



ADB TA 8727-REG

# *CAREC: Study for Power Sector Financing Road Map*

## Mobilizing Financing for Priority Projects

### Pakistan

*September 2016*

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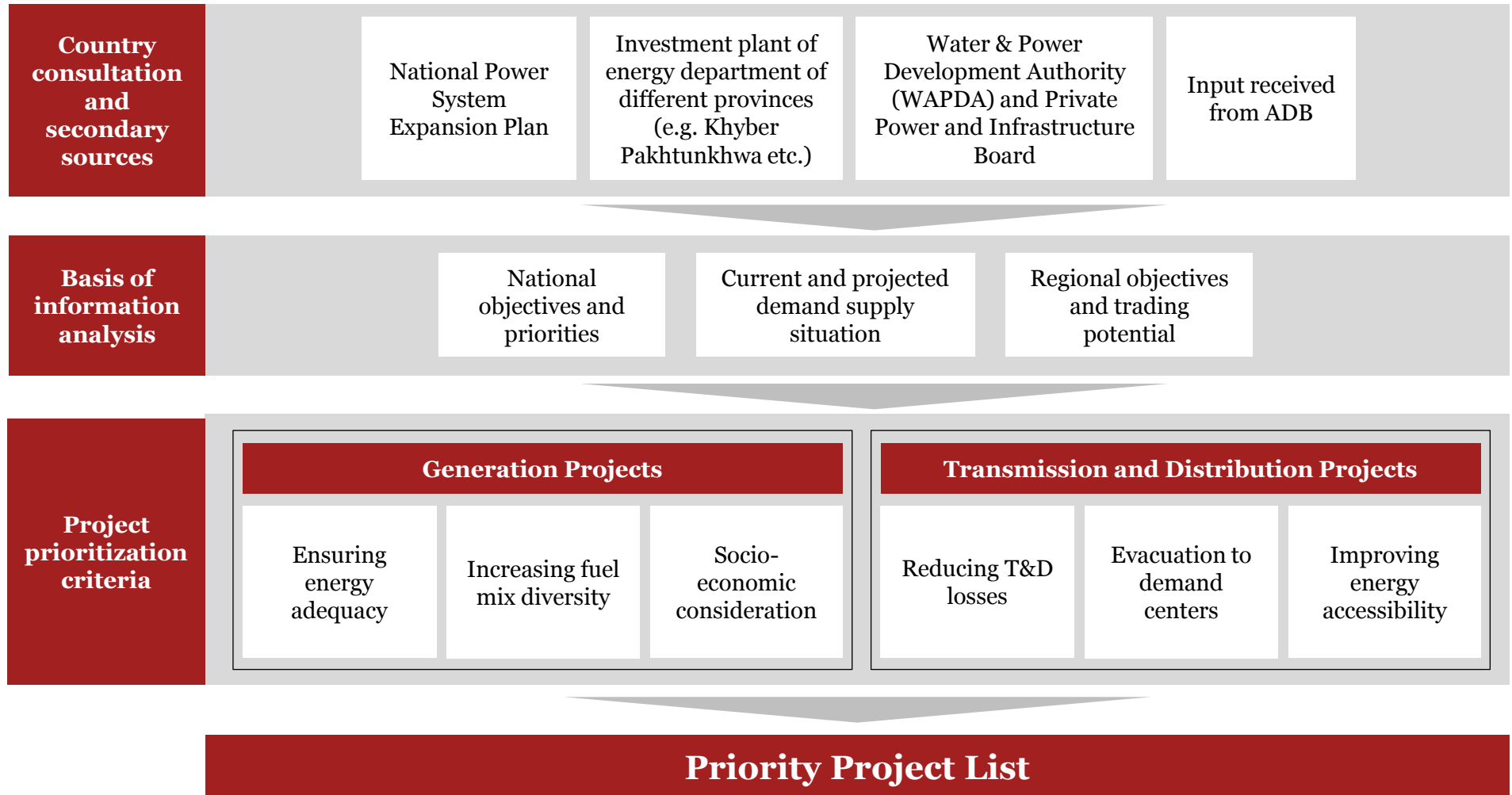
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# Section 1

## ***Priority Project Selection Criteria***

## *Key considerations for project prioritization*



## *Project selection criteria – Generation projects*

### **Criteria for project (generation) prioritization**

#### **Ensuring energy adequacy**

- Power demand continues to outstrip generation by a substantial margin.
- Current generation mix likely to lead to dependency on imported energy.
- As of 2014-15, generation was 15,500 MW against a demand of 21,000 MW.

#### **Increasing fuel mix diversity**

- Diversification to include indigenous coal & hydro aimed at reducing reliance on imports.
- Depletion of indigenous gas and usage of furnace oil, diesel oil adversely affecting affordability.
- Reliance on imported oil (85% of the total oil supply) exerts strain on balance of payments.
- Hydro potential currently remains underutilized.

#### **Socio-economic considerations**

- Socio-economic implications of projects is key in prioritization.
- Low access to energy as deterrent to poverty alleviation (68% in 2011 and targeted to be increased to 75% by 2018).

## ***Project selection criteria – Transmission & distribution projects***

### **Criteria for project (transmission and distribution) prioritization**

#### **Reducing transmission & distribution losses**

- Reducing losses in T&D system (approx. 23-25% at present) is a key objective of the government.
- National Power Policy envisages reduction in transmission and distribution losses ~16% by 2017.

#### **Evacuation to demand centers**

- Construction and synchronization of transmission lines for dispersal of power from large new HPPs and for coal & renewable in the south is a key criteria.

#### **Strengthening inter-country power transmission**

- Access to electricity, particularly in the far flung rural areas of the country, would require strengthening of the power transmission system.
- This will require strengthening of 220 KV rings around large cities to minimize losses and expand high voltage transmission lines further north.

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## 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 (1/9)

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
1.	2 x 660 MW TPP at Bhikki (Sheikhupura)		✓	✓	✓	1500
2.	2 x 660 MW TPP at Haveli Bahadur Shah (Jhang)	1320 MW imported coal based TPPs to be developed by Government of Punjab through public or private investment to address growing power demand and address energy security issues.	✓	✓	✓	1620
3.	2 x 660 MW TPP at Balloki (Kasur)		✓	✓	✓	1620
4.	2 x 660 MW TPP at Trinda Saway (Rahim Yar Khan)		✓	✓	✓	1600
5.	2 x 660 MW TPP at Keti Bunder	1320 MW Imported/ Thar Coal based power project to be developed by Government of Sindh through a private partner on BOO basis.	✓	✓	✓	1300

## List of generation projects (2/9)

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
6.	Daimer Bhasha HPP	4,500 MW Daimer Bhasha HPP being developed by WAPDA would eliminate about half of Pakistan's power shortfall and irrigate millions of acres of parched farmland.	✓	✓	✓	14,000
7.	Shushgai /Zhendoli HPP	144 MW HPP to be developed in Chitral district of Khyber Pakhtunkhwa through PPP mode.	✓	✓	✓	339
8.	Shogo-Sin Hydropower Project	132 MW HPP to be developed in Chitral district of Khyber Pakhtunkhwa through PPP mode.	✓	✓	✓	322



## List of generation projects (3/9)

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
9.	Kaigah HPP	548 MW HPP on the River Kandiah, near Village Karrang in Kohistan district of Khyber Pakhtunkhwa province. This project will help improve the D-S situation in the region.	✓	✓	✓	822
10.	Dudnial HPP	Dudnial and Ashkot HPPs are planned by WAPDA with a total capacity of 1760 MW in the northern region.	✓	✓	✓	960
11.	Ashkot HPP		✓	✓	✓	920
12.	Chakothi Hattian	500 MW HPP expected to be developed on a PPP basis.	✓	✓	✓	1,177

## List of generation projects (4/9)

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
13.	Naran HPP	180 MW HPP being developed by KPK will leverage the vast hydro resources in the region and improve energy security in Manshera.	✓	✓	✓	462
14.	Balakot HPP	300 MW HPP being developed by KPK will leverage the vast hydro resources in the region and improve energy security in Manshera.	✓	✓	✓	645
15.	Ghrait-Swir Lasht	377 MW HPP being developed by KPK will leverage the vast hydro resources in the region and improve energy security in Chithral, will be developed through PPP mode.	✓	✓	✓	1,773

## List of generation projects (5/9)

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
16.	Jamshill More Lasht	260 MW HPP being developed by KPK will leverage the vast hydro resources in the region and improve energy security in Chithral; to be developed through PPP mode.	✓	✓	✓	561
17.	Booni-Zaith HPP	350 MW HPP being developed by KPK will leverage the vast hydro resources in the region and improve energy security in Chithral; to be developed through PPP mode.	✓	✓	✓	439
18.	Laspur-Murigram HPP	230 MW HPP being developed by KPK will leverage the vast hydro resources in the region and improve energy security in Chithral; to be developed through PPP mode.	✓	✓	✓	525

## List of generation projects (6/9)

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
19.	Neelum Jhelum HPP	Proposed 969 MW HPP project, involves diversion of Neelum waters through tunnels at Nauseri about 41 km upstream of Muzaffarabad and out falling in Jhelum River.	✓	✓	✓	3,975
20.	Golen Gol HPP Tarbel 4th Exp	Proposed 108 MW HPP being developed by KPK will leverage the vast hydro resources in the region and improve energy security in Chithral.	✓	✓	✓	271
21.	Tarbel 4th Exp	Proposed 1410 MW HPP being developed by KPK in Tehsil Ghazi, District Haripur, Khyber Pakhtunkhwa.	✓	✓	✓	1,800

**List of generation projects (7/9)**

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
22.	Kayal Khwar	122 MW HPP located on Keyal Khwar, a right bank tributary of Indus River in Lower Kohistan District in Khyber Pakhtunkhwa and 310 Km from Islamabad.	✓	✓	✓	267
23.	Tarbel 5th Exp	1410 MW (Three Units 470 MW each) MW HPP being developed on Tarbela Dam (on Indus river), District Swabi, Khyber Pakhtunkhwa. Will ensure load shedding will be substantially reduced.	✓	✓	✓	1,800
24.	Dasu (2nd Stage)	2160 MW HPP (2nd stage) includes 6 units with total installed capacity of 2,160 MW; a run-of-the-river project at the Indus River located 7 km upstream of Dasu Town, Kohistan, Khyber Pakhtunkhwa.	✓	✓	✓	1,800

**List of generation projects (8/9)**

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
25.	Suki Kinari	Suki Kinari is a Run-of-the-River hydro project located in Kaghan Valley, District Mansehra at a Distance of 265 Km from the Islamabad.	✓	✓	✓	1,800
26.	Kohala	A proposed 1,100 run-of-the-river, high head project on the Jhelum river. The project is envisaged to be developed through a build, own, operate and transfer (BOOT) basis.	✓	✓	✓	2,400

## List of generation projects (9/9)

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Ensuring energy adequacy	Socio-economic considerations	Increasing fuel mix diversity	
27.	Chor Nullah HPP 660 MW district Kohistan	Palas valley (Chor nullah) is the left bank tributary of Indus River with its confluence 12 km upstream of Patan in Kohistan District, KPK.	✓	✓	✓	1,270
28.	Muzaffargarh Coal Power project in Punjab, 1320 MW	Repairing and rehabilitating Muzaffargarh Thermal Power Station (MTPS) located in Punjab Province. The project aims to restore 475 MW of generation capacity, enough power to supply electricity to 4.4 million people.	✓	✓	✓	1,600
29.	Bata Kundi HPP	Proposed HPP is 17Km upstream of Naran on the Kunhar River, a right bank tributary of Jhelum River.	✓	✓	✓	183

## *List of transmission and distribution projects (1/2)*

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Reducing T&D losses	Evacuation to demand centers	Improving energy accessibility	
1.	Dispersal of Power from 6600 MW Imported Coal Based Plants at Gadani	Evacuate power from the major power plants and transmit electricity from the south to load-centres in the north.	-	✓	✓	2,300
2.	Dispersal of Power From Diamer Bhasha Hydro Power Project (4500 MW)		-	✓	✓	2,000

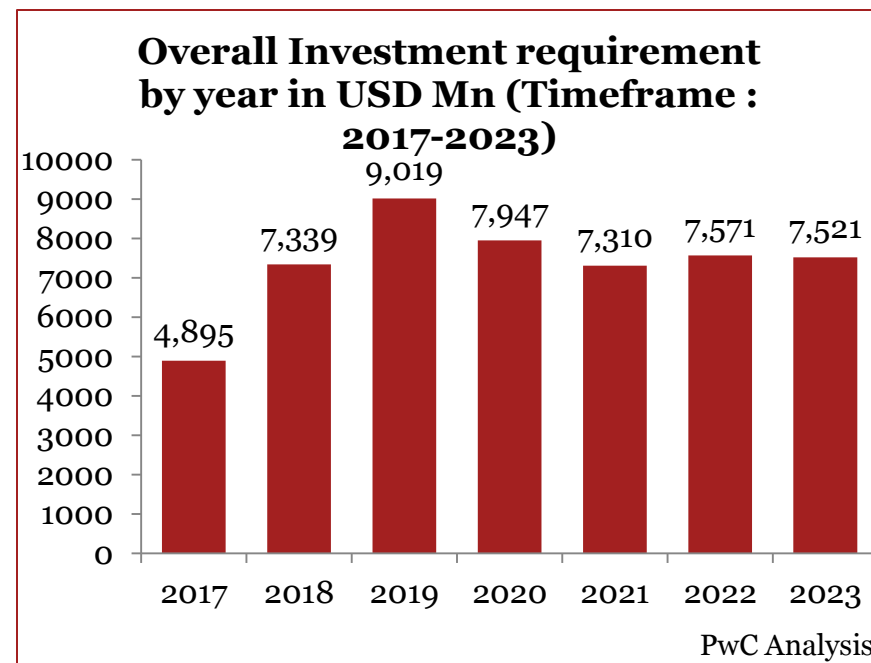


## *List of transmission and distribution projects (2/2)*

S.No	Project	Brief Description and Benefits	Project Selection Criteria			Investment Requirement (USD Mn)
			Reducing T&D losses	Evacuation to demand centers	Improving energy accessibility	
3.	Alliot Substation and Evacuation of associated HPPs	500 kV D/C T/L from Suki Kinari to Alliot (100 km). As well as Extension at Allot substation. Will help transmit power from HPPs in the region to other areas.	✓	✓	✓	200
4.	Distribution System Investment Program	Various distribution improvement programs by DISCOMs.	✓	✓	✓	3,280
5.	Advanced Metering Projects	Advanced metering project being funded by ADB, DISCOMs and through other foreign borrowings.	✓	✓	✓	4,922

## Estimated investment requirement for 2017-2023

- Based on the priority projects list estimated investment requirement is **USD 60,452 million**.
- Investment requirement between 2017 and 2023 is estimated at **USD 51,601 million** or **85%** of the total estimated investment plan for priority projects.
- Key assumptions:
  - TPP Projects to commence construction in 2017 with a completion period of 7 years;
  - HPP Projects to commence construction in 2017 with a completion period of 8 years;
  - Mega HPP Projects such as Diemer Bhasha to commence construction in 2017 with a completion period of 10 years.



### Investment phasing

Year	1	2	3	4	5	6	7	8	9	10
% of project cost (TPPs)	10%	20%	20%	16%	14%	10%	10%	-	-	-
% of project cost (HPPs)	10%	10%	15%	15%	12%	15%	13%	10%	-	-
% of project cost (MHPPs)	5%	10%	10%	10%	12%	12%	11%	10%	10%	10%

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# Section 3

## ***Potential Sources of Funding for Financing Priority Projects***

## *Investment plan and financing sources for 2017-2023*

### A snapshot

**Estimated Requirement  
(USD 51,601 mn)**

**Estimated Funding Gap  
(USD 19,435 mn)**

**Likely source: private sector and assistance from other countries**

**Estimated Funding from Development Partners  
(USD 10,510 mn)**

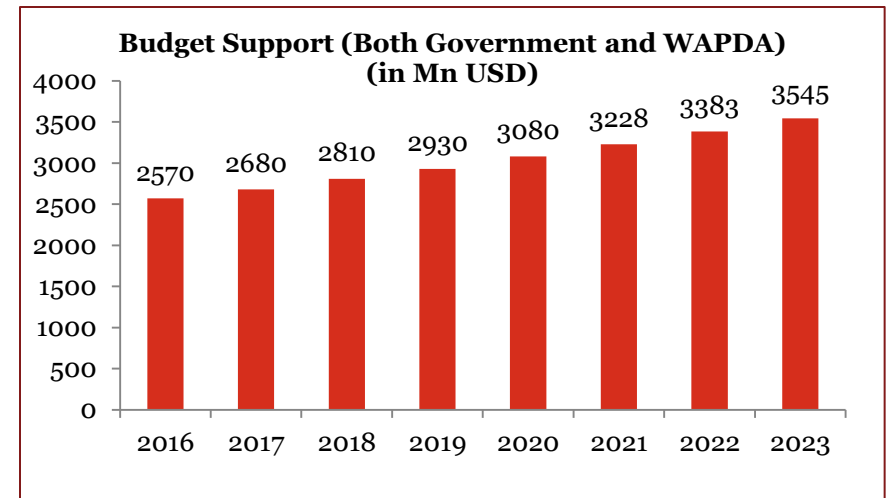
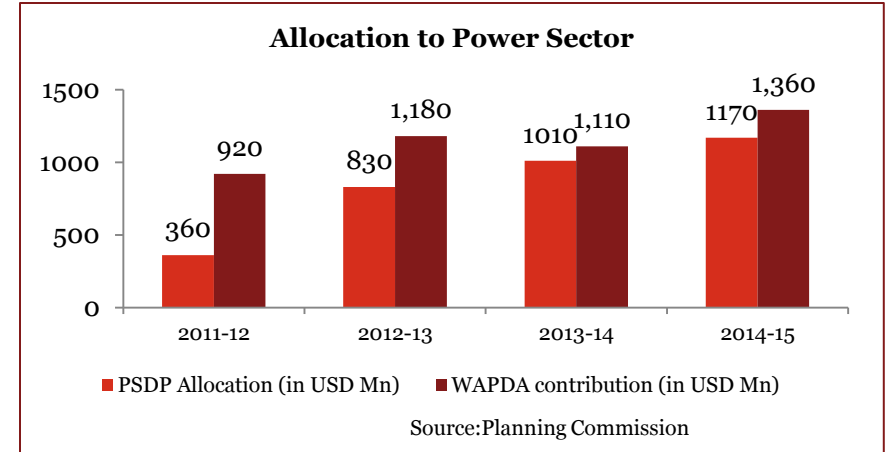
**Estimated Government Budgetary Support  
(USD 21,656 mn)**

**Investment plan and funding pattern from 2017-2023**

## *National government*

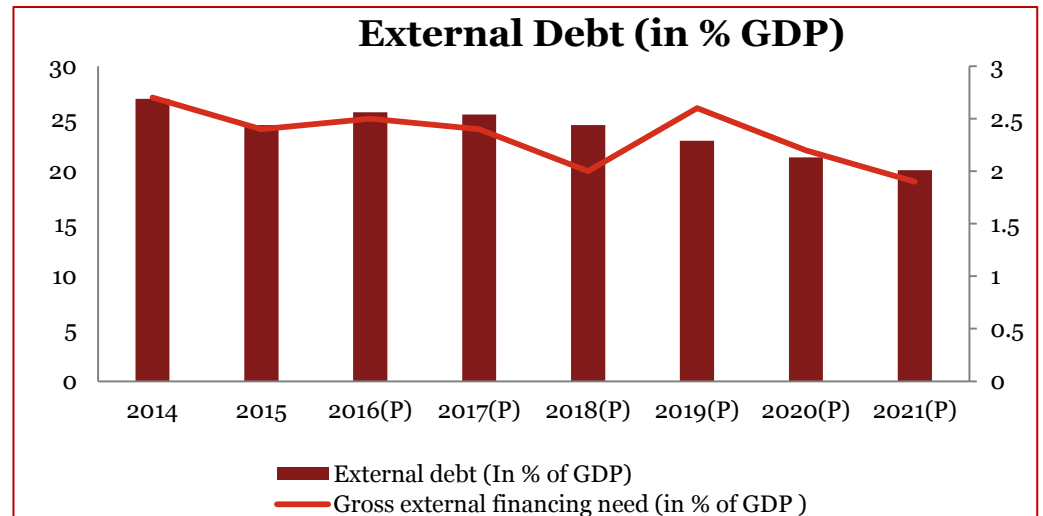
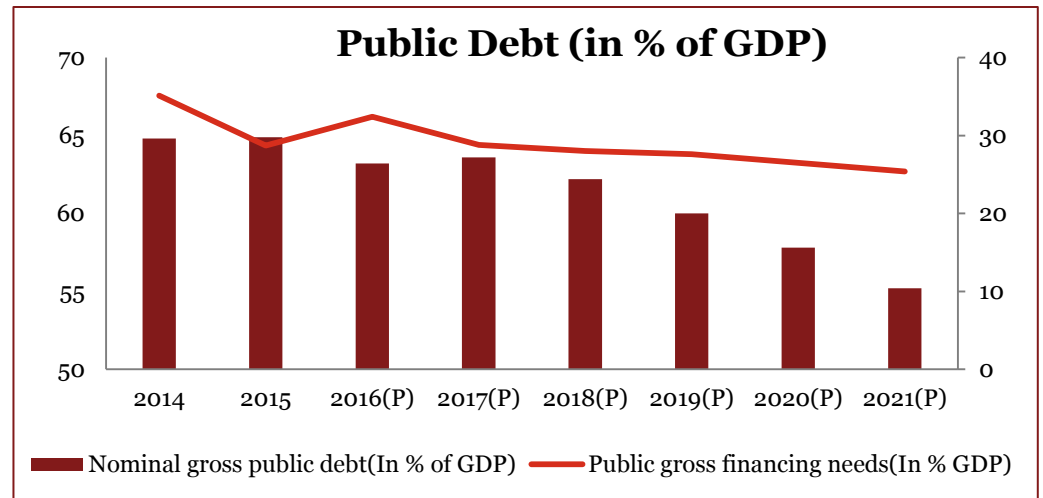
### Estimate of government spending towards the power sector

- Government budgetary support over 2017-2023 is estimated at **USD 21,656 Mn** (for capital projects) based on the following assumptions:
  - Budget support assumed at 2% of the GDP based on trend of last 4 years.
  - Estimates include budget contribution and mobilization of resources by WAPDA.
  - Average GDP growth of 4.8% till 2023 (as per IMF projections till 2020).
- It may be noted that besides the funding towards power sector projects, the government also provided subsidies amounting to **Rs 292.3 billion (USD 2.7 bn)** for FY 2015.



## Maximum government borrowing

- Fiscal Responsibility and Debt Limitation (FRDL) Act, 2005 requires the public debt-to-GDP ratio to be below 60%.
- Medium Term Debt Strategy (MTDS), 2014-18 targets this ratio in the range of 51.2 to 52.0% by end of 2017-18.
- Currently the debt/GDP ratio is close to 64%.
- Assuming that Pakistan sticks to the MTDS target, the net borrowings needs to reduce.
- **Based on historical trends, the government (including PSEs) can borrow a maximum of USD 12 bn per year across all sectors.**



## *Assistance from Development Partners*

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

- Based on Country Partnership Strategies/ Country Operations Business Plan, funding from key partners for power sector projects is estimated to be **USD 10,510 mn** over 2017-2023:
  - ADB and WB is estimated to fund around USD 3,650 mn & USD 6,080 mn respectively.
  - USD 100 mn per year is the past trend of financing by other partners (mainly JICA, USAID, GIZ, IDB, KfW, etc.); estimate over 2017-23 is USD 780 mn.

#### WB estimates

Year	Amount (in \$ mn)	Remarks
2016	800	Based on the current CPS which proposes a spending of USD 2 bn per year and allocation of 40% to power sector
2017	800	
2018	800	
2019	800	
2020	920	Increase in lending by 15% for the next CPS from 2020 based on past trends
2021	920	
2022	920	
2023	920	
<b>Total</b>	<b>6080</b>	

#### ADB estimates

Year	Amount (in \$ mn)	Remarks
2016	800	Based on COBP
2017	300	
2018	450	
2019	550	Based on the average proposed lending for 2016-18
2020	550	
2021	600	10% increase in lending assumed for the period 2021-2023 over the lending in 2019-2020
2022	600	
2023	600	
<b>Total</b>	<b>3650</b>	

## *Support from government of other countries*

### Past trends

- China, UK and Japan have been the largest bilateral support providers for Pakistan.
- China’s support has been mostly for the development of energy projects.
- The government has signed an agreement with China to overcome the problem of energy shortages in the country.
- USA and Saudi Arabia are the other key governments providing assistance to Pakistan across various sectors.

<b>In USD Mn (for all sectors)</b>	<b>2014</b>	<b>2015</b>
<b>China</b>	602	1209
<b>Japan</b>	184	138
<b>Others</b>	575	458
<b>Total</b>	<b>1,361</b>	<b>1,805</b>



## ***Private sector involvement***

### **Past trends**

- Pakistan’s power sector consists of many privately-owned independent power producers. K-electric is the only privatized distribution company (as part of the vertically integrated structure of K-electric).
- First private sector hydropower project – 84 MW has been commissioned in March 2013. Second private sector hydropower project of 147 MW is under construction and is to be commissioned in March 2017. Third private sector hydropower project of 102 MW has achieved financial closure in October 2015.
- The China-Pakistan Economic Corridor (CPEC) is expected to generate 10,400 MW to Pakistan's national grid by 2018. Chinese banks and company like Power Construction Corp of China Ltd will finance two coal-fired power projects in Pakistan (Thar coal project and projects near Pakistan’s port city Karachi) worth USD 4.15 Billion.
- The construction of the 6,600 MW coal-fired Gaddani Power Park, undertaken with financing from China and investors from the Middle East, is due to be completed by 2018.

The IEP and recommendations from various government agencies clearly recommend that the GOP should encourage the setup of private/public partnership projects in the IPP sector thereby speeding up funding. An important aspect of the CPEC projects is that it will be implemented in the private sector.

## *Envisaged funding probability of priority generation projects (1/4)*

<b>Projects</b>	National Government	Other Governments	Development Partners	Private investment
<b>2 x 660 MW TPP at Bhikki (Sheikhupura)</b>	Medium	Low	Medium	Medium
<b>2 x 660 MW TPP at Haveli Bahadur Shah (Jhang)</b>	Medium	Low	Medium	Medium
<b>2 x 660 MW TPP at Balloki (Kasur)</b>	Medium	Low	Medium	Medium
<b>2 x 660 MW TPP at Trinda Saway (Rahim Yar Khan)</b>	Medium	Low	Medium	Medium
<b>2 x 660 MW TPP at Keti Bunder</b>	Medium	Low	Medium	High
<b>Daimer Bhasha HPP</b>	Medium	Low	Low	Low
<b>Shushgai /Zhendoli HPP</b>	Medium	Low	Medium	Medium
<b>Shogo-Sin Hydropower Project</b>	Medium	Low	Medium	Medium

## *Envisaged funding probability of priority generation projects (2/4)*

<b>Projects</b>	National Government	Other Governments	Development Partners	Private investment
<b>Kaigah HPP</b>	Medium	Low	Medium	Medium
<b>Dudnial HPP</b>	Medium	Low	Medium	Medium
<b>Ashkot HPP</b>	Medium	Low	Medium	Medium
<b>ChakothiI Hattian</b>	Medium	Low	Medium	Medium
<b>Naran HPP</b>	Medium	Low	Medium	Medium
<b>Balakot HPP</b>	Medium	Low	Medium	Medium
<b>Ghrait-Swir Lasht</b>	Medium	Low	Medium	Medium
<b>Jamshill More Lasht</b>	Medium	Low	Medium	Medium

## *Envisaged funding probability of priority generation projects (3/4)*

<b>Projects</b>	National Government	Other Governments	Development Partners	Private investment
<b>Booni-Zzaith HPP</b>	Medium	Low	Medium	Medium
<b>Laspur-Murigram HPP</b>	Medium	Low	Medium	Medium
<b>Neelum Jhelum HPP</b>	Medium	Low	Medium	Medium
<b>Golen Gol HPP Tarbel 4th Exp</b>	Medium	Low	Medium	Medium
<b>Tarbel 4th Exp</b>	Medium	Low	Medium	Medium
<b>Kayal Khwar</b>	Medium	Low	Medium	Medium
<b>Tarbel 5th Exp</b>	Medium	Low	Medium	Medium
<b>Dasu (2nd Stage)</b>	Medium	Low	Low	Medium

## *Envisaged funding probability of priority generation projects (4/4)*

<b>Projects</b>	National Government	Other Governments	Development Partners	Private investment
<b>Suki Kinari</b>	Medium	Low	Low	Medium
<b>Kohala</b>	Medium	Low	Low	Medium
<b>Chor Nullah HPP 660 MW district Kohistan</b>	Medium	Low	Medium	Medium
<b>Muzafargarh Coal Power project in Punjab,1320 MW\</b>	Medium	Medium	Low	Medium
<b>Bata Kundi HPP</b>	Medium	Low	Medium	Medium

## *Envisaged funding probability of priority transmission projects*

<b>Projects</b>	National Government	Other Governments	Development Partners	Private investment
<b>Dispersal of Power from 6600 MW Imported Coal Based Plants at Gadani</b>	Medium	Medium	Low	Low
<b>Dispersal of Power From Diamer Bhasha Hydro Power Project (4500 MW)</b>	Medium	Low	Low	Low
<b>Alliot Substation and Evacuation of associated HPPs (840MW)</b>	High	Low	Low	Medium
<b>Distribution System Investment Program</b>	Medium	Low	High	Low
<b>Advanced Metering Projects</b>	Medium	Low	High	Medium

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## Section 4

# ***Barriers to Private Investment and Mitigation Measures***

## *Legal and regulatory barriers (1/2)*

<b>Aspects</b>	<b>Issues</b>	<b>Recommendations</b>
<b>Financial Health of Utilities and Circular Debt</b>	<ul style="list-style-type: none"> <li>• Insufficient funds with distribution companies to pay the central power purchasing agency.</li> <li>• This leads to shortfall in revenue for the entire chain of utilities from generating companies to fuel suppliers.</li> <li>• Intervention by Government is required to prevent default.</li> <li>• This issue is cyclic and needs to be addressed to improve confidence of investors.</li> </ul>	<ul style="list-style-type: none"> <li>• One time bailout package may be provided to the sector linked to a clear roadmap for efficiency improvement.</li> <li>• Develop regulations for sharing of payments between various stakeholders to ensure transparency and proper balancing of all interests.</li> </ul>
<b>Lack of competition</b>	<ul style="list-style-type: none"> <li>• Development of generation projects is not necessarily done through competitive bidding.</li> <li>• Unsolicited projects play deterrent in promoting competition and reduces transparency.</li> </ul>	<ul style="list-style-type: none"> <li>• Competitive bidding may be made mandatory for development of generation projects, after a specified time period.</li> <li>• To encourage competitive bidding, the provision for regulatory approval of tariffs may be removed for such projects.</li> </ul>



## *Legal and regulatory barriers (2/2)*

Aspects	Issues	Recommendations
<b>Cost reflective tariffs</b>	<ul style="list-style-type: none"> <li>• The Government notifies tariffs based on subsidy requirements and NEPRA tariffs.</li> <li>• Efficiency needs to be improved to reduce cost of supply.</li> <li>• Promoting competition and private participation to improve efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>• Make tariff setting more independent.</li> <li>• Long Term Tariff Regulations for all the licensees with incentive-penalty framework based on performance.</li> <li>• Increase private participation in distribution through a franchisee model.</li> </ul>
<b>Strengthening of NEPRA</b>	<ul style="list-style-type: none"> <li>• NEPRA focuses on tariff setting and licensing, but needs institutional strengthening.</li> <li>• Lack of skilled manpower with technical capabilities for sector regulation and tariff determination.</li> </ul>	<ul style="list-style-type: none"> <li>• Separate sector regulators for the four provinces can be formed with NEPRA as apex or federal sector regulator.</li> <li>• Detailed guidelines on constitution of regulators, competency of members and process of selection of members.</li> </ul>

## *Tools for promoting private investment*

### Existing framework

The PPP Policy of 2007, revised in 2010, facilitates PPPs across all infrastructure sectors and at both federal and provincial level.

Initiation of PPP programs in Sindh and Punjab.

Sindh approved its PPP legislation in 2009 and Punjab in 2014.

No specific PPP law at the federal level, but a regulatory framework is provided by the PPP Policy in combination with the laws on concessions and other forms of investment.

Infrastructure Project Development Facility (IPDF) chaired by the MoF acts as the PPP unit and assists the PPP Task Force.

IPDF was created to act as a channel between public and private sector for facilitating infrastructure development.

### **Key objectives of the 2010 PPP Policy**

Set up efficient & transparent institutional arrangement for identification & development of projects.

Create an enabling economic environment to encourage private sector participation.

Promote social & economic development through infrastructure provisioning.

Provides mechanisms for various funding options available for infrastructure projects.

Provide risk management framework and protects the interest of all stakeholders.

## *Tools for promoting private investment*

### Scope for improving PPP framework

The public-private interface needs substantial strengthening, including enhancement of skills and institutional mechanisms within the government for effective interaction with the private sector.

Disaggregate and allocation of risk is key to attract investments. There is a need to improve risk allocation among partners and a robust risk management system.

PPP pilot transactions are currently taking considerable time and cost to prepare and to complete. The preparation periods and costs must be significantly reduced or else the much-needed private investments in infrastructure will not reach closure.

The federal government also needs to ensure provision for revenue guarantees that will safeguard against the commercial risk of the project and yet create incentives for the private sector to generate core and non-core revenues from the project.

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# Appendix 1

## ***Macroeconomic indicators***

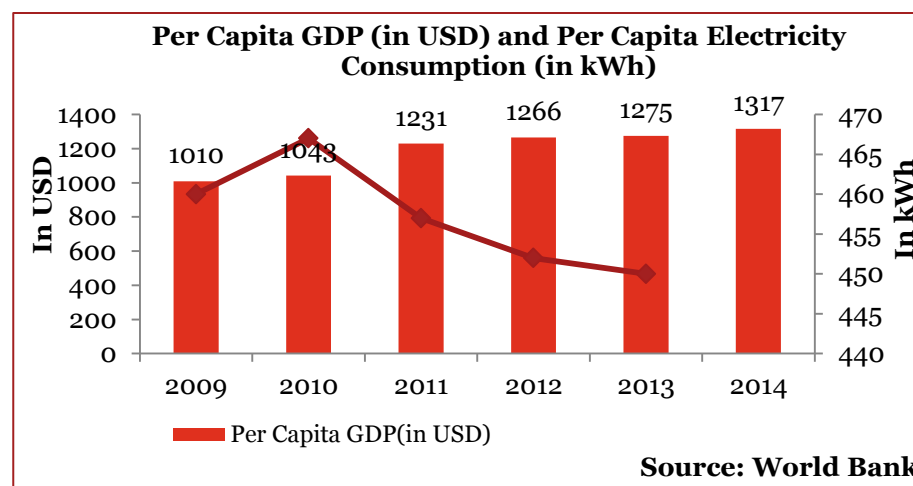
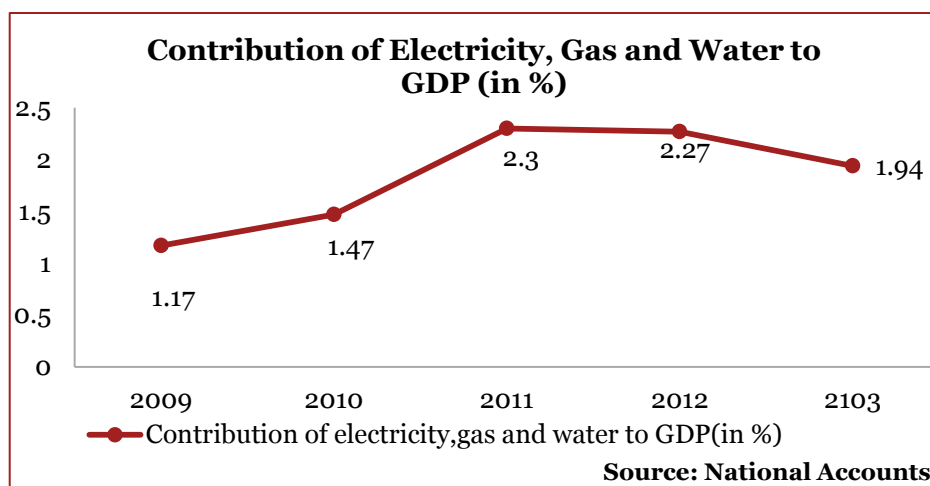
## *Macroeconomic overview – Historical (1/2)*

- Macroeconomic imbalances, structural weaknesses, and security concerns negatively impact Pakistan’s economy.
- Services sector expanded by 5% and remained the largest contributor to growth in FY2015.
- Pakistan has not been able to meet most of its MDGs (e.g. eradication of extreme poverty, promotion of primary education, checking child mortality, promotion of gender equality and ensuring environmental sustainability).
- Fiscal discipline had declined because of the constant need to finance expanding energy sector subsidies with improvements in recent years through the IMF program period.
- Currently, a deterioration in the current account position and weakening financial inflows have put pressure on the rupee, prompting foreign exchange market intervention in the spot and forward markets by the Central Bank (State Bank of Pakistan).

### GDP by sectors (in %) (Source: ADB Outlook)

Year	Overall GDP growth	Agriculture	Industry	Services
<b>2008</b>	3.7	1	1.4	6
<b>2009</b>	0.4	3.5	-5.2	1.3
<b>2010</b>	2.6	0.2	3.4	3.2
<b>2011</b>	3.6	2.0	4.5	3.9
<b>2012</b>	3.8	3.6	2.5	4.4
<b>2013</b>	3.7	2.7	0.6	5.1
<b>2014</b>	4.0	2.7	4.5	4.4
<b>2015</b>	4.2	2.9	3.6	5.0

## Macroeconomic overview – Historical (2/2)

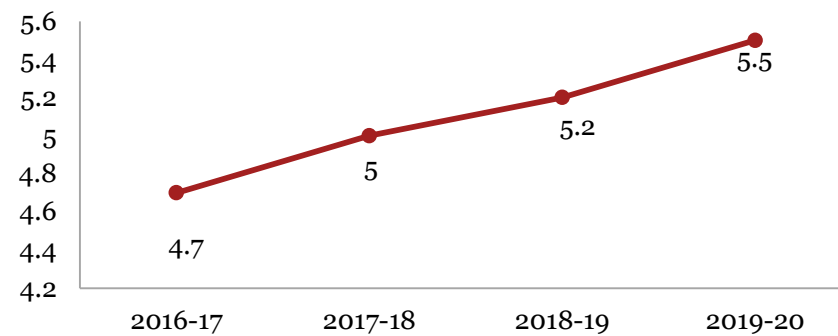


- As Pakistan produces more than one-third of its electricity through fuel-oil powered thermal plants, any change in price trends in the international market affects the energy prices in the country.
- Household sector continues to be the largest consumer of electricity with about 46% of the total consumption.
- The growth targets for medium term are subject to various risks such as decline in energy availability, extreme weather fluctuations, non-implementation of expected reform program and fiscal expenditures.
- Energy shortages are expected to continue over the medium term but volatility in supply will still remain a risk to exports and growth of the economy.
- High and stable economic growth will be achieved through short-term stabilization policies which will reduce crisis dangers and restore fiscal and balance of payments sustainability in the economy.

## Macroeconomic overview – Future Outlook

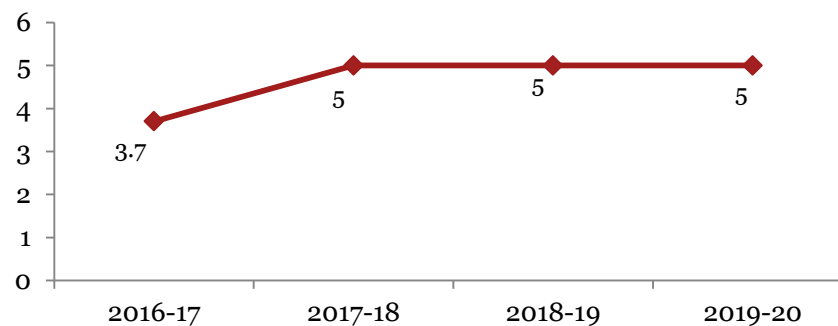
- The GDP growth rate is projected to increase to about 5.5% by 2020.
- The industrial sector is projected to grow by 6.4% during FY 2016 because of better energy supply and planned investment under China-Pakistan Economic Corridor (CPEC).
- During the medium term, the inflation rates will be around 5% as the energy prices declines and inflation expectations are supported by a sensible monetary policy.
- The Pakistan government targets to revive and achieve sustainable growth and development and become one of the top 25 global economy by 2025.

**Projected Real GDP at factor cost (in %)**



Source: IMF

**Consumer prices (period averages, %)**



Source: IMF

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# Appendix 2

## ***Industry structure & institutional arrangement***



## *Industry structure and institutional arrangements (1/4)*

Power industry in Pakistan consisted of two vertically state owned power utilities before restructuring in 1998.

- Water & Power Development Authority' or 'WAPDA' controlled all electricity related functions in entire Pakistan except Karachi.
- Karachi Electric Supply Corporation' or KESC oversaw similar functions for Karachi.

The unbundling of WAPDA into separate G, T & D functions lead to the creation of

- four thermal generation companies (GENCOs),
- one transmission (& dispatch) company, and
- ten distribution companies all under state control (DISCOMs).

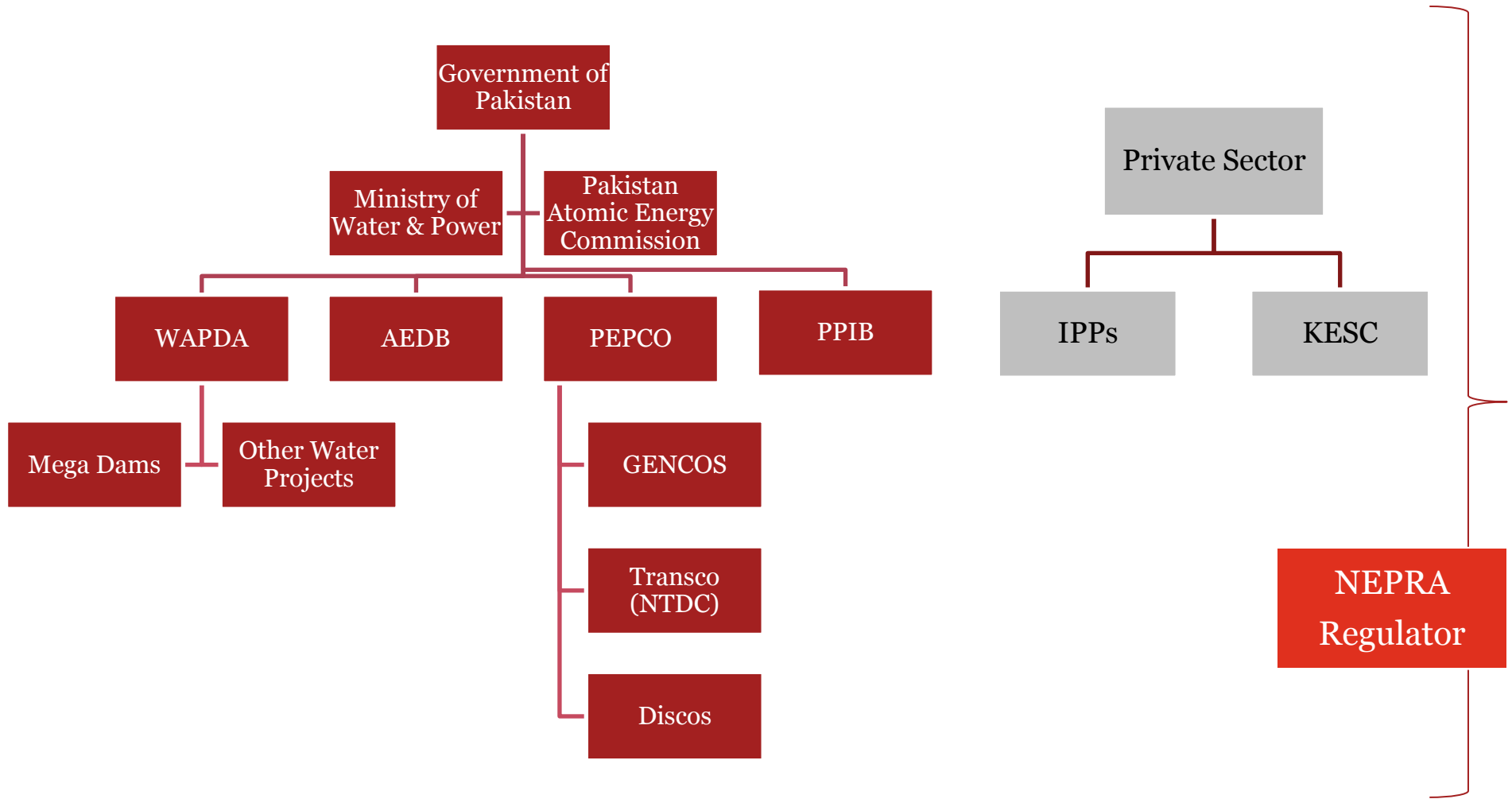
To co-ordinate the functions of the unbundled entities & strengthen the organizational setup 'Pakistan Electric Power Company' or 'PEPCO' was formed in 1998. The responsibility of thermal power management of the four GENCOs and the DISCOMs went to PEPCO.

'National Electric Power Regulatory Authority' or NEPRA was created as the energy regulator.

In 2007, WAPDA was made responsible for hydro power generation and development in the country.

## *Industry structure and institutional arrangements (2/4)*

### Existing structure of the power sector in Pakistan



## *Industry structure and institutional arrangements (3/4)*

The 'National Transmission & Dispatch Company' or NTDC is a public limited company under majority government ownership and tasked with the duties of transmission, dispatch and system operator (SO) functions.

Along with these functions, prior to April 2015, the NTDC used to play the role of 'Central Power Purchasing Agency' or CPPA for procurement of power from GENCOs, Hydel & IPPs on behalf of the DISCOMs.

The Ministry of Water & Power separated CPPA from NTDC and formed an independent agency called CPPA-G (also market operator) where G stands for guarantee.

The Board of Directors of the CPPA-G is composed of representatives from the open market, generation companies (GENCOs), distribution companies (DISCOMs) and Finance and Water and Power Ministries.

## *Industry structure and institutional arrangements (4/4)*

In May 2008, Abraaj Capital acquired a 50% stake with management control in KESC. This marked the beginning of privatization of Government owned power utilities in Pakistan.

Other Government owned generating companies had also been opened for private sector but mostly remained unattractive for investments because of operational inefficiencies.

The Private Power & Infrastructure Board (PPIB) was established in 1994 to provide one window facility for implementation of projects above 50 MW capacity while the respective provinces are responsible for projects below 50 MW.

In order to facilitate, promote and encourage development of renewable energy in Pakistan, the Alternative Energy Development Board (AEDB) was established in the year 2003. The administrative control of AEDB was transferred to Ministry of Water and Power in 2006.

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# Appendix 3

## *Demand-Supply Situation*

## *Demand-Supply Situation (1/4)*

Pakistan faces a severe power supply and demand gap that has continuously grown since 2006-07.

The available generation capacity remains about the same from 2007 to 2013. The increased use of imported oil as a primary fuel for power generation led to increase in power supply cost.

Indigenous resources like coal and hydro have not been developed effectively, leading to a skewed power generation mix.

High T&D loss have affected the financial performance of the DISCOMs and subsequently reduced the financial capability of the generators to pay for the fuel consumed.

- D-S gap results in load-shedding for almost 14 hours a day across some parts of the country.
- The shortage of energy and its related problems have continued to impede Pakistan's economic growth prospects severely given the country's state of power sector infrastructure.

## *Demand-Supply Situation (2/4)*

<b>Shift in Power Generation Mix in Pakistan</b>		
<ul style="list-style-type: none"> <li>Oil's share of electricity Power generation has grown since the 1990s, while the share of HPP sources has largely remained stagnant;</li> <li>HPPs generate electricity at around 20 to 25% of the cost of generation from other fuels but entail significant upfront capital costs compared to oil or coal;</li> <li>While hydropower is the cheapest source of electricity for Pakistan, mobilizing the financing for such projects constitutes a major challenge.</li> </ul>	<ul style="list-style-type: none"> <li>While Pakistan has a hydro potential of about 60,000 MW (approx.) only 7,185 MW has been harnessed so far;</li> <li>The share of hydro power is 26% of total generation in 2014-15 as compared to nearly 70% in the 1980s.</li> </ul>	<ul style="list-style-type: none"> <li>Thermal power was relied upon for power generation as natural gas was abundant and also cheaper than oil;</li> <li>Depletion of indigenous gas has resulted in the increased usage of expensive furnace oil and high speed diesel oil in the electricity generation.</li> <li>Lopsided reliance on the imported oil supply, is exerting strain on the balance of payments besides making the energy mix unfavorable.</li> </ul>

- Power generation mix of Pakistan is highly dependent on thermal (70%) followed by hydro (26%), nuclear (3%) and wind (1%).
- Approximately USD 14.5 Billion worth of oil is imported each year, most of which is used for electricity generation.
- Higher dependency on fuel oil for electricity generation have resulted in fuel crisis and increased power supply cost.

## ***Demand-Supply Situation (3/4)***

### **Electricity peak demand in Pakistan has grown at the rate of 7.8% from 2007-2013.**

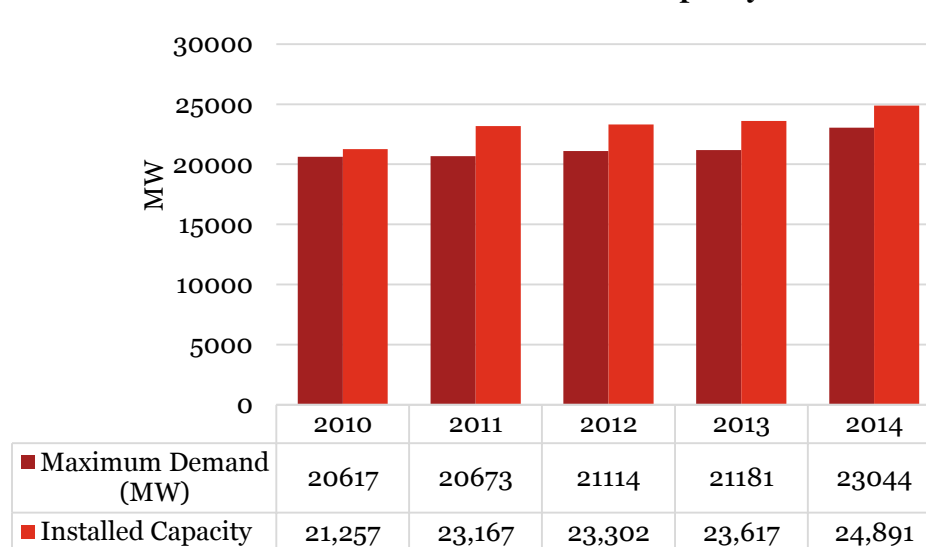
Although demand has experienced a very high growth rate, energy consumption has reduced since 2007-08 due to supply constraints.

Pakistan is experiencing an acute energy crisis at this moment due to lingering losses and underinvestment in power generation

This is further exacerbated by inefficient management of indigenous coal and hydro based resources.

- The demand for electricity far outstrips the current generation capacity leading to gaps of up to 4,500 – 5,500 MW. The demand-supply gap has continuously grown since 2008 and has led to load-shedding of 12-16 hours across some parts of country.
- On an average, the supply deficit of around 5,000 MW was experienced in 2014-15 and it touched the peak of over 7,000 MW in July 2015.

**Pakistan Peak Demand vs Installed Capacity**



Source: NTDC Statistics 2014-15



## *Demand-Supply Situation (4/4)*

Demand supply gap shows an increasing trend till 2017 but is expected to reduce from 2018 due to planned construction of new power capacities.

GoP plans to add up to 8,000 MW of additional nuclear generating capacity by 2030, with China’s support.

Major portion this new capacity addition will be in the form of coal based power plants.

In the short term the available generation will usually be low due to unavailability of fuel and lower efficiency of plants.

It is envisaged that considering the future energy demands, GoP will work towards leveraging its own coal reserves for electricity production.

Pakistan has a coal potential of 100,000 MW, but is utilizing only a small percentage of indigenous coal due to lack of modern technology.

### Peak demand vis-a-vis installed capacity (MW)

Year	2015	2016	2017	2018
<b>Peak Demand</b>	32,130	35,485	38,360	41,747
<b>Installed Capacity</b>	25,034	26,256	28,866	39,420

**Source: Pakistan economic survey 2013-14 & NTDC report on electricity demand forecast**

- The CASA-1000 will facilitate supply of 1,300 MW of existing summertime hydropower surplus from Kyrgyz Republic and Tajikistan in Central Asia to Afghanistan and Pakistan.
- Supply of cheap electricity to Pakistan through CASA-1000 is expected to start from 2018.

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*Thank you!*

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