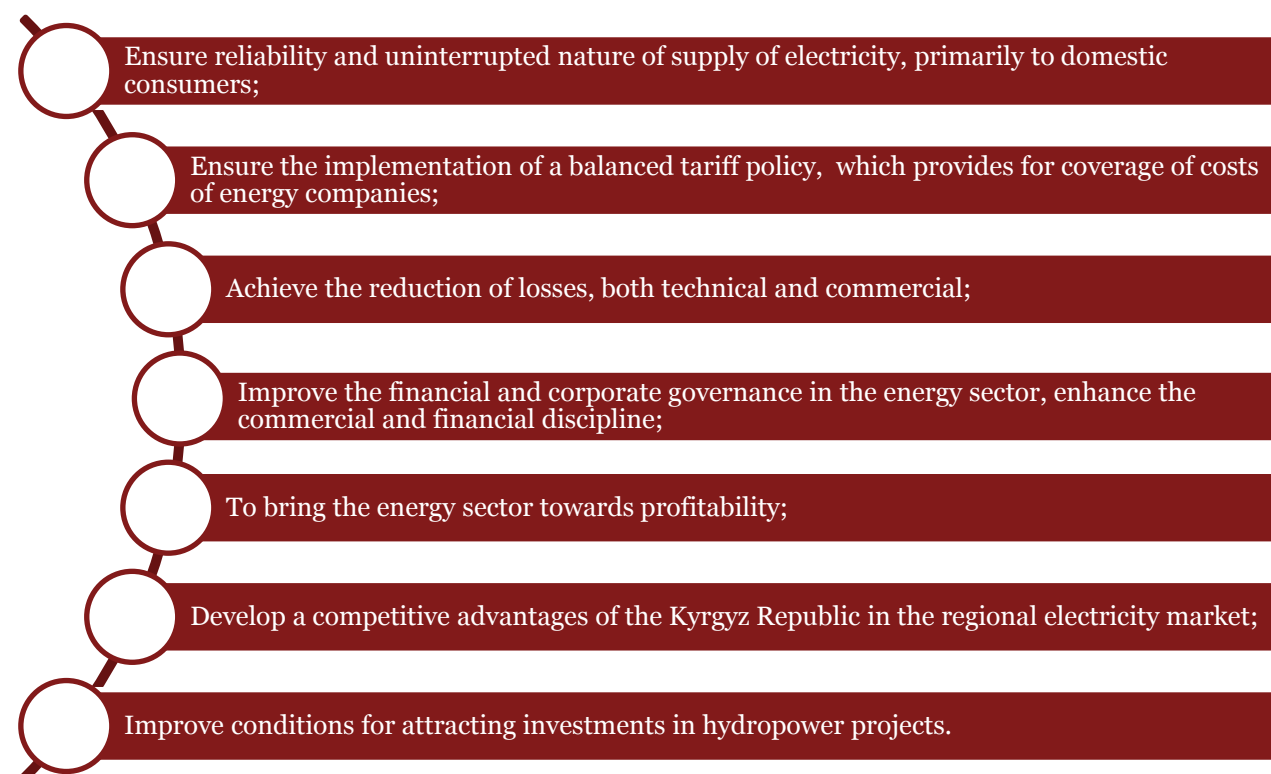
- Formation of the structure and placement of generating capacities and transmission main grids guaranteeing energy security and sustainability of the Kyrgyz Republic with energy resources;
- Ensuring reliable electricity and heating supply to meet the domestic economy and population needs;
- Completion of EPS reforming as a full-fledged element of the market economy in accordance with the new provisions of the energy policy with adoption of necessary legislative and normative acts aimed at regulation of the current processes in the sector;
- Approaching parameters of efficiency indicators of electricity and heat generation, transmission and distribution, negative impact on the environment;
- Modernisation and increasing the EPS production capacity and increasing its efficiency based on the application of new technologies, introduction of an automatic system of management and optimal regulation of load patterns;
- Creation of complexes of generating capacities and transmission lines based on use of hydropower resources and coal deposits of the country, oriented mainly at electricity export and electricity supply of energy-consuming industries that can promote the efficiency of the sector and sustainable development of economy of the Kyrgyz Republic;
- Active participation in interstate integration in the power sector within the framework of Euro Asia Cooperation organisation and bilaterally, in preparation and creation of the single competitive electric energy and capacity market.

Policies pertaining to energy sector in Kyrgyz Republic

In the wake of the challenges facing the country, the Government of the Kyrgyz Republic has adopted a number of strategic documents on the energy sector reform in the last few year. The key plans that provide the basis for the reform are the following:



The key objective of Kyrgyz's energy sector is to ensure the energy security and the development of export potential. The government is focusing on the following set of objectives towards development of electrical energy that will allow Kyrgyzstan to become a major producer of electricity in the region by 2017 and fully provide the population with electricity and increase the export of electricity to neighbouring countries.



It is also foreseen that one of the most important routes for development for the national energy sector will be the promotion of renewable sources of energy via micro-energy industry and through creating favourable conditions for investments in this industry.

The investment required for the Kyrgyz power sector as per the Power Sector Master Plan is provided in **Appendix B**.

Alignment of the power sector objective of the Kyrgyz Republic with the CAREC Energy Work Plan, 2016 – 20

The table below provides a brief overview of alignment of the Kyrgyz Republic's power sectors goals and objectives with the CAREC EWP 2016-20

| No | Element of EWP | Objectives of Kyrgyz's power sector |
|----|---|--|
| 1. | Developing the East-Central Asia-South Asia Corridor | <ul style="list-style-type: none"> The development of the CASA-1000 project will transmit power from Kyrgyz Republic in Central Asia during the summer season to Pakistan and Afghanistan in South Asia. The National Sustainable Development Strategy outlines the construction of 500 kV Datka-Khudjand transmission line for the CASA-1000 project as one of the key priorities. |
| 2. | Promoting regional electricity trade and harmonization | <ul style="list-style-type: none"> Among the key objectives of the Kyrgyz National Energy Program is adoption of measures aimed at maintaining the competitively beneficial position of the Kyrgyz Republic at the regional electricity exporting market and development of export capacity based on introduction of an open regional energy market. The envisaged construction of the Kambarata-1 HPP, continuation of construction of the Kambarata-2 HPP, commencement of operations of Power Units Two and Three, construction of the Upper Naryn cascade of hydro-electric power plants are key to tapping into Kyrgyz Republic's export potential. The National Sustainable Development Strategy for the Kyrgyz Republic aims that by the end of 2017, the Kyrgyz Republic will achieve significant progress towards achieving energy independence, and make a serious bid for the acquisition, in the near future, of a status of a major exporter of electricity. The NSSD aims to retune relations with neighbours - Kazakhstan, China, Tajikistan and Uzbekistan, as well evolution to a new level of strategic cooperation with the Russian Federation. |
| 3. | Managing energy-water linkages | <ul style="list-style-type: none"> The Kyrgyz National Energy plan anticipates that the electricity supplies will be exported to Kazakhstan and Uzbekistan with simultaneous water releases to Russia, China, and Pakistan. The CASA project will help transmit power from Kyrgyz Republic and Tajikistan in Central Asia to Afghanistan and Pakistan in South Asia during the summer season. |
| 4. | Mobilising financing for priority projects | <ul style="list-style-type: none"> Given the weak financial health of the energy sector companies, the National Sustainable Development Strategy for the Kyrgyz Republic aims to ensure: |

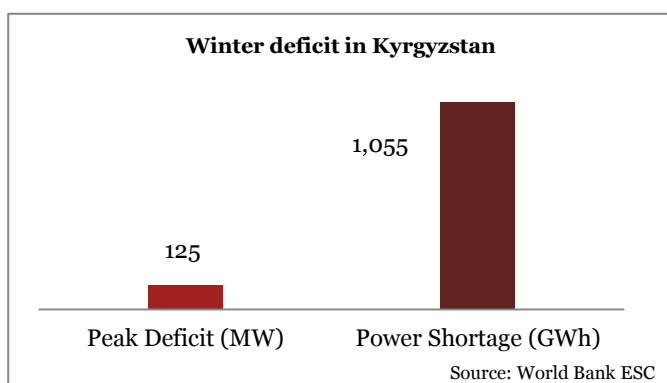
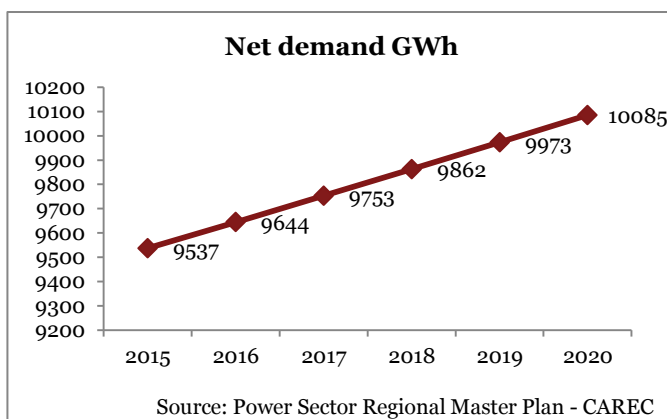
| No | Element of EWP | Objectives of Kyrgyz's power sector |
|----|---|--|
| | | <ul style="list-style-type: none"> • The implementation of a balanced tariff policy, which provides for coverage of costs of energy companies; • Improve the financial and corporate governance in the energy sector; • Bring energy sector to profitability; • Improve conditions for attracting investments in hydropower projects. <p>These steps will play a key role in mobilising and attracting funds for the power sector.</p> |
| 5. | Implementation of energy sector priority projects | <ul style="list-style-type: none"> • The National Sustainable Development Strategy for the Kyrgyz Republic outlines strategic projects in the energy sector that will focus on ensuring energy security. • Implementation of energy sector priority projects will focus on rehabilitation and modernisation of projects that will focus on improving energy security and at the same time boost power export. |
| 6. | Capacity building and knowledge management | — |
| 7. | Promoting and prioritizing clean energy technologies | <ul style="list-style-type: none"> • The Kyrgyz National Energy Program aims to decrease of mining of hydrocarbon raw material in the Kyrgyz Republic, import restriction, and increase the prices for energy carriers that would create favourable conditions for development of non-traditional renewable sources of energy (NRSE) and small HPPs. • The NSSD envisages a growing introduction of renewable energy sources: solar energy, wind, water, geothermal sources and biofuel with one of the most important vectors of development for the national energy sector is expected to be through promotion of renewable sources of energy via micro-energy industry and through creating favourable conditions for investments in this industry. |

2.2. Projected supply and demand

According to the Power Sector Master Plan (PSMP), from 2010 to 2031, net electricity demand will increase by 1.1% in base case scenario whereas in high case scenario, it will increase by 2.9% per annum whereas the peak load will almost remain constant.

Although the growth in demand is not very huge during the year, there is a huge gap between inter seasonal demand, i.e. the summer and winter demand. The difference between demand of residential consumers between winter and summer season in 2012 is 2,400 GWh and winter demand consumption for residential consumers has shown an increase of 78% from 2009 to 2012.

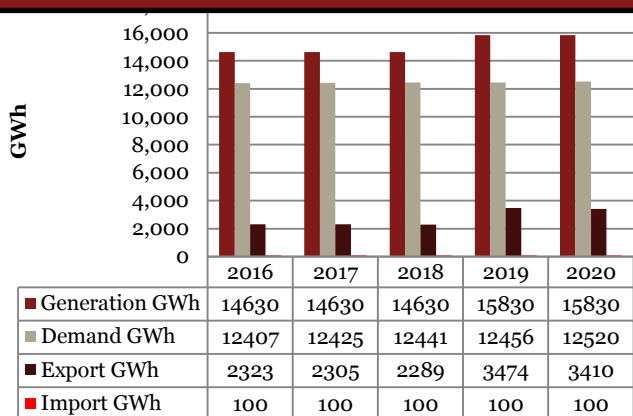
The graph alongside clearly shows that the Kyrgyz Republic does not have enough capacity to meet projected demand in winter. If new investment is not mobilised for generation, the demand supply deficit will widen in winter. This gap between winter consumption and available generation during winter months is expected to touch 1,300 GWh in 2020 and to 2,500 GWh in 2030 from current level of 1,055 GWh.



In Kyrgyz Republic, the daily power consumption during the winter season is at times thrice the power consumption during summers

As hydropower accounts for 90% of electricity generation, there is limited generation capacity in winter while energy spills over in summer. Although Toktogul has a reservoir capacity, fully discharging of water can have adverse impact on ecology and irrigation. So, the seasonal demand supply gap can be met through development of thermal power generation & regional integration.

Additional investment is required for developing new thermal generation assets, inter-regional link so that surplus power can be exported in summer and the winter demand can be met efficiently through regional power trade. The above figure shows that Kyrgyz Republic will be power surplus in future with seasonal export and import. The export volume will increase with commissioning of new plants and increase in generation.



Source: Power Sector Regional Master Plan

It may be noted further, from the adjacent graph,

that the power export volume from Kyrgyz Republic has shown an increasing trend from 2008. Export demand is projected to grow, especially if the CASA-1000 transmission line connecting the power grids of Tajikistan, the Kyrgyz Republic, Pakistan and Afghanistan comes online. If completed as scheduled, the line would increase export potential from the Kyrgyz Republic to 3,024GWh by 2022.

With a view to ensure independence of national power supply from energy grids of the adjacent countries, the construction of the 500/220/35 kV "Datka" substation in the south and Kemin substation in the North, along with the 410 km long 500 kV Datka-Kemin transmission line was completed in August 2015. The Datka-Kemin transmission will allow the Kyrgyz Republic to transmit electricity from the Datka substation in southwestern part of the country to a new substation in Kemin, in the northeast, without routing through Uzbekistan.

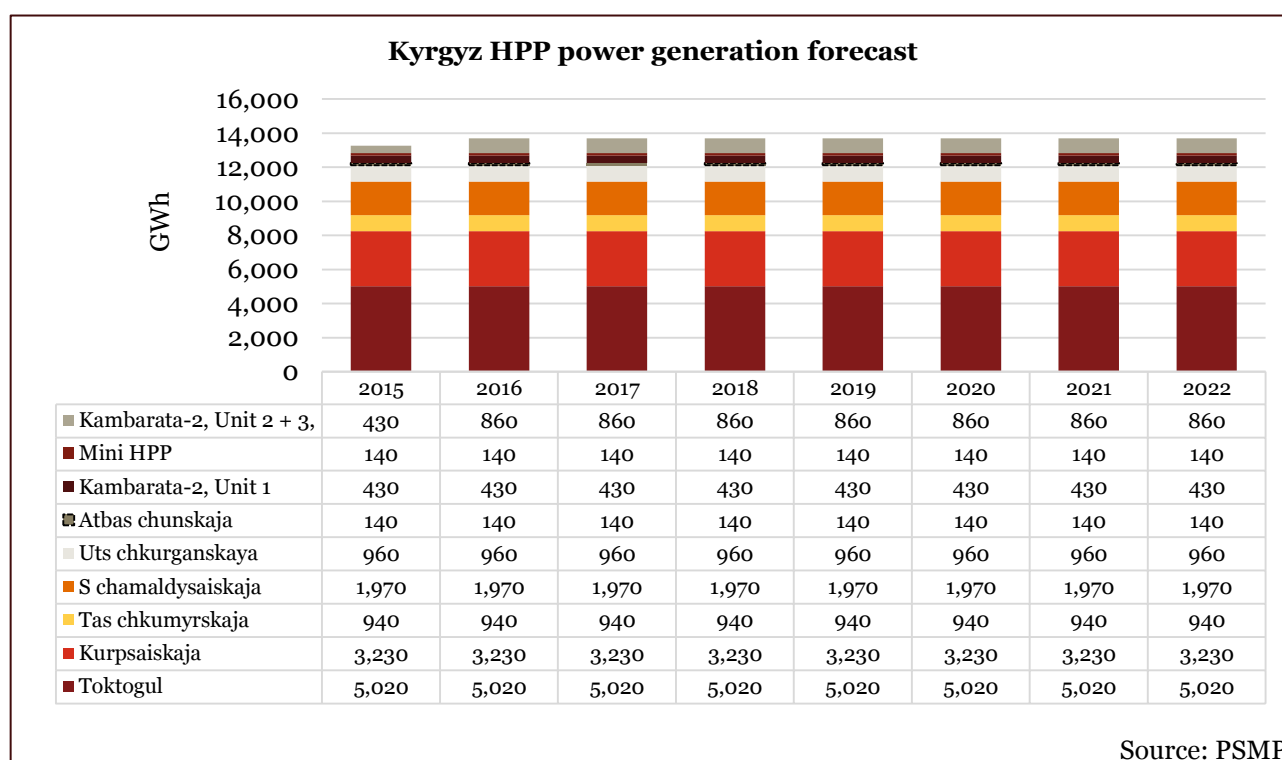
Moreover, to leverage its export potential, the focus will be on expediting the construction of high-voltage 500 kV "Kemin-Almaty" transmission lines, 500 kV "Kyrgyzstan-China" transmission line along with the 500 kV "Datka-Khudjand" transmission line for the CASA-1000 Project.

Apart from that, the construction of Datka Kemin 500 kV line (for transmission from south to north) will also reduce the load on Toktogul-Frunze 500 kV line which can be used for export of power to Kazakhstan during winter. The table below shows the proposed 500 kV lines for interregional power trade and their benefits. The

| Line | Benefits |
|-----------------------|--|
| 500 kV-Datka Kemin | Reduce load on Toktogul-Frunze- export to Kazakh |
| 500 kV Kemin Alma | Additional power export to Kazakhstan |
| 500 kV Datka-Hodzhent | Direct link-power trade with Tajikistan |

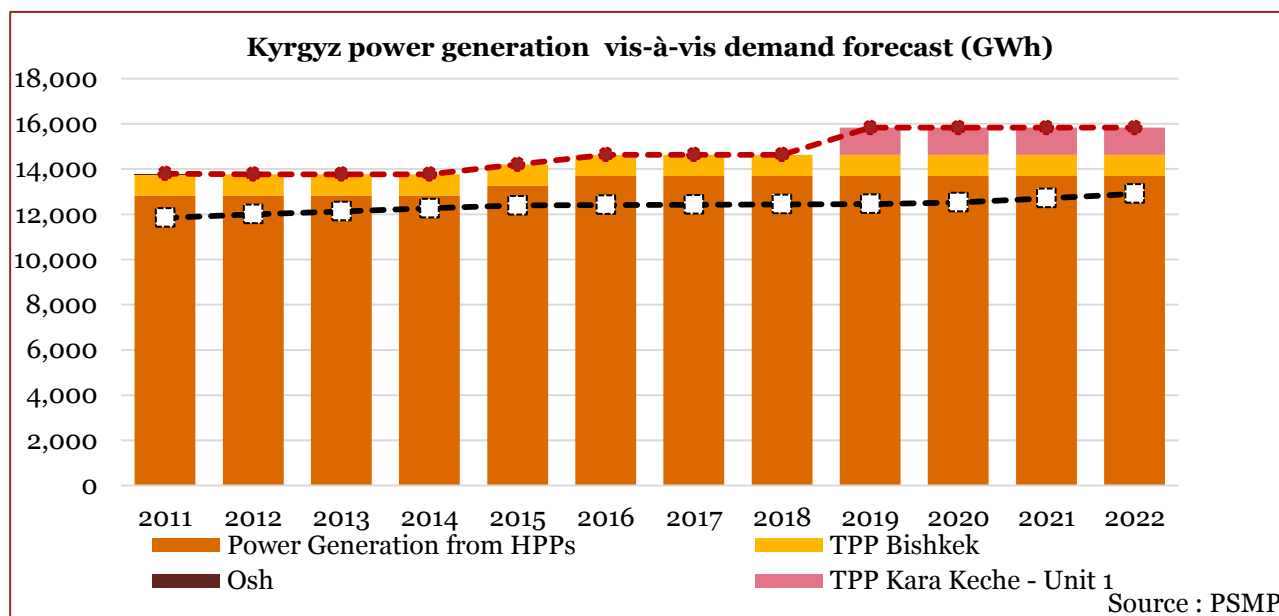
Datka-Kemin power transmission line was recently commissioned and is expected to improve the reliability.

Supply projection: HPPs will continue to form the mainstay of Kyrgyz's power generation accounting for 86% of the power generated in 2022. The chart below captures the power generation from HPPs in Kyrgyz



Republic.

Power generation from thermal plants: Currently, the power generation mix in Kyrgyz Republic is not diversified with only the Osh and Bishkek TPP. The construction of the Kara-Keche plant will ensure diversification of power generation and improving sustainability of power supply in the northern regions. The chart below captures the expected generation from the Bishkek and Kara-Keche power plants vis-à-vis hydro power.



The rehabilitation of the Bishkek Thermal power plant is currently underway. The Bishkek TPP which provides heat and hot water to residents of the capital is almost completely worn out. By 2018, four outdated turbine generators out of the eleven existing ones are expected to be dismantled, with two new ones to be installed. Once rehabilitated, the Bishkek TPP can help overcome winter power shortage which reaches almost 800 MW during the autumn and winter. Season in northern regions of Kyrgyz Republic the cost of electricity produced by Bishkek TPP is almost ten times higher than that generated by hydro plan.

Kara-Keche power plant will help supply electricity to the northern region and reduce dependence from the Bishkek HPP and imports of expensive natural gas and coal. It is expected that Kyrgyz Republic will be able to leverage its significant deposits of brown coal the construction of the Kara-Keche TPP Unit 1 will operate on coal extracted from the Kavaksky lignite basin. The Kara-Keche TPP will have a cascading effect on power exports as well as provide a boost to mining activity in Kyrgyz Republic. The construction of the Kara-Keche power plant is significant in many ways as it will help diversify Kyrgyz's power generation mix from HPPs. While diversification of the power gen mix through the Kara-Keche power plant is seen to be important; rehabilitating and modernising existing assets will play an important role in dealing with the power deficit at less than the cost of building new assets. Rehabilitating of the key hydropower plants such as the Toktogul, UchKurgan, and At-Bashi will play an important role in improving available power capacity levels in country.

The gap between peak demand and available capacity could increase to approximately 650 MW by 2020, 900 MW by 2025 and 1,300 MW by 2030 if there is no new investment in generation or if no demand-side management measures are undertaken.

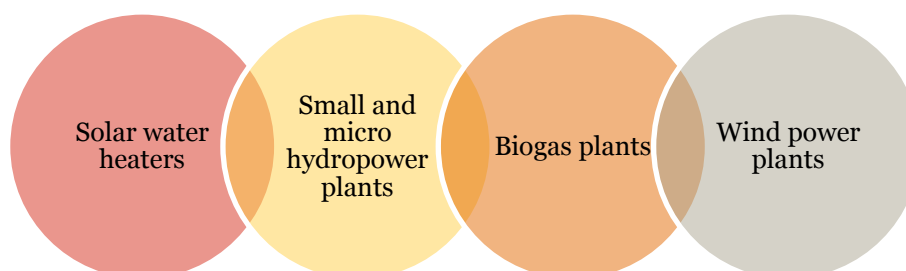
Renewable energy in Kyrgyz Republic

The Kyrgyz Republic is among the top CIS countries with the largest solar power reserves. On an average, the surface area of the Kyrgyz Republic absorbs solar energy equivalent to 570 million tons of standard fuel per annum. Wind energy resources in the country are equivalent to 245 million tons of standard fuel. Total capacity of the network of small streams is estimated at 1.6 million kilowatts. Despite substantial renewable energy sources, the country suffers shortage of energy, especially in rural and mountainous areas. Less than 1% of the country's huge renewable energy potential is currently used.

It is estimated that the country's renewable energy potential of approximately 270 GW, can replace up to 51% of energy consumption in the country and that around 20% is technically feasible and nearly 5% is feasible in the coming years. The table below captures the estimated RE potential in the Kyrgyz Republic¹.

| Type | Biomass | Solar PV | Wind | Small Hydro |
|--|---------|----------|-------|-------------|
| Technical Potential for Installed RE Capacity in MW | 200 | 267,000 | 1,500 | 1,800 |

Power generated from renewable energy is best suited for far-flung remote areas with very limited or no grid connectivity. The key focus areas for renewable energy in Kyrgyz Republic are:



The law on renewable energy sources has been adopted in the Kyrgyz Republic. The objectives of the Law is the development and use of renewable energy sources, improved energy structure, diversification of energy resources, improved social situation of the population, and ensuring the energy security of the Kyrgyz Republic, environmental protection and sustainable economic development. The Law allows any individuals or legal entities creating, acquiring and operating facilities for the use of renewable energy sources subject to compliance with the legal requirements and technical regulations.

Small Hydro Power Plants in Kyrgyz Republic

The National Energy Program outlines the development of small hydro power energy sector that would be carried out by restoration and construction of small HPPs. The total hydro power capacity of the surveyed 172 rivers and streams on the territory of the Kyrgyz Republic with water discharge from 0.5 to 50 cubic m/s. exceeds 80 Bn kWh per annum, out of which 5-8 Bn kWh per annum is technically acceptable for development.

¹ UNDP RE Snapshot (estimates as of 2012)

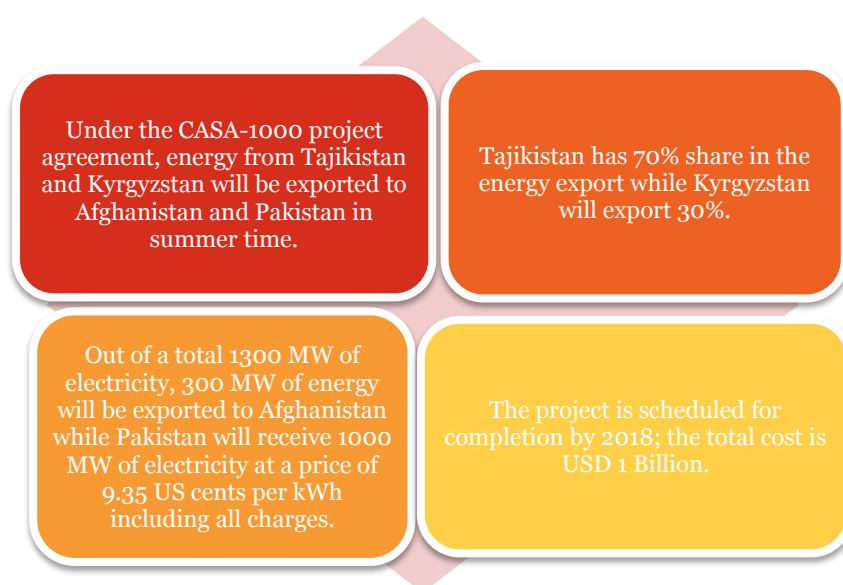
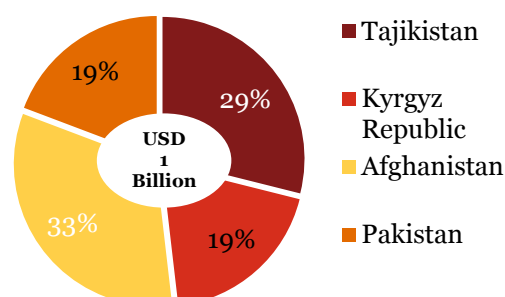
Central Asia-South Asia (CASA) Agreement²

The CASA-1000 electric power line project will supply electricity from Kyrgyz Republic and Tajikistan to Afghanistan and Pakistan. The CASA-1000 agreement had been formalised in December 2014.³

The CASA transmission line is expected to go from Datka, Kyrgyz Republic, and through Tajikistan and Afghanistan before terminating in Peshawar, Pakistan. The line will allow Tajikistan to sell surplus electricity in the summer to Afghanistan and Pakistan. The chart provided below shows the proposed cost allocation for the CASA project across the four countries.

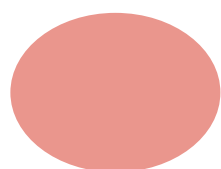
The CASA-1000 project, with total estimated cost of 1 Bn USD will facilitate supply of 1,300 MW of existing summertime hydropower surplus from Kyrgyz Republic and Tajikistan in Central Asia to Afghanistan and Pakistan in South Asia. Tajikistan along with Kyrgyz Republic possesses hydropower which is environmental-friendly and at the same time less expensive. Afghanistan and Pakistan have a demand for energy for electricity in the summer to operate their industrial production, and avoid the closure of small businesses and job cuts. When complete, the full CASA-1000 transmission lines will move electricity at high voltages between the Kyrgyz Republic and Tajikistan for the first 477 kilometres and from Tajikistan towards Afghanistan and Pakistan for the next 750 kilometres). While the feasibility report had already been completed, the laying of transmission line from Kyrgyz Republic-Tajikistan-Afghanistan-Pakistan is expected to commence from May 2016. The graphic provided below highlights the salient features of the CASA 1000 agreement:

CASA project cost allocation by country



² Participating countries of the CASA-1,000 MW power project have made a third-party access clause part of their agreement, which would allow other nations to use the transmission line and export electricity to Pakistan-The Express Tribune, PK

³ Articles from Dawn, Tribune and World Bank



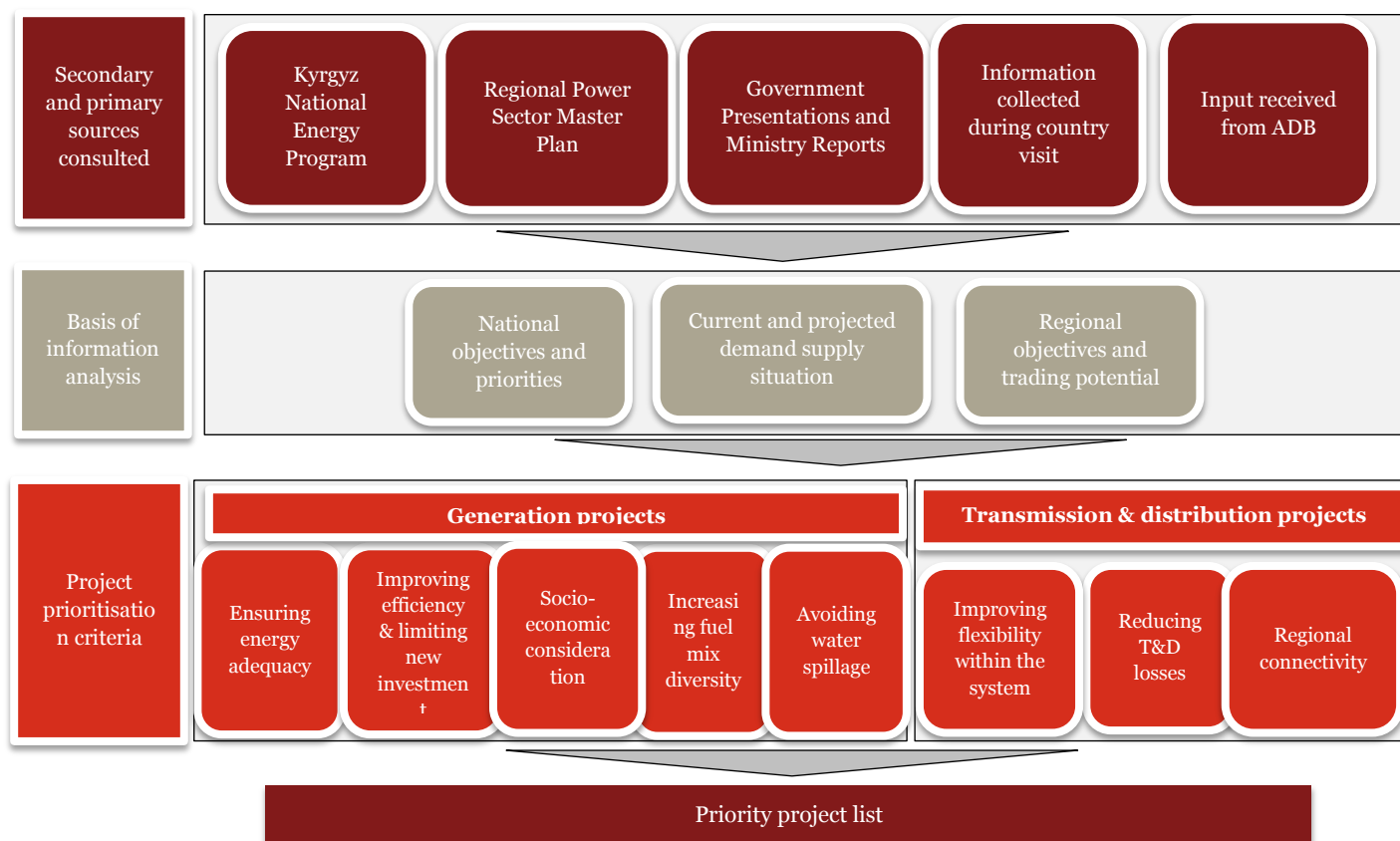
Although, overall implementation progress of the project is satisfactory, perception of high risk rating due to political and stakeholder' issues exists. There are also substantial concerns about macroeconomic and energy sector policies in countries involved in CASA-1000

Of the total exports, Kyrgyz Republic's share will be 30% while that of Tajikistan is expected to be 70% .Pakistan is expected to be a major consumer receiving approx.1000 MW of power while Afghanistan will consumer roughly 300 MW

According to the estimates, the Kyrgyz Republic will earn a profit of five cents on every produced unit of electricity sold. Export demand is expected to receive a huge boost with expected increase in export potential from the Kyrgyz Republic being almost 1,600 MW by 2020.

2.3. Approach and key considerations for project prioritisation

Based on assessment of the current and targeted macroeconomic and sector status, we have framed our approach to prioritise projects as shown below:



An initial list of projects were identified from the Kyrgyz National Energy Program, Regional Power Sector Master Plan, Government presentations, the Ministry Report and in consultation with ADB. This was further discussed, during the country visit which took place between 1 and 6 November 2015, with the CAREC energy focal points, ministries and various development partners. A holistic view of the power sector was obtained to understand the key government priorities, thrust areas and taking into consideration the existing and forecasted demand supply situation vis-à-vis the regional objectives. This provided us with an understanding of the priorities for the power sector based on which we worked out the different categories of the projects to be considered and also the key considerations/ criteria for project prioritisation. A consultative methodology for prioritising the projects which included a mix of secondary research and inputs from our national consultants on a regular basis and subsequent analysis and review, have been followed to arrive at the list of priority projects.

Project selection criteria – Generation projects

The schematic alongside represents the key criteria for selection of generation projects from the initial list developed. These criteria, along with rationale for selection, are further discussed in brief below.

| Criteria | Overview |
|--|--|
| Ensuring energy adequacy | <ul style="list-style-type: none"> Ensuring energy adequacy is significant to addressing the severe winter shortages and leveraging better the power surplus during summers. Reliability of power supply decreases significantly in winter, with the network load levels being almost thrice the summer load levels. |
| Improving efficiency and limiting new investments | <ul style="list-style-type: none"> Improving plant efficiency is essential since most of the existing generations assets are aged and deterioration level is almost 50%. Power plants in the Kyrgyz Republic operate much below their rated capacity due to aging of the assets. |
| Socio-economic considerations | <ul style="list-style-type: none"> Energy Poverty (Proportion of households spending more than 10% or more of their budgets on energy) is significantly below the regional average at less than 25%. Business environment in the Kyrgyz Republic compared to other countries in the region has suffered as a result of poor power service quality. Kyrgyz Republic features among the poorest countries globally in terms of the ease of getting electricity in IFC's Doing Business Index. Socio-economic implications of a project is key to prioritisation. |
| Avoiding water spillage | <ul style="list-style-type: none"> Water is usually spilled from reservoirs during summer seasons. Leveraging high inflow and avoiding spillage during summer season to generate power will help boost power exports. |
| Increasing fuel mix diversity | <ul style="list-style-type: none"> It is imperative to diversify the fuel mix to address winter power shortages and improve the power supply situation in the northern region. A power generation mix where hydro power accounts for 80% is subject to significant decrease in generation levels during winters. Moreover, the northern region facing shortages relies on a single 666 MW TPP and a 40 MW HPP which results in a skewed distribution of generation assets |

and subsequent demand-supply gap.

Project selection criteria – Transmission projects

The schematic alongside represents the key criteria for selection of transmission projects from the initial list developed. These criteria, along with rationale for selection, are further discussed in brief below.

| Criteria | Overview |
|---|---|
| Reducing transmission & distribution losses/ Rehabilitation of existing infrastructure | <ul style="list-style-type: none"> Almost 50% of the NESK's substations over 25 years old, and 18 % of the lines are over 40 years old which results in huge losses. The distribution company (SE) has reported that 85% of 0.4 kV distribution lines and electrical equipment are in urgent need of repair. |
| Improving flexibility within the system | <ul style="list-style-type: none"> Improving flexibility is key to addressing this skewed power demand in the country. 60% of the power is consumed in the north while 81% of the aggregate generation capacity is located in the south. |
| Regional connectivity | <ul style="list-style-type: none"> Regional connectivity is important to transmit the surplus power during the summer to the neighbouring countries. Strengthening of the existing transmission infrastructure and improving regional connectivity is important as it will help efficiently transmit the surplus power to the other neighbouring countries. |

2.4. List of priority projects and investment requirements

The list of generation, transmission and other key energy projects are presented in the tables below⁴. It may be noted that the proposed time frame for commissioning of these projects is between the years 2017 and 2023:

List of Power Generation Projects

| S. No. | Project | Brief description and benefits | Project selection criteria | | | | | Investment requirement (Mn USD) |
|--------|-------------------------|--|----------------------------|---|-------------------------------|-------------------------|-------------------------------|---------------------------------|
| | | | Ensuring energy adequacy | Improving efficiency and limiting new investments | Socio-economic considerations | Avoiding water spillage | Increasing fuel mix diversity | |
| 1 | Kambarata- 1 | 1900 MW HPP on the Naryn river in the central region of Kyrgyz Republic. Will regulate the flow of electricity and water regime in Central Asia and help meet the winter electricity demand. | ✓ | - | ✓ | ✓ | - | 2,300 |
| 2 | Upper Naryn HPP Cascade | Consists of 4 HPPs with total capacity of 237 MW on the Naryn river. Electricity produced will be supplied to the domestic market and also towards exports. | ✓ | - | ✓ | ✓ | - | 800 |

⁴ Source: Report-Updating Energy Sector Development Plan (Volume I and II), List of Projects included on the Concession Agreement 2015-17-Government of Mongolia, List of major approved/proposed ADB energy projects in Mongolia, State Energy Policy 2015

| S. No. | Project | Brief description and benefits | Project selection criteria | | | | | Investment requirement (Mn USD) |
|--------|---------------|--|----------------------------|---|-------------------------------|-------------------------|-------------------------------|---------------------------------|
| | | | Ensuring energy adequacy | Improving efficiency and limiting new investments | Socio-economic considerations | Avoiding water spillage | Increasing fuel mix diversity | |
| 3 | Oruktam HPP | 100 MW HPP on the upper Naryn cascade with an average power output of 580 million kWh. Will increase economic efficiency of the HPS construction located below the Naryn cascade. | ✓ | ✓ | ✓ | ✓ | - | 240 |
| 4 | Toguz-tor HPP | 243 MW power plant with a power production capacity of 915 Mn kWh in the western part. Will ensure the region is self-sufficient and also have a cascading effect on the socio-economic development. | ✓ | - | ✓ | ✓ | - | 335 |
| 5 | Sary-Djaz HPP | 1200 MW HPP on Sary-Djaz river. Will help to achieve energy independence and also from a power export standpoint. | ✓ | - | ✓ | ✓ | - | 1,200 |

| S. No. | Project | Brief description and benefits | Project selection criteria | | | | | Investment requirement (Mn USD) |
|---|--------------------------------|---|----------------------------|---|-------------------------------|-------------------------|-------------------------------|---------------------------------|
| | | | Ensuring energy adequacy | Improving efficiency and limiting new investments | Socio-economic considerations | Avoiding water spillage | Increasing fuel mix diversity | |
| 6 | Utschkurganskaja HPP | Active hydro power project on the Naryn River in Uch-Kurgansk, Kyrgyz Republic with a capacity of 180 MW. Needs to be rehabilitated and modernised to increase its available capacity which will reduce the probability | ✓ | ✓ | ✓ | ✓ | - | 96 |
| 7 | Kara-Keche Thermal Power Plant | Kara-Keche TPP Unit 1 will operate on coal extracted from the Kavaksky lignite basin. Improved energy security by reducing dependence on hydropower. The Kara –Keche coal-fired TPP is required to supply | ✓ | - | ✓ | ✓ | ✓ | 2,300 |
| 8 | Small HPPs, Tar River | Set of small HPPs with an installed capacity of 62 MW with an annual power generation of 232 Mn kWh. | ✓ | - | ✓ | ✓ | - | 130 |
| <ul style="list-style-type: none"> Investment requirement for Project No.3 and 6 is as per estimates from Regional Power Sector Master Plan Investment requirement for Project No.1 and 2 is as per estimates from secondary sources and PwC estimates following discussions (http://www.reuters.com/article/us-kyrgyzstan-russia-projects-idUSKBN0U70Y520151224) Investment requirement for project No. 5 is as per estimates from National Energy Program of the Kyrgyz Republic for 2008-2010 and the fuel and energy complex development until 2025 Investment requirement for Project No.7 is as per estimates from mineconom.gov.kg/ Investment Requirement for Project No. 4 and 8 is based on PwC estimates | | | | | | | | |

List of power transmission & distribution projects

| S. No. | Project | Brief description and benefits | Project selection criteria | | | Investment requirement (Mn USD) |
|---|---|---|--|---|-----------------------|---------------------------------|
| | | | Reducing transmission losses/ Rehabilitation existing infrastructure | Improving flexibility within the system | Regional connectivity | |
| 1 | Rehabilitation of substation and transmission lines (R&M) | Ageing transmission lines need to be rehabilitated across south Kyrgyzstan to improve overall connectivity between the various regions across Kyrgyz Republic | ✓ | ✓ | - | 190 |
| 2 | Investments required towards metering/ billing | This involves installation of an automatic metering and data acquisition systems across various regions | ✓ | ✓ | - | 60 |
| <ul style="list-style-type: none"> Investment requirement for Project No. 1 and 2 is based on estimates as per World Bank's Power Sector Policy Note for the Kyrgyz Republic, 2014 | | | | | | |

Other key energy sector programmes not considered as priority

| No. | Project | Investment required (Mn USD) |
|-----|---|------------------------------|
| 1. | Orto-Tokoi HPP(20MW), Chu River (on the basis of reservoir) in Issyk-Kul Region | 25 |
| 2. | Kara-Kul HPP(18MW) Kara-Kul Town, Karasu River (left) in Zhalal-Abad Region | 25 |
| 3. | Kirov HPP,Talas River (on the basis of reservoir) in Talas region | 24 |
| 4. | Oi-Alma HPP, 1 May Village, Karakulzha River) | 18.4 |
| 5. | Chon-Aksu HPP, Cho-Ak-Suu River | 27.2 |

Renewable energy projects: The list below captures few small HPP projects in the Kyrgyz Republic for which financing is sought.

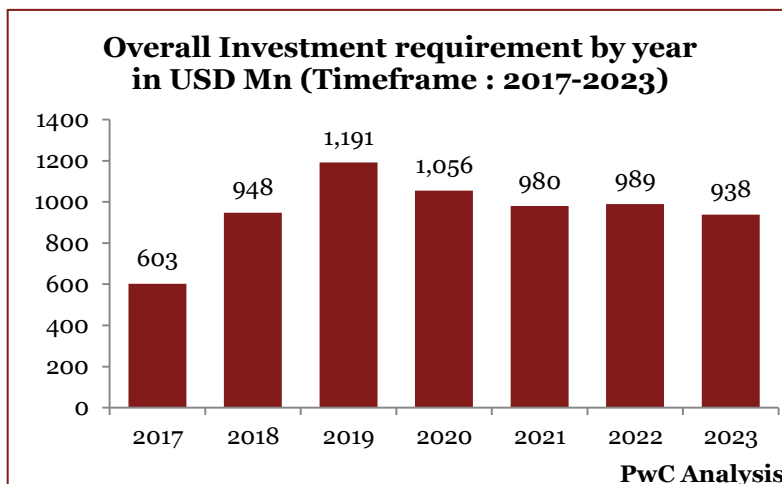
| No | Name | Installed capacity | Average annual power production, Million kW | Expected investments, USD Million |
|------------------------------|---|--------------------|---|-----------------------------------|
| 1. Issyk-Kul Region | | | | |
| 1.1 | Orto-Tokoi HPP, Chu River (on the basis of reservoir) | 20.0 | 80.941 | 25 |
| 1.2 | Arashan HPP (reconstruction) Arashan River (Ak-Suu) | 2.0 | 14.220 | 2.125 |
| 1.3 | Ak-Terek HPP, Kyzyl-Suu Village, Ak-Terek River | 3.5 | 25.000 | 5.6 |
| 1.4 | Karakol HPP, Karakol River | 1.6 | 11.500 | 1.8 |
| 1.5 | Chon-Aksu HPP, Cho-Ak-Suu River | 11.4 | 55.000 | 27.2 |
| 2. Naryn Region | | | | |
| 2.1 | On-Archa HPP (reconstruction) Min-Bulak Village, On-Archa River | 1.38 | 5.100 | 1.5 |
| 2.2 | Kulanak HPP (upper) At-Bashy River | 12.0 | 60.000 | 30.0 |
| 2.3 | Kulanak HPP (lower) At-Bashy River | 6.0 | 30.000 | 9.0 |
| 3. Zhalal-Abad Region | | | | |
| 3.1 | Kara-Kul HPP Kara-Kul Town, Karasu River (left) | 18.0 | 140 | 25 |
| 4. Osh Region | | | | |
| 4.1 | Oi-Alma HPP, 1 May Village, Karakulzha River | 7.7 | 54.493 | 18.35 |
| 4.2 | Small HPP, TaR River | 62.0 | 232.000 | 129.90 |
| 5. Batken Region | | | | |

| No | Name | Installed capacity | Average annual power production, Million kW | Expected investments, USD Million |
|------------------------|--|--------------------|---|-----------------------------------|
| 5.1 | Torytgul HPP Isfara River (on the basis of reservoir) | 3.0 | 11.858 | 2.575 |
| 5.2 | Ibragimov HPP Dzhangakty River | 0.54 | 0.682 100 | 1.00 |
| 6. Talas Region | | | | |
| 6.1 | Kurkureu HPP 1 Kok-Sai Village, Kurkureu-Suu River | 1.6 | 8.00 | 1.5 |
| 6.2 | Kurkureu HPP 2 Kok-Sai Village, Kurkureu-Suu River | 3.7 | 18.50 | 3.7 |
| 6.3 | Kirov HPP Talas River (on the basis of reservoir) | 20.0 | 91.4 | 23.6 |
| 7. Chui Region | | | | |
| 7.1 | Chon-Kemin HPP1 Chon-Kemin River | 4.8 | 21. 896 | 6.4 |
| 7.2 | Chon-Kemin HPP2 Chon-Kemin River | 6.8 | 19. 291 | 7.9 |
| 7.3 | Chon-Kemin HPP3 Chon-Kemin River | 4.1 | 19. 291 | 5.6 |
| 7.4 | Chon-Kemin HPP4 Chon-Kemin River | 3.2 | 10.100 | 5.2 |
| 7.5 | Ala-Archa HPP National Park Ala-Archa, Ala-Archa River | 2.0 | 15.000 | 3.6 |
| 7.6 | Kalinin HPP (reconstruction) Sosnovka Village, Kara-Balta River | 1.6 | 11.000 | 2.0 |
| 7.7 | Sokuluk HPP-5 Belogorka Village, Sokuluk River | 1.5 | 9.089 | 3.342 |

Project implementation and year-wise investment requirement for the power generation & transmission projects

The total investment required for the power projects (excluding small HPP projects) in Kyrgyz Republic is estimated at 7,651 Mn USD. Investment requirement between 2017 and 2023 is estimated at 6,704 Mn USD or 88% of the total estimated investment plan for priority projects.

We assume a project start-up year of 2017 and completion period of 7 years with a major portion of the investment required is foreseen between the years 2018-2020. The chart alongside captures the estimated yearly investment requirement between till 2023 for the selected projects assuming project start-up from 2017 onwards.



Assumptions:

- TPPs to commence construction in 2017 with a completion period of 7 years;
- HPPs to commence construction in 2017 with a completion period of 8 years;
- Kambarata-1 to commence construction in 2017 with a completion period of 10 years.
- T&D & HPP rehabilitation and small HPP projects to commence in 2020 with a completion period of 4 years.

Investment phasing

| Year | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|-------------------------------------|------|------|------|------|------|------|------|------|------|------|
| HPPs | 10% | 10% | 15% | 15% | 12% | 15% | 13% | 10% | | |
| HPP rehab/T&D Projects & small HPPs | | | | 15% | 25% | 30% | 30% | | | |
| TPPs | 10% | 20% | 20% | 16% | 14% | 10% | 10% | | | |
| Mega HPPs | 5% | 10% | 15% | 10% | 10% | 10% | 10% | 10% | 11% | 9% |

3. Options for funding and financing power sector investment plans

The National Energy Program of the Kyrgyz Republic for 2008-2010 and the fuel and energy complex development until 2025 envisages the following investment requirement across the following categories:

| Category | Time frame | Investment required (Mn USD) |
|--|------------|------------------------------|
| Launching of new capacities during the period: | 2011-2015 | 1,620 |
| | 2016-2020 | 2,120 |
| | 2021-2025 | 1,000 |
| Development of grid and sub-stations: | 2011-2015 | 300 |
| | 2016-2025 | 250 |
| Development of small HPP and non-traditional renewable sources of energy : | 2008-2010 | 25 |
| | 2011-2015 | 80 |
| | 2016-2020 | 90 |
| | 2021-2025 | 100 |

In order to reduce dependency on hydropower and to become energy self-sufficient, Kyrgyz Republic envisage to focus more on thermal power plants which can be developed with relatively lower investment costs compared to large HPP like Kambarata 1. The total investment envisaged between 2011 and 2025 according to the Kyrgyz National Energy program is 5,585 Mn USD with an annual investment requirement of roughly 400 Mn USD each year until 2025. Given the limited capability of the Kyrgyz government to fund power projects by itself, the National Energy Program outlines the following steps to overcome the financial hurdles.

Eliminate mutual non-payment and carry out restructuring of debts among energy companies based on the taxes owed to fiscal bodies and debts for credits

Elimination of energy carriers' price skewing and shift to prices and tariffs to cover costs of energy companies and other enterprises for generating, transmitting, and supplying consumers with energy resources

Reassessment of fixed funds of energy companies with introduction of a practice of an accelerated depreciation

Expansion of the number of investment projects with a tender placement of private and foreign investment resources or in accordance with reached inter-state agreements

Implementation of measures aimed at the accelerated financial and economic enhancement of energy companies through a full-scale restructuring, liquidation of barter settlements for the consumed electricity, reduction of costs, losses, and theft

Development of the secondary market of securities and of the infrastructure of capital markets

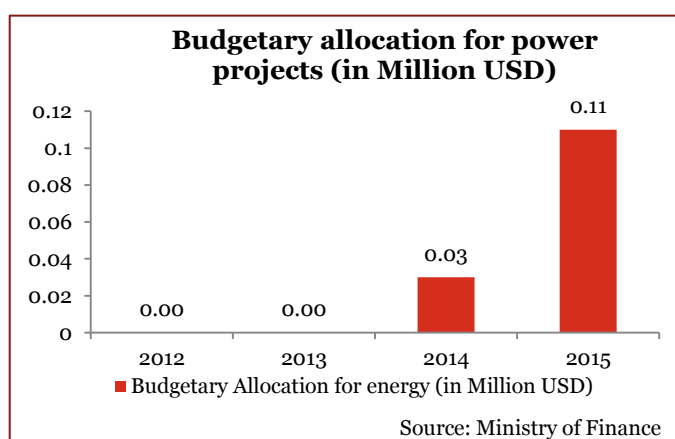
In line with the investment plan for Kyrgyz Republic from 2017-23, the proposed funding from the national government budget, other governments, assistance from development partners (ADB and World Bank) has been estimated and the funding gap has been determined which needs to be filled up from other sources such as private investors, PPP, etc. The following section describes the proposed funding from each source in details.

3.1. National government

The economy of Kyrgyz Republic continues to face challenges because of poor regional economic environment, high public debt, and the transition to the Eurasian Economic Union. The government's medium-term fiscal structure predicts an investment-led expansion addressing critical investment needs in energy and transport. This could impact the growth as well as funding /budgetary support from the government for the power sector.

In Kyrgyz Republic, the budgetary contribution for large scale public investment programmes (particularly in the energy sector) are low. Such programmes are generally financed through concessional loans sourced from various development partners.

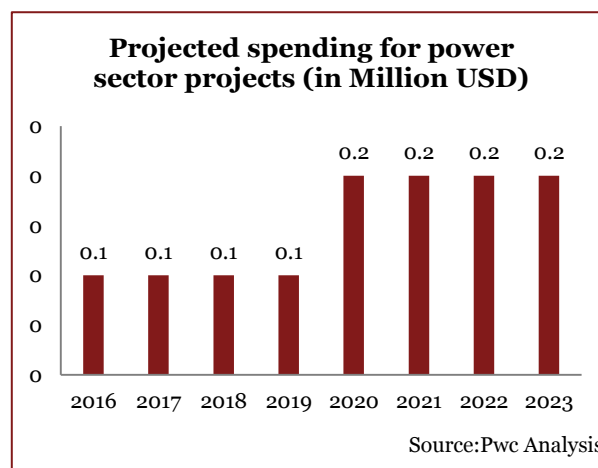
In July 2013, the government adopted an Action Plan on reforming the energy sector and is committed to investments in the energy sector. Thus, the investment for the energy sector by the government of Kyrgyzstan has increased from 2014 to 2015 as evident in the graph alongside.



The Kyrgyz Republic's budget remains socially oriented. The country's plans for fiscal stability during 2015–2017 are forecast on rise in public investment to bridge the gaps between infrastructure and energy sectors.

Government's budgetary support over 2017-2023 is estimated at **1 Mn USD** (for capital projects) based on the following assumptions:

- The budgetary support is assumed to be 0.001% of GDP based on trend between 2013 to 2015.
- Average GDP growth of 4.6% till 2023 (as per IMF projections till 2020).
- In the past, the support from government to power sector has been low and generally comes as counterpart financing for development partner funded projects.
- Since the global crisis in 2009, the budget allocation towards power sector depended mostly on external assistance.

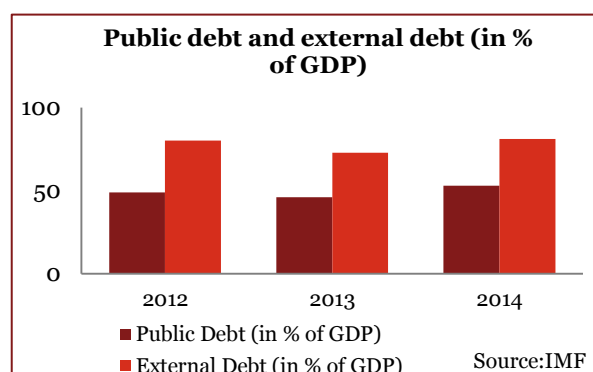


Government's ability to borrow

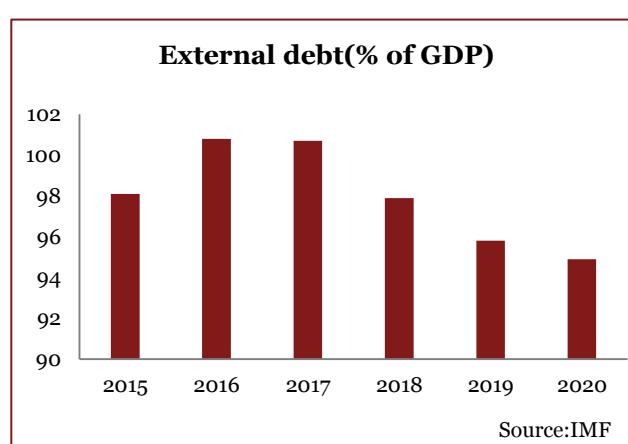
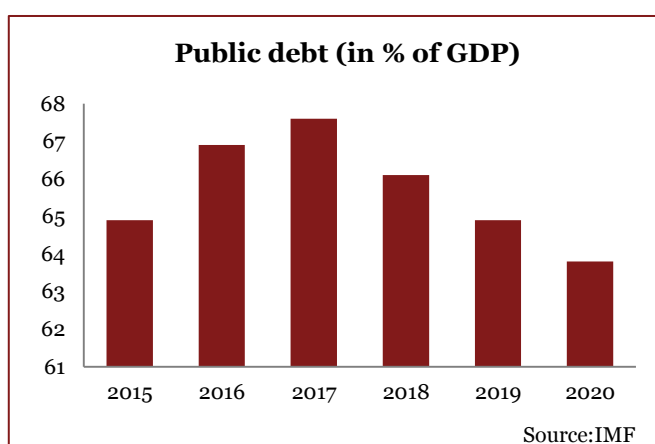
The government's ability to borrow is broadly based on the current level of debt and the projected level of debt in the near future. The following section provides a broad overview on the overall ability of the Government of Kyrgyzstan to borrow from various sources based on the debt sustainability.

Debt sustainability analysis

Based on the joint IMF-World Bank Low-Income Country Debt Sustainability Framework, the Kyrgyz Republic remains at a moderate risk of debt distress. Among CAREC member countries, Kyrgyz Republic has one of the largest public debt to GDP ratio. A steady growth of remittances is expected to ease the debt-related risks. As per IMF projections, total value of public debt is expected to be about 65.7% of GDP on an average till 2020. The external debt is expected to be close to 98% of GDP on an average during the medium term as per the IMF projections.



The external debt is expected to reach around 94.9% of the GDP in 2020. Some of the salient features w.r.t to the debt situation are as mentioned in the charts given below.



- The public sector debt was 64.9% of GDP in 2015-16.
- The medium term debt strategy (MTDS) for 2015–2017 promotes borrowing to projects which boosts growth and promote social development in the country.
- Based on such assumptions, the average net borrowing by the Government of Kyrgyz Republic is estimated to be around **USD 450 Mn** per year across all sectors.

3.2. Assistance from development partners

Assistance from multilateral financing institutions will play a pivotal role in Kyrgyz Republic's power sector as the Kyrgyz government grapples with limited financing ability for its power projects.

Asian Development Bank: ADB aims to facilitate Kyrgyz power sector with terms of regional cooperation and supply reliability to ensure energy security. It also emphasizes on improving the financial condition of the sector through tariff reform and loss reduction.

ADB has provided assistance to Kyrgyz Power Sector totalling to 210 Mn USD from 2011-2015, having been involved in various projects like the rehabilitation of Totogul HPP, introduction of automated metering and

data acquisition system to help cut losses, capacity building of state-run National Electric Grid of Kyrgyzstan, etc.

According to the country's Partnership Strategy (2013-2017), ADB is likely to enhance its interventions in the energy sector with major focus on improving the quality of energy supply. This is envisaged to be achieved by improving the electricity supply for all customers based on commercial tariffs, improving income distribution to generation, transmission, and distribution companies based on approved tariff by 2017. Further, ADB is likely to allocate funding of ~ 200 Mn USD in the following major areas:

- Transmission rehabilitation and wholesale metering.
- Rehabilitation of an existing hydropower plant.
- Improvement in distribution sector operations.

Apart from the above, ADB would continue support to the power sector through TAs and loans for building capacity which includes preparation of a power sector master plan, a dam safety study of hydropower plants of the Naryn cascade, preparation of an asset inventory and asset revaluation of all seven power sector companies, improving governance in power sector companies, designing and implementation of enterprise resource planning (ERP) for the major generating company, corporate and financial audit of energy companies, etc.

European Bank for Reconstruction and Development (EBRD): As a part of country strategy, EBRD will focus on economic and trade cooperation and integration within the region by supporting rehabilitation and development of critical infrastructure. In addition, the emphasis will be on renewable energy, commercialization of public utilities and private sector participation in the sector.

World Bank: World Bank recently sanctioned US\$24 million as a part of Energy Sector Development Policy Operation for the Kyrgyz Republic. It consists of a highly concessional credit of US\$13.2 million and a grant of US\$10.8 million. The operation will support reform actions of Kyrgyz Government's Energy Sector Action Plan for 2013-2014 aimed at long term supply reliability with emphasis on three policy areas:

- Improvement of financial viability through tariff reforms.
- Strengthening of energy sector governance in terms of transparency & accountability through establishment of an economic regulator, implementation of a performance reporting and monitoring framework, as well as public outreach and communication.
- Preparation and implementation of power supply management plans for the supply based on the principles of transparency, equitability, predictability, and preservation of essential services.

In addition, the focus will be on regional transmission connectivity and investment promotion in the sector. Previously World Bank had assisted Kyrgyz Republic in rehabilitation of generation, transmission & distribution assets.

Other major development partners in the region are **Islamic Development Bank, KfW, Nordic Development Fund, and Swiss State Secretariat for Economic Affairs, USAID, Danish International Development Agency and EXIM bank of China.** The table below lists some of the past and ongoing engagements of the above development agencies in the power sector of Kyrgyz Republic.

| Development partner | Project scope | Duration | Amount (Mn USD) |
|---------------------|---|-----------|--------------------|
| ADB | Transmission rehabilitation: SCADA for the National Electric Grid of Kyrgyzstan | 2011–2014 | 43.3 |
| | Study on the settlement mechanism for wholesale electricity transactions | 2012 | 0.5 |
| | Power Sector Improvement Project | 2011–2017 | 44.8 |
| | Power Sector Rehabilitation Project | 2012–2019 | 55 |
| | Toktogul Rehabilitation Project Phase 2 | 2013–15 | 110 |
| | Toktogul Rehabilitation Project Phase 3 | 2016 | 110 |
| World Bank | Energy Emergency Recovery Project (Bishkek CHPP, distribution companies) | 2009–2012 | 35 |
| | Energy Emergency Assistance Project | 2008–2011 | 15 |
| IDB | Improvement of Electricity Supply in Bishkek and Osh Aigultash–Samat 110 kV power transmission line | 2012–2014 | 23 |
| | | 2009–2011 | 12 |
| KfW | Loss Reduction Program through distribution rehabilitation: JSC Severelectro cable, metering, and billing systems | 2010–2014 | €33.6 million |
| EXIM bank of China | Kemin 500 kV substation and Datka–Kemin 500 kV transmission line project | 2012–2014 | 390 |
| | Datka 500 kV substation and 220 kV transmission line to Batken and Osh | 2011–2013 | 208 |
| USAID | Kyrgyz Energy Advisory Services Project | 2008–2011 | 3.6 |
| | Regional Energy Security, Efficiency and Trade: JSC EPP capacity building, HR and ERP experts | 2011–2013 | 2.3 |
| SECO | At-Bashy Hydropower Plant (40 MW) rehabilitation | 2012–2014 | 20 (indicative) |
| EBRD | Strategic Planning on Small/Medium Hydropower | 2010–2011 | €0.8 million |

The support from multilateral funding institutions is primarily required in the power generation, transmission and to a certain extent in the renewable energy space. The table below provides an analysis of the trends of multilateral support to the power sector in Kyrgyz Republic.

| No | Sector | Current degree of multilateral support | Expected trend | Comments |
|----|--------------------|--|----------------|---|
| 1 | Power generation | High | ↑ | Multilateral financing institutions have been directed towards rehabilitation and maintenance of power generation assets with new projects being undertaken through bilateral support from China & Russia |
| 2 | Power transmission | High | ↑ | Transmission networks need to improve across the country as well to improve regional connectivity. This will require substantial support from the multilateral funding in the short term |
| 3 | Renewable energy | Low | ↑ | With several small hydro power plants, the role of multilateral funding agencies will be pivotal in the development of Kyrgyz Republic vast RE potential. |

Assistance from development partners – Future trends

Development partners will continue to play a critical role in the development of the power sector in Kyrgyz Republic. Their role is more important as the government is challenged in terms of limited financing ability for its power projects.

WB estimates

| Year | Amount (in \$ mn) | Remarks |
|--------------|-------------------|---|
| 2016 | 12 | Based on the Country partnership Strategy |
| 2017 | 15 | |
| 2018 | 25 | Increase in lending by 25% for the next CPS and based on the committed pipeline |
| 2019 | 25 | |
| 2020 | 25 | |
| 2021 | 25 | |
| 2022 | 30 | Increase in lending by 20% for the next CPS |
| 2023 | 30 | |
| Total | 175 | |

ADB estimates

| Year | Amount (in \$ mn) | Remarks |
|--------------|-------------------|---|
| 2016 | 110 | Based on COBP |
| 2017 | 0 | |
| 2018 | 25 | |
| 2019 | 40 | Based on the average proposed lending for 2015-2018 |
| 2020 | 40 | |
| 2021 | 40 | |
| 2022 | 50 | Increase in lending by 25% based on past trends |
| 2023 | 50 | |
| Total | 245 | |

Thus, based on Country Partnership Strategies/ Country Operations Business Plan, estimates of funding from key development partners for power sector projects is estimated to be USD 1370 mn over 2017-2023

- ADB and WB is estimated to fund around 245 Mn USD and 175 USD Mn respectively.
- Based on past trends of financing of 125 Mn USD per year by other development partners (mainly China Exim Bank, IDB, KfW, USAID, etc.), estimate for 2017-23 is 950 USD.

3.3. Other governments

Countries like China, Czech Republic and Russia have invested in Kyrgyz Republic's energy sector in the past and it can be envisaged that they would continue to invest in the power sector even in future..

China: The Datka-Kemin power transmission line, which allowed the country to have its first major independent transmission line, was built with Chinese assistance. It is expected that over the medium term, cooperation with Chinese enterprises in hydropower and energy space will be strengthened.

Czech Republic: The government of Kyrgyz Republic and Czech companies are on the verge of reaching an agreement towards the construction of small hydro power plants (HPPs). Czech company Geen General Energy plans to build 4-5 hydropower plants with a total capacity of up to 65 MW in the Kyrgyz Republic with an estimated investment of 80 Mn USD. These include projects on the Papan reservoir, Kichi-Kemin River, the Noorus and Kegety rivers.

DC-master management plans to construct 10 small HPPs with an aggregate total capacity of 107 MW which will include projects on the Kirov reservoir, Chu River, Cascade of HPPs on Tyup and other projects.

Russia: Russia has been active in the Kyrgyz Republic's energy (mainly hydroelectric power plants), gas, and oil industries. In January 2016, the Kyrgyz parliament revoked an agreement with Russia to construct key projects such as the Kambar-Ata-1 facility and building the four smaller HPPs with a combined output of 237.7 MW on the Upper Naryn cascade. Given the economic crisis, Russia seems unlikely to invest in the Kyrgyz Power Sector in the short term.

3.4. Envisaged funding probability of priority projects

Overview of investment plan and financing sources for 2017-2023



It can be envisaged that from 2017-23, the estimated requirement for development of the power sector is 6,705 Mn USD. Further, it can be estimated that the power sector is likely to receive 1 Mn USD as Government budgetary support and 1,370 Mn USD as assistance from development partners (from sources such as World Bank, ADB and others) over 2017-2023. The remaining is likely to be sourced from the private sector and assistance from other countries. The envisaged funding probabilities from various sources are provided in 2 separate tables below.

Envisaged funding probability of priority transmission & distribution projects

| Projects | National government | Other governments | Assistance from development partners | Private investment |
|--|---------------------|-------------------|--------------------------------------|--------------------|
| Rehabilitation of substation and transmission lines | Medium | Low | High | Low |
| Investments required towards Metering/Billing projects | Low | Low | High | Low |

Envisaged funding probability of priority generation projects

| Projects | National government | Other governments | Assistance from development partners | Private investment |
|--------------------------------|---------------------|-------------------|--------------------------------------|--------------------|
| Kambarata-1 | Low | High | Medium | Low |
| Upper Naryn HPP Cascade | Low | High | High | Low |
| Orukhtam HPP | Medium | Medium | Medium | Low |
| Toguz-tor HPP | Low | Medium | High | Low |
| Sary-Djaz HPP | Medium | Low | High | Low |
| Utschkurganskaja HPP | Low | Medium | High | Low |
| Kara-Keche Thermal Power Plant | Low | High | Low | Medium |
| sHPPs on Tar River | Medium | Low | Medium | Medium |

3.5. Private sector participation

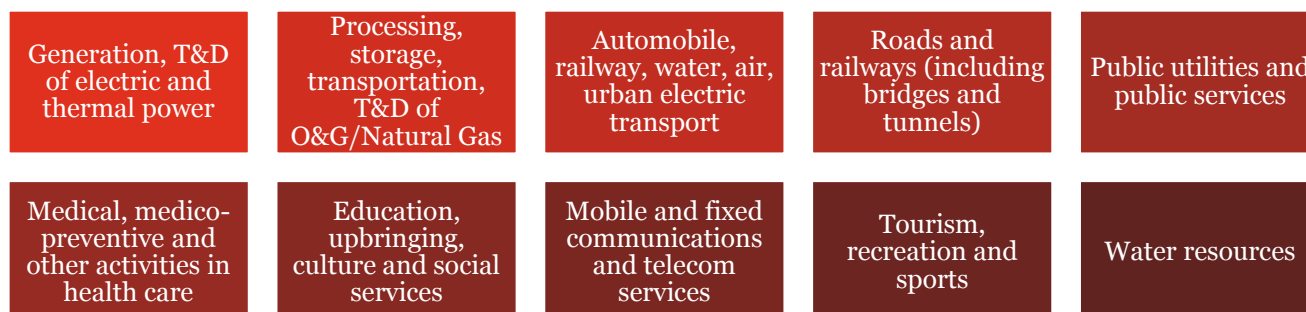
Need for PPP in Kyrgyz Republic

By 2020, the Kyrgyz government plans to award around 20 PPP contracts to private partners with a total capital value of around 20 Bn Soms (400 Mn USD)⁵. The significant investment requirements in the Kyrgyz Republic towards power and infrastructure outline the need for prioritisation of public sector resources and financing from the multilateral and bilateral development partners and to leverage private sector investment.

Laws pertaining to PPP in Kyrgyz Republic

⁵ Source : PPP Unit of The Investment Promotion Agency -This target assumes for the period 2015 – 2020 an average investment by the private sector of the equivalent of 1% of GDP, which is above the 0.5% overall average achieved by developing countries and below the 2.5% benchmark of the leading PPP countries India and Brazil. It is also equivalent to approximately 10% of the average Public Investment Program, which is below the 40% benchmark of India, the leading PPP country worldwide.

A new Law on “Public-private partnerships in the Kyrgyz Republic” was adopted on 22 February 2012. The Government of Kyrgyz has expressed its interest in establishing and promoting PPPs in its National Strategy on Sustainable Development of the Kyrgyz Republic for the period of 2013-2017. By 2020, the Kyrgyz government plans to award around 20 PPP contracts to private partners with a total capital value of around 20 Bn Soms



(400 Mn USD). The scope of the Government’s programme for PPP is the creation of new infrastructure, and development and renovation of existing assets. Key focus areas for PPP Development are:

On 23 October 2015, the draft law “On Amendments and Additions to the Law of the Kyrgyz Republic “On Public-Private Partnership in the Kyrgyz Republic” came in to the Jogorku Kenesh.

This draft law was developed to improve the procedures and stages of the PPP projects promotion, taking into account the practical experience of application of the law, and the adduction to a successful international practice. In addition, clarifications of certain provisions are being made, special attention is paid to the clarification of the process of initiation and verification of PPP projects in the draft Law.

Support for PPP and the project development support facility (PSDF): The PSDF is seen as a special financing unit to successfully and competently assist PPP project across Kyrgyz Republic. Through yearly allocations from the state budget, PDSF allotted almost 2 million USD in 2014 and estimated 1 million USD each in 2015 and 2016 towards developing PPP projects.

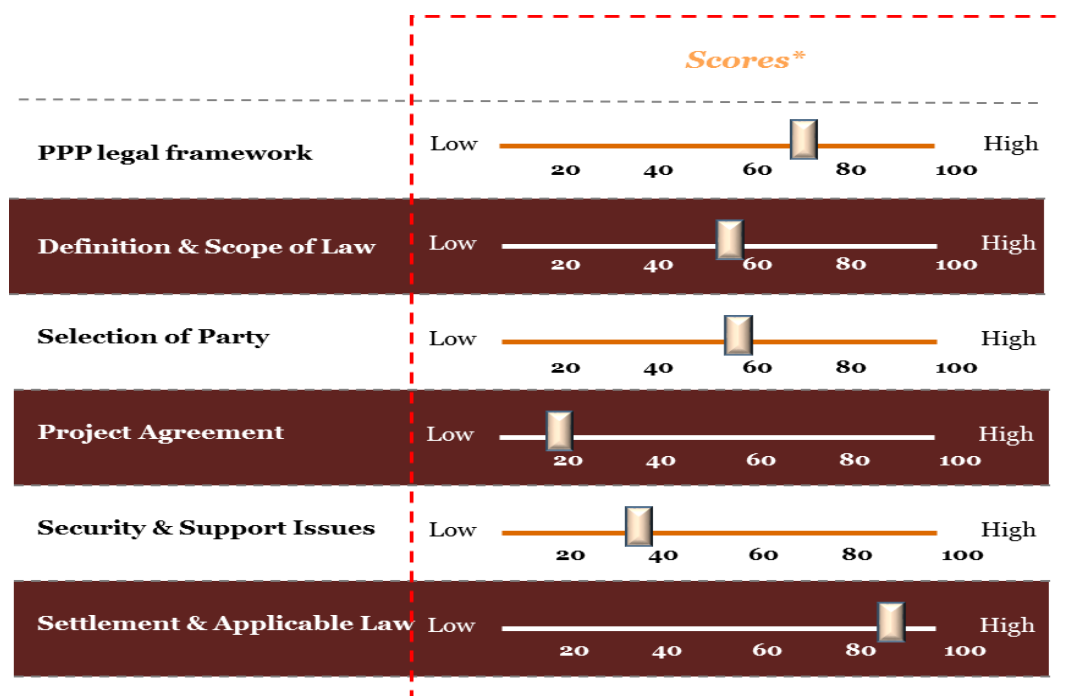
Institutional arrangement: The Kyrgyz PPP Law identifies four main government institutions that are responsible for the state regulation of projects in the sphere of PPPs, which are:

| | |
|--|---|
| The Government of the Kyrgyz Republic | •Overarching authority for PPP across Kyrgyz Republic; |
| PPP Public Agencies | •Any authorised state agency established by the Government of Kyrgyz for the purposes of developing and promoting PPPs in the country (the PPP Unit); |
| Public risk management unit authorised by the Government | •Authorised by the government to develop a state policy on management of project implementation risks; pursuant to the resolution on PPP Public Agencies, the Ministry of Finance acts as the Risk Management Unit; |
| Public partners | •Includes the government, executive public agencies including line ministries, state committees, administrative agencies and local state administrations, as well as executive bodies of local self-government, and municipal enterprises |

To aid the progress of PPP and the preparation and execution of PPP projects, the Government of Kyrgyz established the Investment Promotion Agency (IPA) in 2014 vide the Government resolution No. 158 dated 18 March 2014. IPA was set up keeping in mind the need for specialists with the requisite technical know-how in order to liaise and aid the public partners when it comes to identification of PPP projects and further help in the implementation.

Assessment of PPP Framework in Kyrgyz Republic

Quality of the PPP legislative framework in Kyrgyz Republic: The chart below captures an evaluation of PPP framework in the Kyrgyz Republic. The right extreme of each scale (100) represents an ideal score in line with international standards such as the UNCITRAL Legislative Guide for Privately Financed Infrastructure projects. The higher the score the more closely concession laws of the country approximate these standards.



The concern areas in the existing PPP legal framework in Kyrgyz Republic that need to be addressed to improve the overall PPP process are as follows.

Key issues/Areas of intervention

- PPP Law does not define the list of applicable PPP forms (e.g. BOOT, BOO, etc.);
- The existing regulation on PPP is silent about the terms of renewal or extension of the PPP agreement. However, it states that the terms and conditions with regard to its extension shall be stipulated in the PPP agreement;
- Law doesn't provide for (or at least does not prevent) compensation of the Private Party for losses incurred as a result for termination on the grounds of public interest for losses incurred as a result of public authority acts;
- The law needs to clarify on allowing the private party to create security interests over the project assets, rights and proceeds or other valuable guarantees;
- The Law doesn't provide much clarity about the step-in right of the lenders in case of default by the private party. While the law generally allows step-in rights it does not specifically mention that this can be exercised in the case of default for the private party.

4. Barriers to investments in the power sector

In this section, we have discussed some of the key issues related to the investment climate and regulatory landscape which are resulting in inadequate investments in the sector.

Mandatory licensing

In Kyrgyz Republic, licenses are required for carrying out generation, transmission and distribution activity. Licenses are also required for sale, import/export of electricity (in case of integrated enterprises, separate licenses need to be obtained for each activity). Even generation of energy from renewable energy sources is a licensed activity. Since obtaining licenses is generally a cumbersome procedure, it often acts as a disincentive for ramping up the generation capacity, especially increase of small capacity renewable sources.

Further, the distribution of electricity or the wires business has not been segregated from the retail supply part. This segregation has been made in other neighbouring countries to promote competition in the distribution sector and also to promote private participation for efficiency improvement.

Credit worthiness of regional distribution companies

The financial condition of the four distribution companies, viz. Severelektro, Vostokelektro, Oshelektro and Jalalabatelektro is poor mainly due to the following reasons:

- Very low electricity tariff for domestic category consumers
- High T&D losses
- Poor collection efficiency
- No substantial efforts to enforce stricter rules for non-payment of bills

An overview of the financial surplus/ gap of the consolidated power sector, based on the World Bank Report on Power Sector Policy Note for the Kyrgyz Republic 2014, is provided in Appendix C.

The poor financial health of the main off-taker of power poses significant threat to investors in the power generation sector. This risk increases even more due to lack of any regulatory provision of guaranteeing payments by the government to generators in the advent of non- payment by the buyer. Such stabilisation commitments to investors against unilateral tariff change by the government has been observed in some of the other neighbouring countries, for protection of the interest of investors.

Capacity and enforcement of regulatory function

The Ministry of Economy was performing the task of design and implementation of sector policies, planning and forecasting, from November 2014 to June 2016. Recently, the State Committee on Industry, Energy and Subsoil Use, has taken over the function of policy development from the Ministry of Economy.

The State Agency for Regulating the Fuel and Energy Sector performs the regulatory tasks like balancing the interests of energy producers and consumers, licensing, tariff setting, etc. The State Agency for Regulating the Fuel and Energy Sector was earlier a part of the department within the Ministry of Energy, but from November

2014, it is acting as a separate body. It has been observed that the regulatory body has not been authorised fully to perform all regulatory functions and have complete authority to enforce the regulations. For example, the government still plays a key role in issuing generation licenses. Also, the regulator is not empowered to issue penalties on account of non-performance. Further, the Director of the Agency does not have a fixed defined tenure and may be removed from the office at any time. As such, given the evolving landscape of regulatory and institutional structure, it is now important that the regulator's capacity and authority as a single dedicated body, be strengthened to enable enforcement of the regulatory function.

Regulations and norms for efficient tariff determination and cash distribution

Article 21 of the Electricity Law, 1997, indicates that electricity tariffs should be cost reflective (including operating & maintenance costs, recovery of capital invested, costs of borrowing funds and interest rate of return). However, the regulations do not contain the required norms and regulations which prescribe the parameters for various tariff and performance elements which ensures efficient and practical cost recovery.

In Kyrgyz Republic, the domestic consumers account for more than 75% of the electricity consumption. Due to lack of suitable tariff determination regulations as well as intervention in tariff determination due to socio-political reasons, the tariff for domestic consumers is much lower than the cost of supply. This has resulted in poor financial conditions of the off-takers (mainly the four electricity distribution companies: Severelektro, Vostokelektro, Oshelektro and Jalalabatelektro).

This issue has further aggravated since, the distribution companies now lack funds for making investments to improve the quality of supply and any attempt to increase tariff results in public outrage. Also, there is no regulation or framework to manage the distribution of funds received by the distribution companies to the other stakeholders like generation and transmission companies. Further, the power sector receives substantial direct and indirect subsidies, which are not sustainable and may have serious macroeconomic and fiscal consequences.

5. Reform action plan for facilitating investments

In the previous section, we have identified key barriers which have resulted in inadequate investments in the electricity sector of Kyrgyz Republic. In this section, we have discussed some indicative reform measures that may be considered for facilitating investments and making the sector more attractive for private investors.

Strengthening of the Sector Regulator

An independent and strong regulatory institution, with a clearly defined legal framework is supposed to be the backbone of an effective institutional framework. For an electricity regulator to be effective, the following governance characteristics are of prime importance:

- Independence/Autonomy
- Capability
- Accountability
- Transparency

In Kyrgyz Republic, the landscape of regulatory institutional structure has changed and evolved. In such an evolved structure, it is important that capacity of the regulatory body be strengthened and complete independence be ensured from the government.

It has been observed worldwide that any bureaucratic and political intervention in the working of sector regulator has always resulted in discharge of ineffective regulatory functions by the body. An Independent regulator can provide assurance to investors that prices, outputs and inputs will not come under the pressure of 'regulatory capture' and pressures from economic and political interest groups.

The following activities are essential for ensuring the autonomy of ERC:

- Enabling guideline to ensure that the members and the chairperson are independent of the government;
- The guideline shall have stricter eligibility criteria for members of ERC so that the regulatory body has adequate regulatory manpower to discharge its responsibilities effectively. The members shall have technical knowledge and relevant professional expertise in the areas of tariff and regulatory.

A brief snapshot of the suggested reform action plan to strengthen the sector regulator has been shown in the below table.

Indicative measures for ensuring the strengthening of the regulatory body

- Developing efficient guidelines for selection of members of the regulatory body which ensures that the regulator is competent, independent and the process of selection is transparent. For example, the tenure of the Director may be fixed.
- In the long run, the regulatory body may be provided quasi-judicial status

🗨️ **Case Study: Kazakhstan**

In Kazakhstan, as per **Article 8 of the Law on Electric Power Industry, 2004**, unless otherwise allowed by the law, Central executive bodies and local representative / executive bodies cannot interfere in the activities of companies which are involved in the generation and transmission of heat and power. Thus policy matters have been dealiented from the functioning of the sector and any undue political influence has been curtailed by this move.

🗨️ **Case Study regarding funding of independent regulatory agencies.**

There are various ways in which independent agencies are funded. The three basic ways are:

- Assessments on regulated companies;
- Appropriations from General Treasury;
- Fees for special services/activities.

The most common method for funding regulation is by assessing the costs of regulation to the regulated companies, and then allowing them to simply pass those costs directly on to the consumers. The second most utilised method is through an appropriation from general tax revenues. The third, and least common methodology, is specific fees for services/activities.

Like Pakistan, Kyrgyz Republic is currently using the third methodology for funding ERC, which ensures financial autonomy to a greater extent but such a method has the highest transaction cost, and may yield less stability and reliability in a revenue stream thus hampering key regulatory activities. Fess, however, can be a very useful mechanism for providing supplemental funds for agencies when required for specific purposes.

India, on the other hand, uses the second method of funding the Central Electricity Regulatory Commission, namely from appropriation from general tax revenues. As per article 11 of The Electricity Regulatory Commissions Act, 1998, the expenses of the Central Commission, including all salaries and allowances payable to, or in respect of, the Chairperson and the Members of the Central Commission, shall be charged upon the Consolidated Fund of India. Even though the above methodology may not always attract political interference in the operation of the agency, is not as reliable or has stable assessments, and does not internalise regulatory costs into the sector.

Indicative measures for ensuring the strengthening of the regulatory body

- Organisational structure to be strengthened by recruitment of sufficient manpower so that expertise in the areas of tariff setting, licensing and changing market structure may be developed.
- A dedicated separate team within the regulatory body should be formed to monitor the performance of licensees on various parameters to ensure adherence with the required standards.
- Provide sufficient legal capacity and powers to the sector regulator to effectively promote competition for moving from the single buyer model to competitive market structure.

Regulations for promoting competition

Kyrgyz Republic has been suffering from the huge gap between tariff and the cost of supply. One of the ways to bridge this gap is to bring more efficiency, increase competition and reduce the cost of supply. Over a longer term, the tariffs can be made completely market determined and deregulating the tariff determination.

In order to allow entry of more players in the sector, it is imperative that enabling provisions are present in the act or power policy for the entry of private players. A brief snapshot of the suggested reform action plan to promote competition has been shown in the below table.

Indicative measures for promoting competition across value chain

- Relaxing the license requirements for power generation, especially for small generation and renewable sources. This would promote increase in capacity and bring more competition in the sector.
- Introduce policies and regulations for mandatory procurement of power and transmission of power through competitive bidding process.
- Introduce option to high value consumers for purchase of power from sources other than the DISCOM (allowing open access to electrical network).
- In order to allow entry of private players in the distribution, a Public Private Partnership Model through Distribution Franchisee (an Agency appointed by a DISCOM to perform its duties in more efficient manner) may be allowed wherein the franchisee can take over certain functions—metering, billing, revenue collection, and capital expenditure— while the government utility retains the legal responsibility for power supply.
- Enabling provisions for the introduction of competition in retail supply side of the electricity distribution sector through segregation of DISCOMs into two parts – carriage (distribution) business and content (retail supply) business. This will bring efficiencies in the distribution value chain of electricity.

We can find numerous examples across the globe where delicensing has resulted in significant capacity additions by private players. In India, post the enactment of Electricity Act 2003, in which generation was de-licensed, there was significant improvement in the contribution of private players towards the installed capacity base. In India, the impact of delicensing coupled with other reforms has been huge where the percentage of private sector towards the installed capacity base has risen from **11%** in 2003 to around **39.5%** by the end of the year 2015 (Ministry of Power Data). Similarly, relaxation in rules regarding captive generation along with simplification of procedures would also improve the generation capacity.

Case Study : Privatisation and competition in the Indian power sector

The distribution franchisee model

In the year 2006-07, The Maharashtra State Electricity Distribution Company Limited (MSEDCL), a public sector utility introduced the Distribution Franchisee Scheme in its one of the worst performing circles named as Bhiwandi (textile hub). The Distribution Model adopted in Bhiwandi achieved tremendous success in the areas of improvement in quality of supply, reduction of AT&C loss and improved consumer satisfaction.

A snapshot of Bhiwandi Distribution Franchisee Performance is given below:

| Parameters | 2006-07 | 2010-11 |
|------------------------------|---------|---------|
| Aggregate AT&C losses (%) | 58 | 18.5 |
| Number of transformers | 2254 | 2611 |
| Transformer failure rate (%) | 42 | 3 |
| Metering (% of consumers) | 23 | 98 |
| Collection Efficiency (%) | 58 | 99 |

The success of Bhiwandi distribution franchisee resulted in exploration of possibilities of franchisee system in other areas in states of Rajasthan, Madhya Pradesh, Uttar Pradesh, Bihar, etc.

Competition in the generation and transmission sector

In 2013, the Ministry of Power issued new guidelines for procurement of power through tariff-based competitive bidding. The Case 1 and Case 2 bid processes were replaced by DBFOO (design, built, finance, own and operate) and DBFOT (design, built, finance, own and transfer) approaches for construction and operation of thermal power stations. The DBFOO guidelines were further amended in April 2015 to ensure passing on of benefits of coal block auction to consumers.

In 2006, similar competitive bidding guidelines were put in place for enabling competition in power transmission as well. Inter-state transmission projects were awarded under the competitive bidding regime. A number of states such as UP, Rajasthan, Madhya Pradesh, Haryana, Tamil Nadu and Odisha embraced competitive bidding in power transmission to enable private sector investments in the sector. Standard bidding documents were issued by the Ministry of Power in 2008 which were later amended in 2008, 2010, 2011 and in 2013 subsequently.

Privatisation in the distribution sector

Orissa was the first state in India and South Asia to restructure its state owned electricity industry and privatise distribution business. OSEB operated as an integrated utility (handling generation, transmission and distribution of electricity) with the responsibility of making electricity available to the consumers in Odisha. Similarly, Delhi Electricity Supply Undertaking (DESU), under the Municipal Corporation of Delhi, was responsible for providing electricity to the consumers in Delhi. In the year 1997, DESU was replaced by a government-owned entity called Delhi Vidyut Board (DVB).

Over the years, the State Electricity Boards showed signs of sickness. The annual commercial loss in Delhi and Odisha for FY 1998-99 was 1039 crore INR and 538 crore INR respectively. Due to reasons like high technical losses, excessive theft, increasing peak demand-supply gap and degrading financial health of SEBs, it became necessary to reform the power sector. The SEBs were unbundled into separate generation, transmission and distribution entities with a long term view of privatisation and attracting private capital.

OSEB was unbundled in 1996. The thermal power stations were transferred to Odisha Power Generation Corporation (OPGC). Hydel generation was transferred to Odisha Hydro Power Corporation (OHPC) while the transmission and distribution business was given to Grid Corporation (GRIDCO) of Odisha. Similarly in 1999, 6 Shell companies were registered to become successor entities of DVB which included 3 DISCOMs, one for each of the three electrical circles, i.e. North and North West circle, Central and East circle, and South and West circle.

The privatisation under regulation has been highly successful in Delhi, which has also been claimed by a report on power sector by SBI cap securities in October 2012 and has saved around 30,000 crores INR for the Delhi Government. This money had been used to initiate various schemes to improve the standard of living of the people. The AT&C losses for Delhi had reduced from 56% to 38% in just five years post privatisation. With the effect of privatisation, not only the loss levels improved but also quality of supply improved. The financial position of the utilities also showed a positive trend and thus reliance on government subsidies has been completely done away with in the distribution sector of Delhi.

Efficiency in tariff determination

Currently, in Kyrgyz Republic, the electricity market is monopolised and tariffs are at very low level, making it difficult for utilities to work profitably. Although end-user power prices have been revised lately, they remain below cost recovery. The reason for this is that the changes in energy prices have not been made gradually according to indexation, but the decision to increase electricity prices has been sudden and unexpected.

Despite sector structural reforms the problems of debts and receivables are yet to be resolved. The imbalance of these between energy producers, mines, providers and consumers has meant that companies are experiencing a shortage of capital sources and are financially unstable. As such, there is a need for a clear framework and regulations to ensure justified distribution of cash in the various companies across the value chain.

Indicative measures for improving the financial position

- Judicious one-time settlement of debts in the electricity value chain so that the sector can recover from its current state of losses.
- Provide guidelines for sharing of revenue among the various power companies and also sharing of losses incurred through shortfall of revenue.
- Undertake regular audit of the DISCOMs to identify the areas of revenue loss and give appropriate directions to the companies and ensure cost recovery tariffs.
- Ensure transparency in tariff setting. For example, having public consultation and clear performance based regulations. There should be clear norms and benchmarks for calculation of tariff which should be framed after extensive stakeholder discussion and research.
- Policies for reducing the gap between category-wise cost of supply and tariff. This may include roadmap for reduction of cross subsidy and the policies for the same.
- Tariff can be fully cost reflective in the event when the tariff will be determined based on the demand and supply considerations in a market operated regulatory regime.

Case Study : Price reform in Vietnam

The key idea of the price reform in Vietnam was to make the price reflect real costs and changes in upstream and downstream markets and gradually reduce the state subsidies to electricity costs and prices.

In 2009, Prime Minister Nguyen Tan Dung issued Decision 21/2009/QD-TTg initiating electricity price reform. The price was planned to move towards cost recovery, increasing average electricity prices and transparency in price setting. The Decision also regulated the phase out of cross subsidies in prices for different consumer groups. The 7th National Power Development Plan (PDP), approved by the Prime Minister in 2011, sets a

specific target of increasing the electricity price to “meet the long-run marginal cost of the electricity system by 2020, equal 8-9 cents per kWh”.

The sale prices were to be adjusted within a fiscal year as per changes in fundamental input indexes, including fuel price, foreign exchange rate and the structure of electricity generation outputs. The minimum time between two consecutive adjustments was decided as three months. The Ministry of Industry and Trade then decided to regulate the electricity price adjustment as per fundamental inputs including foreign exchange rate, electricity generation structure and fuel price. The electricity price adjustment are specifically regulated and openly announced.

As a result of this measure, within 1.5 years electricity retail prices were increased thrice and thus increased by 8.3% in USD. However, still the electricity prices in Vietnam are lower than their cost of production but situation is slowly improving.

Promotion of renewables

The current fuel mix in Kyrgyz power generation is dominated by Hydro. The contribution of renewable energy resources to the national energy mix is limited. This clearly indicates need for key policy initiatives to promote indigenous resources like renewable sources. A brief snapshot of the suggested reform action plan to promote competition has been shown in the below table:

Indicative measures for promoting renewables

- Fix clear and tangible targets for RE generation and frame associated plan to meet the targets;
- Fix tangible targets for increasing share of hydro, renewables, etc. in total energy mix;
- Provide enabling environment and regulations to promote use of other fuels for generation.

Case Study: National Solar Mission 2010 in India

India has shifted its focus towards Solar Power too with National Solar Mission 2010. The Mission has set the ambitious target of deploying 20,000 MW of grid connected solar power by 2022 is aimed at reducing the cost of solar power generation in the country through (i) long term policy; (ii) large scale deployment goals; (iii) aggressive R&D; and (iv) domestic production of critical raw materials, components and products, as a result to achieve grid tariff parity by 2022. The Mission is also aimed at creating an enabling policy framework to achieve this objective.

Appendix A: List of power plants

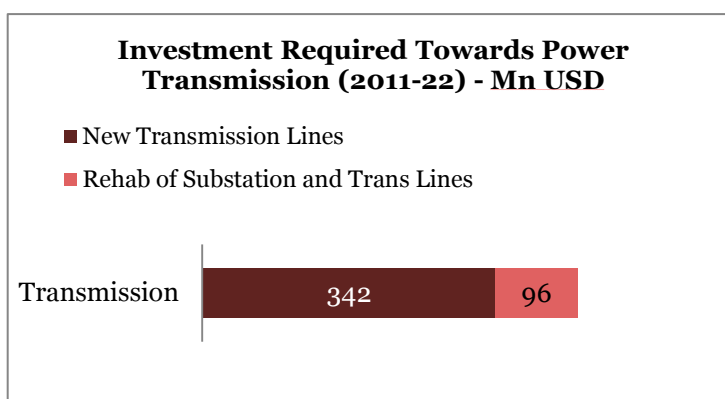
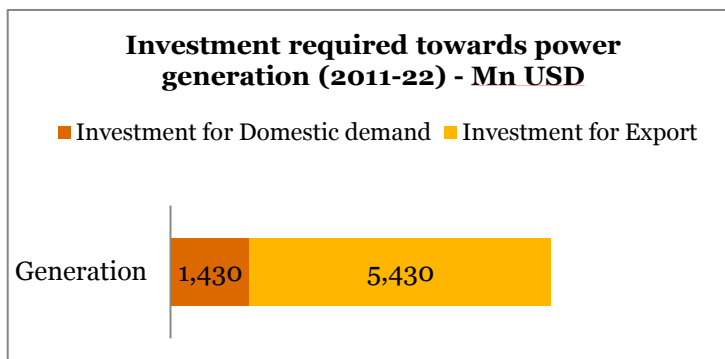
| Name of the plant | Installed capacity (MW) |
|--------------------------|--------------------------------|
| Toktogul HPP | 1200 |
| Kurpasi HPP | 800 |
| Tash Kumyr HPP | 450 |
| Shamaldysai HPP | 240 |
| Uch-Kurgan | 180 |
| At-Bashi | 40 |
| Bishkek CHP | 678 |
| Osh CHP | 50 |

Appendix B: Investment requirement according to the Power Sector Master Plan

According to the Central Asia Regional Power Sector Master Plan, the total investment for generation and transmission expansion was estimated at 7,298 Mn USD. Most of the investment in generation is required for the rehabilitation of hydropower plants to increase the operational efficiency and construction of thermal power plant to improve the supply scenario during winter months. Some investment is made to develop hydropower plants for export purpose. So a total of 1,430 Mn USD is required to cater the domestic demand whereas investment of 5,430 Mn USD is required for export purpose. A major portion of the 6.8 Bn USD investments in generation will be towards rehabilitation of existing HPPs. To address the winter power shortages in Kyrgyz and to make allowance for the lower power generation from HPPs during winters The Kara –Kecher coal-fired TPP is required to supply electricity during winters.

An investment of 1,430 MNUSD in generation will be necessary to meet domestic electricity demand.

In transmission, an investment of 438 Mn USD is envisaged for rehabilitation of substation and development of Datka Kemin transmission line. The development of 500Kv Datka Kemin line and 500/220Kv substation is required for power supply from south to north. This line will also help to supply power to load centres without using the network of Uzbekistan and Kazakhstan.



Source: CAREC Power Sector Master Plan

Investment requirement – A Summary

Thermal (coal) generation unit of 1200 MW capacity with an estimated investment of \$4 Bn

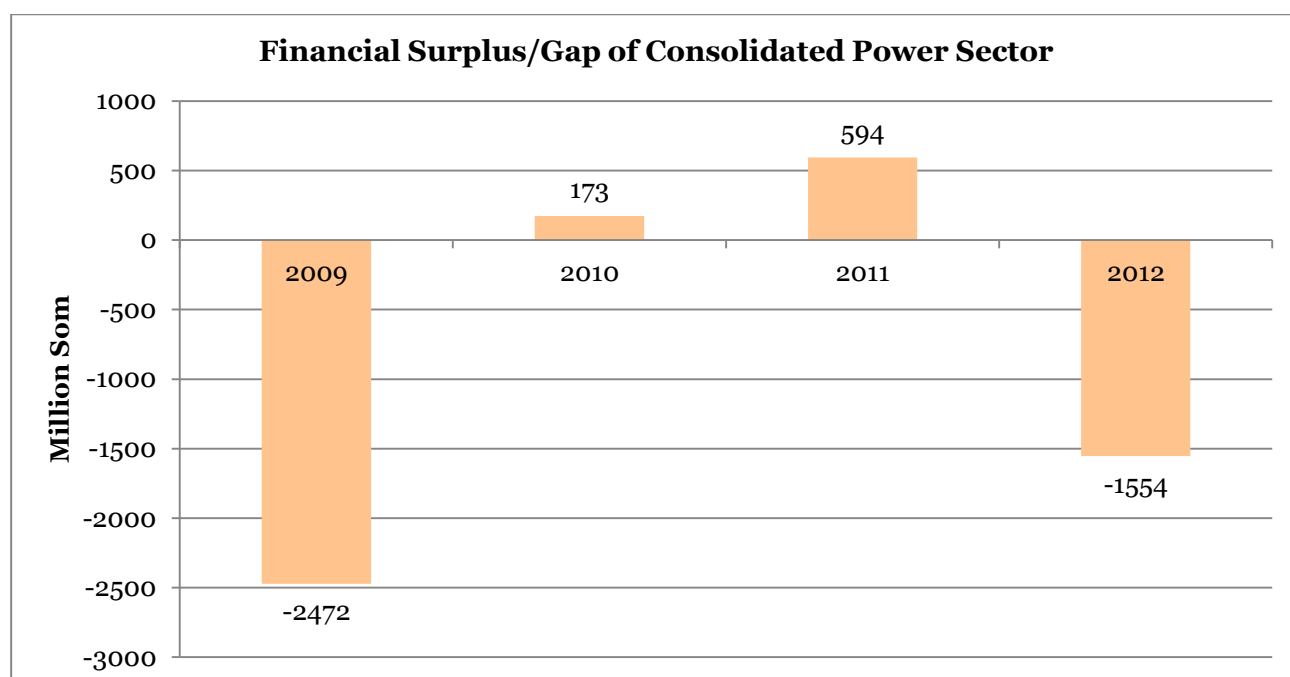
Hydro power projects with a capacity of 1600 MW with an estimated investment of \$2.5 Bn

Investment requirement for Transmission projects estimated at \$438 Mn

Appendix C: Financial surplus/ gap of the consolidated power sector

The financial situation of the power sector has varied significantly in recent years due to fluctuations in export revenue. It improved from 2009 to 2011 mainly on account of robust growth in export revenue. However, in 2012 it declined largely because of decrease in export revenue by nearly 60%, high technical & commercial losses.

The figure given below compares the financial surplus/gap for the years 2009-12. The financial gap or surplus is defined as the difference between cash inflow and actual costs (recurring expenses and debt payment) incurred by the consolidated sector.



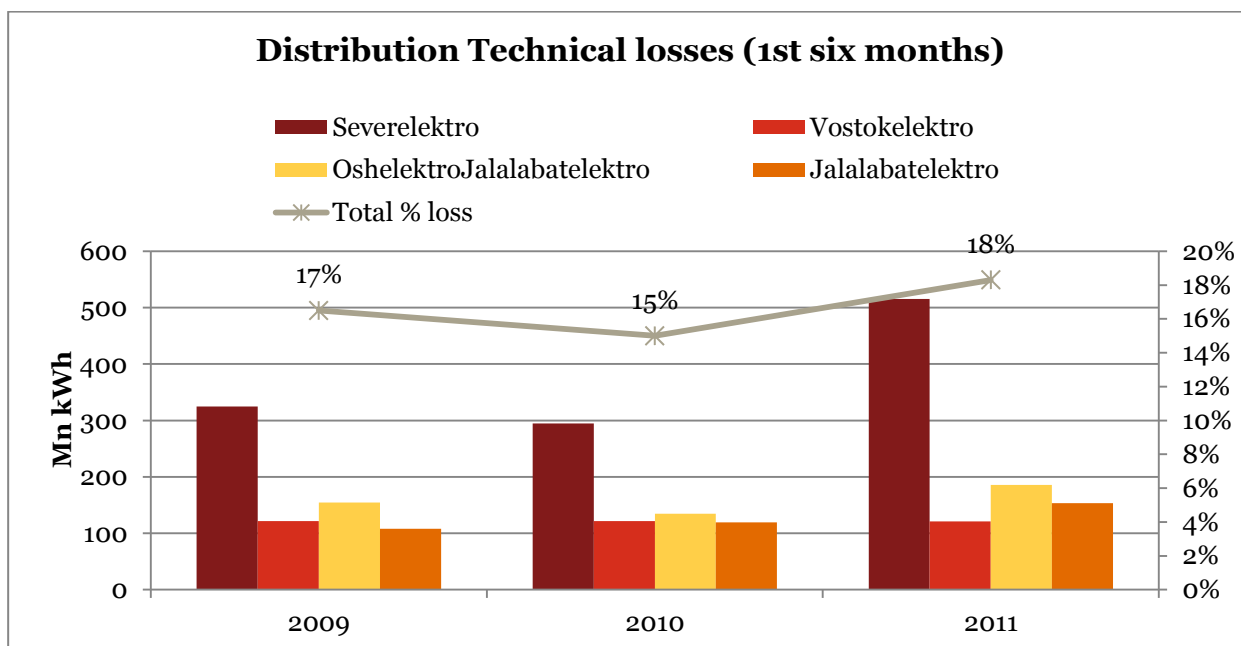
Source: World Bank Report on Power Sector Policy Note for the Kyrgyz Republic 2014

Under recovery of cost

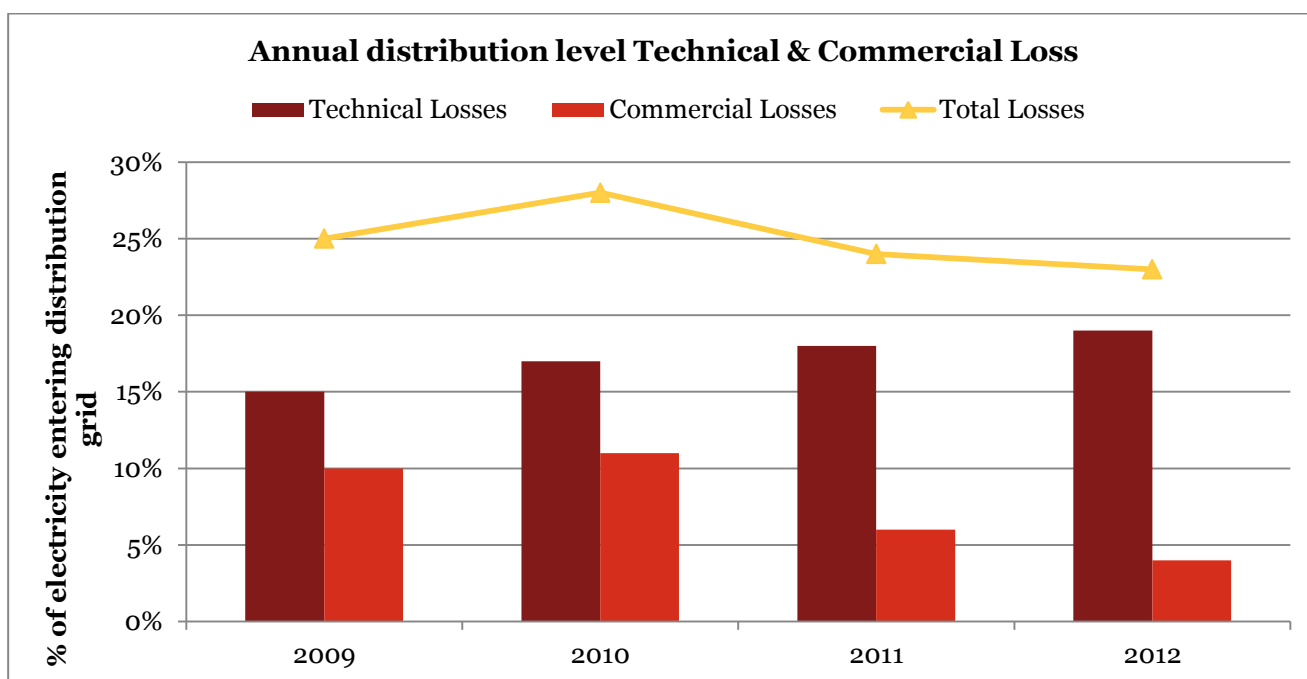
From 2007 to 2012, the actual cost of generating, transmitting and distributing one kWh of power was, on an average, 35% higher than the average end-user tariff for domestic consumption. This implies that the tariff does not reflect the actual cost of power supply. This is mainly attributable to the increase in cost of supply by 15% p.a on an average from 2007 to 2012 and high technical and commercial losses.

Technical & commercial losses

Most of the losses occur at the distribution stage primarily due to obsolete equipment, the absence or malfunctioning of meters, inaccurate metering of consumed electricity and theft. The technical losses for the first six months alone in 2011 were around 18%. The total losses for the entire year have consistently been above 20%.



Source: World Bank Report on Power Sector Policy Note for the Kyrgyz Republic 2014



Source: World Bank Report on Power Sector Policy Note for the Kyrgyz Republic 2014

The aggregate technical and commercial losses at the distribution level in Krygzy Republic have been above 20% consistently from 2009 onwards. The average loss for the period 2009-12 is 25%, which is one of highest amongst the CAREC countries.

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