

ADB TA 8727 REG

*CAREC: Study
for Power Sector
Financing Road
Map*

**Mobilizing
Financing for
Priority Projects**

**Turkmenistan
September 2016**



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List of Abbreviations

ADB	Asian Development Bank
ADO	Asian Development Outlook
AT&C	Aggregate Technical & Commercial Losses
BCM	Billion Cubic Meters
BP	British Petroleum
CAPS	Central Asian Power System
CAREC	Central Asia Regional Economic Cooperation
CBT	Central Bank of Turkmenistan
EAP	Energy Action Plan
ESCC	Energy Sector Coordinating Committee
FDI	Foreign Direct Investment
FSU	Former Soviet Union
GDP	Gross Domestic Product
GHG	Green House Gases
G-T-D	Generation-Transmission-Distribution
HPP	Hydro Power Plant
IMF	International Monetary Fund
IPP	Independent Power Plant
kWh	kilowatt -hour
Mn	Million
MTPP	Medium Term Priority Project
MW	MegaWatt
PLF	Plant Load Factor
PPA	Power Purchase Agreements
PPP	Public Private Partnership
R&M	Repair and Maintenance
RDC	Regional Dispatch Center
RDTA	Research and Development Technical Assistance
REC	Regional Electric Grid Companies
RES	Renewable Energy Source
RESET	Regional Energy Security, Efficiency and Trade
RPMP	Regional Power Sector Master Plan
TA	Technical Assistance
TAPI	The Turkmenistan-Afghanistan-Pakistan-India Pipeline Project
TCF	Trillion Cubic Feet
TMT	Turkmen New Manat/Turkmenistani Manat
TPP	Thermal Power Plant

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1. National power sector overview

Turkmenistan has the world's fourth large natural gas reserves accounting for almost 9.3% of the global reserves.¹ Like some of the other CAREC members such as Azerbaijan and Tajikistan, Turkmenistan has a skewed energy mix with natural gas being the fuel for power generation followed by small contributions from oil and hydro power. Currently the electricity generation in the country exceeds demand which helps it to export power to countries like Iran and Afghanistan.

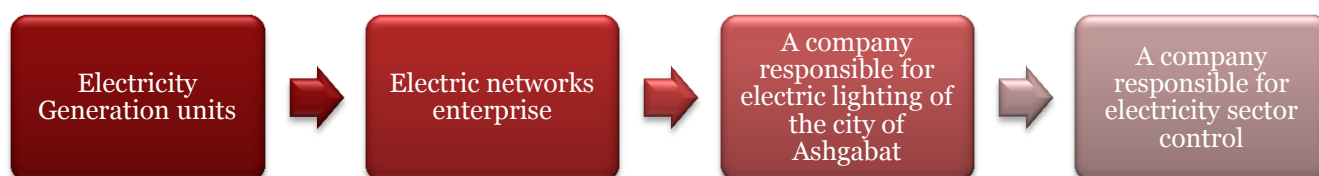
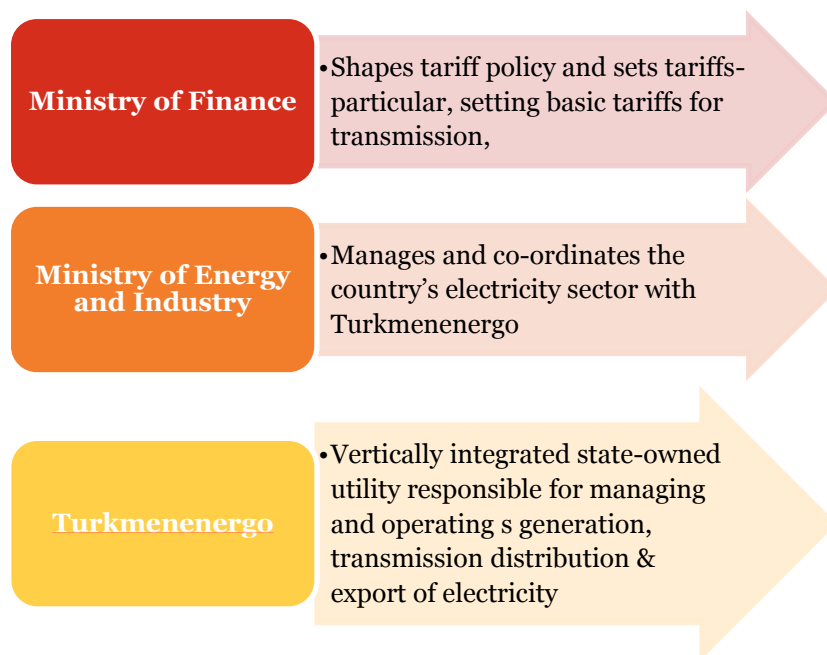
In this section we have provided a brief description of the companies/ agencies involved in the sector, including their roles in the sector and ownership structure. Further, we have discussed the historical electricity supply and demand situation in the country along with a description of the regulatory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

1.1. Industry structure and institutional arrangements

The power sector in Turkmenistan is governed by Ministry of Energy and Industry, and is operated by the vertically integrated state owned monopoly the 'Turkmenenergo State Corporation'. Turkmenenergo was established on 1st July, 2005, by renaming Kuvvat State Energy & Technology Corporation (founded in 1993) pursuant to a resolution by the President on 28th June, 2005.

The Major Stakeholders in Turkmenistan power sector are the Ministry of Finance, Ministry of Energy and Industry along with the vertically integrated utility "Turkmenenergo".

The utility is in charge of generation, power trading, transmission & distribution of electrical power. Its assets include the below list which cater services in generation, transmission and distribution sector of the Turkmenistan electricity system. Turkmenistan's power sector comprises of the following:



¹ Statistical Review of World Energy ,BP (2015)

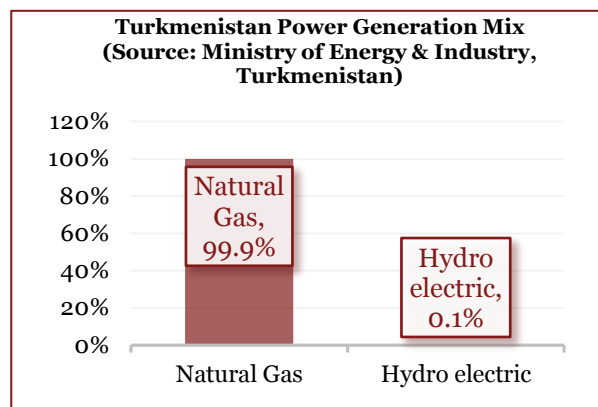
1.2. Power supply and demand

1.2.1. Power supply

Turkmenistan power system has an installed capacity of 4764 MW and relies mainly on gas-based power generation that helps meet 99% of the country's power requirement. A small portion of power is generated by oil and hydropower, although the overall potential of the later is low. Currently, there are ten thermal power plants (mainly use gas as fuel) and one hydropower plant catering to both domestic and export requirement. The total electricity production in Turkmenistan was 22.5 billion kilowatt-hours in 2015 of which 3.2 billion kilowatt-hours was exported to neighboring countries. The government is keen on increasing its electricity output to 27.4 billion kilowatt-hours by 2020 by building 14 gas-turbine power stations in its different regions within the framework of the Concept of Electric Power Industry Development Plan of Turkmenistan for 2013-2020. This will increase the volume of power export to 6.9 billion kWh by 2020.

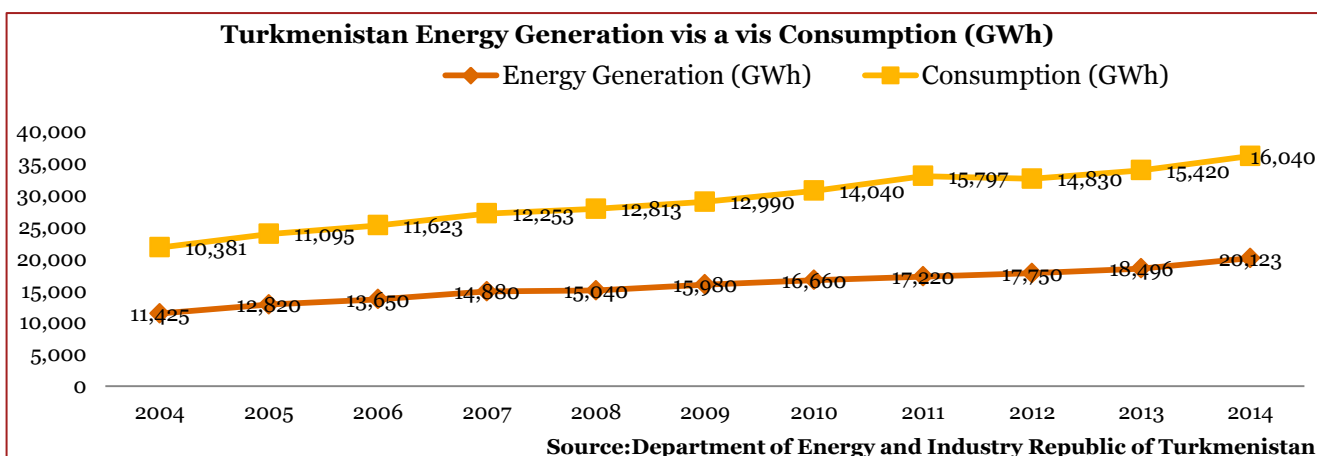
Moreover, to facilitate additional power export to Iran and Turkey, the government of Turkmenistan is developing additional high voltage overhead transmission lines from Mary to Marshhad (Iran) and Mary to Atamyrat (Turkey).

On the contrary, because of its reliance on gas and oil, the power sector accounts for 15.7% of greenhouse gas emissions. Therefore to reduce the impact on GHG emission, sufficient focus has also been given to renewable energy development, particularly towards solar and wind that have a large potential.



1.2.2. Power demand

Electricity demand in the country has increased significantly in the last decade with an overall increase of 54% owing to increase in its electrification rate and subsequent increase in per capita consumption. Residential sector accounts for almost 53% of the total demand followed by commercial & public services sector (22%) and industrial sector (14%)². While demand has been increasing, supply too has increased sufficiently by an overall 76% in the last 10 years with the development of several new thermal power plants (that use gas as fuel) like Balkanabad TPP, Dashoguz TPP, Axal and Avaz TPP. This has resulted in a countrywide power surplus

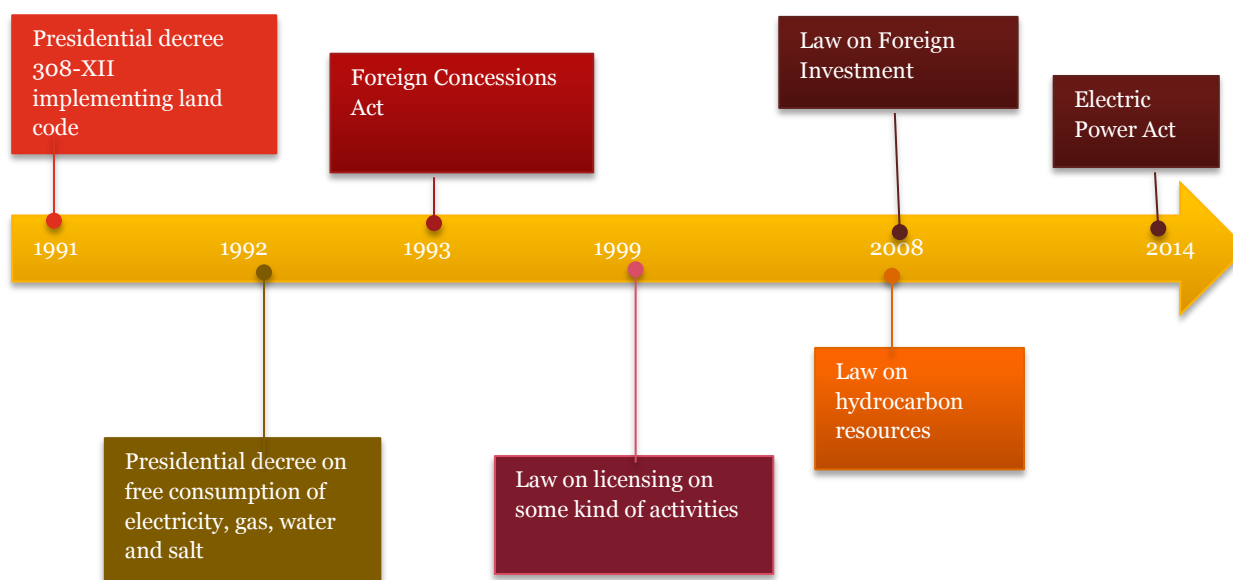


situation and created the need for increase in export of electricity to its neighbouring countries.

1.3. Sector regulation

1.3.1. Evolution of legal and regulatory landscape

Key regulatory milestones in the power sector since the 1990s is represented in the schematic diagram below:



The regulatory development of natural resource and electricity sector started with the introduction of Land Code in 1991 and Concession Act in 1993 which defined the procedure for acquiring land for infrastructure development and provided legal rights to investors and developers to explore, produce & operate natural resources and other business activities. In 1999, the Law on Licensing established the requirement of license for carrying out such activities.

Later in 2008, the government came up with Foreign Investment Law and Law on Hydrocarbon resource to facilitate foreign investment in various sectors including electricity and hydrocarbon sector. The laws provide provisions for exploring and producing natural resources (exploration & production only for oil fields) and various incentives like tax exemption, profit repatriation etc.

Recently in 2014, the Electric Power Act was introduced, the first power sector specific law with the objective of enhancing the capacity of electricity utility system of the country and usage of energy efficiency technologies and equipment in the industry.

1.3.2. Key features of the legal and regulatory landscape

License framework

The **Law on Licensing of some kind of activity, 1999** defines the provisions for requirement of license by any legal entity or individual entrepreneur to carry out any specific type of activity mentioned in the law. The Cabinet of Ministers is the main governing body responsible for defining the licensing procedure and the list of activities for which license is required whereas the responsibility of issuing the license rests with State bodies governing that particular activity.

The Law lays down the detailed provisions regarding issuance of licenses, qualification requirement, reasons for refusal, and withdrawal of license etc. The law also provides for the provision of carrying out independent examination by the licensee for verification, in case of license cancellation. The license cannot be issued for a period of less than 3 years and requires a license duty to be paid by the licensee within three months from the issuance of license.

Foreign investment promotion

The **Law on Foreign Investment, 2008** acknowledges the need of foreign investment for the development of various sectors including natural resource and electricity sector and provides certain benefits to make the investment climate favorable for investors. Some of the benefits applicable as per the law are:

- Foreign investments are not subject to nationalization;
- Provision of similar legal regime for both national and foreign investors;
- Repatriation of profit is allowed after paying of applicable taxes & other obligatory payments;
- Custom duty exemption on funds brought to Turkmenistan as a part of contribution to the charter capital of the company with foreign participation;
- If there is a change in legislation which can have adverse effect on foreign investment, the change will be applicable to those investment after 10 years from the date of registration.

The law also provides special incentives to the investors investing in the free economic zone in the form of exemption of certain fees and taxes like rental for land, registration fees, licensing and its renewal fees etc.

Foreign Concessions Act

In 1993, Government of Turkmenistan came up with a **Foreign Concessions Act** to provide legal rights to foreign investors to carry out exploration, production or operation of natural resources as well as other business activities not prohibited by legislation of the state. The law specifies the various conditions for granting a concession, granting procedure, qualification criterion and the reason for termination of the agreement.

The priority sectors for which concession will be granted is decided by the Cabinet of Ministers whereas the process of granting the concession is carried out by the State Property Administration Agency. The concession period varies from 5 to 40 years with an option for renewal depending upon the terms of agreement between the concerned parties. It defines a number of rights and guarantees to be provided by the State Authority to protect developer's interests and attract investment in the sector which is as follows:

- In case of early termination of the contract by the contracting authority, the expenses incurred will be reimbursed to the investor,
- In case of violation of agreement by someone other than the investor, losses incurred by the investor because of such incident will be compensated by the concession granting authority,
- The concessionaire has the right to export a share of the output and hard currency profit as per conditions in the concession agreement or additional agreements,
- The concessionaire can appeal to the court against any illegal actions taken by the state administrative bodies.
- The concessionaire can hire any citizen either from Turkmenistan based on labor law or from other countries.

Electric Power Act

The Electric Power Act, 2014, establishes the guidelines for policy development, generation, supply and investment in power sector. It defines the electrical utility entities as state owned property and the entities have to abide by the country's legislation for usage and disposal of the infrastructure. The Cabinet of Ministers and Ministry of Energy are the main governing bodies which determine the state policy, direction of economic reforms, procedures for production and supply. The key features of the Act are:

- No one including state governing bodies and local self-government has the right to tamper with the production and other technological activities of power industry as specified by the legislation of Turkmenistan.
- The power supply company cannot deny electrical network connection to any consumers if the requirements established by the law are duly fulfilled by them.
- The power supply company has to provide equal conditions to all its consumers.
- The load dispatcher is responsible for secure and reliable operation of the network
- The authorized body is responsible for the execution of interstate agreements on power supply/cross border trading.

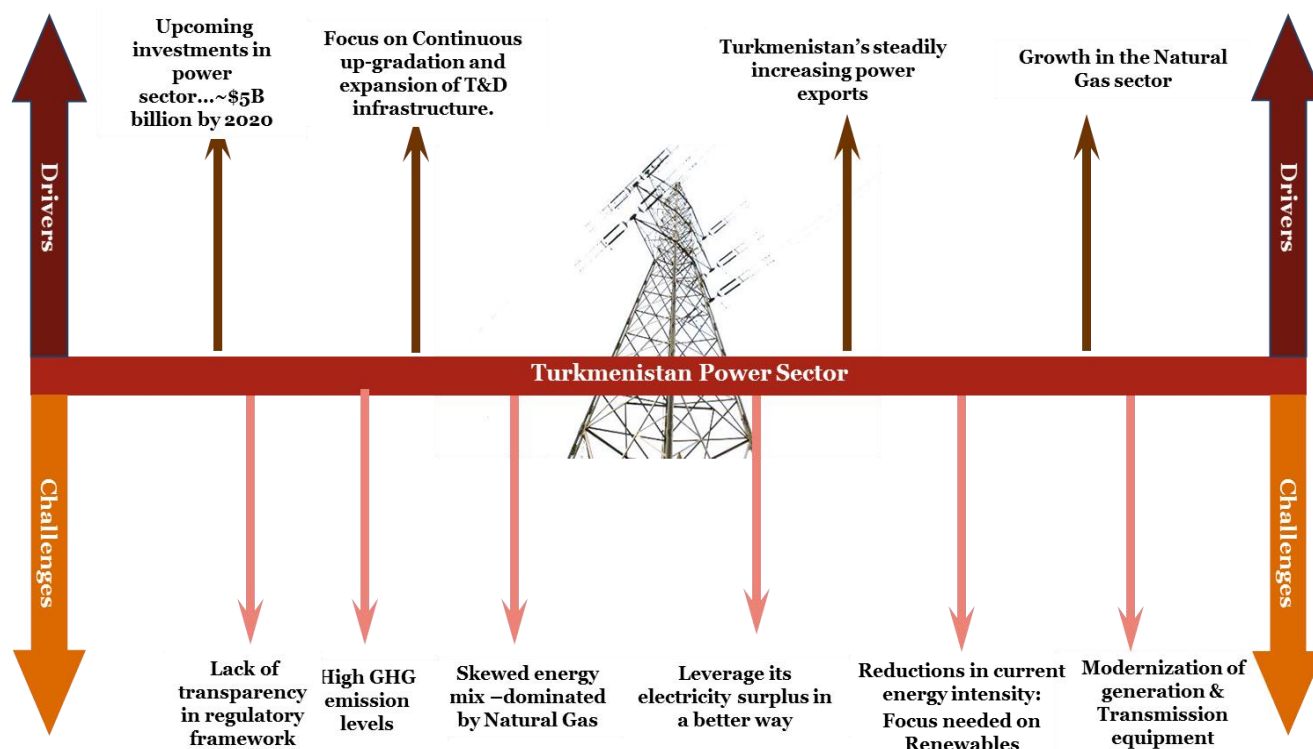
2. Power sector development and investment plan

2.1. Objectives driving sector development

Turkmenistan recorded robust growth in 2011, driven largely by hydrocarbon exports and an ambitious public investment program. Gas exports, the main stay of the economy, rose by 75.2%, reflecting a 42.5% rise in production and the expansion of pipeline capacity to the People’s Republic of China (PRC) and the Islamic Republic of Iran. Industry contributed more than half of all growth, with the hydrocarbon subsector, which provides 75% of industrial output and 40% of GDP, growing by an estimated 19%.

GDP growth in 2013 remained high at 10.2%, slightly below the 11.1% attained in 2012. Expansion was supported by strong performances in both the hydrocarbon economy and its non-hydrocarbon counterpart. Growth in industry reflected moderate expansion in hydrocarbons, electrical power, and chemicals, paired with a strong pickup in construction materials, textiles, food, and agro-industrial products. With the hydrocarbon sector accounting for about 35 % of GDP, 90 % of exports, and 80 % of fiscal revenues, the recent decline in hydrocarbon price remains a key risk to economic growth in the medium term.

The figure below captures the key driver and challenges for Turkmenistan power sector from 2014 to 2020. Turkmenistan’s power sector is buoyed by planned investment of USD 5 Billion and growing focus on power trade across the region. The growth in the natural gas segment is also expected to have a cascading effect on the power sector. Like most CAREC member countries, Turkmenistan also faces challenges such as ageing power infrastructure, high electricity intensity and dependency on a single source for power generation.



The National Program of President of Turkmenistan till 2020 outlines various objectives for the power sector including electrification for all, reconstruction of distribution networks, and increase in electricity export volumes. A number of projects have been outlined in the Concept of Electric Power Industry Development Plan of Turkmenistan (2013-2020) which seeks to modernize various thermal power projects and construction of cross border transmission lines.

Alignment of the power sector objective of Turkmenistan with the CAREC Energy Work Plan, 2016-20

The table below provides a brief overview of alignment of Turkmenistan’s power sector goals and objectives with the CAREC EWP 2016-20.

No	Element of EWP	Objectives of Turkmenistan power sector
1.	Developing the inter regional corridor	<ul style="list-style-type: none"> • Turkmenistan preparing to construct additional lines from Mary to Marshhad and Mary to Atamyrat to increase the export of electricity to Iran and Turkey respectively. • Turkmenistan is also contemplating to construct additional lines to Afghanistan to increase its capacity for future export to Pakistan via Afghanistan. • Turkmenistan–Afghanistan–Pakistan–India (TAPI) pipeline, which will transport Turkmen natural gas through Afghanistan to Pakistan and India.
2.	Promoting Regional Electricity Trade and Harmonization	Turkmenistan envisages a mutually beneficial long-term agreement for exporting power with neighboring countries and extending collaboration. In continuation to this endeavor, MoU was signed with Afghanistan on energy sector cooperation.
3.	Managing Energy-Water Linkages	-
4.	Mobilizing Financing for Priority Projects	<p>The various planned projects in those areas will be financed with the collaboration of public and private sectors through:</p> <ul style="list-style-type: none"> • Foreign investments; • State budget and investment programs; • Cooperation with international financial organizations and development partners.
5.	Implementation of Energy Sector Priority Projects	The energy sector priority projects are planned with an objective to achieve energy efficiency through conversion to combined cycle and modernization of the existing power plant.
6.	Capacity Building and Knowledge Management	--
7.	Promoting and Prioritizing Clean Energy Technologies	Turkmenistan is in the process of developing its solar potential in the RE space and initiative has been taken to attract private sector participation in renewable energy.

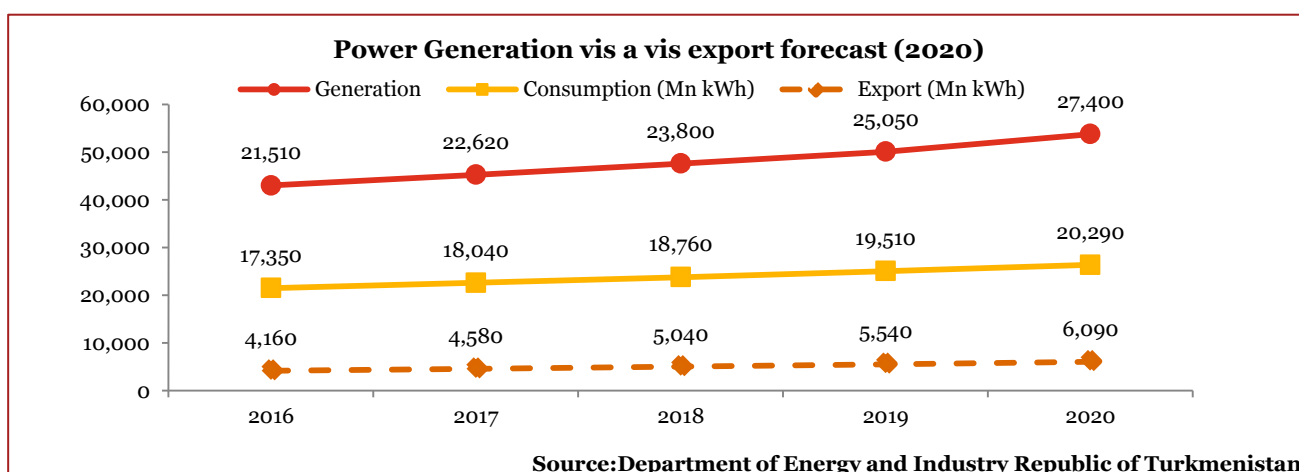
2.2. Projected supply and demand

Turkmenistan's electricity demand is projected to grow at an average 4% every year from 17350 GWh in 2016 to 20290 GWh in 2022. Whereas on the supply side, a list of various planned greenfield and R&M projects will result in an average 7% annual increase in the domestic supply to meet the growing demand. Considering higher increase in supply over demand, Turkmenistan is expected to be power surplus for the next five years and has to look for power trading opportunities with the neighboring countries.

Trading potential

Turkmenistan is a net energy exporter of electricity and currently exporting electricity to Afghanistan and Iran. Turkmenistan's electricity exports to Tajikistan ceased in December 2009, after Uzbekistan withdrew from the united power grid of Central Asia's electricity system.

As Turkmenistan's spending on its power sector is driven by the general policy of diversifying its energy export routes in the region, it is evaluating plans for transporting electricity to Tajikistan, Kazakhstan, Pakistan, and Caucasus countries. For example, Turkmenistan and Afghanistan have reached an agreement to supply electricity from Turkmenistan to Afghanistan in 2018-2027 and to increase the volume of exported electricity four-fold in this period. The chart below shows the power generation and exports by Turkmenistan since 2005



and the projected consumption.

To facilitate such transaction, Turkmenistan is preparing for the construction of high-voltage overhead transmission lines to export electricity to Iran and Turkey. As Turkmenistan, like Tajikistan, is no longer linked to the Central Asian Power System (CAPS), Turkmenistan has to complete the construction of a 500kV overhead transmission line in order to increase the volume of electricity exported to Afghanistan. With the implementation of this ambitious project, power export from Turkmenistan to Tajikistan and Pakistan via Afghanistan will become technically possible.

Renewable energy development

Turkmenistan has sufficient renewable energy potential in terms of solar, wind and comparatively smaller potential in terms of small hydropower which is concentrated mainly in the southern part of the Republic on the Murgab and Tejen rivers and Karakumy canal. Turkmenistan's continental and dry desert climate offers substantial solar potential with annual solar irradiation intensity of 600 W per square meter. Especially in the regions Kuli, Gasan and the capital, Ashgabat, the surface receives the most usable sunlight in the CIS region.

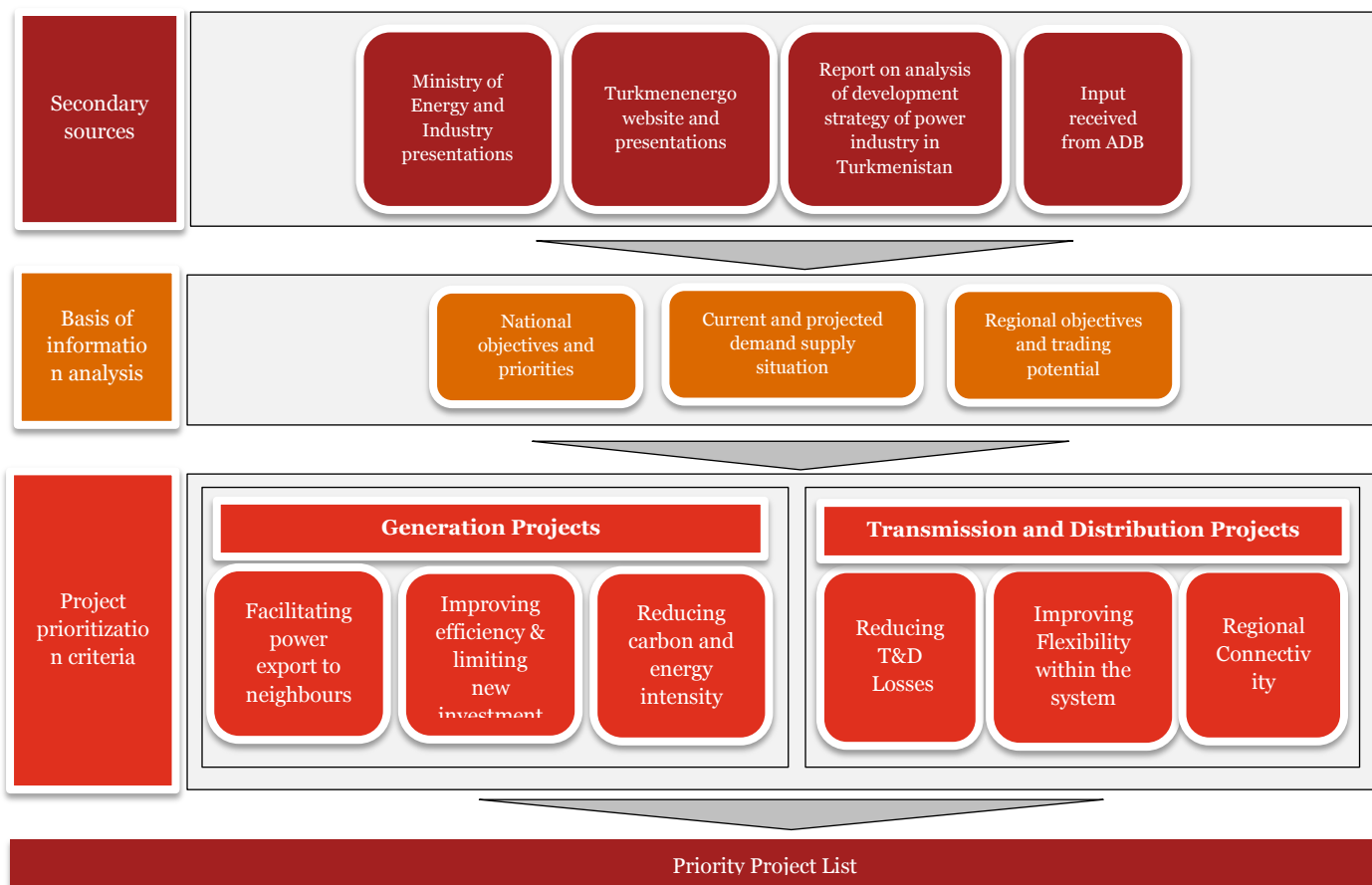
Although Turkmenistan is self-sufficient in electric power generation, still renewable energy development is required for some places which are not connected to the centralized electric power lines e.g. Caspian Islands. Moreover the dependency on oil and gas have resulted in increasing greenhouse gas emissions which calls for use of cleaner source of energy for ensuring sustainable development. For example, a solar wind hybrid is operational in Turkmenistan that provides energy for residential and agricultural usage in most remote parts of the country.

RE Source	Solar	Wind	Small hydro
Technical potential (MW)	655,000	10,000	1,300
Source: Renewable Energy Snapshot Turkmenistan, UNDP			

Therefore, to promote renewable energy development, in 2012, the President approved the National Strategy on Climate Change which outlines the country’s long-term vision for promoting renewable energy and reducing greenhouse gas emissions. The government also decided to create a National Climate Change Fund to finance climate change mitigation and adaptation projects, including renewable energy generation. In addition, a Decree was issued by the President for the creation of a Solar Research Center to explore country’s untapped solar potential.

2.3. Approach and key considerations for project prioritization

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



An initial list of projects were identified from Concept of Electric Power Industry Development Plan of Turkmenistan 2013-2020, Ministry of Energy & Industry and Turkmenenergo websites and in consultation with ADB. This was further discussed with the CAREC energy focal points, ministries and various donor agencies. 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-à-vis the regional objectives. This provided us with an understanding of the priorities for the power sector based on which we worked out the different categories of the projects to be considered and also the key considerations/ criteria for project prioritization. A consultative methodology for prioritizing the projects, which included a mix of secondary research and inputs from our national consultants on a regular basis and subsequent analysis and review, have been followed to arrive at the list of priority projects.

Project selection criteria – Generation projects

The 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	Overview
Facilitating power export to neighboring countries	<ul style="list-style-type: none"> Turkmenistan plans to increase electricity exports to 6 billion kWh (at present 3 billion kWh) by 2020. New gas turbine power plants with a total capacity of 3,854 MW is expected be installed to export electricity to Iran, Afghanistan, and Turkey.
Improving efficiency and limiting new investments	<ul style="list-style-type: none"> Government's Development Programme for Power Generation Industry until 2020 plans to upgrade and refurbish existing plants. Envisaged conversion of existing power plants to combined cycle will enable increasing the overall capacity by 720 MW.
Reducing carbon and energy intensity	<ul style="list-style-type: none"> Power sector accounts for around 15% of greenhouse gas emissions in Turkmenistan. Conversion of generation facilities to combine cycle will reduce emission by 3 million tonnes by 2020.

Project selection criteria – Transmission projects

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

Criteria	Overview
Reducing transmission and distribution losses	<ul style="list-style-type: none"> Most of T&D assets quite old with technical losses of approximately 13%. National Program of President of Turkmenistan outlines reconstruction of distribution networks & transformers especially in the rural areas.
Improving reliability of the system	<ul style="list-style-type: none"> Of the total transmission line length, 500 kV lines account for a small portion. A key aspect is the construction of 500 kV overhead lines across various region. National Program of President of Turkmenistan till 2020 outlines construction of more than 24,000 km of power transmission lines in rural areas.

Criteria	Overview
Regional connectivity	<ul style="list-style-type: none">• Turkmenistan is currently evaluating plans for exporting power to Tajikistan, Kazakhstan, Pakistan, and other Caucasus countries.• Turkmenistan plans to increase electricity exports from 2.85 billion kWh in 2012 to almost 6 billion kWh by 2020.

2.4. List of priority projects and investment requirements

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

List of Power Generation Projects

No.	Projects	Investment Type	Investment Requirement (USD Mn)	Project Selection Criteria		
				Ensuring energy security	Socio-economic considerations	Increasing fuel mix diversity
1	Construction of 4 combined cycle gas turbine power plants with total capacity of 1496 MW	New	1,650	✓	-	✓
2	Modernization of the existing steam turbine power units at the Mary power station	Existing	200	✓	✓	✓
3	New Gas Turbine Power Plant in Akhal Region	New	600	✓	✓	✓
4	Modernization of power plants in Seydi, Balkanabat and Abadan	Existing	500	✓	✓	✓
Total			2,950			
<ul style="list-style-type: none"> Investment Requirement for Project No. 1 was estimated by assuming a construction cost of USD 1.10 per MW Investment requirement for Project No. 2 and 4 was estimated assuming a range of USD 150 Mn –USD 220 Mn as the cost of modernization Investment Requirement for Project No. 3 is based on PwC estimates 						

List of Power Transmission Projects

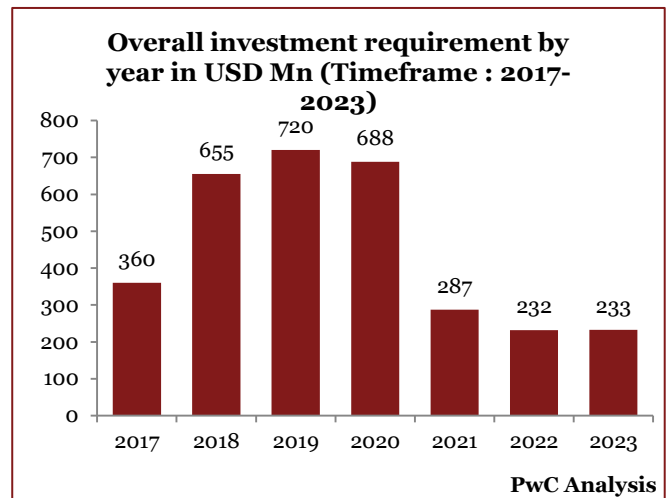
No.	Projects	Investment Type	Investment Requirement (USD Mn)	Project Selection Criteria		
				Reducing transmission & distribution losses	Improving flexibility with the system	Regional Connectivity
1	Construction of the substation and 500 kV power transmission line in the direction Mary GRES Atamurat-Afghanistan with a total length of 440 km	New	135	✓	✓	✓
2	Construction of 500 kV power transmission lines in the directions Ashgabat Turkmenbashi Balkanabad, Ashgabat-Mary, Dashoguz-Turkmenbashi	New	60	✓	✓	-
3	Construction of 220 kV power transmission lines in the direction Serdar-Farap-Watan in Lebap region	New	30	✓	✓	-
Total			225			
<ul style="list-style-type: none"> Investment requirement for these projects is based on PwC estimates. 						

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

Based on the priority projects list estimated investment requirement is **USD 3,175 million**. The entire set of projects included are envisaged to be completed between 2017 and 2023.

Key assumptions:

- ✓ TPPs to commence in 2017 with a completion period of 8 years;
- ✓ TPP modernization to commence in 2017 with a completion period of 4 years.
- ✓ Transmission projects to commence in 2018 with a 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 (TPP Modernization)			15%	25%	30%	30%	
% of project cost (T&D projects)				15%	25%	30%	30%

3. Options for Funding and Financing Power Sector Investment Plans

In line with the investment plan for Turkmenistan from 2017-23, proposed funding from National Government, other governments, assistance from development partners(like ADB) have been estimated .The following section describes the proposed funding from each source in details.

3.1. National government

Turkmenistan was considered the poorest of all of the Soviet-occupied territories and in 1989, 45% of the population lived below the national poverty line. Rapid economic growth and increased budgetary support which is socially oriented have led to reduction in poverty with ~25 % the proportion of population living below the poverty line at \$1.25 (PPP) a day.

The 2014 state budget provided for a significant increase in allocations for implementation of strategic programs and large-scale projects initiated by the President of Turkmenistan, including construction of new facilities in the national tourism zone “Avaza”, as well as socio-cultural, industrial, transportation and communication infrastructure in the capital city and the provinces of the country. In 2013, the Turkmenistan government developed a policy of modernizing and expanding its electricity sector by increasing transmission infrastructure and constructing 14 natural gas-fired electric power plants between 2013 and 2020.

The government of Turkmenistan as a part of "Program of President of Turkmenistan on the social and economic living conditions in villages, settlements, towns in districts and district centers up to 2020" intended to provide electrification to even the most remote corners of the country, the reconstruction of distribution networks, transformer stations in villages, towns, district centers. The program also intends construction of more than 24,000 km of power lines in remote rural areas.

Apart from this, “Concept of development of power industry in the country for 2013-2020” focuses on advance development of production and technical potential of electric-power sector – basic segment of the industry and whole economy of the country.

In Turkmenistan, since last 20 years (within the limits), all citizens of the country are provided with free gas, electric power and drinking water. Fuel subsidies per capita in Turkmenistan are one of the most highest in the world according to the data of the International Energy Agency. The following points provides salient features of the medium term plans of Turkmenistan on the power sector and the government’s support towards the investment in the power sector

- Turkmenistan is a net exporter of electricity, and to meet increasing demand and boost its export potential the government is planning to invest USD 5 billion in the power sector by 2020.
- The government is planning to invest USD 5 Billion in developing its electricity infrastructure.
- Over the medium term, the government will focus on the construction of new power plants and power lines, and the reconstruction & modernization of existing power facilities.

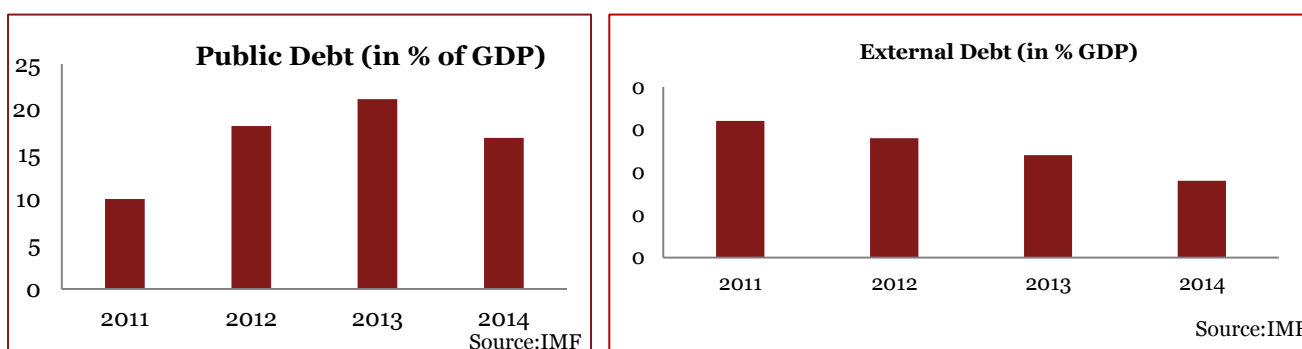
So it can be envisaged that the government would continue to allocate significant amounts to the budget for modernizing and expansion its power sector and increase its electricity export.

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 Turkmenistan to borrow from various sources based on the debt sustainability.

Debt sustainability analysis

Total External Debt of Turkmenistan has declined from 2011 to 2014. External debt is predominantly long term and multi-lateral. Debt service ratio is insignificant and declined from 2011 to 2014. Interest rate is mostly concessional. These indicators indicate that external debt of Turkmenistan is sustainable and the country would not face any major problems to finance external debt in the near and medium term.



Key observations on the debt situation has been discussed below:

- Turkmenistan has very high gross domestic savings and the low dependence on external finance.
- External debt is projected to be about 0.7% of GDP in 2018.
- In 2012, about 57% of foreign investment was in the energy sector.
- Large sovereign foreign assets provide a buffer to help mitigate the impact of any significant macro-economic shocks.
- External debt is sustainable and the country is not expected to face any major problems to finance external debt in the near and medium term.

Impact of decline in oil prices

As the economy depends heavily on oil and gas exports, growth is projected to be at 6.5% in 2016 due to reduction in energy earnings. The sharp contraction of oil and gas export revenue, which almost halved in 2015, led to the deterioration of the external and fiscal balances. The sharp drop in oil and gas export revenue is expected to increase the fiscal deficit of up to 2% of GDP.

The Government improved spending efficiency and has frozen new large public investment programs to manage the fiscal balance in line with the declined revenue inflows. At the same time, the Government maintained commitments on social spending. The Stabilization Fund will support to finance the domestic development projects to build social and industrial infrastructure and. If the Government decides to continue its fiscal consolidation efforts in view of sustained low oil and gas prices the budgetary allocations to the power sector in the medium term may be impacted.

3.2. Assistance from development partners

The table below captures the key programs in the energy sector and the involvement of major development partners:

Sr No.	Program Name	Development Partner	Government Implementing Partner	Budget
1	The Turkmenistan-Afghanistan-Pakistan-India (TAPI) Pipeline Project	ADB	Ministry of Oil and Gas of Turkmenistan	USD 2.6 Mn
2	Zerger Regional Power Generation Project ³	ADB	Ministry of Energy of Turkmenistan	USD 150 Mn
3	Strengthening Climate (Energy) Policy	UNDP with support from UK Government	There is no Implementing Partner nominated by the government	USD 0.22Mn
4	PPG: Energy Efficiency and Renewable Energy for Sustainable Water Management in Turkmenistan	UNDP with support from Global Environment Facility	UNDP with support from Global Environment Facility	USD 0.15 Mn
5	Improving Energy Efficiency in the Residential Buildings Sector of Turkmenistan	UNDP with support from Global Environment Facility	State Corporation "Turkmengas"	USD 2.81 Mn
7	Sustainable Energy Programme for Central Asia: Renewable Energy Sources - Energy Efficiency (RES – EE)	EU	Ministry of Economy and Development with the underlying ministries for oil & gas, energy & industry and nature protection	EUR 3.96 Mn

Assistance from the development partners – Future trends

ADB is one of the most significant development partners of Turkmenistan's power sector and it can be envisaged that ADB would continue to invest in the power sector even in the future. The World Bank has only been engaged in energy sector in providing advisory services and has no immediate plans of providing any loans to energy sector projects.

³Final draft MIP Turkmenistan for the period 2014 - 2017

ADB estimates

Year	Amount (in Mn USD)	Remarks/ Assumptions
2016	0	Based on COBP 2016-17
2017	450	
2018	70	Based on historical trends and the importance adopted to the energy sector as a part of recent and past COBP
2019	70	
2020	70	
2021	70	
2022	70	
2023	70	
Total	870	

Thus, based on Country Partnership Strategies/ Country Operations Business Plan, funding from ADB for power sector projects is estimated to be USD 870 mn over 2017-2023.

3.3. Other Governments and private investors

Countries like Iran, Japan have invested in Turkmenistan's power sector in the past and it can be envisaged that they would continue to invest in the power sector even in future. Apart from them private investors like Çalık Enerji have actively involved in Turkmenistan's power sector. The following paragraphs mention about the past and proposed investments of the countries mentioned above in power sector of Turkmenistan¹.

Iran: In 2015, Iran and Turkmenistan decided to bring their bilateral trade up to USD 60 Billion in the next 10 years. Further the two countries signed 9 MOUs and agreed to cooperate on various sectors including construction of electricity transmission lines, transportation and housing etc.

Japan: In October 2015, Japan and Turkmenistan signed a raft of energy and other deals worth USD 18 Billion. Japanese company Sumitomo Corp won a USD 300 Million order for a 400 MW gas-fired power plant in Turkmenistan.

Private investors: Çalık Enerji is one of the main private players in Turkmenistan's power sector having completed several projects in Turkmenistan. Çalık Enerji completed 11 gas fired simple cycle power plants. Some projects like construction of power plants (1,574 MW Mary-3 Combined Cycle Power Plant and 254 MW Watan Simple Cycle Power Plant) are on-going.

3.4. Envisaged funding probability of priority projects**Envisaged funding probability of priority transmission projects**

Projects	National Government	Other Governments	Development Partner Assistance	Private investment
Construction of the substation and 500 kV power transmission line in the direction Mary GRES Atamurat-Afghanistan with a total length of 440 km	High	Low	Medium	Low
Construction of 500 kV power transmission lines in the directions Ashgabat-Turkmenbashi Balkanabad, Ashgabat-Mary, Dashoguz-Turkmenbashi	High	Low	Medium	Low
Construction of 220 kV power transmission lines in the direction Serdar-Farap-Watan in Lebap region	High	Low	Medium	Low

Envisaged funding probability of priority generation projects

Projects	National Government	Other Governments	Development Partner Assistance	Private investment
Construction of 4 combined cycle gas turbine power plants with total capacity of 1496 MW	High	Low	Medium	Medium
Modernization of the existing steam turbine power units at the Mary power station	High	Low	Low	Low

Projects	National Government	Other Governments	Development Partner Assistance	Private investment
New Gas Turbine Power Plant in Akhal Region	High	Low	Low	Low
Modernization of power plants in Seydi, Balkanabat and Abadan	High	Low	Low	Low

3.5. Private sector participation

Public-Private-Partnership in Turkmenistan

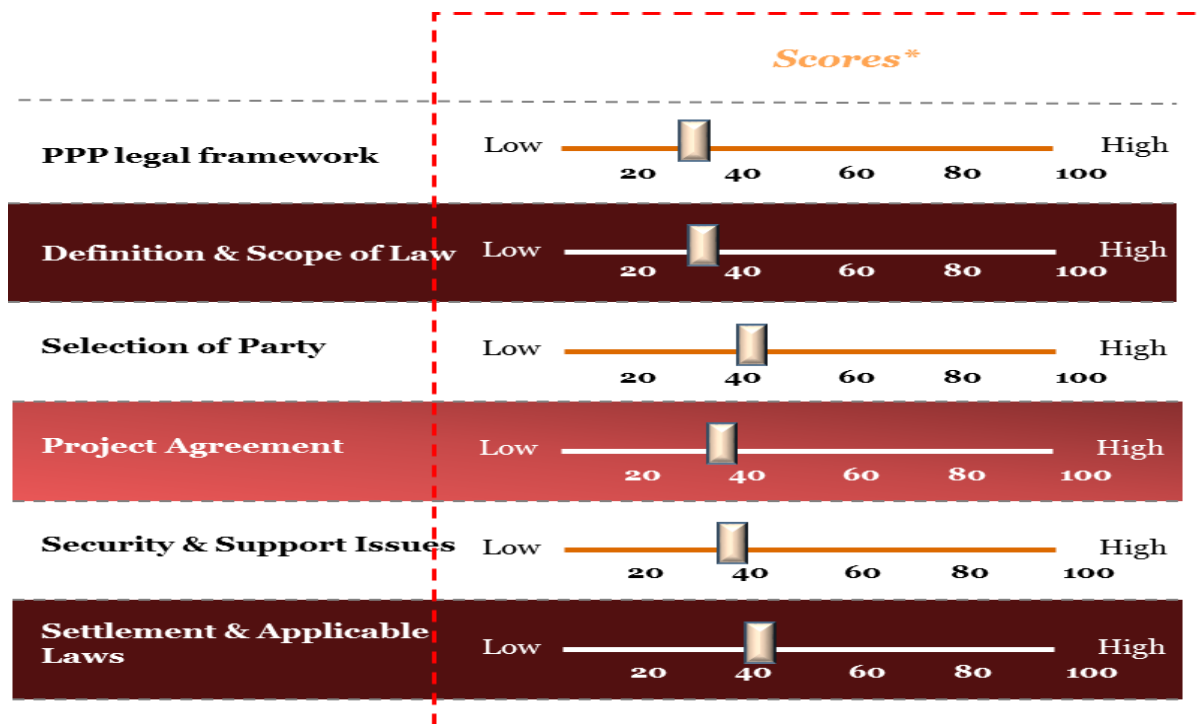
In Turkmenistan, the first step towards development of award of concessions and to an extent PPP framework was taken back in 1993 with the introduction of Law on Foreign Concessions. It provides the guidelines for providing concessions to foreign investors for exploration, development, production and operation of natural resources including the contents of concession agreement and rights & obligation of the concessionaire. The priority sectors for which concession will be granted is decided by the Cabinet of Ministers whereas the process of granting the concession is carried out by the State Property Administration Agency. Moreover in 2002, Law on Public Procurement was introduced to regulate both national and local government procurement which is mainly looked after by Ministry of Economy.

Overall PPP assessment

Some features of the existing law on PPP are:

- The law only pertains to allocation of concession to foreign investors and therefore discriminates domestic investors.
- The current law doesn't provide sufficient clarity on aspects such as definitions and scope, selection procedures, project agreement, security instruments, state support, and dispute resolution.
- The selection process is underdeveloped and there is no obligation to make public a notice on the project award.
- Disputes are settled in domestic courts without any arbitration.

According to the EBRD 2012 PPP/Concession Assessment, the legislation in Turkmenistan was rated as being in "low compliance" with international standards. The quality of PPP legislative framework of Turkmenistan is shown below:



Essential requirements for achieving successful PPPs in Turkmenistan

Development and introduction of a specific PPP Legislation and/or PPP Law

Availability of capital

Sufficient political support across all ministries for the PPP process

Private participation should be linked to broader sustainable development objectives of the country.

Transparent procedure should be developed for all stages of the PPP process

4. *Barriers to investments in the power sector*

Independence and transparency in regulatory functions

The transparency of regulatory system of Turkmenistan is an issue in terms of disclosure of information to relevant stakeholders or participation of stakeholders in development of regulations. For example, draft copy of the proposed laws and regulations are not published for public comment and are not open for stakeholder consultation. In addition, there may be a statutory requirement for the government owned entities to make financial statements publicly available which makes the investment climate more favorable for investors.

Ideally there should be two separate bodies for framing policies and the other for framing regulations. An Independent regulator can provide assurance to investors that prices, outputs and inputs will not come under the pressure of ‘regulatory capture’ and pressures from economic and political interest groups. In this regard, the involvement of Government in regulatory functions including tariff determination can hamper investor confidence.

Low levels of tariffs (not cost reflective)

According to the 1992 Presidential Decree (No.598) “On Free Consumption by the Population of Turkmenistan of Electric Power, Gas, and Water”, the population of Turkmenistan will receive electricity, gas, water and salt free of cost up to a certain consumption level and the rest will be charged at a very minimal rate. The decree was later extended to 2020 through the 2003 Presidential Decree. As a result of such policies, the tariff rates are heavily subsidized and are not cost reflective. This may not be a sustainable solution for financial viability of the sector in long run. It is suggested that there should be policies and regulations to ensure that the tariffs gradually become cost reflective and the utilities are financially independent and sustainable.

Foreign investment issues

The Foreign Investment Law provides various incentives to facilitate investment in the energy sector but the government is segregating the foreign and domestic investors by denying license renewal, excessive tax examinations, visa issuance impediments and by supporting JV with the government. Various issues with foreign investment are mentioned below:

- Profit tax of 8% is applicable to joint venture companies (formed between government and foreign investor) whereas wholly owned foreign companies have to pay 20% income tax.
- There is no comprehensive penalty mechanism and administrative procedure for violation of intellectual property rights of foreign investors.
- At least 70% of the workforce of foreign-owned enterprises must be citizens of Turkmenistan, which may be a challenge for specific segments of work
- Fully owned foreign operations are allowed only in certain specific segments (like oil).
- The Government of Turkmenistan usually does not accept international arbitration of investment disputes.

So, the Government of Turkmenistan has to take necessary steps towards creating a more investor friendly regime to attract more foreign investment in the 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 needs to be implemented in spirit. Also, while tariffs are revised to be cost reflective, there is requirement for specifying the principles of determining tariff for various categories/consumer groups, 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 vicious cycle of losses and under investment.**
- **Transparency in tariff setting process and other regulatory process to ensure periodic and justified revisions of tariff. This may be done by public consultation in regulatory processes and also 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 generation to ensure efficient power generation cost.**
- **Tariff can be fully cost reflective in the event when the tariff 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 Trade then decided to regulate the electricity price adjustment as per fundamental inputs including foreign exchange rate, electricity generation structure and fuel price. The electricity price adjustment are specifically regulated and openly announced.

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

Regulations for promoting competition

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

In order to allow entry of more players in the sector, it is imperative that enabling provisions are present in the act or power policy for the entry of private players.

A brief snapshot of the suggested reform action plan to promote competition has been shown in the below table.

Indicative measures for promoting competition across value chain

- **Relaxing the license requirements for specific projects/ functions. For example, power generation, especially for small generation and renewable sources. This would promote increase in capacity and bring more competition in the sector.**
- **Introduce policies and regulations for mandatory procurement of power and transmission of power through competitive bidding process.**
- **Introduce option to high value consumers for purchase of power from sources other than the 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 Agency appointed by Distribution Company to perform its duties in more efficient manner) may be allowed where in 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 through 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 had been substantial 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 an effective institutional framework. For an electricity regulator to be effective the following governance characteristics are of prime importance:

- Independence/Autonomy
- Capability
- Accountability
- Transparency

In Turkmenistan, the regulatory activities are mainly performed by the Ministry of Energy 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' and pressures from economic and political interest groups.

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

- Enabling guideline to ensure that the members and the chairperson are independent of the government.

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

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

Indicative measures for ensuring strengthening of regulatory Body

- **Establishment of an independent regulator for power sector which has an independent entity (from all stakeholders including Government). It could be an independent committee within the Ministry or an independent advisory body providing inputs to the Government on key regulatory decisions.**
- **In order to ensure financial autonomy, the regulatory body can be funded through other means 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 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 SOP. A separate cell within the regulatory 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 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: Macroeconomic overview

Turkmenistan's resource endowments make it one of the largest holder of gas reserves in the world. It is also amongst the top 10 oil producers in Asia and the Pacific.

Turkmenistan has the highest ratio of trade to GDP in Central Asia and trade accounts for nearly 84% of GDP (hydrocarbon accounts the majority of the exports).

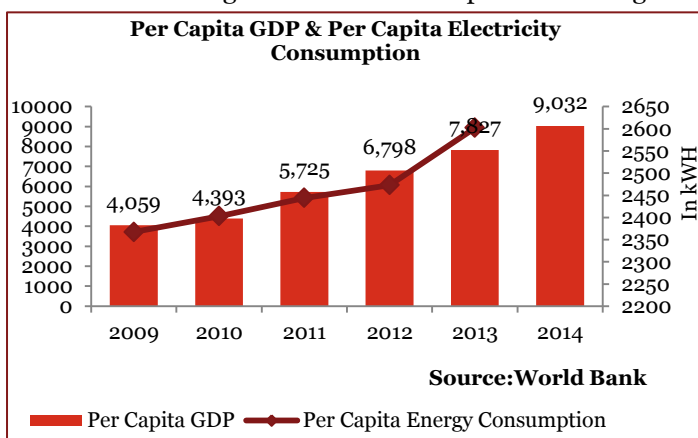
Its growth rate has declined sharply from 10.3 % in 2014 to 6.5 % in 2015 due to decline in global energy prices and the widening of the current account deficit.

GDP growth (%) by sector (Source: ADB Asian Development Outlook)				
Year	GDP	Agriculture	Industry	Services
2010	9.2	7.8	8.7	9.8
2011	14.7	0.1	26.5	16.8
2012	11.1	8.1	8.6	16.3
2013	10.2	10.0	7.3	10.0
2014	10.3	4.2	11.4	10.6
2015	6.5	7.9	3.1	10.0

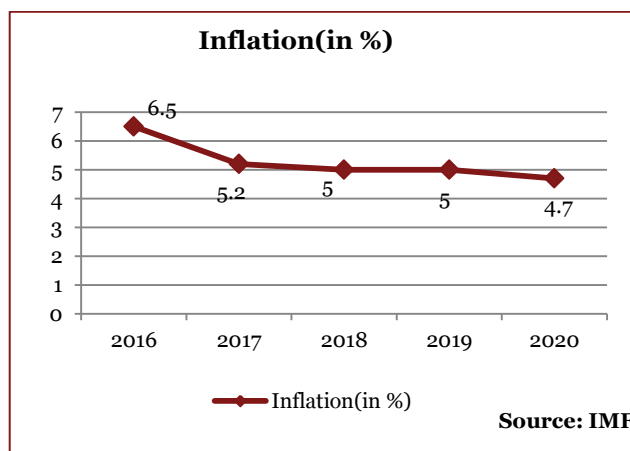
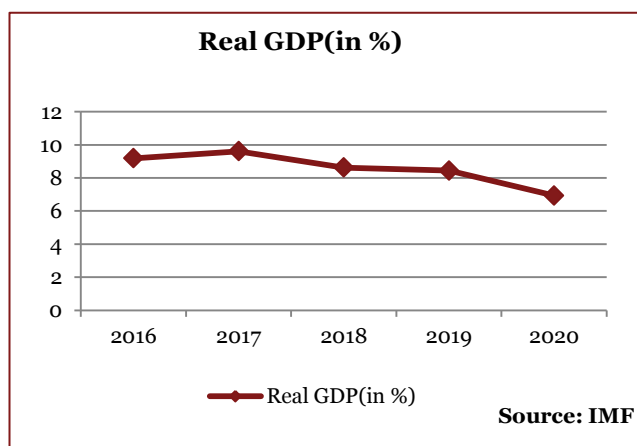
On the other hand, per capita GDP has shown a continuous increasing trend due to the rapid economic growth on the back of continuous public investment and growing hydrocarbon exports.

In 2013, Turkmenistan successfully reach MDG1 and WFS goal by reducing the number of malnourished people and living in extreme poverty.

Turkmenistan has seen an increase in per capita income but this has led to only a moderate increase in per capita consumption of electricity as most of the residential sector already has access to electricity.



Turkmenistan approved the 'Concept of development of power industry in the country for 2013-2020', which stipulates investing over USD 5 Billion in the power sector by 2020



Over the medium term till 2017 growth is expected to increase after which it is expected to exhibit a decreasing trend.

In order to achieve a higher growth in the long term, the government should strengthen governance and transparency, improve the quality of fiscal spending and encourage diversification and private sector-led growth in the economy.

The government is expected to continue with its import substitution and price control to bring inflation under control.

The government has initiated programs within National Program of Socio-Economic Development of Turkmenistan (2011–2030) with the aim to diversify the economy and raise the role of the private sector

Appendix B: Concept of electric power industry development plan of Turkmenistan 2013 - 2020

April 2013 saw the government of Turkmenistan introduce a USD 5 Billion plan to develop the Electric Power Industry during the period 2013-2020, aimed at increasing the country's electricity exports five times to an estimated 12.6 Billion kWh by 2020. Turkmenistan has set ambitious targets to bring power generation capacity to about 26 Billion kWh by 2020 and to 35 Billion kWh by 2030 by upgrading its existing power stations and building new ones. The implementation of the Electric Power development plan is proposed to be carried out in two phases. The first phase of the program (2013-16) is currently underway and will be followed by the second phase from 2017 until 2020.

The first phase of the program's implementation (2013-2016) includes the construction of eight gas turbine power plants in Akhal, Lebap and Mary provinces, the reconstruction of power plants in Seydi, Balkanabat and Abadan cities, and the construction of highvoltage power transmission lines.

The second phase, which will be completed during the period 2017-2020 involves the construction of two steam driven and four gas-driven turbine generating electric power stations.

Phase one of the program will allow Turkmenistan to increase its electricity production by 2020 to approximately 27.4 Billion kWh. With an eye on increasing volume of electricity exported to Afghanistan, construction of an overhead transmission line with a voltage of 500 kilovolts is underway in Turkmenistan. Construction of high-voltage overhead transmission lines is also planned in Afghanistan which will allow Turkmenistan in the near future to establish cooperation in the field of electricity not only with Afghanistan but also other countries of the region. With the implementation of this ambitious project, the export of Turkmen electricity to Tajikistan and Pakistan via Afghanistan will become technically feasible. Turkmenistan government also envisages modernization & refurbishment and conversion of existing power plants to combined cycle power plants.

Conversion of existing power plants to the Combined Cycle will allow increasing capacity to 720 MW will save 1.5 Billion cubic meters of gas annually, allow to reduce emissions into the atmosphere by more than 3 Million tons .It is also planned to modernize the existing steam turbine plants. Up to the 2020 at the power plants of this kind 11 power units will be covered, which will ensure the increase of available generating capacity of approximately 790 MW. Turkmenistan also plans to have to have more than 24,000 km of power lines constructed in urban and rural areas by 2030.Turkmenistan plans to create 14 gas turbine power plants in order to increase electricity exports to 6.9 Billion kWh by 2020. The installation of new gas turbine power plants, with a total capacity of 3,854 MW, will provide electricity export to Iran, Afghanistan, and Turkey. Turkmenistan is now preparing for the construction of high-voltage 400 kW overhead power lines to provide electricity from Balkanabat to Aliabad (Iran) and from Mary to Mashhad (Iran).

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