ADB TA 8727-REG

CAREC: Study for Power Sector Financing Road Map

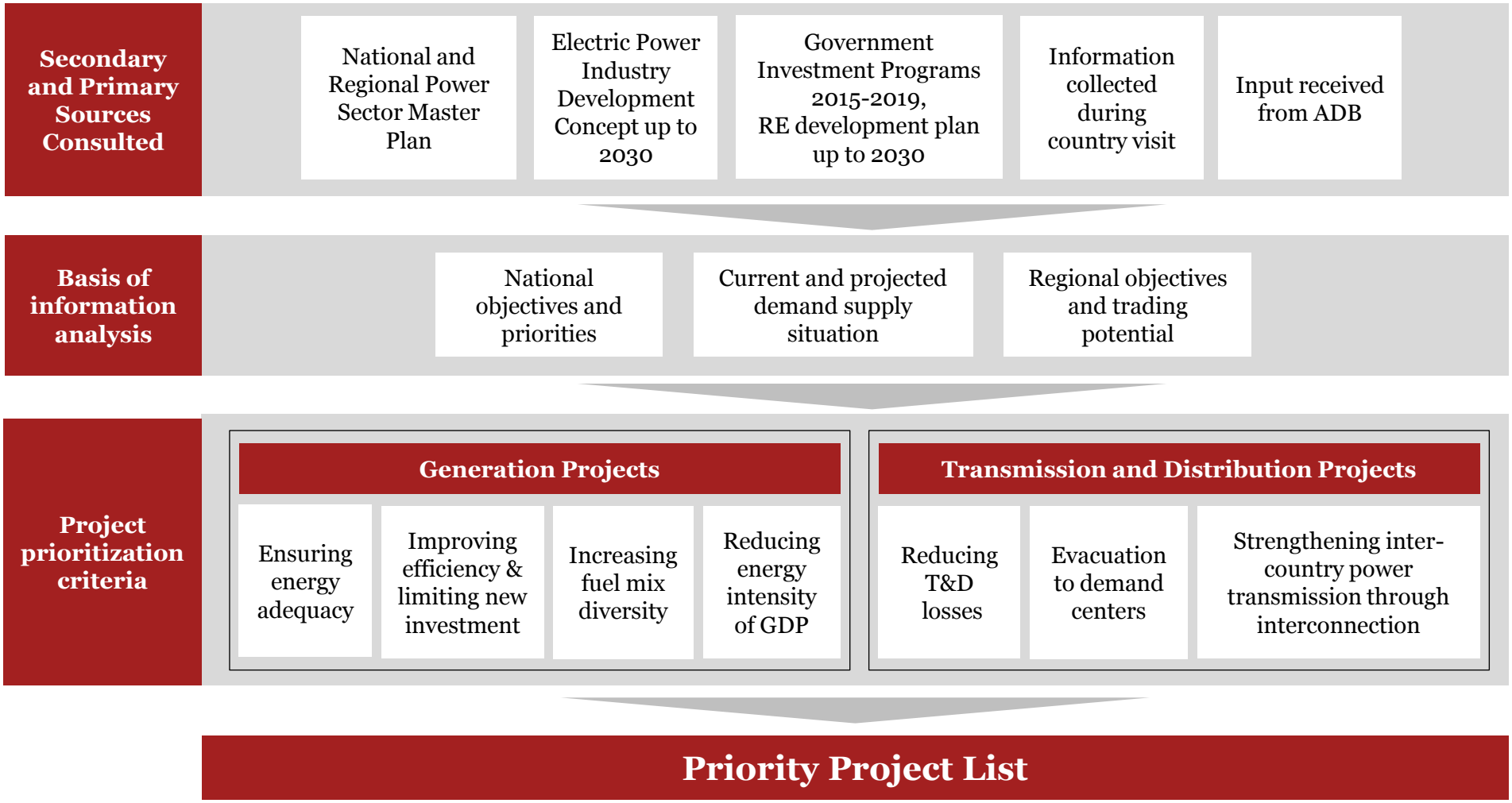
Mobilizing Financing for Priority Projects

Uzbekistan

September 2016

Section 1
Priority Project Selection Criteria

Key considerations for project prioritization



Project selection criteria – Generation projects (1/2)

Criteria for project (generation) prioritization

Ensuring energy adequacy

- Addressing growing power demand (annual AGR of 4% from 2016 to 2022 as per Uzbek Energo forecast) driven by residential and industrial segments.
- Industry is the largest power consumer accounting for 57% of total consumption followed by residential at 27%.
- Reliance on natural gas for generation exerts pressure on natural gas production.
- Addressing winter shortages in eastern region relying on HPPs and imports.

Improving efficiency and limiting new investments

- Power plants work well below installed capacity and grapple with poor peaking capacity.
- Available capacity of existing TPPs reduced to almost 70% of installed capacity.
- R&M necessary to compensate for large gap between peak demand and available capacity.

Project selection criteria – Generation projects (2/2)

Criteria for project (generation) prioritization

Increasing fuel mix diversity

- Generation mix heavily reliant on gas, limits earnings from gas exports.
- Focus on increasing share of hydro based power plants and RE sources.
- GOU seeks to reduce share of thermal power from 90% now to 77% by 2030.

Reducing energy intensity of GDP

- Reducing energy intensity of GDP and energy efficiency are national priorities.
- Uzbekistan is among the top 20 gas flaring countries in the world. Since 1994, gas flaring has increased at a rate of 4% annually.
- Flared gas estimated to be worth ~USD 500 million in foregone export revenues.

Project selection criteria – Transmission & distribution projects

Criteria for project (transmission and distribution) prioritization

Reducing transmission & distribution losses

- Expansion of the transmission systems did not keep pace with the power demand which resulted in overloading of lines.
- Most T&D assets are old with high technical losses of ~23%.
- Reduction of technical & commercial losses to 9% and 3% respectively can save ~USD 7.2 billion over a 20-year period.

Evacuation to demand centers

- Power from new power plants to be wheeled to regions with growing power demand (e.g.. industrial regions).
- Constructing new sets of OHTLs and expansion of existing infrastructure across specific transit routes.

Strengthening intra-country power transmission through interconnection

- Connectivity across the various regions needs to be strengthened further.
- Fergana region will benefit through power from central and other regions during winters.

Section 2
List of Priority Projects and Investment Requirement

* Types of projects not considered in the list of priority projects are projects that have achieved financial closure, captive power projects and generation projects (< 100 MW) including renewable generation projects.

* Details pertaining to information source for investment requirement for priority projects are provided in the country report.

List of generation projects (1/5)

No	Project	Brief Description and Benefits	Project Selection Criteria				Investment Requirement (USD Mn)
			Ensuring energy adequacy	Improving efficiency and limiting new investments	Increasing fuel mix diversity	Reducing energy intensity of GDP	
1.	Expansion of JSC Mubarek Power	Expansion of JSC Mubarek Power Station with construction of gas turbine unit (GTU) of 140 MW based in Qashqadaryo, Uzbekistan. The expansion of the plant will improve heat and power supply to residential areas and will reduce overall power deficit in the region.	✓	✓	-	✓	140
2.	Solar PV Plant in Sherabad district	Construction of solar photovoltaic 100 MW station in Sherabad district of Surkhandarya region. The proposed solar PV plant will improve the energy security in the region that sees limited grid connectivity. A MW scale solar power plant will also be required keeping in view the ambitious RE targets of the Uzbek government.	✓	-	✓	✓	210
3.	Coal based power plants in Novo-Angren	Transfer of power units No 6,7 of Novo-Angren power station to coal combustion with construction of the second coal conveying plant and second coal storage area. This transfer of power generation units to coal based will ensure reduction in natural gas for power generation. This is in line with GoU's goal to increase coal's contribution to more than 15% in the next 5 years.	✓	✓	✓	✓	204

List of generation projects (2/5)

No	Project	Brief Description and Benefits	Project Selection Criteria				Investment Requirement (USD Mn)
			Ensuring energy adequacy	Improving efficiency and limiting new investments	Increasing fuel mix diversity	Reducing energy intensity of GDP	
4.	Navoi Power Station CCGT	Construction of 3rd 450 MW CCGT at Navoi Power Station. Navoi TPP was built in 1963 to supply energy for the rapidly developing Kizilkum region. Increasing the capacity of Navoi TPP is essential for improving power supply in the Navoi free industrial-economic zone, created in the Navoi province of Uzbekistan.	✓	✓	✓	✓	500
5.	Tashkent HPP Cascade	Construction of new hydropower station-1 Unitary Enterprise (UE) "Cascade of Tashkent HPS". Reduce dependence on TPPs and improve supply to the Tashkent region reeling under power cuts. This 28 MW HPP will be particularly helpful during the summer season and help diversify the generation mix.	✓	-	✓	✓	40
6.	Solar PV Plant in Kashkadaria province	New 100 MW Solar PV plant in Kashdatta province. Compliment the Navoi TPP in the Kashkadarya region in South Uzbekistan that is expected to see lot of power demand due to growing industrial activity. The solar PV plant will also ensure diversification of the power generation mix.	✓	-	✓	✓	

List of generation projects (3/5)

No	Project	Brief Description and Benefits	Project Selection Criteria				Investment Requirement (USD Mn)
			Ensuring energy adequacy	Improving efficiency and limiting new investments	Increasing fuel mix diversity	Reducing energy intensity of GDP	
7.	Surhandaria province Photovoltaic Power Plant (2X100 MW)		✓	-	✓	✓	265
8.	Republic of Karakalpakstan Photovoltaic Power Plant (100 MW)	Solar Photovoltaic power plants, each with a cumulative capacity of 100 MW and above across the various regions . These set of Solar PV plants will leverage the huge solar potential across the regions and play an important role in diversification of energy mix and reducing energy intensity in Uzbekistan.	✓	-	✓	✓	135
9.	Navoi province PV (2X50)		✓	-	✓	✓	80

List of generation projects (4/5)

No	Project	Brief Description and Benefits	Project Selection Criteria				Investment Requirement (USD Mn)
			Ensuring energy adequacy	Improving efficiency and limiting new investments	Increasing fuel mix diversity	Reducing energy intensity of GDP	
10.	Tashkent province Wind Park (100 MW)	Construction of wind parks with total capacity of 150 MW in Tashkent and Bukhara regions will result in 400 million kWh of annual energy production.	✓	-	✓	✓	120
11.	Bukhara province Wind Park (50 MW)	Leveraging the potential of wind energy in these areas will reduce natural gas for power generation and ensure natural gas saving, thereby improving gas exports.	✓	-	✓	✓	80

List of generation projects (5/5)

No	Project	Brief Description and Benefits	Project Selection Criteria				Investment Requirement (USD Mn)
			Ensuring energy adequacy	Improving efficiency and limiting new investments	Increasing fuel mix diversity	Reducing energy intensity of GDP	
12.	Construction of new power station comprising two CCGT of 450 MW in Syrdarya region	CCGTs will be built to replace retiring from service NN 3, 4 and 5 units. Expansion of Syrdarya TPP the largest plant in Uzbekistan is vital towards ensuring energy adequacy not just in the region but across the country.	✓	✓	-	✓	910
13.	Increasing capacity of Talimarjan power station through the construction of the next 2 CCGT of 450 MW	Expansion of existing power stations at Talimarjan and Turakurgan through the construction of the 2 CCGT of 450MW. It is urgently required to upgrade the facilities in order to ensure power supply and improve reliability. Furthermore, the thermal efficiency of the power plant is as low as approximately 30%. This is one of the causes of increased environmental load, and the introduction of highly efficient power generation facilities is anticipated for the purpose of reducing CO_2 emissions.	✓	✓	✓	✓	40
14.	Increasing capacity of Turakurgan power station		✓	✓	✓	✓	120

List of transmission and distribution projects

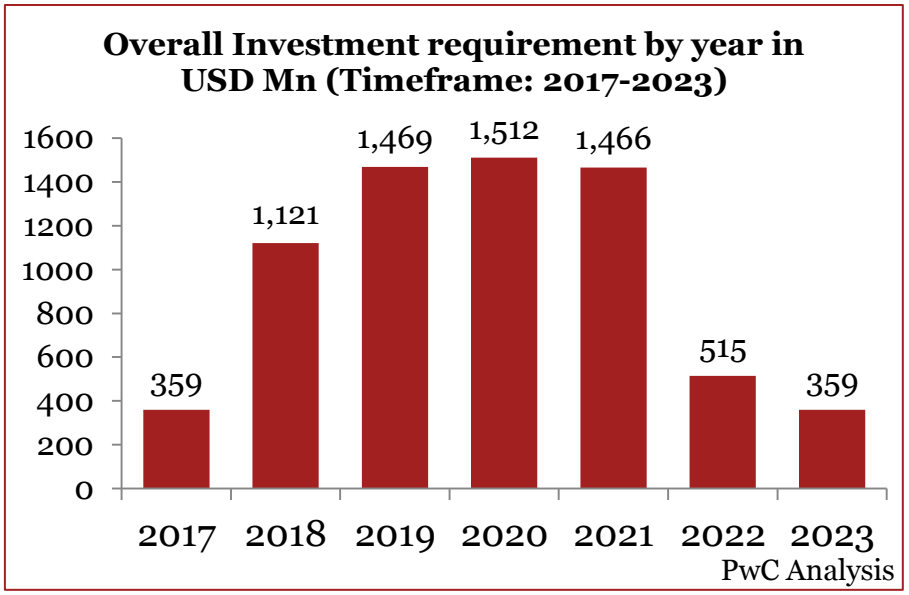
S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Reducing T&D losses	Evacuation to demand centers	Strengthening inter-country power transmission through interconnection	
1.	Construction of 220 kV power transmission line (PTL) Takhiatash PS –Substation Khoresm- Sarimay	Power line help transfer power to the Sarimay area catering primarily to domestic consumers in the Khoresm region of Uzbekistan	-	✓	✓	191
2.	Investments towards power distribution across various provinces	Includes construction of new transmission lines as well modernization of existing transformer points and 0.4 kv,6 kV,10 kV power lines across Bukhara,Ferghana,Khoresem,Kashdarya, Dizaak and other provinces	-	✓	✓	836
3.	Northwest Region Power Transmission Line Project	The project components include the construction of a 220 kV single-circuit overhead transmission line approximately 364 km in length, the expansion, rehabilitation and construction of 3 substations, and institutional development, capacity building and project management.	✓	✓	✓	460

List of other energy projects

No	Project	Brief Description and Benefits	Investment Requirement (USD Mn)
1.	Kandym gas field in the Bukhara-Khiva region	The project will construct and operate gas wells, gas collection clusters, gas processing plant, ancillary infrastructure, and other associated facilities in the Kandym gas field in Uzbekistan. Benefits include development of environmentally safe, technically sound and financially sustainable gas field in Kandym and increased local employment generation in relatively poor rural areas in the Bukhara-Khiva region.	150
2.	46953-014 Oltin Yo'l Gas to Liquids Project	Shurtan Gas-to-Liquids Project in the Kashkadariya Region, South of the Republic of Uzbekistan	200

Estimated investment requirement for 2017-2023

- Based on the priority projects list estimated investment requirement is **USD 6,800 million.**
- The entire set of projects included are to be completed between 2017 and 2023.
- Key assumptions
  - TPPs to commence in 2017 with a completion period of 7 years;
  - RE projects to commence construction by 2018, with completion period of 4 years;
  - HPPs to commence by 2018 with a completion period of 4 years;
  - Transmission projects to commence in 2018 with completion period of 4 years.



Investment phasing

Year	2017	2018	2019	2020	2021	2022	2023
% of project (TPPs)	10%	20%	20%	16%	14%	10%	10%
% of project cost (Solar PV Plants)			15%	25%	30%	30%	
% of project cost (Metring, projects Wind & HPPs)		15%	25%	30%	30%		
% of project cost (Transmission & other energy Projects)		15%	25%	30%	30%		

Section 3
Potential Sources of Funding for Financing Priority Projects

Investment plan and financing sources for 2017-2023
A snapshot

Estimated Requirement (USD 6,800 mn)

Estimated Funding Gap (USD 1,110 mn)

Likely source: private sector and assistance from other countries

Estimated Funding from Development Partners (USD 4,370 mn)

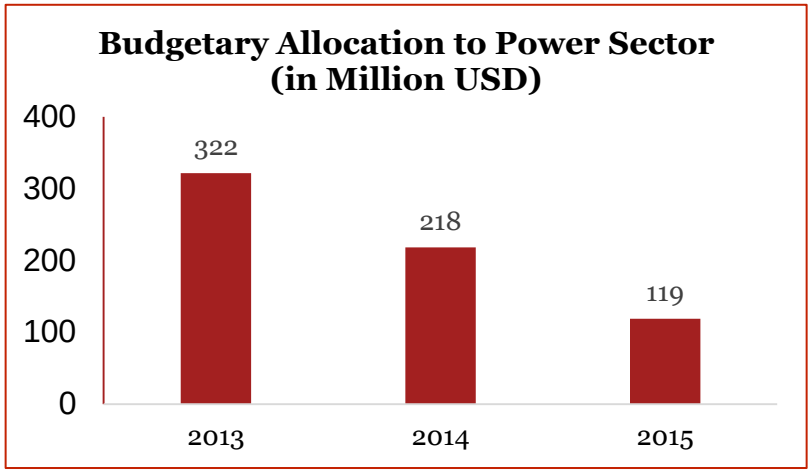
Estimated Government Budgetary Support (USD 1,320 mn)

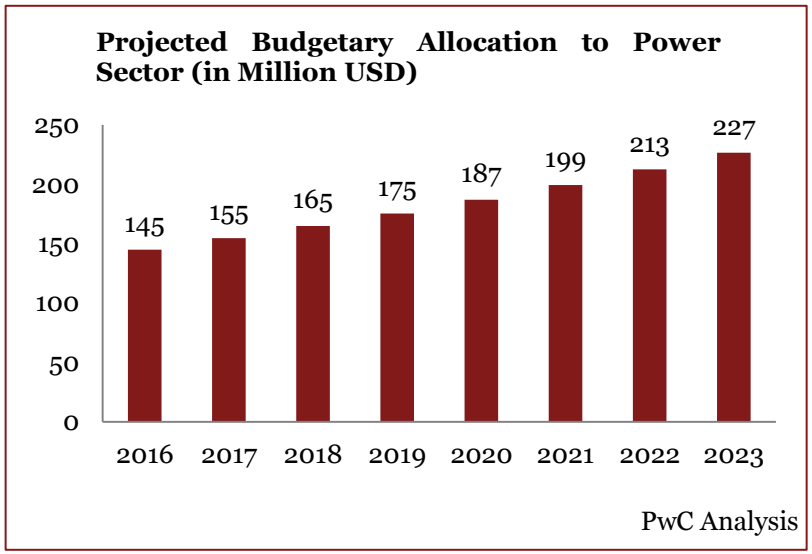
Investment plan and funding pattern, 2017-2023

National government

Estimate of government spending towards the power sector

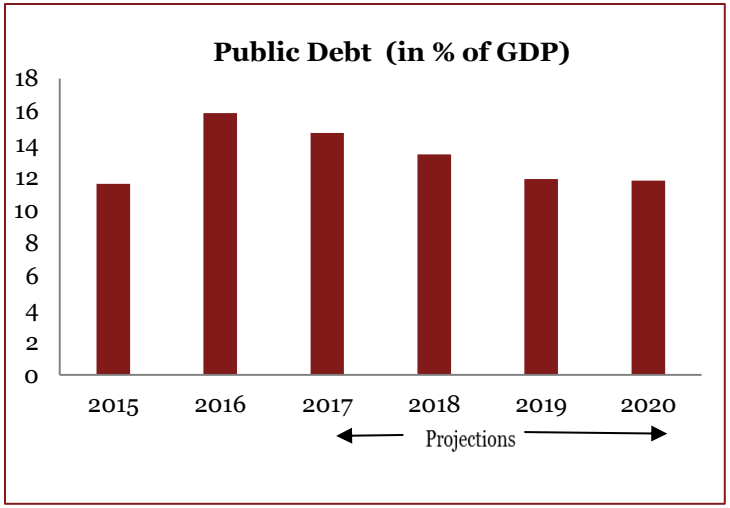
- Government budgetary support over 2017-2023 is estimated at **USD 1,320 Mn** based on the following assumptions:
  - The budgetary support was assumed to be 0.35% of GDP based on trend between 2013 to 2015.
  - Average GDP growth of 6.6% till 2023 (as per IMF projections till 2020).
- The government of Uzbekistan recently approved Hydro-Power sector development program for the period of 2016-2020. The government, with help from the international development partners, has planned to allocate USD 889 Million.
- The budget allocation will primarily be used for construction of various HPPs and rehabilitation/ modernisation of TPPs.

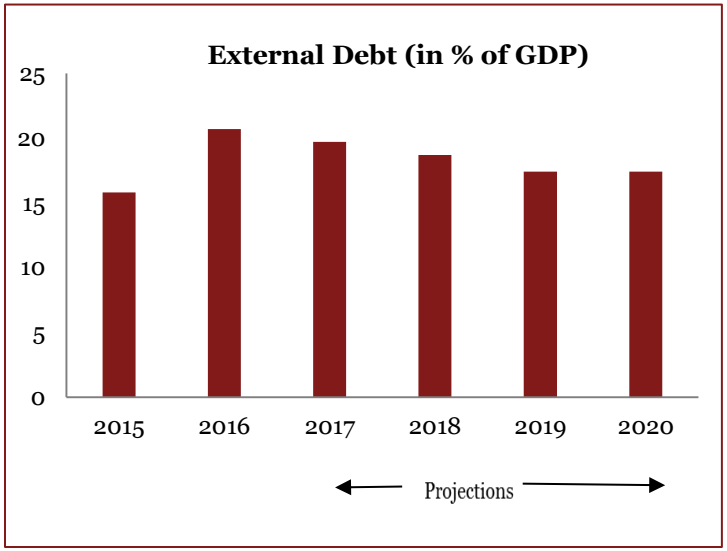




Maximum government borrowing

- Uzbekistan has among the lowest public debt to GDP ratio among the CAREC member countries at 11.6% of GDP in 2015.
- Current account surpluses over the past decade have translated into rapidly falling indebtedness, with external debt also declining rapidly from 64 percent of GDP in 2001 to around 17 percent of GDP in 2014.
- Given high international reserves, the Government is not expected to borrow domestically in the medium term and only borrow from international sources.
- As per IMF projections total value of public debt is expected to increase in 2016, post which it will reduce and remain close to **~12% of GDP till 2020.**
- Based on such assumptions the average net borrowing by the Government of Uzbekistan is estimated to be around **USD 550 mn** per year.
- Debt sustainability is not a significant concern for Uzbekistan as high GDP growth and budget and current account surpluses have led to decrease in public and external indebtedness.
- Uzbekistan has chances for external borrowing in support of growth and employment because of the low debt level in the country.





Assistance from Development Partners

Estimates of support from ADB, World Bank and other development partners

- Based on Country Partnership Strategies/ Country Operations Business Plan, funding from key partners for power sector projects is estimated to be USD **4,370 mn USD** over 2017-2023.
- ADB and WB is estimated to fund around **USD 1,510 mn** and **USD 1,460 mn** respectively.
- **USD 200 mn** per year is the past trend of financing by other partners (mainly IDB, JICA, China EXIM bank, etc.); estimate over 2017-23 is **USD 1,400 mn.**

WB estimates

Year	Amount (in $ mn)	Remarks
2016	180	Based on current CPS and the lending pipeline. The current CPS mandates about USD 4 bn and energy sector is ~20% of the portfolio
2017	200	
2018	200	
2019	200	
2020	200	
2021	220	Increase in lending by 10% for the next CPS based on past trends
2022	220	
2023	220	
Total	**1,460**	

ADB estimates

Year	Amount (in $ mn)	Remarks
2016	140	Based on COBP
2017	100	
2018	350	
2019	200	Based on the average proposed lending for 2016-2018
2020	200	
2021	220	Increase in lending by 25% based on past trends
2022	220	
2023	220	
Total	**1,510**	

Assistance from Development Partners

Current support in power sector and envisaged trends

No	Sector	Current Degree of Support	Expected Trend	Comments
1.	Power Generation	Medium	↑	Development partners have been actively involved in funding power generation assets in the past and the scope for development partner assistance is envisaged to be high in the medium term.
2.	Power Transmission	medium	↑	Transmission sector requires more support from multilateral financing institutions in order to improve the demand-supply imbalance and strengthening inter-country power transmission system.
3.	Renewable Energy	low	↑	Currently the requirement for development partner assistance is low but it is likely to increase as government has made plans for expansion of this sector under Uzbekistan's Renewable Energy Development Plan up to 2030.
4.	Power Distribution	low	↑	Currently the requirement for development partner assistance is low but it is likely to increase in the future.

Other governments and private investors

China

- The Government of China remains a key financier having already financed the Construction of 150 MW Angren Thermal Power Plant and 370-MW CCGT Construction on Tashkent TPS through China Development Bank.

Japan

- In 2015, Japan's Mitsubishi Hitachi Power Systems, Ltd. (MHPS) signed an MOU with Uzbekenergo under which the two companies will associate in the area of power plant operation and maintenance.

Korea

- The Korean companies are expected to have more opportunities to invest in large-scale infrastructure development projects in Uzbekistan over the next 5 years.
- These projects includes the construction of thermal power plants in Turakurgan and Takhiatash and a solar power plant in Samarkand.
- South Korean and Uzbekistan governments signed a MoU to put efforts in bringing solar power to the country.

Envisaged funding probability of priority generation projects (1/3)

Projects	National Government	Other Governments	Assistance from Development Partners	Private Investment
Expansion of JSC Mubarek Power	Medium	Low	High	Low
Solar PV Plant in Sherabad district	Low	Low	High	Medium
Coal based power plants in Novo-Angren	Medium	Low	High	Low
Navoi Power Station CCGT	Medium	Low	High	Low
Tashkent HPP Cascade	Medium	Low	High	Low
Solar PV Plant in Kashkadaria province	Low	Low	High	Medium

Envisaged funding probability of priority generation projects (2/3)

Projects	National Government	Other Governments	Assistance from Development Partners	Private Investment
Surhandaria province Photovoltaic Power Plant	Low	Low	High	Medium
Republic of Karakalpakstan Photovoltaic Power Plant	Low	Low	High	Medium
Tashkent province Wind Park	Medium	Low	High	Low
Bukhara province Wind Park	Medium	Low	High	Low
Navoi province Photvoltaic plant	Low	Low	High	Medium

Envisaged funding probability of priority generation projects (3/3)

Projects	National Government	Other Governments	Assistance from Development Partners	Private Investment
Construction of new power station comprising two CCGT of 450 MW in Syrdarya region	Medium	Low	High	Low
Increasing capacity of Talimarjan power station through the construction of the next 2 CCGT of 450 MW	Medium	Low	High	Low
Increasing capacity of Turakurgan power station	Medium	Low	High	Low

Envisaged funding probability of priority transmission & distribution projects

Projects	National Government	Other Governments	Assistance from Development Partners	Private Investment
Construction of 220 kV power transmission line (PTL) Takhiatash PS –Substation Khoresm- Sarimay	Medium	Low	High	Low
Investments towards power distribution across various provinces	Medium	Low	High	Low
Northwest Region Power Transmission Line Project	Medium	Low	High	Low

Section 4
Barriers to Private Investment and Mitigation Measures

Investment barriers (1/2)

Aspects	Issues	Possible Mitigation Measures
Tariff Determination Framework	• Absence of clear regulations and policies for tariff determination. • Only retail supply tariff is determined and no provisions for determination of separate tariffs for generation, transmission.	• Long Term Tariff Regulations for all the licensees with incentive penalty framework based on performance. • Separate regulations for determination of tariff for functions like generation, transmission, distribution.
Promoting Competition	• Limited private participation in power sector • Efficiency in various functions like generation, retail supply etc. may be improved through competition.	• Competition may be infused in functions like generation and retail supply by unbundling and segregating distribution and retail supply

Regulatory barriers (2/2)

Aspects	Issues	Possible Mitigation Measures
Dedicated regulator for the electricity sector	• Regulator does not have the responsibility of tariff fixation.	• Dedicated regulator may be set up for electricity sector to enhance investor confidence. • The scope of the regulator may be enhanced to ensure that it has sufficient autonomy to look into the economic and financial aspects of the sector.

Tools for improving private sector participation
Key legislations and challenges for PPP development

Key Laws pertaining to PPP	Key challenges for PPP development
Law on concessions	Law "On Concessions" is silent on government support, financial securities and lenders' rights.
Law on natural monopolies	There is no specialized public authority designated or created by the government to promote PPPs and to serve as central PPP unit in the country.
Law on foreign investments	The law doesn't identify the sectors and/or types of infrastructure and/or services in respect of which a PPP may or may not be granted.
	There are no provisions in the Law "On Concessions" which explicitly provide for compensation of the Private Party for losses incurred as a result of termination on the grounds of public interest and/or as a result of public authority acts.
	There are no specific provisions in the Law "On Concessions" in regard of right to create any security interests over the project assets.

Appendix 1
Macroeconomic indicators

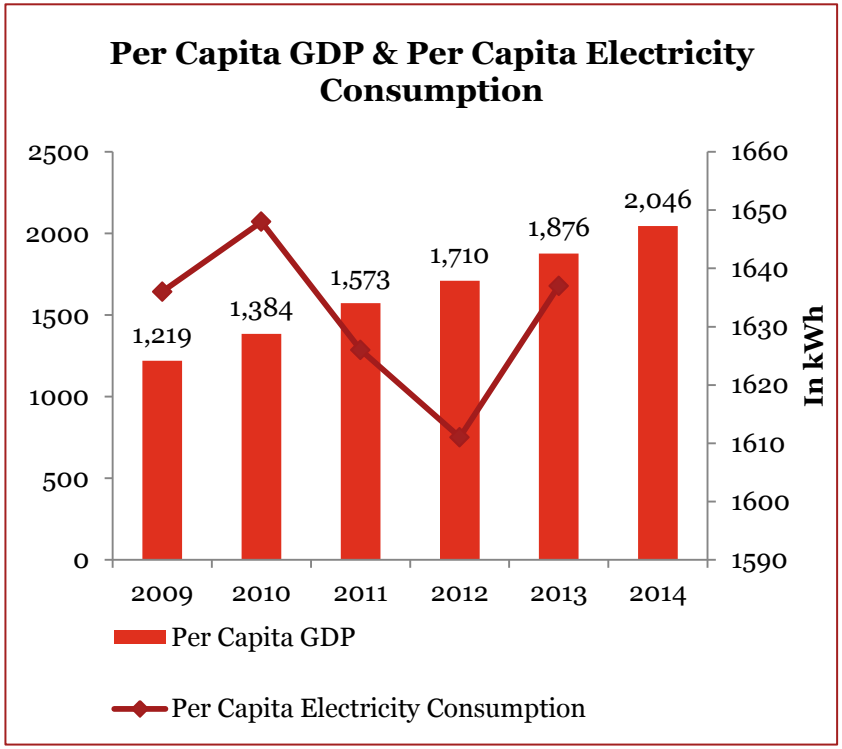
Macroeconomic overview – Historical (1/2)

- Uzbekistan has enjoyed GDP growth of over 8% for the past decade, on account of government's macro-economic management, favourable trade conditions and limited exposure to international financial markets.
- The energy sector is a major contributor to GDP (accounting for nearly 7% of GDP), the largest export revenue generator and accounts for ~50% of capital investments.
- Although services continued to dominate, registering at 44% of GDP in 2014, the share of industry has expanded significantly in recent years at 24.1% of GDP, which exceeds agriculture's current 17.2%.
- Poverty declined from 27.5% of the population in 2001 to an estimated 13.7% in 2014-15 reflecting rapid per capita economic growth.

GDP by sector (in %) (Source : ABD Outlook)

Year	Overall GDP growth	Agriculture	Industry	Services
2010	8.5	6.8	8.2	11.7
2011	8.3	6.6	7.5	11.8
2012	8.2	7.0	8.0	10.4
2013	8.0	6.8	9.0	13.7
2014	8.1	6.9	8.5	15.4
2015	8.0	6.8	8.0	9.8

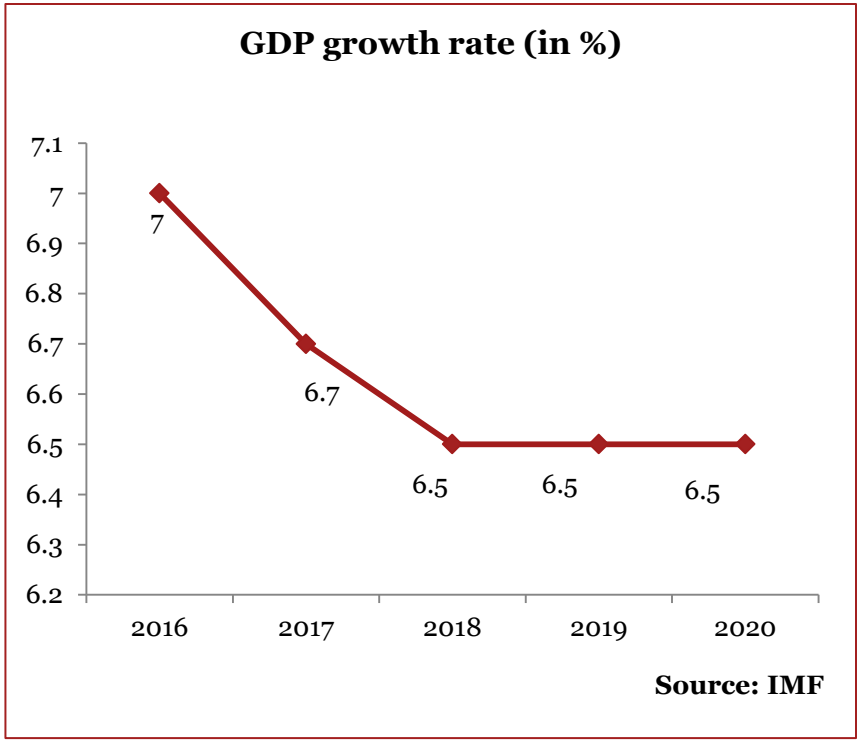
Macroeconomic overview – Historical (2/2)



- The Per Capita GDP has increased about 50% over the past five years; however, per capita income still remains low, if compared with other resource rich countries in the region.
- Winter deficits and unreliable supply had led to a reduction in per capita consumption in 2011.
- The industry has been the largest consumer of electricity, accounting for more than 45%.
- Uzbekistan ranks 145th among 189 countries on the getting electricity indicator, according to the Doing Business 2015 report prepared by the World Bank and IFC.

- Uzbekistan is the second-largest producer of electricity in the Central Asian region.
- The government of Uzbekistan recently approved Hydro-Power sector development program for the period of 2016-2020.

Macroeconomic overview – Future Outlook



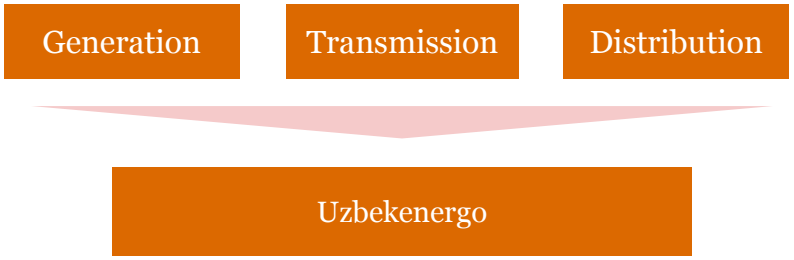
- The weak global environment and historically low energy prices is expected to impact economic growth in the near term.
- Inflation will remain a key challenge, as pressure emanates from increase in government spending and depreciation of local currency.
- Falling international prices for the country's main export commodities, the deteriorating economic situation in the Russian Federation, and slow growth in the People's Republic of China will reduce the trade surplus and transfers, including remittance inflows.

Public spending is expected to drive economy in the medium term with the government adopting a comprehensive structural modernization and diversification program for USD 40.8 Billion from 2015-2019.

Appendix 2
Industry Structure & Institutional Arrangement

Industry structure and institutional arrangements

- The power sector in Uzbekistan is vertically integrated through the state owned company Uzbekenergo.
- Uzbekenergo is in charge of electricity generation, transmission and distribution and heat/thermal energy supply).
- Uzbekenergo operates under the supervision and regulation of Cabinet of Ministers and Ministry of Finance.
- Uzbekenergo has 54 subsidiary companies with different business units/verticals.



Uzbekenergo operates :

- Power generation sector comprising 7 thermal power plants, three heat and power plants, and 28 hydropower plants)
- Power transmission network
- Power distribution and supply (through 14 subsidiaries)
- Coal sector and auxiliary service companies

In August 2001 following a reorganization, the Ministry of Electric Power and Electrification was changed into the State Joint Stock Company Uzbekenergo.

Appendix 3
Demand-Supply Situation

Demand-Supply Situation (1/3)

Uzbekistan electricity production over the years (GWh)							
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Coal	2,000	2,018	2,041	2,112	2,140	2,145	2,214
Oil	2,044	1,456	1,038	750	542	381	277
Gas	38,506	34,566	37,541	37,992	39,478	38,764	40,149
Hydro	6,400	11,360	9,330	10,846	10,240	11,210	11,560
Total	48,950	49,400	49,950	51,700	52,400	52,500	54,200

Source: IEA

Key Demand-Supply issues in Uzbekistan

Ageing power sector infrastructure - Most power plants are over 30 years old

+

Overreliance on gas based generation - Need to diversify power generation mix

+

Severe power shortages in the Fergana region during winters

+

Technical & commercial losses account for 23% of net generation

A key challenge facing Uzbekistan is the low available capacity of major power plants.

Ageing of generation and transmission infrastructure result in power supply reliability & efficiency issues.

Power sector characterized by insufficient investments towards power generation and transmission.

75% of existing generation assets are more than 30 years old and 40% of the assets will cross the useful service life by 2017.

Demand-Supply Situation (2/3)

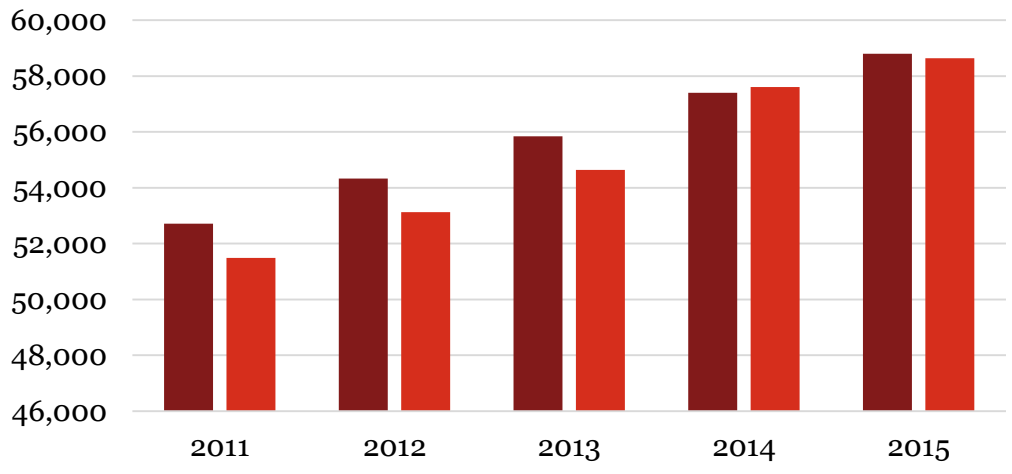
Power supply interruptions results in some regions being without electricity for most part of the day during winter.

Power supply demand condition is more pronounced during winter season due to increased demand of heat and power.

Load curtailment occurs for 2-6 hours a day in both small rural settlements as well big cities.

Power supply reliability is a major issue caused by transmission bottlenecks as well as ageing and unreliable power generation.

Uzbekistan Power Demand vis a vis Generation

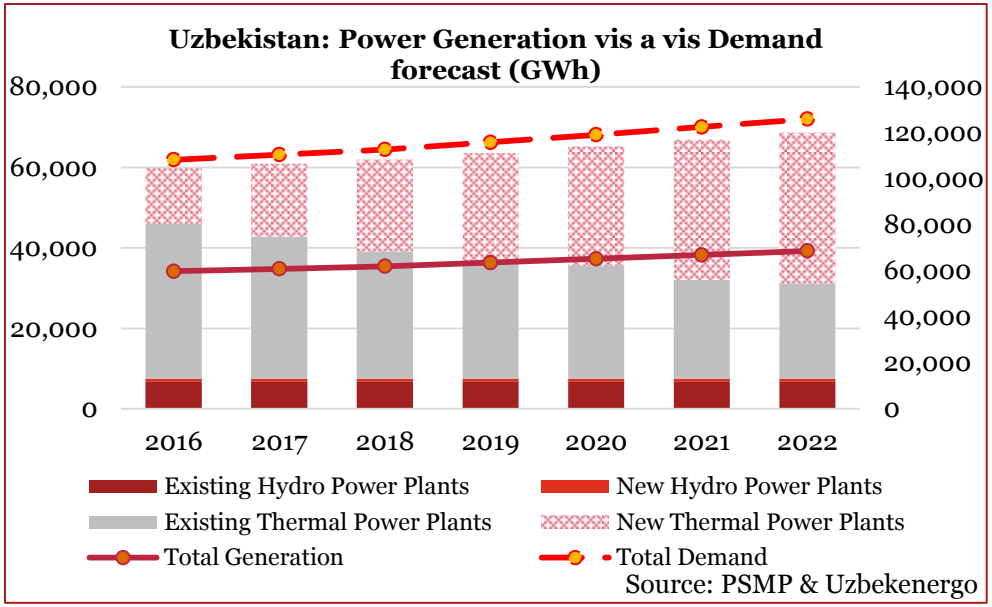


Source:PSMP and IEA

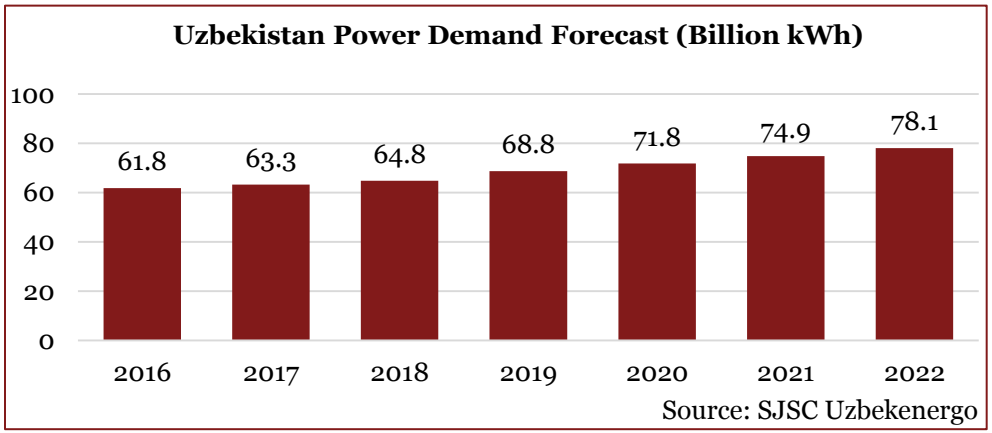
- Maximum power demand ranges between 8,000-8,600 MW in contrast to an overall power generation capacity of 12,945 MW.
- Considering rapid deterioration in power generation infrastructure, power facilities usually generate 7,400-8,000 MW.

Demand-Supply Situation (3/3)

- A key focus is the construction of high-efficiency cogeneration plants.
- It is also crucial to undertake R&M of existing power plants as the average loss in installed capacity is around 22%.
- Between 2016 to 2022, annual growth in power demand is expected to be approx. 4%.
- Industrial activity and residential sector are expected to drive future demand.
- Share of HPPs and RE in generation mix will increase significantly while that of TPPs is expected to come down by approximately 12-13% from current levels.
- Gas being a costly source of generation, Uzbekistan can import cheaper electricity from Tajikistan & Kyrgyz Republic during summer and can export gas or electricity during winter.



Source: PSMP & Uzbekenergo



Source: SJSC Uzbekenergo

Thank you!