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**POLICY FOR DEVELOPMENT OF POWER  
GENERATION PROJECTS IN PAKISTAN**

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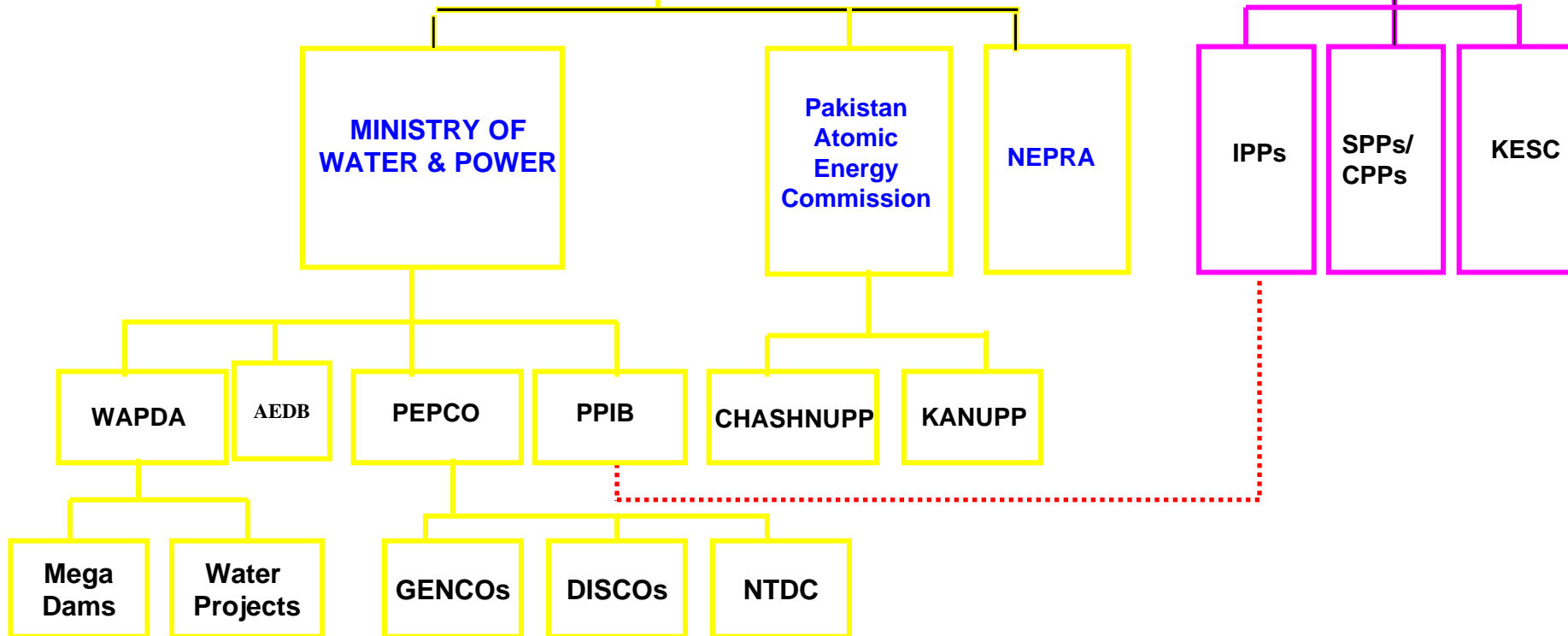
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- **Overview of Pakistan Power Sector**
- **Power Supply & Demand Position**
- **Power Policy and Renewable Energy Policy**
- **Power Generation Projects in Public & Private Sector**
- **Renewable Energy Projects**
- **Conclusions**

# PAKISTAN POWER SECTOR PLAYERS



## GOVERNMENT OF PAKISTAN

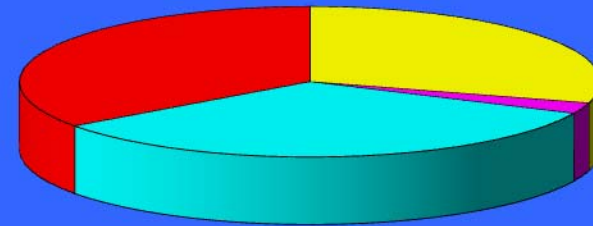


# PAKISTAN POWER SECTOR - TOTAL INSTALLED CAPACITY

	MW	%
<u>Public Sector</u>		
WAPDA	6516	28
NTDC	4829	20
PAEC	802	4
Sub-Total	<u>12147</u>	<u>52</u>
<u>Private Sector</u>		
IPPs	9211	39
KESC	<u>2105</u>	<u>9</u>
Sub-Total	<u>11316</u>	<u>48</u>
G. Total	<u>23463</u>	<u>100</u>

Public Sector  
Thermal  
4829 MW

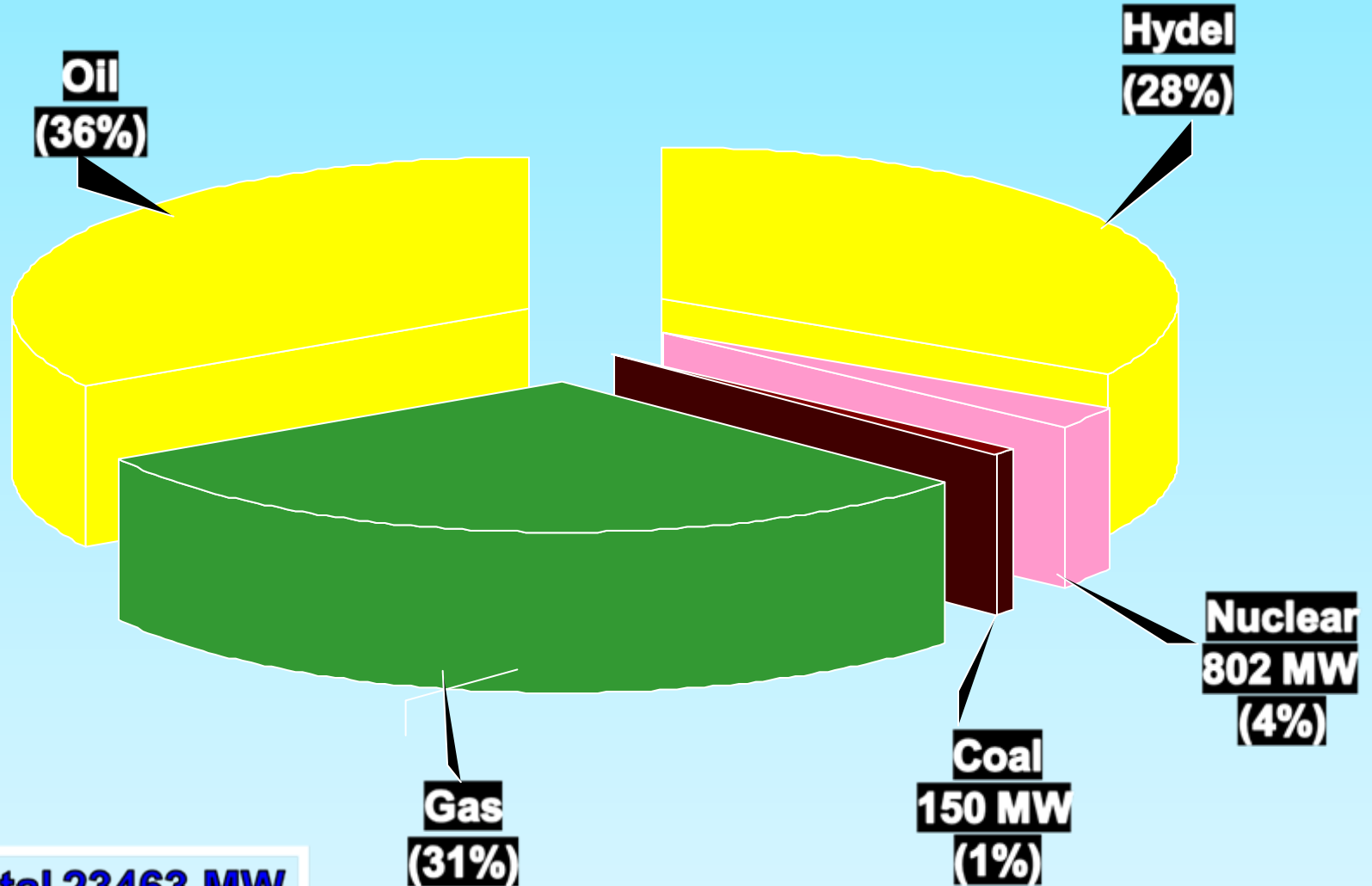
IPPs & KESC  
11316 MW



Nuclear  
802 MW

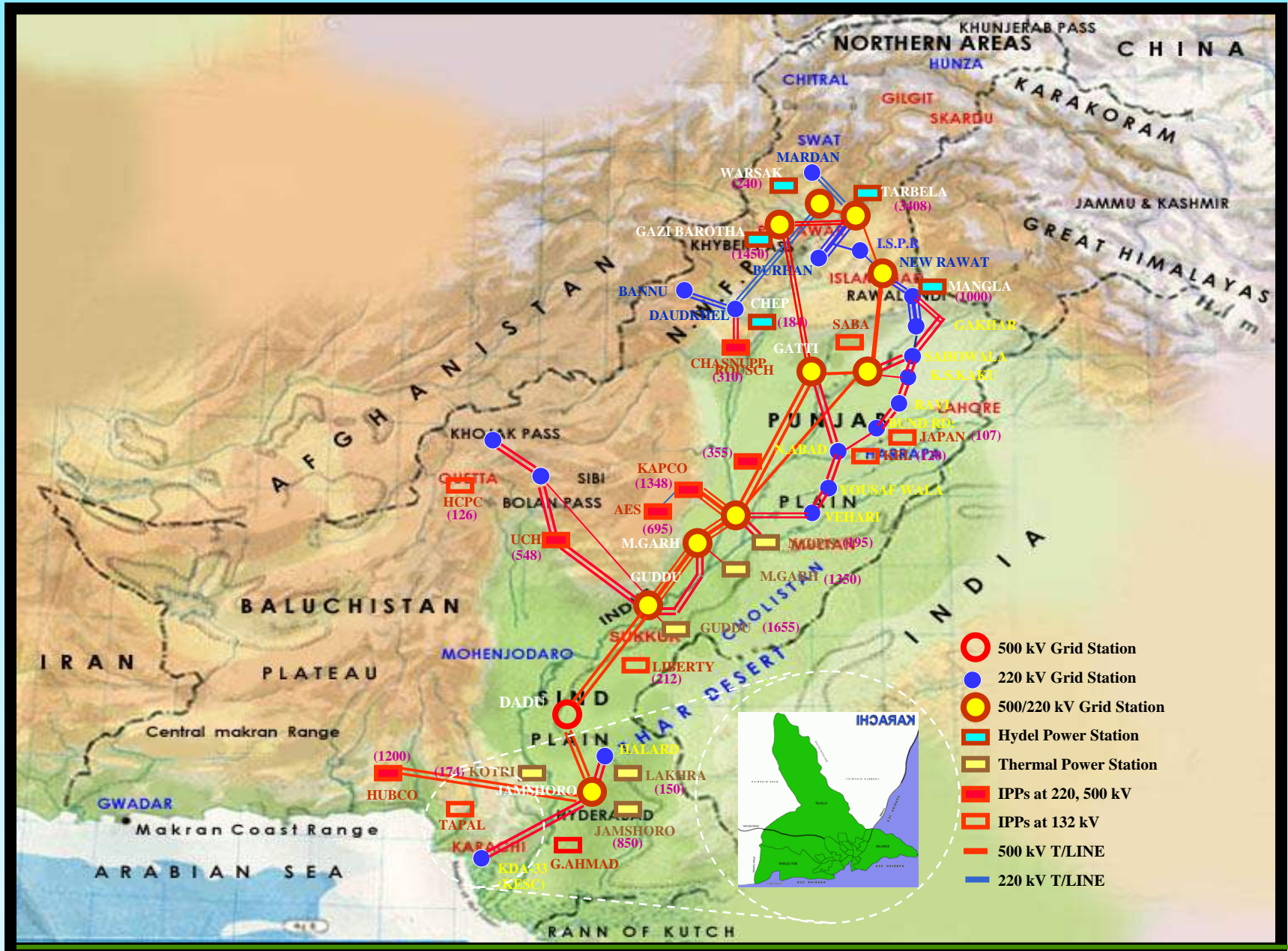
Public Sector  
Hydel  
6516 MW

# OVERVIEW OF PAKISTAN POWER SECTOR GENERATION PATTERN



**Total 23463 MW**

# PAKISTAN POWER SECTOR TRANSMISSION SYSTEM



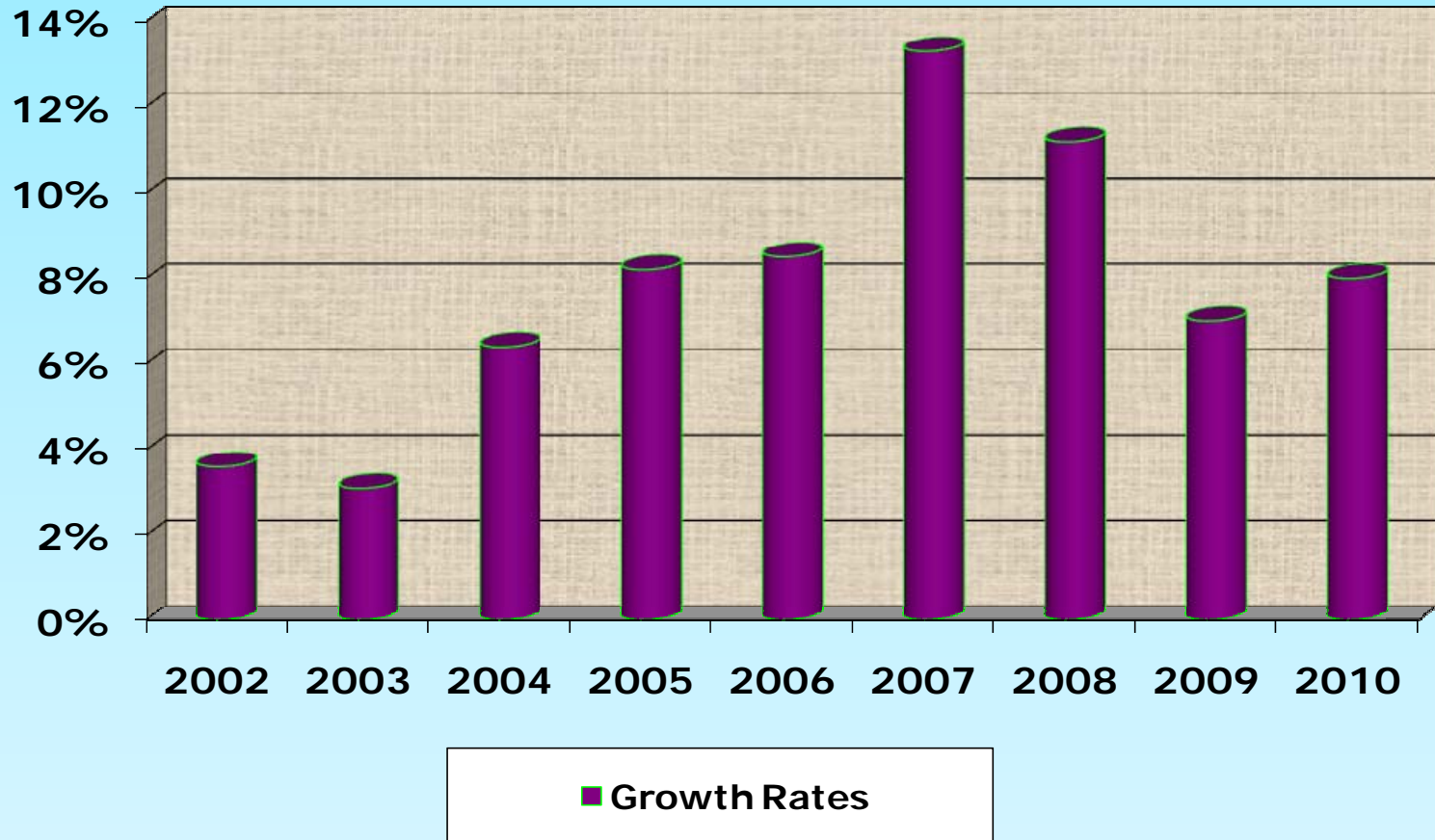
# Historical Demand (2002 – 2010)

YEAR	NTDC*		KESC		COUNTRY**	
	MW	G.R.	MW	G.R.	MW	G.R.
2001-02	10109	4.0%	1885	1.3%	11875	3.6%
2002-03	10481	3.7%	1973	4.7%	12244	3.1%
2003-04	11078	5.7%	2073	10.0%	13021	6.4%
2004-05	12035	8.6%	2197	6.0%	14091	8.2%
2005-06	13212	9.8%	2223	1.2%	15282	8.5%
2006-07	15138	14.6%	2349	5.7%	17314	13.3%
2007-08	16838	11.2%	2443	4.0%	19257	11.2%
2008-09	17959	7%	2565	4.9	20524	7%
2009-10	19422	8.2	2700	5.2	22122	8%

\* NTDC computed demand; without export to KESC

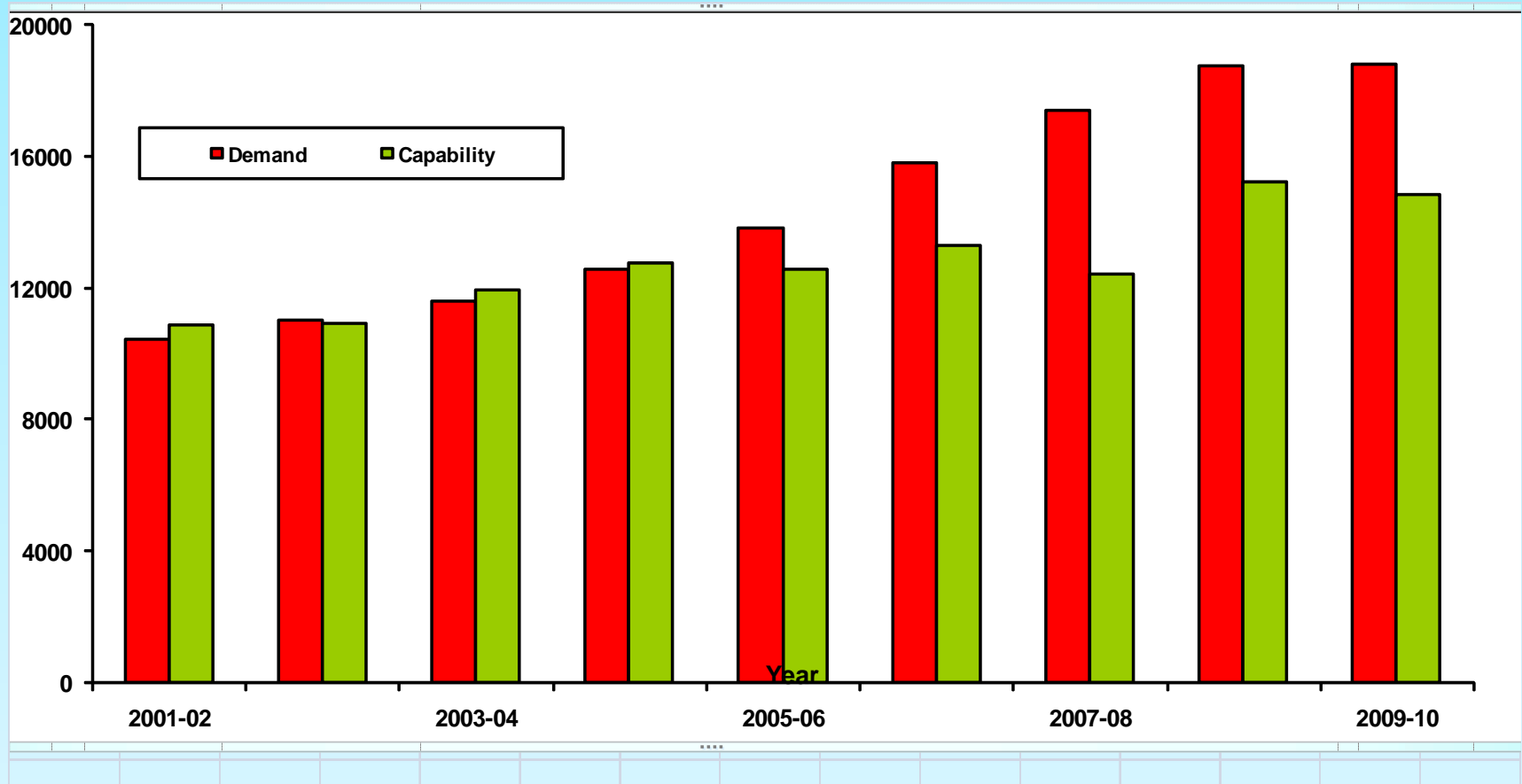
\*\* Assuming 1% diversity between WAPDA & KESC Power Demands

# Historical Peak Load Demand Growth (%) (PEPCO + KESC)





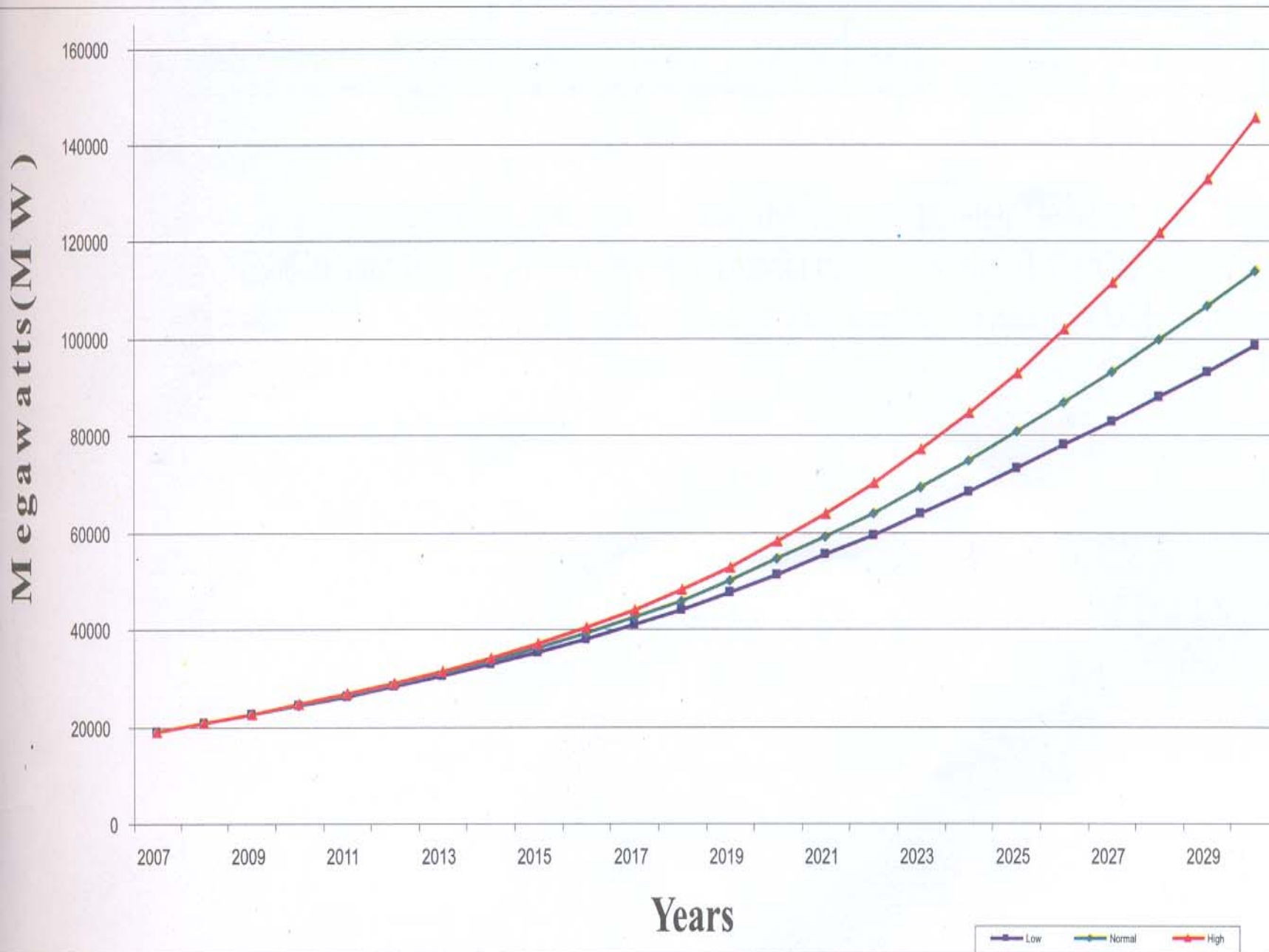
# Peak Demand Vs System Capability 2001-02 To 2009-10



# Load Forecast

Fiscal Year	Load Forecast based on Regression Analysis		Revised Forecast by applying Growth Rates of Regression based Load Forecast
	MW	G.R	MW
<b>2006-07</b>	15138		
<b>2007-08</b>	16484	8.9%	16838*
<b>2008-09</b>	17868	8.4%	18251
<b>2009-10</b>	19352	8.3%	19768
<b><i>A.C.G.R. (2006-2010)</i></b>		<b>8.5%</b>	
<b>2010-11</b>	20874	7.9%	21322
<b>2011-12</b>	22460	7.6%	22942
<b>2012-13</b>	24126	7.4%	24643
<b>2013-14</b>	25919	7.4%	26475
<b>2014-15</b>	28029	8.1%	28630
<b><i>A.C.G.R. (2010-2015)</i></b>		<b>7.7%</b>	

# Demand Forecast - Country



# SUMMARY OF NEW POWER PROJECTS

Expected Year of COD	Hydel		Oil		Pipeline Quality Dual Fuel/LNG		Gas		Coal		Total (MW)	Investments US\$ Million	No. of Projects
	MW	No.	MW	No.	MW	No.	MW	No.	MW	No.			
2008	-	-	165	1	225	1	-	-	-	-	390	293	2
2009	-	-	575	3	450	2	429	2	-	-	1454	1091	7
2010	-	-	1429	6	375	2	205	1	-	-	2009	1507	9
2011			600	3	-	-	584	2	-	-	1268	993	5
2012	332	3	150	1	-	-	120	1	550	3	1152	1168	8
2013	251	2	-	-	-	-	-	-	2000	2	2251	2314	4
2014	506	4	-	-	-	-	-	-	1000	1	1422	1528	5
2015	2047	8	-	-	-	-	-	-	-	-	2047	1859	8
2016	1342	3	-	-	-	-	-	-	-	-	1342	1678	3
<b>TOTAL</b>	<b>4478</b>	<b>20</b>	<b>2919</b>	<b>14</b>	<b>1050</b>	<b>5</b>	<b>1338</b>	<b>6</b>	<b>3550</b>	<b>6</b>	<b>13335</b>	<b>12431</b>	<b>51</b>

# INDIGENOUS GENERATION POTENTIAL

## ● Hydroelectric

- Potential : 41000 MW
- Projects in Operation : 6474MW
- Projects Under Implementation : 7500 MW
- Untapped Hydel Potential : 27000 MW

## ● Coal

- Thar Coal Reserves : 175.5 billions tons
- Lakhra Reserves : 1.33 billion tons
- Sonda Jheruk Reserves : 5.5 billion tons

## Private Power & Infrastructure Board (PPIB) – CREATION / PURPOSE

- Created Aug 1994 to promote private investments in power sector
- Provide One-Window facility on behalf of GOP, its Ministries / Departments
- Assist GOP in preparation of Private Power Policies
- Execute IA and provide guarantees on behalf of GOP
- Monitor and assist IPPs in executing PPA /FSA / GSA / WUL with the relevant GOP agencies
- Provide support to WAPDA, KESC, PSO, SSGC, SNGPL, OGDC, etc
- Assist IPPs in obtaining consents / licenses
- Provide technical, financial and legal support to Provinces / AJK

# POLICY FOR POWER GENERATION , 2002

## OBJECTIVES

- Provide sufficient capacity for power generation
- At least cost
- To avoid capacity shortfalls
- Encourage exploitation of indigenous resources, e.g.
  - Natural resources
  - Human resources
  - Local engineering and manufacturing capabilities
- Ensure that rights of all stakeholders are looked after i.e. win-win situation for all.

## **POLICY FOR POWER GENERATION, 2002 SCOPE**

- **Applicable for Projects in**
- **Private sector**
- **Public sector**
- **Through private-public partnership**
- **Hydel and Thermal Projects**



# **POLICY FOR POWER GENERATION, 2002**

## **INSTITUTIONAL ARRANGEMENTS**

- Private Power & Infrastructure Board (PPIB)
- Provinces / AJK PPCs (Private Power Cells)
- Power Purchaser, NTDC
- National Electric Power Regulatory Authority (NEPRA)

## **POLICY FOR POWER GENERATION, 2002**

### **Projects Implementation by PPIB / Provinces / AJK**

- Projects above 50 MW
- One window support by PPIB
- Projects below 50 MW
- One window support by Province / AJK

# POLICY FOR POWER GENERATION, 2002

## Implementation Model

- The Policy envisages long term Agreements (IAs / PPAs) based on following models:
  - Hydel Projects – BOOT
  - Thermal Projects – BOOT / BOO
  - BOOT Projects to be transferred to GOP after concession period

# POLICY FOR POWER GENERATION, 2002

## Tariff Structure

- Two – part structure of power purchase price
- Capacity payment to cover fixed costs, debt servicing and return on equity regardless of dispatch level
- Energy payment to cover fuel and variable O&M costs
- Indexation
- Pass through of fuel price increase
- Specified foreign currency exchange rate variations
- Pakistan and US inflation

# POLICY FOR POWER GENERATION, 2002

## Projects Selection

- **Solicited Proposals**
- International Competitive Bidding (ICB) for projects with feasibility studies.
- **Unsolicited Proposals**
- Negotiation for proposals on raw sites
- Advertise Raw Sites
- **Selection Criteria**
- Lowest levelized tariff over the concession period.

## **POLICY FOR POWER GENERATION, 2002**

### **Fiscal Concessions**

- **Customs duty at rate of 5% on the import of plant and equipment not manufactured Locally**
- **No levy of sales tax**
- **Exemption from income tax (including turnover rate tax and withholding tax on import).**

# **POLICY FOR POWER GENERATION, 2002**

## **Special Incentives**

### **Hydel Projects**

- Hydrological risk to be borne by power purchaser
- Priority dispatch with economic load dispatch criteria

### **Coal Projects**

#### **Integrated coal mining and power generation**

- Return on investment made on dedicated coal resource for power generation
- Investment made in integrated projects to be recovered from tariff

# **POLICY FOR POWER GENERATION, 2002**

## **Environment**

All requirements of Pakistan Environmental Protection Agency (PEPA) Act 1997 will have to be met.



# POLICY FOR POWER GENERATION, 2002

## SECURITIES

- Guarantee contractual obligations of NTDC and Provincial / AJK Governments
- Provide protection against political risks
- Provide protection against changes in taxes and duties regime
- Protection against risk associated with convertibility / remit ability of currency.

# POLICY FOR POWER GENERATION, 2002

## Security Package

- To eliminate protracted negotiations, following long term
- Standard agreements are being prepared for hydel projects
- Implementation Agreement
- Power Purchase Agreement
- Water Use Agreement

# RESPONSE OF POWER POLICY 2002

Projects	Number	Capacity (MW)	Investment Expected (USM\$)
● Hydel	20	4478	4898
● Oil	14	2919	2189
● Pipeline Quality Dual Fuel	5	1050	788
● Gas	6	1338	1004
● Coal	6	3550	3550
<b>Grand Total:</b>	<b>51</b>	<b>13335</b>	<b>12429</b>

## HYDEL PROJECTS UNDER VARIOUS POLICIES

- Processing
- 3 projects under 1995 policy
- 17 projects under 2002 power policy
- LOIs issued and Feasibilities for 4 projects have been completed whereas Feasibility Studies for rest of projects is in progress.

## HYDRO POWER PLANTS IN PUBLIC SECTOR (SHORT & MEDIUM TERM: 2008-2012)

	<b>Power Stations</b>	<b>Sector</b>	<b>MW</b>	<b>Target</b>
i.	Malakand-III	Private	81	Commissioned
ii.	Satpara	Public	16	Nov 2011
iii.	Khan Khwar	Public	72	Feb 2011
iv.	Duber Khwar	Public	130	June 2012
v.	Jinnah Hydro Power	Public	96	Dec 2012
vi..	Allai khwar	Public	121	Feb 2012
	<b>TOTAL</b>		<b>516</b>	

# PAKISTAN



150 MW InterGen Power, Kohat (Jun-10)

175 MW Faruji Mari, Daharki (Apr-09) 134 MW Star Power, Daharki (Feb-10)  
150 MW Engro Power, Daharki (Feb-09)

150 MW Fauji Korangi Power Project  
205 MW Green Power, Dadu (May-10)

150 Habib Ullah Energy Project (Ghotki)

150 MW Attock Gen, Rawalpindi (Aug-08)

150 MW Eastern Power, Pasrur (Oct-08)

225 MW, Muridke Power Project (Mar-09)  
225 MW Bhikki Power Project (April-09)  
225 MW Atlas Power Limited  
130 MW Taiyo Hills Project

200 MW WARDA Power, Lahore (Mar-09)

225 MW Orient Power, Balloki (Dec-08)

225 MW Sahiwal Power Project

179 MW Gulf Power, Sahuwala (Oct-08)  
400 MW KAPCO Expansion, Kot Addu

150 MW Western Electric Project

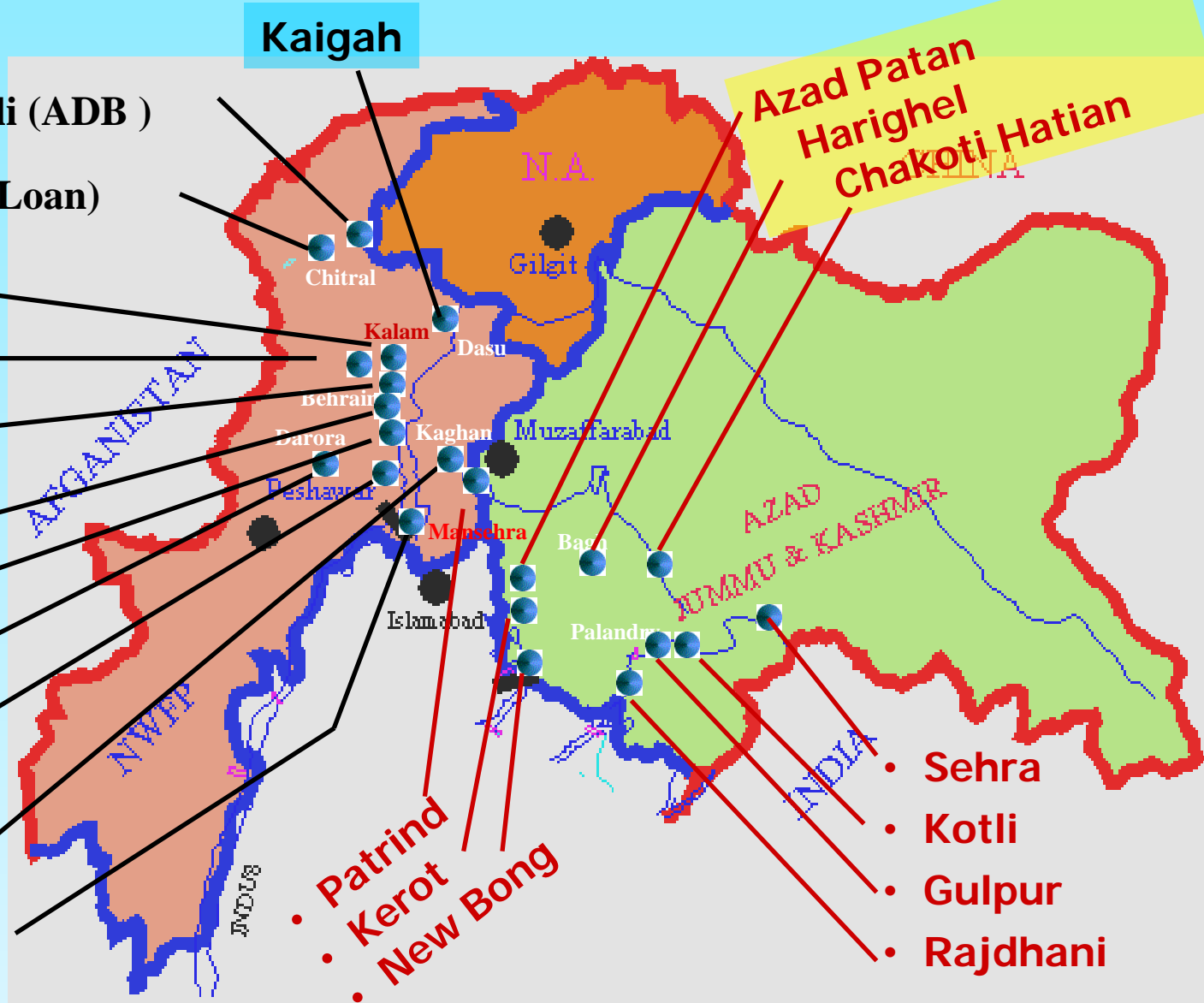
200 Al-Fateh Coal Project (Sindh)

200 Dadabhoy Coal Project (Jherrukh)

1000 MW AES Imported Coal Project  
1000 MW Mitsui Imported Coal Project

# LOCATION OF Hydropower Under PPIB

- Shushgai Zhendoli (ADB )
- Shogo Sin (ADB Loan)
- Matiltan
- Gabral Kalam
- Kalam Asrit
- Asrit Kedam
- Madyan
- Sharmai
- Munda
- Suki Kinari
- Tarbela 4<sup>th</sup> Ext.



**Kaigah**

**Azad Patan  
Harighel  
Chakoti Hatian**

**● Patrind  
● Kerot  
● New Bong**

**● Sehra  
● Kotli  
● Gulpur  
● Rajdhani**

# **RENEWABLE ENERGY POLICY 2006**

## **Goals**

- Addition of 9700 MW by 2030.
- RE development in under developed areas to promote social welfare.
- Induce investment – friendly incentives to attract private sector.

## **Scope**

- Small hydro of 50 MW or less capacity.
- Solar Energy.
- Wind Power Generation



# **RENEWABLE ENERGY POLICY 2006**

## **Implementation**

- **Short, Medium & Long Term Projects.**
- **Security Package.**
- **Implementation Agreement (IA).**
- **Power Purchase Agreement (PPA).**
- **Financial and Fiscal Incentives (FFI).**
- **Wind & Hydrology Risk Coverage.**

# RENEWABLE ENERGY POLICY 2006

## Policy Objectives

- ❑ Energy Security.
- ❑ Economic Benefits.
- ❑ Social Equity.
- ❑ Environmental Protection.

# CURRENT STATUS OF WIND IPPs

- **LETTER OF INTENT (LOI)**                      **Responsible Agency: AEDB**
  - LoIs issued to ninety three (93) national and international investors for 50 MW wind power projects each and one (1) LOI for 05 MW wind project.
  
- **ALLOCATION OF LAND**                      **Responsible Agency: Government of Sindh, AEDB**
  - More than 100,000 acres of Government land identified in Sindh.
  - *Lease of 33,976 acres* of land approved by Sindh Government on 15<sup>th</sup> November 2007
  - Rs. 169.88 Million deposited by AEDB with the GoS as lease amount.
  - Master Lease Document awaited
  - Provisionally allocated to 21 IPPs for 22 projects
  
- **FEASIBILITY STUDY**    **Responsible Agency: IPPs**
  - Feasibility Studies for 50 MW completed by nine (9) IPPs.
  
- **GENERATION LICENSE**    **Responsible Agency: IPPs, NEPRA**
  - Eight (8) IPPs have applied for Generation License
  - NEPRA has issued Generation License to six (6) IPPs

# WASTE TO ENERGY / BIOMASS

- LOIs has been issued to **six (06)** investors for generation of 275 MW of electricity from Waste to Energy / Biomass

## MICRO HYDEL

- Lol issued for **16 MW** for a micro hydro power project on River Gilgit.

## TIDAL ENERGY

- Lol issued for 50 MW with scale up to 300 MW

## BIO FUELS

- Policy recommendations submitted to the Federal Government

## BIO GAS

- Feasibility Study for 30,000 rural homes by Winrock / SNV completed

## SUMMARY OF GENERATION COSTS

<b>Project Type</b>	<b>Tariff (US Cents/kWh)</b>	<b>Project Cost (Million\$/MW)</b>
<b>Oil</b>	<b>16 ~ 17</b>	<b>1.1</b>
<b>Gas</b>	<b>7 ~ 8</b>	<b>1.1</b>
<b>Hydro</b>	<b>6 ~ 9</b>	<b>2</b>
<b>Wind</b>	<b>13 ~ 17</b>	<b>2.8</b>

# CONCLUSIONS

**In order to meet projected electricity demand, Pakistan has to develop its indigenous resources for reasonably affordable consumer end tariff for keeping the cost of electricity affordable. Power Policy 2002 and Renewable Energy Policy 2006 are aimed for maximum exploitation of indigenous resources through private and public sector participation. The goals of energy security, economic benefits, social equity and environmental protection can only be met with continuous efforts through policy incentives for indigenous resources.**



I THANKS

The image features the words "I THANKS" rendered in a 3D, blue, sans-serif font. Each letter is positioned as if it were floating on a surface of water, with concentric, golden-brown ripples emanating from its base. Below each letter, a clear reflection of the letter is visible on the water's surface. The entire scene is set against a light blue background.

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