ADB TA 8727 REG

CAREC: Study for Power Sector Financing Road Map

Mobilizing Financing for Priority Projects

Tajikistan *September 20*16



This consultant's report does not necessarily reflect the views of ADB or the Government concerned, and ADB and the Government cannot be held liable for its contents.



# List of Abbreviations

AT&C	Aggregate Technical & Commercial Losses
Barji Tojik	Also referred to as Barki Tojik,Barji Tajik, Barqi Tojik,Barqi Tajik
ADB	Asian Development Bank
CAPS	Central Asian Power System
CAREC	Central Asia Regional Economic Cooperation
CIS	Commonwealth of Independent States
CRET	Central Regional Electricity Transmission Company
EAP	Energy Action Plan
EBRD	European Bank for Reconstruction and Development
ECA	European Central Asia
ERC	Energy Regulatory Commission
ESCC	Energy Sector Coordinating Committee
ESO	Energy Supplying Organizations
FDI	Foreign Direct Investment
FSU	Former Soviet Union
GDP	Gross Domestic Product
G-T-D	Generation-Transmission-Distribution
GWh	Gigawatt – hour
HPP	Hydro Power Plant
IEA	International Energy Agency
IPP	Independent Power Plant
JICA	Japan International Cooperation Agency
kWh	Kilowatt-hour
MTPP	Medium Term Priority Project
MW	Mega Watt
NBT	National Bank of Tajikistan
NDC	National Dispatching Centre Company
PLF	Plant Load Factor
PPA	Power Purchase Agreements
РРР	Public Private Partnership
PRS	Poverty Reduction Strategy
R&M	Repair and Maintenance
RDC	Regional Dispatch centers
RDTA	Research and Development Technical Assistance
REC	Regional Electric Grid Companies
RPMP	Regional Power Sector Master Plan
SDR	Special Drawing Rights
TA	Technical Assistance

TALCO	Tajik Aluminum Company
TJS	Tajikistani Somoni
ТРР	Thermal Power Plant
UK	United Kingdom
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USD	United States Dollar
ҮоҮ	Year on Year
AT&C	Aggregate Technical & Commercial Losses
Barji Tojik	Also referred to as Barki Tojik,Barji Tajik, Barqi Tojik,Barqi Tajik
ADB	Asian Development Bank
CAPS	Central Asian Power System
CAREC	Central Asia Regional Economic Cooperation

# Table of contents

1. National power sector overview	5	
1.1. Industry structure and institutional arrangements	5	
1.2. Power Supply and Demand	6	
1.2.1. Power Supply	6	
1.2.2. Power Demand	8	
1.3. Sector regulation	12	
1.3.1. Evolution of Legal and Regulatory Landscape	12	
1.3.2. Key features of the legal and regulatory landscape	12	
2. Power sector development and investment plan	15	
2.1. Objectives driving sector development	16	
2.2. Projected supply and demand	20	
2.3. Approach and key considerations for project prioritization	21	
3. Options for funding and financing power sector investment plans	30	
3.1. National government	30	
3.2. Assistance from Development Partners	32	
3.3. Other Governments	36	
3.4. Envisaged funding probability of priority projects	37	
3.5. Private sector participation	38	
4. Barriers to investments in the power sector	41	
5. Reform action plan for facilitating investments	43	
Appendix A: Key power plants in Tajikistan	48	
Appendix B: Investment requirement according to regional PSMP	49	
Appendix C: Macroeconomic overview		
Appendix D: Bibliography5		

# 1. National power sector overview

Tajikistan's power grid consists of three separate electricity systems namely, the northern region, the southern region, & the Gorno-Badakhshan region. The electricity sector in Tajikistan is dominated by 'Barji Tojik'' Open Joint Stock Holding Company' (BTOJSHC), a wholly state owned & vertically integrated power utility.

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 implementation of the energy policy & planning of the country is vested in the Ministry of Energy and Industry of the Republic of Tajikistan. State Joint Stock Holding Company "Barji Tojik" is the vertically integrated utility of Tajikistan. The current structure along with key stakeholders in the sector of is shown below:



<sup>1</sup> Barji Tojik-Also referred to as Barki Tojik, Barji Tajik, Barqi Tojik, Barqi Tajik

Barji Tojik is responsible for ~95 % of the total power generation in the country and also owns & operates the transmission & distribution network in the entire country except the Gorno-Badakhshan region.

## 1.2. Power Supply and Demand

Tajikistan has vast hydropower resources that account for more than 9/10<sup>th</sup> total power generated in the country. Although Tajikistan's hydro dominated power generation mix ensures energy surplus during summers, it faces severe power shortage during the winter season affecting almost 70% of the population. These deficits are due to high power and heating demand in winter which are further exacerbated by Tajik's dependency on hydropower plants wherein the available generation during the winter is low due to decreased river flows. In Tajikistan, the availability of power generated from hydropower plants is lowest during winters, due to hydrological conditions as the rivers freeze during the season. Moreover the power demand across the country has also been rising due to relatively strong economic growth.

## 1.2.1. Power Supply

Hydro based power plants account for a major portion of the Tajikistan power generation mix. Around eight of Tajikistan's key hydro power plants (including Rogun) are located on the Vaksh River while the other generation facilities are located on the Panj, Zerafshan, and Kafarnigan rivers. Tajikistan has a total installed capacity of 5,157MW (as of 2014)<sup>2</sup>. During the Soviet era nearly 2/3rd of Tajikistan's energy needs were met by oil and diesel produced across other Soviet republics; however post-independence the share dropped significantly.

After the collapse of the Soviet Union and the rise in price of gas and fuel oil by at least four times, the CHPP Dushanbe-1 with a capacity of 198 MW oil, operated at almost 20% of its rated capacity. Majority of Tajikistan's thermal & heating plants are not operational due to lack of fuel and importing fuel is not economically feasible. Steep decline in power generated from thermal sources was seen since 1993 and most plants also see reduced output due to lack of maintenance.

Currently, about 91% of power generated in



Tajikistan I	Power Ger	neration o kWh)	ver the yea	urs (Mn
Plant Type	2010	2011	2012	2013
Hydro-power plants	16,400	16,200	16,900	17,071
Gas-turbine power plants	35	38	74	44
			S	ource: IEA

Tajikistan is from 11 large and medium HPPs, 7% of power from CHPP Dushanbe-1 and Dushanbe-2 with a design capacity of 400MW (first stage 100 MW is current and second stage 300MW is being built) and 1% from small HPPs, Varzob cascade and Pamir energy company.

Russian company 'Inter Rao ESS' owns majority stake in Sangtuda Electric Plant-1, whereas, Sangtuda-2 is cofunded by the Government of Iran, Iranian Company 'Sangob' and Government of Tajikistan. Pamir energy with an installed capacity of ~43 MW operates independently in the GBAO region and supplies power to residential, commercial, and government customers. Pamir Energy also purchases an additional 5.2 MW from

<sup>&</sup>lt;sup>2</sup> http://www.ebrd.com/news/2014/ebrd-invests-in-hydropower-in-tajikistan.html

Barki Tojik and Oriyon GES (an Independent Power Producer). Pamir Energy was formed in 2002 under a PPP arrangement through a concession agreement for 25 years signed between the Government of Tajikistan & the Aga Khan Fund for Economic Development (AKFED).

Ageing of power sector infrastructure and the lack of capacity addition due to limited investments in the sector are among the major challenges being faced by Tajikistan's power sector. Much of the infrastructure was set up during the Soviet era and needs to be replaced. Despite Tajikistan's total installed capacity of 5,157MW, only

- Tajikistan lacks significant oil reserves and natural gas unlike Kazakhstan, Uzbekistan and Turkmenistan.
- While Tajik has significant reserves of coal, the sector is rather undeveloped and moreover the high extraction cost renders it uneconomical.

57% is currently available for electricity generation as it needs to be renovated and modernized 3-

A list of major hydro and thermal power plants and with Capacity is provided in Appendix A of the report.

## Seasonal Character of predominantly hydro based generation

An energy mix heavily skewed in favor of hydro, comes with its own share of problems, as energy generated from hydropower plants are subject to fluctuation in levels on account of the variation in water flow during different seasons. The lowest trend in energy production is seen during the autumn and winter periods while during summers there is an energy surplus. Decreased river flows in cold weather reduces the electricity generation during winters, particularly from non-storage HPPs.

As a result of acute energy deficit during winter, the economic development of Tajikistan is adversely affected. In winter, electricity is available only for up to 3 hours a day in the rural areas. Impact of energy shortages in winter on overall economy is profound with the share of energy costs amounting to almost  $3/5^{\text{th}}$  of the total volume of the GDP. The power supply scenario is steady during the summer period and surplus power of 3.0 to 7.5 Billion kWh is available.

While an energy mix dependent on HPPs has its own advantages, there are disadvantages as well. Almost  $1/3^{rd}$  of the installed capacity is unavailable during the winter season due to low water availability/ flow in the rivers. Hence, the power demand in the winters is not met leading to adverse effect on the economic development.

Power Imports: The northern and southern electricity systems of Tajikistan are not directly connected. The

country's northern regions have not traditionally been connected to the rest of the national transmission grid. The transmission of electricity was done using a 500kV transmission line running through the territory of Uzbekistan. Currently there are no power flows between Tajikistan and Uzbekistan because of political issues. The Northern and Southern energy systems connected by a 500 kV power transmission line "North-South", 500 kV power

Tajikistan Power Imports (Mn kWh)			
2010	432		
2011	172		
2012	114		
2013 117			
Source : IEA			

transmission line of Central Asian energy system (CAPS) is currently disabled from Uzbekistan. The table alongside captures the yearly import by Tajikistan since 2010. In the late 2009, Uzbekistan decided to withdraw power from the Central Asian Integrated Power Transmission network (CAPS). As a result, Tajikistan is no

<sup>&</sup>lt;sup>3</sup> According to EBRD estimates from October '14

longer able to import electricity from Uzbekistan or from Turkmenistan through transmission lines running across Uzbekistan.

Tajikistan is also connected to the Kyrgyz Republic. Tajikistan's transmission systems are connected to Kyrgyz Republic through a 53 km 220 kV transmission line from the Kanibadam substation in Tajikistan to the Aigul-Tash substation in Kyrgyz Republic. The Tajikistan transmission system is also connected to Afghanistan through a 220 kV double circuit transmission line from Sangtuda in Tajikistan to Pul-e-Khumri in Afghanistan. The Government of Tajikistan, through Barki Tajik and the Ministry of Energy and Industry, conducts dialogue with the Coordination Energy Council of Central Asia to consider opportunities for reunification of the CAPS to increase imports in the short term.

The table below captures a list of international power transmission lines connected with Tajikistan and their current status of operation

Sn No.	Connection	Voltage (kV)	Length (km)	Capacity	Comment
1.	«Kanibadam – Batken», Tajikistan- Kyrgyzstan	220	53	600	Operating
2.	Regar – Guzar, Uzbekistan	500	257	1560	Does not operate
3.	Regar – Surkhan, Uzbekistan	500	162	580	Does not operate
4.	Regar – Gulcha, Uzbekistan	220	48	690	Does not operate
5.	Regar – Denau, Uzbekistan	220	49	690	Does not operate
6.	Zarya Syrdarya HEPP – Karakum HPP, Uzbekistan	220	48	690	Does not operate
7.	Khudzhand – Syrdarya HEPP, Uzbekistan	220	42	690	Does not operate
8.	Kizylinsk Array- Syrdarya HEPP, Uzbekistan	220	9	600	Does not operate
9.	Uzlovaya - Syrdarya HEPP, Uzbekistan	220	5	600	Does not operate
10.	Donkurgan - Metallurgy, Uzbekistan	110	9	380	Does not operate
11.	Kanibadam - Yaypan, Uzbekistan	110	11,9	600	Does not operate

## 1.2.2. Power Demand

Tajikistan faced severe power shortages during autumn of 2015 as the power supply to several parts of the country was being restricted. This was primarily due to increased demand on account of dip in temperatures and insufficient electricity generation by the Nurek HPP. Tajikistan had shifted to a phased system of power supply - up to 10 hours per day and only the capital city Dushanbe was supplied with electricity for 24-hours a day. During the winter periods, the country experiences significant deficits in power supply ranging from 2.2 - 2.5 Bn kWh. In order to have sufficient electricity during winter and autumn, Tajikistan had to introduce limitations, which primarily affected the rural residents who comprise approx. 70% of the total population.

## Key aspects of Tajikistan's demand-supply mismatch

Tajikistan have surplus electricity during summer and it struggles with power shortages during winter.

Tajikistan has to import expensive fuel from other countries in order to cover around 70% of its energy demand. Electricity shortfall impacts Tajikistan's largest export commodities aluminum and cotton which account for almost 1/5<sup>th</sup> of Tajikistan's GDP and over half of Tajikistan's exports.

A surge in energy shortages was seen in 2009 with Tajikistan's electricity transmission links being severed from the Central Asia Power System (CAPS) and the power trade with Central Asian countries being withdrawn. Generation from hydropower has a seasonal character and depends on the level of water in rivers.

Tajikistan's have power surplus during summer, while portion of the surplus power is exported to Afghanistan and the Kyrgyz Republic; water is usually spilled from reservoirs.

Currently around 90% of Tajikistan's electricity generation is provided by utilizing approximately 5-6% its

hydropower generation potential. There is increasing focus on leveraging Tajikistan's hydro potential to help address the country's as well as CAREC members' regional energy crisis by exporting the surplus power generated. Tajikistan has the world's 8th highest potential in hydropower resources. The industrial segment is the largest consumer of electricity accounting for 41% of the total electricity consumed followed by agriculture (30%) and residential users (22%). Tajik Aluminum Company (TALCO), state-owned а aluminum smelter consumes almost all of the electricity consumed by the industrial



sector. The energy intensity of the industry sector in Tajikistan is almost ten times higher than most of the European countries.

According to government estimates, Tajikistan possesses approximately 527 Billion kWh per year of hydropower generation reserves out of which it is technically possible to develop about 50% (280 Billion kWh)<sup>4</sup> at present. This is thought to be more than thrice the existing combined consumption of electricity throughout the whole of Central Asia.

<sup>&</sup>lt;sup>4</sup> Republic of Tajikistan Ministry of Energy and Industry Presentation

**Power Exports:** Tajikistan currently exports over 1 billion kWh of electricity for about USD 35 Million for the 9 months of the year when it witness a power surplus. It usually exports power to Afghanistan, the Kyrgyz Republic and Kazakhstan. The power generation from HPPs is very much dependent on water flows in the country's major rivers. As a result, the country exports its surplus power only in the

Tajikistan Power Exports (Mn kWh)			
Year	Export Volume		
2010	286		
2011	197		
2012	775		
2013 1061			
Source : IEA			

summer months. The power export to Afghanistan is in accordance with a PPA signed in August, 2008 and the transmission is done through a 220kV transmission line built in 2010 with the support of ADB. In December 2014, Pakistan signed a green electricity import deal from Tajikistan for a 15 year period under the CASA-1000 project.

## CASA Agreement and the Tajikistan's role 5

The CASA-1000 electric power line project will supply electricity from Kyrgyzstan and Tajikistan to Afghanistan and Pakistan. The CASA-1000 agreement has been formalized in December 2014. The graphic provided below highlights the salient features of the CASA 1000 agreement:

Under the CASA-1000 project agreement, energy from Tajikistan and Kyrgyzstan will be exported to Afghanistan and Pakistan in summer time.

Pakistan will now receive 1300 MW of electricity, from the Central Asian states, under the CASA-1000 project, as Afghanistan has shown its inability to draw its share of electricity due to lack of demand. Tajikistan has 70% share in the energy export while Kyrgyzstan's share is 30%.

The project is scheduled for completion by 2018; the total cost is USD 1 Billion.

<sup>&</sup>lt;sup>5</sup> 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

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

Pakistan has stated that it will be ready to re-export electricity, while Afghanistan claimed that Tajikistan is now obliged to supply electricity not only in summer, but in winter as well.

The CASA transmission line is expected to be routed from Datka, Kyrgyz Republic, and through Tajikistan and Afghanistan before terminating in Peshawar, Pakistan. The line will allow Tajikistan to sell surplus electricity during 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 USD 1 Billion will facilitate supply of 1,300 MW of existing power surplus during summer from Kyrgyz Republic and Tajikistan in Central Asia to Afghanistan and Pakistan in South Asia. Tajikistan and Kyrgyzstan possess large hydropower resources which are not only environment friendly but also cheaper than other forms of power. Afghanistan and Pakistan have demand for electricity in the summer for their industrial production, and to avoid the closure of small businesses which results in job cuts. Tajikistan has



527 Billion kWh of electricity reserves per year, which is more than thrice the current demand for electricity in the Central Asian region.<sup>6</sup>

Tajikistan plans to export 3 Billion kWh under the CASA-1000 project which can boost the interregional collaboration between the countries of Central and South Asia, as well as provide the efficient use of natural resources. The total investment for implementing CASA-1000 project in the territory of Tajikistan will be around USD 314 Million. The project is being realized under the auspices of the World Bank whereby the World Bank has issued an 'Implementation Status and Results Report' for CASA-1000 on 27th December, 2014. Tajikistan has already started commissioning of the transmission lines to Afghanistan, and is supplying electricity to the country. The tender for the CASA project is to be launched soon and will be completed by 2018. The project is expected to bring a number of economic and environmental benefits, reducing the energy deficit, improving trade and business links, besides promoting friendship among the partner countries. In this regard, Pakistan and Tajikistan have reiterated their resolve to complete CASA-1000 project by 2018.

<sup>&</sup>lt;sup>6</sup> Recent announcements/updates on CASA-1000 project – Tribune, EBRD, Energy Charter and other Industry Sources

## 1.3. Sector regulation

## 1.3.1. Evolution of Legal and Regulatory Landscape

The key legal and regulatory milestones in the power sector of Tajikistan since the 1990s is represented in the schematic diagram below:



The development of Tajikistan electricity sector started with the decision to attract foreign investment & privatize the state properties of the sector. The privatization began in 2002 with the formation of Pamir Energy taking the control of most of Barqi Tojik's assets in Gorno-Badakhshan Autonomous Oblast region for a period of 25 years. From 2001-2004 the Government focused on investment promotion by providing tax incentives and also emphasized on energy security by introducing the Concept of Fuel Energy Complex. In 2006, the restructuring plan of the state owned utility of Barqi Tojik was developed in three phases from 2009 to 2018. The first phase focused on improvement of corporate governance and financial management; the second phase on separation of generation, transmission and distribution assets and the third phase will evaluate the readiness for privatization of generation & distribution assets.

Currently the Govt. of Tajikistan has started to shift its focus towards use of alternate energy sources and energy conservation to address the power deficit during lean season. Tajikistan had to face severe power deficit during lean season due to over dependence on hydro power and absence of trading from regional countries.

## **1.3.2.** Key features of the legal and regulatory landscape

## License framework

The **Law on Licensing of separate type of activities**, **2004** provides for requirement of license by any legal entity or individual entrepreneur for generation, transmission and distribution of electricity except in case any of the above activities is implemented to satisfy their own needs. The licenses will be issued by concerned authorities designated for the specific activity. Further, the Law clearly specifies the detailed provisions

regarding issuance of licenses, processing applications, reasons for refusal, temporary suspension and withdrawal of license etc. The issuance of license is subject to license tax which is fixed by the government depending on the type of activity. The license will be cancelled if the license tax is not paid within 3 days.

## **Energy Efficiency**

The regulation on the Concept of development of Tajikistan Fuel and Energy Complex Industries (2003-2015) lays down the roadmap for implementation of energy efficient measures in three phases:

**First phase (2003-2007):** The objective of the first phase is to renovate and modernize the existing assets by using advanced technology and introduce market prices for energy resources.

**Second phase (2007-2011):** The objective of the second phase is development of new hydropower facilities, geological exploration and infrastructure development of new oil and gas deposits as well coal extraction along with development of renewable energy sources.

Third phase (2011-2015): The third phase will focus on export of energy resources to Euro Asian countries and overseas for energy sector development.

The main purpose of the regulation is to prioritize projects for reliable supply and attract foreign investment in the country for implementation of those projects.

## **Foreign investment promotion**

The Law on Foreign Investment acknowledges the need of investment from foreign sources for the development of various sectors including electricity sector and provides favorable environment to investors based on their role and contribution. Some of the benefits to foreign investors as per **Law on Foreign Investment** are:

- It is mandatory to compensate the foreign investor in terms of money in case of suspension or requisition of the investment activity and the value should be the real cost of that investment at the time of decision.
- Investors are free to repatriate their income in foreign currency and profits earned can also be reinvested.
- Tax incentives like VAT free import of property from foreign countries by the investors as a part of their investment.
- The property of the enterprise which received foreign investment will act as a guarantee for the company's obligations including loan. The guarantee may also include right to use of land and natural resource.
- Having license and concession agreement in place, foreign investors can acquire land, and also have the right to explore and use natural resources as per the agreement.

The new **Concession Law**, **2011** defines the concession period as maximum of 49 years depending upon the techno economic feature of the concession except for mineral resource deposits. However the concession period may be extended up to 99 years.

## Law on use of renewable energy

In 2010, Government of Tajikistan came up with Law on use of Renewable Energy for regulating legal relationships between administration and stakeholders with an emphasis on international cooperation. It offers a number of incentives to the developers to attract investment in the sector which are as follows:

- Priority is given to renewable energy projects in very remote areas where there is shortage of power supply and the grid connectivity is not feasible.
- Free grid connection charges for the plant operator.
- Water royalty tax exemption for independent small hydropower plants.
- Determination of Feed-in-tariff according to generation costs for each project.
- Allows imports of equipment for renewable energy use on preferential terms.

The above provisions make the renewable energy sector attractive for investors.

# 2. Power sector development and investment plan

Despite high growth between 2011 and 2013, Tajikistan's economy is still striving to speed up the process structural transformation. of Growth slowed down to 6.7% and % 2014 and 6.0 in 2015 respectively. This was primarily because there was recession in the Russian Federation a year earlier which caused subsequent fall in the Rouble. The remittances from Russia in Rouble are Tajikistan's main source of income and devaluation of Rouble accounted the impeded for growth of Tajikistan's economy in 2014 & 2015.

GDP by sector (Source: IMF,ABD Outlook)					
Year	Overall GDP Growth	Agriculture	Industry	Services	
2008	7.9	7.8	-8.9	12.0	
2009	3.9	10.5	-6.5	9.5	
2010	6.5	6.8	9.7	4.6	
2011	7.4	7.9	5.7	11.0	
2012	7.5	10.4	10.4	14.5	
2013	7.4	7.6	3.9	19.3	
2014	6.7	4.5	13.3	1.0	
2015	6.0	3.2	11.2	-7.0	

Majority of the labor force still continue to get employment in agricultural sector. The economy is quite vulnerable to the fluctuations in the prices of cotton and aluminum exports. The main policy challenge is to boost private investment by improving governance and the investment climate. Electricity generation is a key input for the production of the country's two largest exports—aluminium and cotton. Government of Tajikistan is considering the following measures in its National Development Strategy for 2030 to boost economic activity: 1) securing stable access to energy resources; 2) attaining self-sufficiency in food production; 3) integrating international and national transport links; 4) developing communication networks; 5) access to social services.

Power generation is dominated by hydropower which accounts for over 90% of the total installed capacity. The power generation declines sharply in cold winter months and the country experiences significant electricity shortage (estimated at 2.7 billion kWh, which is about 24% of total winter supply requirement of 11.2 billion kWh). As estimated by the World Bank the winter shortage leads to an economic loss of some USD 200 Million per year, which is about 3% of the gross domestic product (GDP) of Tajikistan.

• The Tajikistan economy is vulnerable to shocks from decline in commodity prices and remittance inflows from Russia.

• Growth in the medium term to be driven by investments of USD 6 billion from 2015 to 2017 from China and export of surplus energy during summers to Afghanistan and Pakistan under CASA Electricity Transmission and Trade Project.

ADB TA 8727 REG: Study for a Power Sector Financing Road Map within Central Asia Regional Economic Cooperation - Final Report: Tajikistan PwC Tajikistan remains one of the poorest countries in the region and lags behind in social and governance aspects as compared to the other countries. Despite the per capita income growth of about 9% a year, there has been no increase in per capita electricity consumption since 2009. More than 96% of Tajikistan's households are connected to the electricity grid, but about 70% of the population currently suffers from blackouts during winters.



## 2.1. Objectives driving sector development

## Sustainable Energy for All-Tajikistan

It is envisaged that by 2030, the following objectives will be attained within the frameworks of the "Sustainable Energy for All" program:



In order to achieve the above objectives Tajikistan has prioritized the following tasks detailed below:

Improvement of the policy / regulatory and institutional framework of the energy sector, including the establishment of independent regulatory body;

Amendment of the tariff policy, ensuring the transparency of the policy-making process and involvement of civil society, vulnerable groups and other users' groups in decision-making;

Mobilization of private investments, in particular for the development of renewable energy,

Establishment of the National Trust Fund on renewable energy and energy efficiency;

Development of the long-term Programme and targeted energy efficient policy in all economic sectors;

Development of the domestic technological base and capacities, including manufacturing, operation and maintenance, supplies and equipment for energy sector, technology transfer and know-how;

Regional cooperation and partnership in energy sector.

## Power sector goals as outlined by the Government of Tajikistan

The Tajik government has emphasized on the fact that energy independence and electricity supply to all the sectors in the country are two important factors that are required for the development of the economy of Tajikistan.

In 2009, the Head of state declared that in order to ensure enforcement of various social and economic sector development programs and maintenance of sustainable level of economic development as per the National development strategy, the following goals have to be achieved:

Constructing small, medium and large HPPs, power transmission lines and developing a unified energy system in the country

Adapting energy-saving technology, renovating and modernizing hydropower facilities and electricity & gas transmission networks, thus ensuring stable development of energy sector

Utilizing all resources and opportunities for foreign and domestic investments to meet the country's demand for natural gas and generate electricity domestically; thus ensuring energy independence in the country

The Government of Tajikistan recognizes both the importance and the challenges of energy security and has therefore introduced various measures to help meet power demand. The government has emphasized the importance of energy saving policies, effective energy resource management and development, reduction of energy losses and also provided impetus for ongoing exploration of new energy supplies.

To accelerate the current priorities and outline future socio-economic development objectives, the Government has developed the National Development Strategy of Tajikistan for 2030. The key objectives set out under the strategy are:

Transition from energy independence to the efficient use of electricity; From overcoming communication deadlock to a transformation into a transit country;

From focusing on food security to ensuring people's access to quality nutrition.

ADB TA 8727 REG: Study for a Power Sector Financing Road Map within Central Asia Regional Economic Cooperation - Final Report: Tajikistan PwC

## Long-term program for building small hydropower plants for the period 2009 - 2020

Apart from the large hydropower plants, Tajikistan also generates about 11 MW from mini-hydro plants on small secondary streams. Under the "Long Term Program of Building Small Hydroelectric Power Stations 2008 -2020", it is intended to increase the power generated through the mini hydro plants to 118 MW. It is envisaged that these plants provide electricity to local communities which are far-flung and not connected to the grid. The Government of Tajikistan is making efforts to develop hydropower engineering practices and has adopted Decree of the Government of the Republic of Tajikistan No.73 dated February 2, 2009, on "Long-Term Small Power Plant Construction plan for 2009-2020". The proposed plan envisages the construction of 189 small HPPs with a total capacity of 26,801 kW. The planned small hydro plant capacity addition for 2009-20 is given below:

Period	Planned total installed grid connecte d capacity (MW)	Additional stand- alone capacity (MW)	Planned annual electricity production from the installed capacity (MWh/year)	Required money to incentivize newly installed capacity in given period (USD Million)	Total required cost in the given period for incentives (USD Million)	Required money to cover investment costs of stand-alone plants (USD Million)
2009-2011	43.53	5	280.84	5.62	5.62	5.00
2012-2015	32.85	18.62	185.07	3.70	9.32	18.62
2016-2020	26.8	73.2	175.74	3.51	12.83	73.20
Total	103.18	96.82	641.65	12.83	27.77	96.82

- 2<sup>nd</sup> National Communication of the Republic of Tajikistan under the UN Framework Convention on Climate Change (2008) outlined that the country's huge potential for development of small hydropower attracts investments for development of renewable energy.
- It is estimated that if existing technical potential for small hydropower of 18 billion kWh/year is utilized in Tajikistan, it can lead to reduction of about 5-6 million tons of CO<sub>2</sub> emissions per year.
- Development of Small HPPs also has a cascading effect on Socio-economic development as it increases employment opportunities for local population and provides better access to energy, especially in rural areas.

## Alignment of the power sector objective of Tajikistan with the CAREC Energy Work Plan, 2016 – 20

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

	Element of EWP	<b>Objectives of Tajikistan's State Energy Policy,2015</b>
		• The Government of Tajikistan (GoT) is upbeat about the prospects of supplying power to South Asia (Afghanistan & Pakistan) through the CASA project.
	Developing the East- Central Asia-South Asia Corridor	• The CASA 1000 project was formally launched on 12th May, 2016 near Dushanbe by Pakistan PM Nawaz Sharif, Tajikistan President Emomali Rahmon, Afghanistan's Chief Executive Abdullah Abdullah and Kyrgyzstan PM Sooronbay Jeenbekov.
1.		• The project will serve as a critical first step towards realizing the potential for energy trade between Central Asian and South Asian countries.
		• The CASA project will ensure steady source of revenue to Tajikistan which can be used to deal with severe winter energy shortages and lessen the summer deficit in Pakistan and Afghanistan when demand is high.
2.	Promoting Regional Electricity Trade and Harmonization	• The Government of Tajikistan, through Barki Tajik and the Ministry of Energy and Industry, maintains dialogue with the Coordination Energy Council of Central Asia to consider opportunities for reunification of the CAPS to increase imports in the short term.
3.	Managing Energy-Water Linkages	-
	Mobilizing Financing for Priority Projects	• The GoT envisages involvement of foreign investments in order to meet the country's power demand. The Tajikistan's president clearly emphasized development of the private sector and attracting investment as one of its top priorities.
4.		• In the last 5 years the GoT has been allocating funds towards sustainable functioning of energy infrastructure, energy sector development and energy independence.
		• Bilateral investments from countries such as Russia and Iran are also expected to play a key role in the power sector in the future.
		• The Tajikistan Government envisages constructing small, medium and large HPPs, power transmission lines and developing a unified energy system in the country.
5.	Implementation of	• Construction of medium and large sized power plants to ensure energy independence is the key to tackling socioeconomic problems.
	Energy Sector Priority Projects.	• The immediate focus of energy development in Tajikistan is to eliminate the current winter energy deficit through seasonal energy management at the TALCO aluminum plant.
		• Savings from energy efficiency, fuel switching, and tariff increase can make the most notable contribution to energy security, reducing winter demand by 1,635 GWh per year, or about 40% of the expected

	Element of EWP	<b>Objectives of Tajikistan's State Energy Policy,2015</b>
		deficit in 2016 (in the absence of any measures).
6.	Capacity Building and Knowledge Management	-
7.	Promoting and Prioritizing Clean Energy Technologies	<ul> <li>The government plans envisage about 100MW of small hydro by 2020 and 20% of the total electricity generation from renewables by 2030.</li> <li>UN Sustainable energy for all envisages increasing energy production from renewable energy sources up to 20% against the baseline.</li> <li>The Tajikistan Government under the "Long Term Program of Building Small Hydroelectric Power Stations 2008 -2020"outlined plans to increase the power generated by Small HPPs to 118 MW. It is envisaged that these mini-hydro plants would provide electricity to local communities which are far-flung and not connected to the grid.</li> <li>GoT strongly supports the initiatives of various development partners including the United Nations, and other developed countries with regard to developing of environment friendly and renewable energy sources.</li> </ul>

## 2.2. Projected supply and demand

Only 4-5% of Tajikistan's total hydropower potential has been currently exploited, and thus there is widespread opportunity for the future development of this enormous and relatively unused power generation source. Tajikistan's latent hydropower potential if leveraged can far outstrip its own domestic power requirements. This surplus power augurs well for the country and the region as it can supply the electricity throughout the region.

Tajikistan needs to address its skewed energy mix as it relies heavily on Hydro power. Due to a lopsided energy mix the lowest levels in electricity generation is seen in autumn and winter season when the country faces acute energy deficit and has to radically limit electricity supply that adversely affects economic development, especially in rural areas. As Tajikistan grapples with power shortages in the winter, it needs to increase electricity generation in winter by developing new TPPs, modernizing of ageing power infrastructure and reducing and controlling technical and commercial losses.

The winter shortages are further exacerbated due to Tajikistan's limited thermal plant capacity that can be operated full-time at full capacity and that only one hydropower plant -the Nurek HPP has a reservoir, while all others are run-of-river plants that experience low flows in the winter. At present, thermal power plants play only a minor role in the Tajik system. With virtually no domestic production of natural gas, thermal power plants are dependent on coal.

The renovation of the existing hydropower assets by 2020 is considered as an important objective to address Tajikistan's winter electricity crisis. Many of the hydropower assets are operating well beyond their design life. The table below captures the overall power generation vis-a-vis net power demand in Tajikistan till 2022 while the chart captures the Demand vis a vis Peak Load forecast till 2022.

The generation expansion plan of Tajikistan consists of commissioning of the new generation Hydro power capacities up to 2020. Tajikistan basically uses electricity for functions such as space heating, water heating and cooking. Electricity demand-supply situation in the country is strongly influenced by its dependence on seasonal hydropower and the consumption of the TALCO aluminum smelter. Despite having an electricity production surplus during summer, the country has supply shortage during winter, when the tributaries of the Amudarja River are frozen. Thus, efficiency measures and a shift of electricity demand from winter to summer at the can TALCO aluminum smelter contribute significantly to reduce the electricity shortage during winter.

2016 2017 2018 2019 2020 2021 2022 Total Net 57,36 Demand 48,488 49,630 50,798 52,365 53,981 55,647 4 (GWh) Total 68,66 Generation 59,847 60,904 61,979 63,567 65,222 66,919 (GWh) Source; Regional PSMP





"With Tajikistan pulling out of CAPS and cost of gas imports from Uzbekistan increasing and an undeveloped coal sector meant Tajikistan needed to rely heavily on hydro based power generation. Hydro will continue to form the mainstay of Tajikistan's power generation mix"

# 2.3. Approach and key considerations for project prioritization

An assessment of Tajikistan's power sector was undertaken to understand the current sector structure, demand supply position, the industry challenges and concerns. Following the sector assessment and identifying the issues plaguing the sector, a list of power projects were identified which would help improve the current situation. Based on assessment of the current and targeted sector scenario, we have framed our approach to prioritize projects based on the three key aspects as shown below:



An initial list of projects were identified from the regional master plans, the Ministry of Energy and Water Resources, Ministry of Energy and Industry reports and presentations, Barji Tojik website and presentations and in consultation with ADB. A holistic view of the power sector was obtained to understand the key government priorities, thrust areas and the existing and forecasted demand supply situation vis a vis the regional objectives. This provided us with an understanding of the priorities for the power sector based on which we have worked out the different categories of the projects to be considered and also the key considerations/ criteria for project prioritization. Through a consultative methodology for prioritizing of the projects, which included a mix of secondary research followed by inputs from our national consultants on a regular basis and subsequent analysis and review, the list of priority projects was arrived at.

#### **Project Selection Criteria – Generation Projects**

The table below 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	l	Overview
		• Seasonal generation imbalances causes surplus power in summer but deficits in winter.
		• Tajikistan faces acute energy deficit that radically limits electricity supply during winter.
Ensuring adequacy	energy	• Winter shortages impact overall economy; energy costs amounting to almost 3/5th of total GDP.
1 2		• Currently only 4-5% of Tajikistan's total hydropower potential has been exploited.
		• Tajik's latent hydropower potential once leveraged can outstrip its own domestic power requirements.
		• Socio-economic implications of projects is key in prioritization of projects.
Socio-economic		• Despite a high electrification rate (over 90%), actual access to electricity is considerably low and unreliable.
considerations		• Unreliable power supply has a negative impact on the overall economy, health, and environment of the country.
		• Idle water discharge is a huge loss of potential power generation.
Avoiding	Water	• Despite power surplus in summers, water get frequently spilled out from reservoirs.
spinage		• Economic loss due to water spillages is estimated to be USD 90-225 Million per annum.

### **Project Selection Criteria – Transmission and Distribution Projects**

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

Criteria	Overview
Reducing T&D losses/Rehabilitation existing infrastructure	<ul> <li>High level of T&amp;D losses at 17.2% out of which over 11% is attributable to technical losses.</li> <li>More than 50% of the equipment, distribution grids and substations need systematic maintenance and capital renovation.</li> <li>Government envisages reducing energy losses by up to 10% by 2030.</li> </ul>
Improving flexibility within the system	<ul> <li>Current focus on increasing availability and reliability of the power supply in the winter season.</li> <li>Focus on improving T&amp;D facilities in regions with heavy power demand.</li> </ul>

Criteria	Overview
	• Current transmission network is inadequate to transmit surplus power during summer.
Regional connectivity	• According to WB estimates, ~3 Billion kWh of electricity (18.5% of current total generation) can be exported to other CAREC member countries.
	• Linking power system of Tajikistan with Afghanistan is a current government priority.

## 2.4. List of priority projects and investment requirements

The list of generation and transmission projects with the probable financing options are presented in the table below. The proposed time frame for commissioning of these projects is between the years 2017 and 2023:

### **List of Transmission Projects**

				Project Selection Criteria		
No.	Project Name	Description	Est. cost (USD Mn)	Reducing transmission losses/Rehabilitation existing infrastructure	Improving flexibility within the system	Regional Connectivity
1.	500 kV Overhead Power Transmission Line Rogun- Jirgatal-Kyrgyzstan-China	Proposed 500 kV Over Head Transmission Line «Rogun Hydro Power Plant -Jirgatal- Sary Tash( Kyrgyz) – Ulugchay (People Republic of China of approx. 550 km to transmit power towards China via Kyrgyz republic.	160	-	*	√
2.	500 kV Overhead Power Transmission Line Rogun- Sangtuda- Kunduz- Puli Khumri -Kabul	585 km Over Head Transmission Line is proposed to transmit generated electricity to the large settlements of Afghanistan, in accordance with Sangtuda and Roghun Hydro Power Plants Power Output Scheme.	158	-	✓	√
3.	500 kV Overhead Power Transmission Line - Rogun - Kunduz-Puli Khumri - Kabul-	1100 km long 500 kV OHTL to transmit ~4 Bn kWh power towards Pakistan and Afghanistan.	296	-	✓	✓

				Pro	oject Selection Criteri	a
No.	Project Name	Description	Est. cost (USD Mn)	Reducing transmission losses/Rehabilitation existing infrastructure	Improving flexibility within the system	Regional Connectivity
	Jelalabod- Peshawar					
4.	CT - 7 : Obi Garm 500 kV substation with network integration	Proposed 500 kV lines in Tajikistan are required to evacuate the power from Rogun HPP. They will also establish a transmission line ring within Tajikistan, which will considerably improve the reliability of the network.	741	✓	✓	✓
5.	CT 8 : Sangtuda 1 ; 500 kv substation with network integration	500 kV OHTL and substation to transmit power from the Sangtuda power plant. This TL is key to ensure connectivity within Tajikistan which will further boost power transmission during summer season and increase power exports.	106	-	✓	✓
6.	CT 9 : Regar-Sangtuda 500 kV Power Transmission Project	500 kV OHTL linking Regar with Sangtuda. Construction of the TL will allow for easy power exchange from Tajikistan to Afghanistan and Pakistan.	60	-	✓	✓
Investment http://ww Investment	Investment requirement for Project No. 1,2 and 3 is as per estimates from the "Ministry of Energy & Industry, Republic of Tajikistan website (Link: http://www.minenergoprom.tj/proectye.php) Investment requirement for Project No. 4.5 and 6 is as per estimates from the Regional Power Sector Master Plan					

## **List of Generation Projects**

			Project Selection Criteria			
No	Duciest Nome	Est. cost				
110.	i roject nume	(USD Mn)	Ensuring energy adequacy	Socio-economic considerations	Avoiding Water Spillage	
1.	Zarafshon HPP , 160 MW	320	4	✓	✓	
2.	Dupulin HPP  , 90 MW	180	1	1	~	
3.	Nurobod-2 HPP , 160 MW	400	4	✓	✓	
4.	Sangor HPP , 160 MW	320	1	1	~	
5.	Shurab HPP , 850 MW	1500	1	1	✓	
6.	Fondarya HPP , 160 MW	321	1	1	~	
7.	Oburdon HPP , 120 MW	240	1	1	✓	
8.	Sangiston HPP , 140 MW	320	1	1	✓	

			Project Selection Criteria		
No.	Project Name	Est. cost (USD Mn)	Ensuring energy adequacy	Socio-economic considerations	Avoiding Water Spillage
9.	Ayni HPP , 160 MW	180	1	1	✓
10.	Sanobod HPP , 125 MW	400	1	1	✓
11.	Urfatin HPP , 160 MW	320	✓	1	✓
12.	Shtiyon HPP , 160 MW	1500	✓	~	✓
13.	Nurobod-1 HPP , 150 MW	321	✓	~	✓
14.	Fon-Yagnob HPP , 500 MW	240	$\checkmark$	$\checkmark$	✓
Investment requirement for all the above projects are as per estimates from the document "UNDP: Tajikistan. Rapid Assessment & Gap Analysis "					

## Project implementation and year-wise investment requirement for the power generation & transmission projects:<sup>7</sup>



The proposed investment plan comprises of the generation and transmission projects with an estimated investment requirement of USD 6,966 Mn. 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 2017-2023.The chart alongside captures the estimated yearly investment requirement till 2023 for the selected projects assuming project start-up from 2017 onwards.

Assumptions:

• HPPs to commence construction in two phase, the first in 2017 and the second in 2018 with a completion period of 4 years;

• T&D Projects to commence in 2018 with a completion period of 4 years.

#### **Investment phasing**

Year	2017	2018	2019	2020	2021	2022	2023
HPPs	10%	10%	15%	15%	12%	15%	13%
HPPs-Phase 1	15%	25%	30%	30%			
HPPs- Phase 2		15%	25%	30%	30%		

<sup>&</sup>lt;sup>7</sup> We have provided a snapshot of the investment requirement as per the Power Sector Master Plan for Kazakhstan in Appendix B

# 3. Options for funding and financing power sector investment plans

In line with the investment plan for Tajikistan from 2017-23, proposed funding from National Government budget, other governments, assistance from Development Partners (ADB and World Bank and others) 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

## **Budgetary allocation for power sector**

Tajikistan has been spending a considerable portion of its budget towards the development of the social and energy sector. The government has been allocating approximately 15 % of its budget on the development of energy and fuel sector. The budgetary support for Public investment program (PIP) has increased over the last five years. Public investment increased by 2.2% in 2013 with re-establishing government spending in infrastructure projects particularly for transport and energy.



The government budgetary support for Tajikistan over 2015-2023 is estimated at over USD 4,406 Mn based on the following assumptions:

- Average GDP growth of 4.7% till 2023 (as per IMF projections till 2020).
- The budgetary support is assumed to be 5.4% of GDP based on trend from 2012 to 2014.

It is envisaged that the government will increase the investment towards renovation and modernization of existing HPPs, substations and transmission lines as well as construction of new transmission lines. Moreover, "Long Term Program of Building Small Hydroelectric Power Stations 2008 -2020" is undertaken by the government to increase the power generation in the country.<sup>8</sup>



<sup>&</sup>lt;sup>8</sup> Power Sector investment requirement according to Regional PSMP is provided in Appendix B

#### 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 Tajikistan to borrow from various sources based on the debt sustainability.

#### **Debt Sustainability Analysis**

Tajikistan's external debt in real terms has increased from 2010 to 2014 though as a percentage of GDP it has seen a significant decrease during the same period of time. External debt is predominantly long term and multi-lateral. Interest rate is mostly concessional, and the grants have increased marginally over the period, while the debt service ratio has declined significantly.



All this major debt sustainability indicators point out that debt may turn out to be unsustainable over medium term. The 2013 Debt Sustainability Analysis (DSA) reduced the risk of debt distress from high to moderate. Some of the salient features w.r.t to the debt situation has been given below

- The government raised the public debt limit from 40% of GDP in nominal terms to 40% of GDP in NPV terms in their new debt management strategy
- The Chinese Export-Import Bank remained the largest creditor to Tajikistan, with its loans representing around 43.1% of total external public debt as on January, 2015.
- As per IMF projections total value of public debt is expected to decrease, post which it will reduce and remain close to ~29.5% of GDP till 2018.
- Based on such assumptions the average net borrowing by the Government of Tajikistan could be around USD 500 mn per year

## 3.2. Assistance from Development Partners

Assistance from the development partners play a pivotal role in the development of Tajikistan's power sector. The coordination among the partners has been considered as one of the best in the region. The table below details the involvement of various partners in the power sector of Tajikistan:

No.	Name of Development Partners	Key Focus Areas
1.	Eurasian Development Bank	Renewable Energy
2.	European Bank for Reconstruction and Development (EBRD)	<ul> <li>Provides renewable energy developers with equity, loans and loan guarantees for projects.</li> <li>Focus areas include improving quality of energy supply, regulation and energy efficiency</li> </ul>
4.	World Bank	<ul> <li>Currently focusses on the development of the CASA- 1000 project-promoting regional power trade and creating a Central Asia-South Asia energy market;</li> <li>Focus areas include enhanced cooperation and collaboration between development partners with respect to assistance to Barki Tajik and Tajikistan government on power sector issues.</li> </ul>
5.	UNDP (United Nations Development Program)	<ul> <li>Environment and Sustainable Development</li> <li>Provided support for the rehabilitation of 20 sustainable energy systems(largely mini hydro power stations)</li> <li>Energy Efficiency Initiatives.</li> </ul>
6.	USAID	• Focus on providing support for regional electricity market and electricity sector reforms
7.	European Investment Bank	<ul> <li>Power Transmission for regional cooperation-EIB is currently active in 3 Central Asian countries- Tajikistan, Kazakhstan and Kyrgyzstan.</li> <li>Focus on renewable energy, energy efficiency, carbon capture projects.</li> </ul>
8.	ADB	Renovation of existing and construction of new
		<ul> <li>Improve energy efficiency</li> <li>Construction of new, small-scale renewable energy plants</li> <li>Rehabilitation of existing hydro plants</li> <li>Support for private sector participation.</li> </ul>

In addition to the above, there are other major development partners in the region e.g. China Eximbank, KfW, IsDB, SECO, OFID etc. The table below lists some of the past and ongoing engagements of the above development agencies in power sector of Tajikistan.

Development Partner	Development Partner Project Scope		Amount (USD Mn)
ADB and IsDB	Power Rehabilitation Project	2000-2009	49
ADB , IsDB and OFID	Regional Power Transmission Interconnection Project	2006-2010	41
	Nurek 500 kV Switchyard Reconstruction	2008-2015	55
	RegionalPowerTransmission Project	2010-2014	122
ADB	Emergency Baipaza Landslide Stabilization Project	2002-2005	5
	Golovnaya240MWHydropowerPlantRehabilitation Project	2013-2021	136
	Construction of 220 kV transmission line Lolazor– Khatlon	2006-2008	55
	Construction of 500 kV transmission line South– North	2006-2009	318
China Eximbank	Construction of 220 kV transmission line Khujand– Ayni	2010-2011	35.1
	Establishment of unified power system of north Tajikistan	2011	24.5
	Construction of Dushanbe CHP-2 (Phase II)	2014-2016	348.9
EBRD, EU and IFCA	Sugd Energy Loss Reduction Project	2012-2013	21
KfW	Nurek Switchyard 220 kV Rehabilitation Project	2008-2013	38

Development Partner	Project Scope	Duration	Amount (USD Mn)
	Power Rehabilitation Project	2000-2009	8
SECO	Energy Loses Reduction Project	2007-2011	8
0200	Pamir Private Power Project	2003-2012	5
	Pamir Private Power Project II	2013-2016	4.4
World Bank	Pamir Private Power Project	2002-2010	12.5
	Energy Loss Reduction Project	2005-2014	36
	Energy Emergency Project	2008-2010	21.5
EBRD, PPCR, Austria and United Kingdom	Qairokkum Hydro Power Rehabilitation Project (Phase I)	2014-2018	75.7
IsDB	Completion of the Sangtuda-2 hydropower plant, 220 MW	2006-2012	180

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

No	Sector	Current Degree of Multilateral Support	Expected Trend	Comments
1	Power Generation	Medium	1	• Most of the power generation in Tajikistan is with government in association with development partners, and the trend is expected to continue.
2	Power Transmission	Medium	1	• Transmission sector requires more support from multilateral financing institutions as the government plans to construct more transmission lines by 2020 to improve the regional connectivity.
3	Renewable Energy	Low	1	• Currently the requirement for donor assistance is low but it may arise in near future as the government plans to efficiently use the renewable energy sources.

## Assistance from the development partners – Future trends

## **World Bank Estimates**

Year	Amount (in \$ mn)	Remarks
2016	5	
2017	5	Based on average of country partnership strategy in the past
2018	5	
2019	8	
2020	8	Increase in lending by 60% for the next CPS
2021	8	
2022	8	
2023	10	Increase in lending by 25%
Total	52	

## ADB Estimates

Year	Amount (in \$ mn)	Remarks
2016	0	
2017	65	Based on COBP
2018	0	
2019	20	
2020	20	Based on the average proposed lending for 2014-2018
2021	20	Increase in lending by 25% based on past trends
2022	20	
2023	25	Increase of lending by 25% in the next CPS
Total	170	

Thus, based on Country Partnership Strategies/ Country Operations Business Plan, funding from key development partners for power sector projects is estimated to be around USD 922 mn over 2017-2023:

- ADB and WB is estimated to fund around USD 170 mn and USD 52 mn respectively
- Based on past trend of financing of USD 100 mn per year by other development partners (mainly China Exim Bank, EBRD, IDB, KfW, etc.), they are estimated to fund around USD 700 mn over 2017-23.

## 3.3. Other Governments

Countries like Russia, Iran, China, and Kazakhstan have invested in Tajikistan's power sector in the past and it can be envisaged that they would continue to do so even in the future.

**Russia:** Russia expressed support for the implementation of the CASA-1000 project, as well as for Tajikistan's efforts to use its hydropower capacity to promote regional development. Earlier a number of agreements were signed on implementation of bilateral large-scale economic projects in hydropower, gas exploration, oil and minerals between Tajikistan and Russia. Russia made direct investments in Tajikistan for many projects with one of the largest investments in hydroelectric power station "Sangtuda-1" which is operational since 2008.

**Iran:** Investments were channelized into construction of Sangtuda-2 which was co-funded by the Government of Iran, Iranian Company 'Sangob' and Government of Tajikistan.

**China:** China has been one of the major investors in the power sector of Tajikistan. One of the biggest Chinese financed projects was reconstruction of Dhushanbe–Chanak highway which included installation of high voltage power transmission lines in North-South and Lolazor-Khalton. Another proposed project which is supposed to have financing from China is 500 kV OHL Rogun-Jirgatal-Kyrgyzstan-China.

Kazakhstan: Kazakhstan has an interest in the rich hydro energy resources of Tajikistan.

## 3.4. Envisaged funding probability of priority projects

Overview of Investment plan and financing sources for 2017-2023



It is envisaged that from 2017-23 the funding requirement for development of the power sector is USD 6,996 Mn. Also. the power sector is likely to receive USD 4,406 Mn as Government budgetary support and USD 922 Mn as assistance from development partners (from sources such as World Bank, ADB) over 2017-2023. The remaining is likely to be sourced from 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 generation projects

Projects	National Government	Other Governments	Development Partners	Private investment
Zarafshon HPP	Low	Medium	High	Low
Dupulin HPP	Low	Medium	High	Low
Nurobod-2 HPP	Low	High Medium		Low
Sangor HPP	Low	Medium	High	Low
Shurab HPP	Low	High	High	Low
Fondarya HPP	Low	Medium	High	Low
Oburdon HPP	Low	High	Low	Low
Sangiston HPP	Low	Low	High	Low
Ayni HPP	Low	Medium	High	Low

ADB TA 8727 REG: Study for a Power Sector Financing Road Map within Central Asia Regional Economic Cooperation - Final Report: Tajikistan PwC

Projects	National Government	Other Governments	Development Partners	Private investment
Sanobod HPP	Low	Medium	High	Low
Urfatin HPP	Low	Medium	High	Low
Shtiyon HPP	Low	Medium	High	Low
Nurobod-1 HPP	Low	High	High	Low
Fon-Yagnob HPP	Low	Medium	High	Low

## Envisaged funding probability of priority transmission projects

Projects	National Government	Other Governments	Development Partners	Private investment
500 kV Overhead Power Transmission Line Rogun-jirgatal- Kyrgyzstan-China	Medium	Medium	High	Low
500 kV Overhead Power Transmission Line Rogun-Sangtuda- Kunduz- Puli Khumri -Kabul	Low	Low	High	Low
500 kV Overhead Power Transmission Line - Rogun - Kunduz- Puli Khumri - Kabul- Jelalabod- Peshovar	Medium	Low	High	Low
CT - 7 : Obi Garm 500 kV substation with network integration	Low	Medium	High	Low
CT 8 : Sangtuda 1 ; 500 kv substation with network integration	Low	Medium	High	Low
CT 9 : Regar- Sangtuda 500 kV Power Transmission Project	Low	Medium	High	Low

## 3.5. Private sector participation

In the current scenario the Government of Tajikistan regulates and controls the planning and delivery of public services. A major portion of Tajikistan's infrastructure dates back to the Soviet era and has been characterized by lack of regular maintenance and underinvestment.

Tajikistan could look to involve multiple stakeholders in the planning process, and diversify the mix between public and private service providers by offering more opportunities for private sector participation. A robust enabling environment with PPPs can help bridge the gap in investment required in infrastructure. In this regard, the key laws pertaining to PPP are as follows:



## PPP in the energy sector

**Pamir Energy:** Pamir Energy (PE) is a private company that operates almost all generation, distribution and transmission in the north eastern part of the country known as Gorno-Badakhshan Autonomous Oblast of Tajikistan (GBAO). The company was founded in 2002 as a joint PPP owned by International Finance Corporation and the Aga Khan Foundation. Thus, Pamir Energy, unlike Barki Tojik, enjoys commercial independence from the government of Tajikistan. As a result, Pamir Energy is able to generate and distribute electricity in more efficient way thereby offering significant benefits to customers of all income groups. Pamir Energy supplies energy year-round to its customers.

## **Quality of PPP Framework in Tajikistan**

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

#### Key Issues/Areas of Intervention

- Law is silent on the provision if a Private Party can create security interests over the project assets, rights and proceeds or other valuable guarantees related to the project ;
- The regulation doesn't mention about the government support to the Contracting Authority to ensure proper implementation of the project;
- The law doesn't clarify the kinds of financial support (tax and custom benefit etc.) government would provide to the contracting authority for PPP implementation
- The Law doesn't mention about the step-in right of the lenders is case of default by the private party.

#### Key Issues/Areas of Intervention

- The Law doesn't permit internal arbitration. Any dispute between the concessionaire and the concession provider to be settled as per the laws of Republic of Tajikistan
- The law doesn't include any provision to provide compensation to the Private Party for losses incurred as a result of termination due to public authority acts;

# 4. Barriers to investments in the power sector

## Absence of a clear tariff determination methodology

Article 15 of the Law of Energy of Tajikistan, 2000, advocates that the tariff for energy will be based on negotiation, whereas the Law on natural monopolies suggests that all segments of electricity sector including power generation and distribution are obliged to set the tariff under centrally determined price. This type of marked changes in regulatory framework impacts the regulatory certainty needed for attracting private sector investment.

Moreover, at present, the tariff levels are heavily subsidized which is not sustainable in the long run. Policies may be developed to reduce such subsidies and ensure that tariffs are cost reflective in the long run. This will reduce the dependency of the power utilities on the Government budget and make them more accountable and independent. Hence, it becomes important for the regulatory authorities to develop a tariff determination methodology considering the cost recovery aspect of the investors.

## Gaps in energy efficiency policies

The energy efficiency framework is an important element in the institutional structure of power industry to ensure that the economics of energy continue to remain affordable and sustainable. This in turn results in effective return on investment and encourages more investment.

The energy efficiency framework is mainly guided by the Energy saving Law, 2002. The primary institutions involved are Ministry of Energy and Industry, Ministry of Economic Development and Trade and the State Committee for Investment. The framework is suffering from various issues related to institutional capacity, clarity of roles, insufficient incentives etc. as given below:

- Lack of state support and investment incentive to carry out energy efficiency activities.
- Absence of clear definition of roles and responsibilities of concerned authorities
- Inadequate institutional capacity of concerned authorities in areas of project management, investment promotion, business planning etc.

Apart from the above mentioned issues, other factors like low levels of retail supply tariff, lack of information, low purchasing power of consumers, insufficient budget etc. contribute to the ineffectiveness of energy efficiency policies. Since, retail supply tariff is low, there is not enough incentive to save energy by buying costly energy-efficient devices.

## Absence of clarity in roles of regulatory authorities

The process of regulating the electricity sector is divided between various agencies, particularly Government, Ministry of Energy and Industry and Anti -Monopoly Enforcement Agency. There is overlapping of roles between various institutions. The Law on Energy provides the legal authority to the regulatory bodies but does not clearly define their jurisdiction. Similarly, the Law on Natural Monopolies indirectly provides certain regulatory roles to the Ministry of Economic Development & Trade but does not define the exact functioning of the body as a regulator. In order to ensure regulatory effectiveness, it is important that the regulatory body is given appropriate powers and authority to control the sector like issuing license, setting tariffs, setting performance standards and norms, imposing penalties etc. In absence of such vested powers with a single authorized body, the regulatory institution may lack the desired effectiveness.

## **Independence of regulator**

The Law on Energy has introduced provision for formation of a separate State body for performing the role of a regulator. At present the role of regulator is performed by the Ministry of Energy and Industry which is also exercising key functions like conclusion of investment agreements, tariff determination & thus cannot be considered independent from political interference. The lack of regulatory independence creates risk of conflict of interest which is a challenge for improving the investment climate in energy sector.

## Credit worthiness of Barqi Tojik

The reasons for dismal financial condition of Barqi Tojik can be attributed to the reasons mentioned below

- Low levels of average electricity retail supply tariff
- High T&D losses
- Poor billing & collection efficiency

The absence of advanced meters in the distribution substations and at the consumer levels leads to poor metering and billing of the electricity consumed. Moreover due to lack of regulatory enforcement, TAZAD, the aluminum smelting entity which consumes 40% of the total generation does not pay bills regularly and also enjoys subsidy in summer tariff. The poor financial health of the main off-taker & absence of payment guarantee mechanism poses challenge to investors in the power generation sector.

# 5. Reform action plan for facilitating investments

In this section we have discussed some indicative reform measures that the Government may consider for facilitating investments and making the sector more attractive for private investors.

## **Cost reflective tariffs**

While the regulations and policies provide for tariffs to be revised in order to make them cost reflective, the same need to be implemented in spirit. Also, while tariffs may be revised to be cost reflective, there is a requirement for specifying the principles of determining tariff for various categories of consumers, road map for cross subsidies etc. Some of the reform measures that can be considered in this respect are discussed below:

#### Indicative measures for ensuring cost reflective tariff

- Judicious one-time settlement of debts in the electricity value chain may be considered so that the sector can recover from its current state of losses and under-investment.
- Transparency in tariff setting process to ensure periodic and justified revisions of tariff through public consultation and clear performance-based regulations for tariff may be considered. For example, information about costs and expenditure, allocation of foreign loans and assistance, purchase and bidding activities and results should be open to the general public and researchers.
- 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.
- Undertake regular audit of the distribution companies to identify the areas of revenue loss and give appropriate directions to the companies and ensure cost recovery tariffs.
- Clear guidelines for competitive bidding in generating activities to ensure efficient power generation cost
- Tariff can be fully cost reflective when it will be determined on the basis of 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 Tradethen 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

## **Regulations for promoting competition**

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

In order to allow entry of more players in the sector, it is imperative that enabling provisions are present in the Act or power. 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 generating facilities and renewable sources. This would promote increase in capacity and bring more competition in the sector.
- Introduce mandatory policies and regulations for power purchase and transmission through competitive bidding process.
- Introduce option to high value consumers for purchase of power from sources other than the distribution company (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 Gency appointed by Distribution Company 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 introduction of competition in retail supply side of the electricity distribution sector though segregation of Distribution companies (discoms) into two parts carriage (distribution) business and content (retail supply) business. This will bring efficiencies in the distribution value chain of electricity
- A more robust framework for energy efficiency may be established with dedicated utility responsible for implementation and framing of schemes, policies for promoting energy efficiency may be adopted etc.

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 delicensed 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 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 : Privatization and Competition in 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 following areas:

- Improvement in quality of supply
- Reduction of AT&C loss
- 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 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.

#### Privatization in Distribution Sector

Orissa was the first state in India and South Asia to restructure its state owned electricity industry and privatize 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 Rs. 1039 crore and 538 crore 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 privatization 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 privatization 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 Rs 30,000 crores 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 privatization. With the effect of privatization 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

## Strengthening of the sector regulator

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

- Independence/Autonomy
- Capability
- Accountability
- Transparency

In Tajikistan, the regulatory activities are mainly performed by the Ministry of Energy and Industry which is part of 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' as well as other 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 policies.

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 strengthening of Regulatory Body

- Establishment of a single dedicated regulator for power sector which shall be an independent entity. It could be an independent committee within the Ministry or an independent advisory body providing inputs to the Government on key regulatory decisions. Also, in order to increase its capacity, it should be a dedicated body looking after the energy sector.
- In order to ensure financial autonomy, the regulatory body can be funded through means other than government budget (refer case study on funding of independent regulatory agency)
- The process of appointment of chairman and members of the regulatory body may be made more transparent by issuing detailed guidelines on competence, selection process etc. The tenure of the members may also be clearly defined.
- Increased focus may be given on monitoring and managing performance of licensees on various parameters ensure adherence with SOPs. A separate cell within the regulatory body may be formed for this purpose.
- The dedicated regulator shall come up eventually with required guidelines regarding standard of performance, grid code, framework for private participation, tariff guidelines etc.
- An effective grievance redressal mechanism framework like appointment of an Electricity Ombudsman for resolution of energy related cases before going to courts or respective commissions may be developed. This will help the regulator to focus on core regulatory functions.

#### Case Study: Kazakhstan

In Kazakhstan as per *Article 8 of 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.

# Appendix A: Key power plants in Tajikistan

*Operating electric plants in Tajikistan: Currently, there are 11 large and medium hydropower plants in the Republic of Tajikistan and nearly 300 small hydro power plants according to government of Tajikistan.* 

No.	Name of Power Plant	Designed Technical Capacity (MW)
1	Nurek HPP	3,000
2	Baipaza HPP	600
3	Kairakkum HPP	126
4	The Vakhsh cascade of HPPs	285
5	The Varzob cascade of HPPs	25,36
6	Pamir Energy	42
7	МГЭC/MGES	13
8	Sangtuda HPP-1	670
9	Sangtuda HPP-2	110
10	Dushanbe CHPP-2	400
11	Yavan thermal electric plant	120
	Total	5,392

Source: UNDP report on Tajikistan

# Appendix B: Investment requirement according to regional PSMP

Tajikistan plans to increase power generation by 40% annually by 2016 towards its bid to increase electricity

CAREC exports to other members. Tajikistan produces about 17 Billion kilowatt hours (kWh) of electricity in a year and envisages generation to the tune of 25 Billion kWh by 2018. At present, small, medium and large power projects, which are under construction, include Rogun and Sangtuda-2 hydroelectric power plants, Dushanbe-2 thermal power station as well as high-voltage 500-kilovolt transmission named Garm-Dushanbe. line Obi Tajikistan's plan to export surplus power to other regions entails significant investment across generation and transmission sectors.

Close to USD 4.1 Billion of investment is required in the power sector from 2011-2022 according to the regional power sector master plan.

A major portion of the investment is allocated for renovation and modernization of existing power plants especially the Nurek HPP which is expected to end by 2020. According to the Regional Power Sector Master Plan almost USD 1.6 Billion is allocated towards construction of a 260 MW new CHPP at Dushanbe along with a new Schurob TPP which is expected to be carried out in two phases of 300 MW each. The Nurek HPP will also see investments to





the tune of ~USD 580 Million. Transmission Sector Investment from 2012-2022 is pegged at ~USD 623 Million of which USD 327 Million has been allocated towards new transmission lines and the rest towards renovation of substations and transmission lines. The Sagtuda HPP is another important project which has been undertaken with help from the government of Iran.

## Investment funding requirements from 2012 to 2020 (USD Million)

World Bank foresees investment requirement of around USD 3.4 Billion from 2012-20 which works out to an average of about USD 380 Million annually. Of the total investment requirements, around 49% is attributed to generation and 32% towards costs for renovation of the existing system while the remaining 19% is allocated towards covering energy efficiency programs and construction of transmission lines for power exports.



**Need for Investment:** Apart from the large hydropower plants, Tajikistan also generates about 11 MW from mini-hydro plants on small secondary streams. Under the "Long Term Program of Building Small Hydroelectric Power Stations 2008 -2020", it is intended to increase the power generated from mini hydro-plants to 118 MW. It is envisaged that these plants provide electricity to local communities which are far-flung and not connected to the grid. The Government of Tajikistan is making efforts to develop hydropower engineering and adopted Decree of the Government of the Republic of Tajikistan No.73 dated February 2, 2009, on "Long-Term Small Power Plant Construction plan for 2009-2020". The proposed plan envisages the construction of 189 small HPPs with a total capacity of 26,801 kW. Currently, the Government of RT adopted a new program for the construction of SHPP 2016-2020.

Period	Planned total installed grid connected capacity (MW)	Additional stand- alone capacity (MW)	Planned annual electricity production from the installed capacity (MWh/year)	Required money to incentivize newly installed capacity in given period (USD Million)	Total required cost in the given period for incentives (USD Million)	Required money to cover investment costs of stand-alone plants (USD Million)
2009-2011	43.53	5	280.84	5.62	5.62	5.00
2012-2015	32.85	18.62	185.07	3.70	9.32	18.62
2016-2020	26.8	73.2	175.74	3.51	12.83	73.20
Total	103.18	96.82	641.65	12.83	27.77	96.82

## Planned Small Hydro plant capacity in Tajikistan, 2009-20

## Appendix C: Macroeconomic overview

Despite high growth, Tajikistan's economy has not been successful in speeding up the process of structural transformation. The economy is quite vulnerable to the fluctuations in the prices of cotton and aluminium exports. The main policy challenge is to boost private investment by improving governance and the investment climate.

- Higher global prices for aluminium and cotton, stronger remittance inflows, higher hydroelectricity production has helped boost industrial activity and supported a robust growth since 2010.
- With remittances equalling to 42.7 % of GDP, Tajikistan remains the most remittancedependent country in the world
- Aluminium and cotton fiber have contributed to about two-thirds of Tajikistan's exports. Hence, the economy of Tajikistan is highly vulnerable to external shocks especially from the commodity prices.
- Tajikistan has adopted the policy of commercialization of financial institutions to reduce its vulnerability to external factors in the absence of sustainable international reserves
- Electricity generation accounts for 5% of Tajikistan's GDP.
- More than 96% of Tajikistan's households are connected to the electricity grid, however about 70% of the population currently suffers from blackouts during winters.
- As estimated by the World Bank the winter shortage leads to an economic loss of some USD 200 Million per year, which is about 3% of the gross domestic product (GDP).

Tajikistan's pace of poverty reduction in the past 15 years has been among the top 10 percent in the world with the national poverty rate falling from 96% in 1999 to 36% in 2013

GDP by sectors (in %) (Source : ADB Outlook)						
Year	Overall GDP growth	Agriculture	Industry	Services		
2008	7.9	7.8	-8.9	12.0		
2009	3.9	10.5	-6.5	9.5		
2010	6.5	6.8	9.7	4.6		
2011	7.4	7.9	5.7	11		
2012	7.5	10.4	10.4	14.5		
2013	7.4	7.6	3.9	19.3		
2014	6.7	4.5	13.3	1.0		
2015	6.0	3.2	11.2	-7.0		





Growth is projected to fall to around 4% in 2016 as recession will continue in the Russian Federation and activity remains weak in other trading partners.

Inflation is expected to remain high as depreciation of currency increases the price of imported goods.

Growth in the medium term to be driven by investments of USD 6 Billion from 2015-2017 from China and export of surplus summer energy under CASA Electricity Transmission and Trade Project among others.

National Development Strategy 2030 of Tajikistan's government aims to boost economic activity by securing stable access to energy resources, achieving self-sufficiency in food production, etc

## Appendix D: Bibliography

- Independent assessment of Asian Development Bank (ADB) assistance to the energy sector in Tajikistan for the Country Assistance Program Evaluation (CAPE)
- Current Situation and Development Prospects for Energy And Industry in The Republic Of Tajikistan-Republic of Tajikistan Ministry of Energy and Industry
- Economic Review Tajikistan- by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
- UNDP- Energy Efficiency Master Plan for Tajikistan
- PSIA Energy Tajikistan: Poverty and Social Impact Assessment: Energy Sector in Tajikistan
- Tajikistan's Winter Energy Crisis: Electricity Supply and Demand Alternatives
- The Law of the Republic Of Tajikistan On Energy
- Tajikistan-Rapid Assessment & Gap Analysis
- Asian Development Bank, Asian Development Outlook
- International Monetary Fund
- Tajikistan Economic Update : Slowing Growth and Rising Uncertainties
- The World Bank Group Tajikistan Partnership Program Snapshot
- Tajikistan Multi Annual Indicative Programme 2014-2020
- Ministry of Foreign Affairs of the Republic of Tajikistan
- Republic of Tajikistan, Living Standards Improvement Strategy of Tajikistan for 2013-2015, UNDP Tajikistan Midterm Review
- Climatescope 2014 Report by Bloomberg New Energy Finance

# **Important Notice**

Our assessment is based on information provided by the government agencies (as applicable) and research from sources in public domain held to be reliable. If any of these are not entirely complete or accurate, the conclusions drawn therein could undergo material change. PwC will not be responsible to rework any such assertion or conclusion if new or updated information is made available. We have not carried out anything in the nature of an audit nor, except where otherwise stated, have we subjected the financial or other information contained in this report to checking or verification procedures. Accordingly, we assume no responsibility and make no representations with respect to the accuracy or completeness of the information in our report, except where otherwise stated.

No representation or warranty, express or implied, is given by the Company or PwC or any of their respective directors, partners, officers, affiliates, employees, advisers, or agents (any warranty expressed or implied by statute is hereby excluded) as to the accuracy or completeness of the contents of this report or any other document or information supplied, or which may be supplied at any time or any options or projections expressed herein or therein, nor is any such party under any obligation to update the report or correct any inaccuracies or omissions in it which may exist or become apparent. In particular, for reasons of commercial sensitivity, information on certain matters has not been included in the report which may be made available at a later stage.

No responsibility or liability is accepted for any loss or damage howsoever arising that you may suffer as a result of this report and any and all responsibility and liability is expressly disclaimed by PwC and the Company or any of them or any of their respective directors, partners, officers, affiliates, employees, advisers or agents PwC disclaims all liability to any third party who may place reliance on this report and therefore does not assume responsibility for any loss or damage suffered by any such third party in reliance thereon.