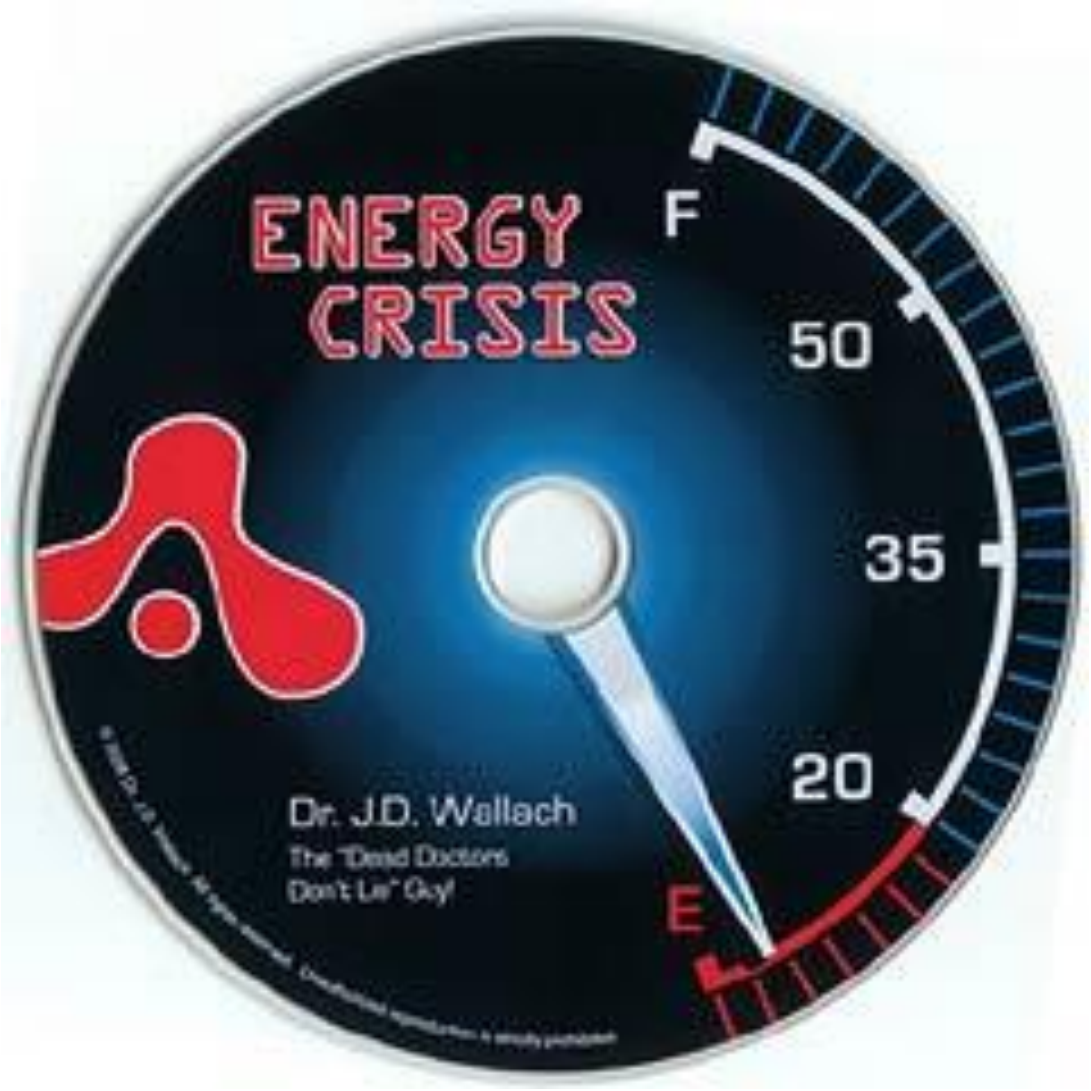
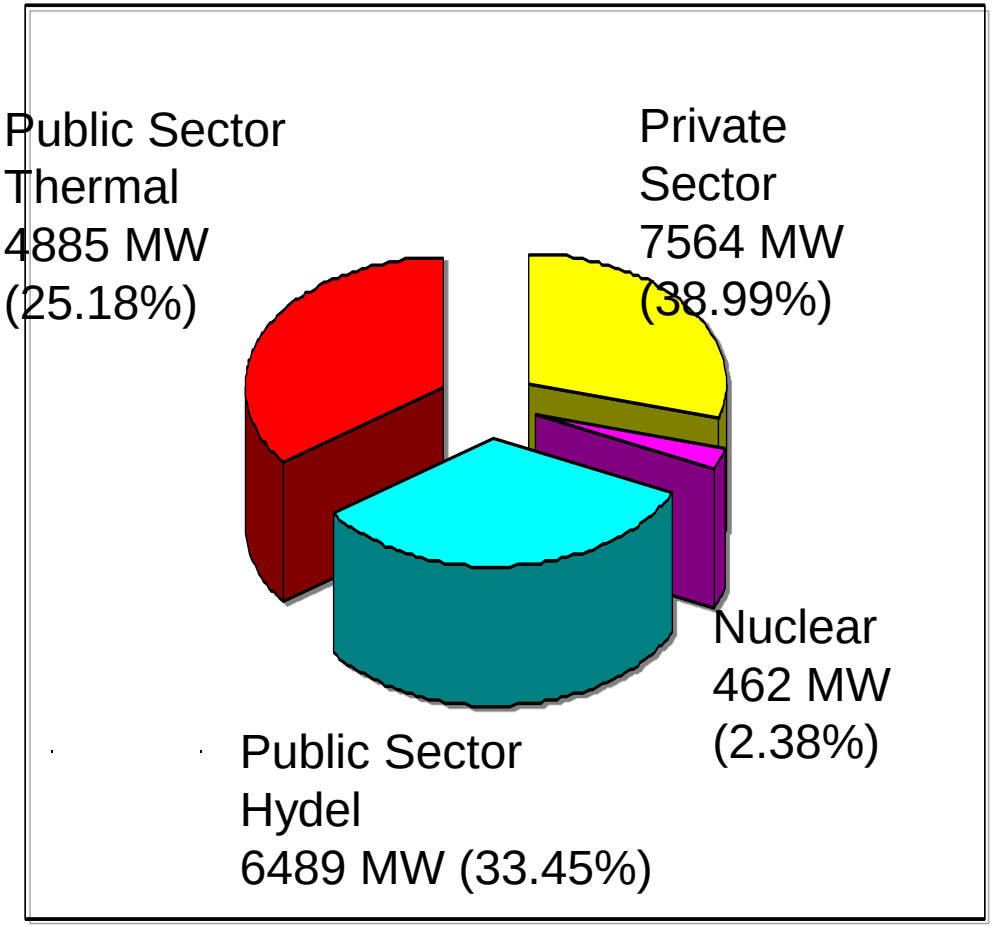
Energy Crisis in Pakistan



ENERGY CRISES OF PAKISTAN

CAUSES AND REMEDY

Power Sector – Total Installed Capacity



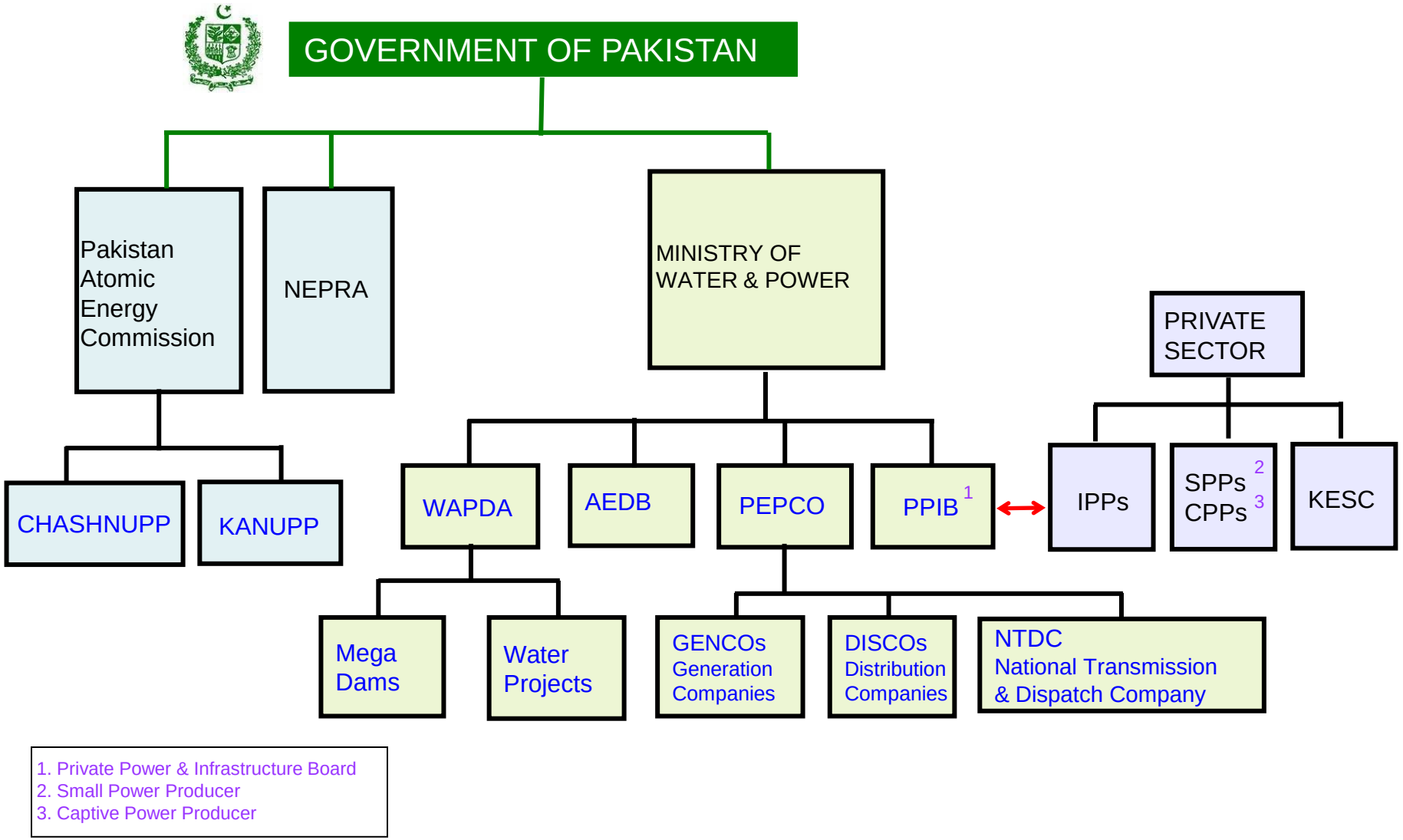
Public Sector

	MW	%
WAPDA	11,374	59
NUCLEAR	462	2
Sub Total	11,836	61

Private Sector

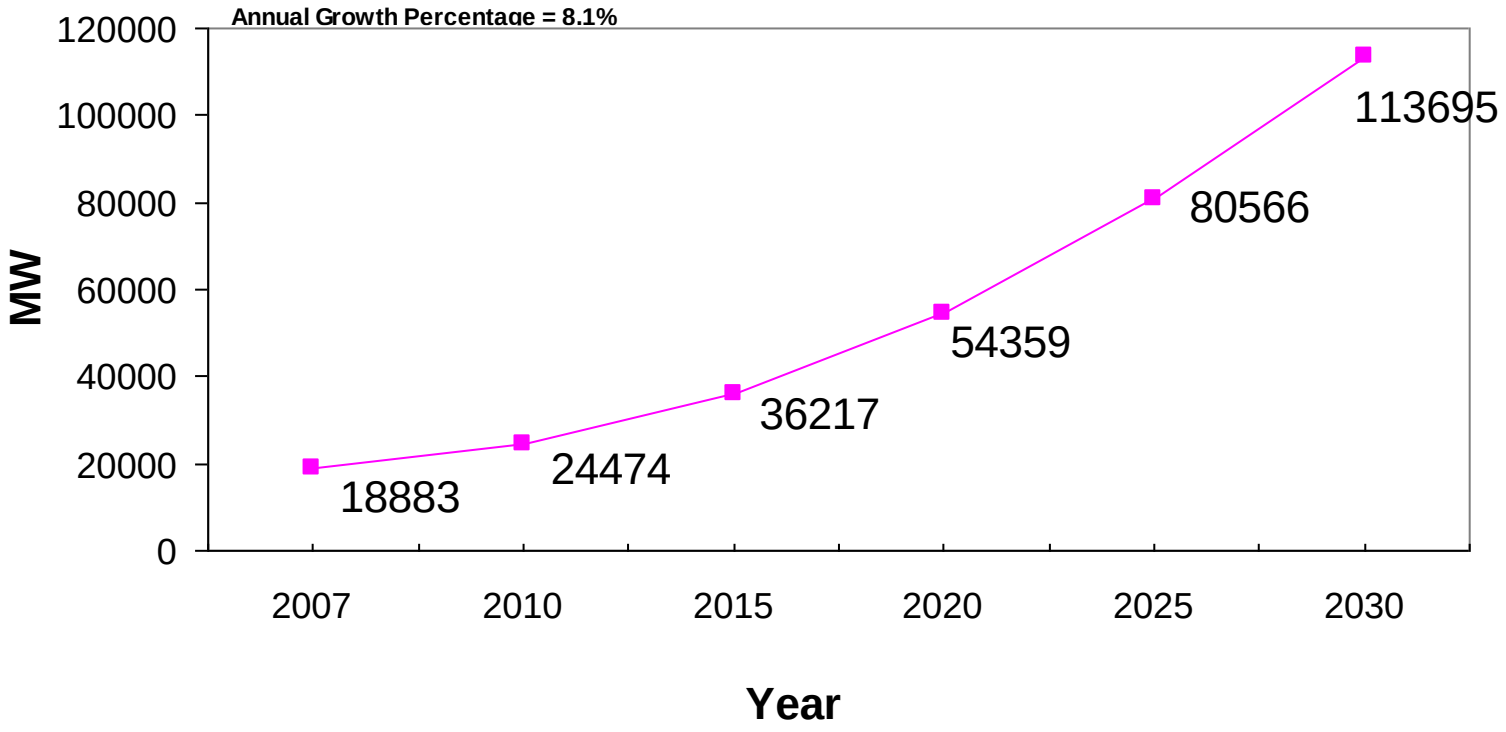
	MW	%
IPPs	5,808	30
KESC	1,756	9
Sub Total	7,564	39
Grand Total	19,400	100

Pakistan Power Sector



1. Private Power & Infrastructure Board
2. Small Power Producer
3. Captive Power Producer

Demand Projection 2007–2030 (Countrywide)



CONTENTS

- INTRODUCTION
- OBJECTIVES
- ENERGY RESOURCES OF PAKISTAN
- TEN YEARS OF ENERGY CONSUMPTION
- CAUSES OF ENERGY CRISIS
- RECOMMENDATIONS
- CONCLUSIONS

OBJECTIVES

- WHY PAKISTAN IS FACING SUCH CRISIS ?
- WHAT ARE REASONS BEHIND IT ?
- WHY PAKISTAN IS NOT UTILIZING RESOURCES?
- WHY PAKISTAN IS IMPORTING COAL IF IT ALREADY HAS LARGE AMOUNT OF COAL ?
- WHY HALF OF POPULATION OF PAKISTAN HAS NO ACCESS TO ELECTRICITY?

INTRODUCTION

- ROLE OF ENERGY IN ECONOMIC DEVELOPMENT
- ROLE OF ENRGY IN SOCIO-ECONOMICAL DEVELOPMENT

USES

- INDUSTRIAL AND AGRICULTURAL SECTOR
- DOMESTIC USE OF CITIZENS

ENERGY SECTOR IN PAKISTAN

- AT PRESENT ENERGY IS GENERATED BY ONLY THREE MODES

1. Thermal 65%
2. Hydel 33%
3. Nuclear 2

- Two companies that produces electricity in Pakistan

1. WAPDA
2. KESC

SUPPLY AND DEMAND

- The total power production capacity in country is 19,500MW
- Country is falling short of 4500MW
- The demand of electricity is growing at the annual rate of 9%,while supply of electricity is increasing at comparatively slower rate of 7%

SUPPLY & DEMAND

- According to a survey

1. Household sector 44.2%
2. Industries 31.1%
3. Agriculture 14.3%
4. Government sector 7.4%
5. Commercial 5.5%
6. Street lights 0.7%

SUPPLY THROUGH POWER PLANTS

- **Thermal power stations**

1. WAPDA operates-11 stations
2. KESC operates -4 stations
3. IPPS operates-14 stations independently

- **Hydel power Generation**

1. Tarbela Dam1750 MW
2. Mangla Dam-900MW

- **Nuclear power generation**

Two nuclear reactors of 425MW power to generate electricity

ENERGY RESOURCES OF PAKISTAN

- PAKISTAN'S CONVENTIONAL ENERGY RESOURCES

ENERGY TYPE	POTENTIOL	SOURCE
CRUDE OIL	339 MILLION BARRELS RECOVERABLE RESERVES	PAK ECO SURVEY 2007-08
NATURAL GAS	31,266 TRILLION CUBIC FEET RECOVERABLE RESERVES	PAK ECO SURVEY 2007-08
COAL	185 BILLION TONNES RECOVERABLE RESERVES	PAK ECO SURVEY 2007-08
HYDRO ENERGY	46,000 MW IDENTIFIED POTENTIOL	GOVT OF PAK 2005
NUCLEAR POWER	425 MW	WORLD NUCLEAR ASSOCIATION 2008

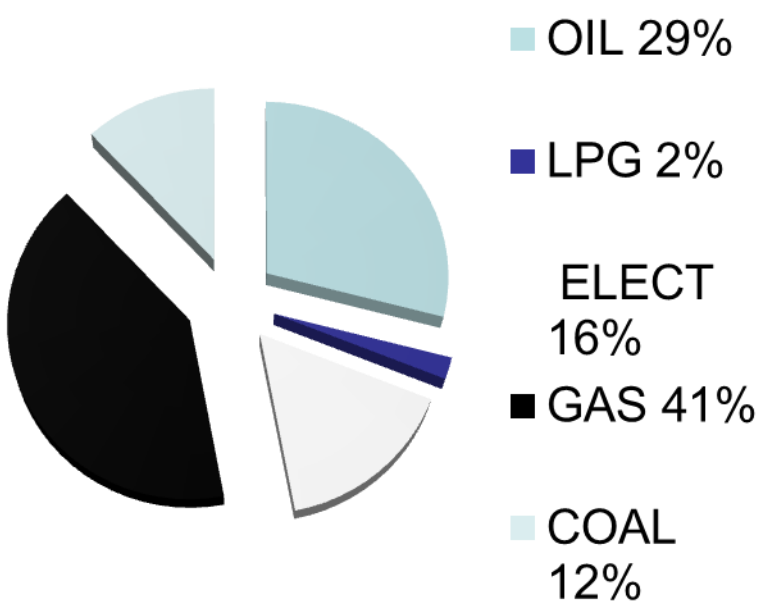
CONTD….

- PAKISTAN RENEW ABLE ENERGY RESOURCES

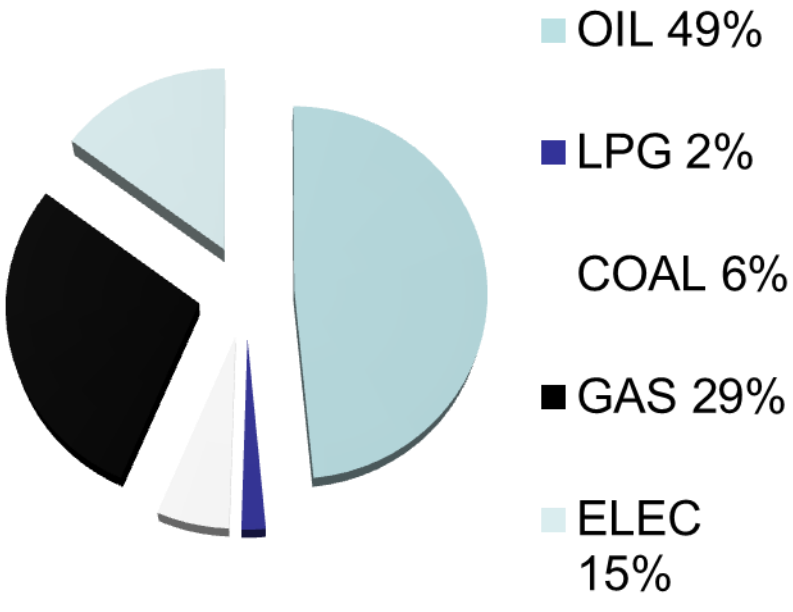
1. WIND ENERGY
2. SOLAR ENERGY
3. BIOMASS AND BIO FUELS
4. GEOTHERMAL ENERGY

TEN YEARS OF ENERGY CONSUMPTION

CONSUMPTION BY SOURCE 2006-07



CONSUMPTION BY SOURCE 1996-97



CAUSES OF ENERGY CRISIS

- ECONOMIC AND POLITICAL STABILITY
- FLUCTUATION OF OIL PRICES IN INTERNATIONAL MARKET
- FAULTY DISTRIBUTION SYSTEM
- AGEING OF EQUIPMENT
- UNPRODUCTIVE EFFORTS
- SILTING PROCESS
- MISMANAGEMENT OF RESOURCES

RECOMMENDATIONS

- A GOOG PLANNING IS NEEDED TO OVERCOME THIS INCREASING CRISIS:

1. SHORT TERM PLAN
2. MEDIUM TERM PLAN
3. LONG TERM PLAN

SHORT TERM PLAN

- INCREASE IPPs(Independent power producers)
- REACTIVATE CLOSED POWER STATIONS
- RENEW POWER DISTRIBUTION SYSTEM
- IMPORT ELECTRICITY TILL CRISIS

MID-TERM PLAN

- UTILIZATION RENEWABLE ENERGY RESOURCES
- INSTALLATION OF SOLAR,WIND, BIOGAS AND WIND PROJECTS IN ELLIGIBLE AREAS

LONG TERM PLAN

- DEVELOPING AND INSTALLING COAL BASED POWERHOUSES
- INITIATE ENERGY AGREEMENTS WITH FRIENDLY COUNTRIES
- EXPLORATION OF MORE OIL,GAS AND COAL FIELDS
- UPGRADATION IN TRAINING COURSES FOR ENGINEERS

CONCLUSIONS

- GOVERNMENT OF PAKISTAN MUST TAKE STEPS
- ENERGY PRODUCTION FROM COAL MUST BE INITIATED

THANKS

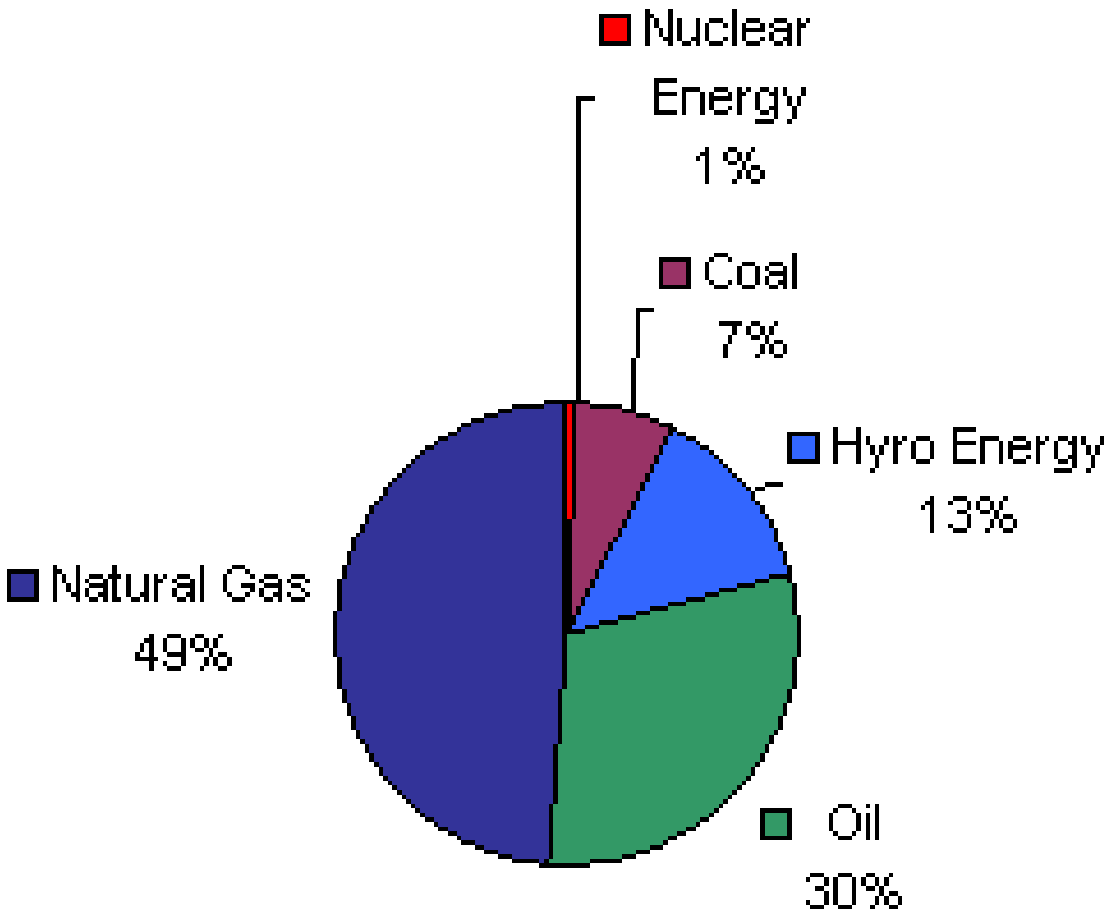
What is Energy Crisis

- An energy crisis is any great shortfall (or price rise) in the supply of energy resources to an economy. It usually refers to the shortage of oil and additionally to electricity or other natural resources.
  The crisis often has effects on the rest of the economy, with many recessions being caused by an energy crisis in some form. In particular, the production costs of electricity rise, which raises manufacturing costs.
  For the consumer, the price of gasoline (petrol) and diesel for cars and other vehicles rises, leading to reduced consumer confidence and spending, higher transportation costs and general price rising

Situation in Pakistan

- Pakistan's energy crisis is more of an oil price crisis rather than a real energy crisis. This is so because Pakistan has enormous coal reserves, worth about $ 30 trillion, and yet, the share of coal in its energy mix is less than 6%. The energy sector in Pakistan depends primarily upon oil (43%), followed by natural gas (38%) and hydroelectric-nuclear power (10%).

Pakistan's Energy Consumption, 2004



Source: Pakistan Ministry of Petroleum and Natural Resources

- The problem with underutilization of coal arises from its under exploration, which is partly because of poor technology use, partly because of inadequate investment in the sector, and partly a result of poor planning and inadequate private entrepreneurship. Another issue is the distance. While most coal reserves are located in the West, most of the demand exists in the Eastern Pakistan.


AFGHANISTAN
PAKISTAN
IRAN
INDIA
BALOCHISTAN
SINDH
NORTH WEST FRONTIER PROVINCE
JAMMU AND KASHMIR
KABUL
KARACHI
ARABIAN SEA
NEW DELHI
JAIPUR
WARSAK
MARDAN
TARBELA
PESHAWAR
I.S.P.R.
NEW REWAT
MANGLA
BURHAN
GBHP
BANNU
DAUDKHEL
CHEP
CHASNUPP
SABA
GAKHAR
SAHOWALA
K.S.KAKU
LAHORE
RAVI
GATTI
JAPAN
KEL
N.ABAD
ROUSCH
KAPCO
YOUSAFWALA
QUETTA
IND.
AES
HCPC
SIBBI
KHANEWAL
N.MULTAN
N.G.P.S.
M.GARH
UCH
GUDDU
LIBERTY
DADU
KOTRI
LAKHRA
JAMSHORO
HUBCO
KDA-33
(KESC)

- As of today, about half of the households in the country are not connected to the National Power Grid. This however is changing very fast, and as that happens, the per capita as well as overall demand of energy in the country will skyrocket very soon. Rising income levels are bound to bring with them a steep rise in household power consumption. Even before that happens, there is a reasonable possibility that the oil prices will rise, creating an energy crisis that the country cannot avoid.

Power Supply and Demand

Source PPIB

year	Firm Supply (MW)	Demand (MW)
2004	15046	13831
2005	15082	14642 (440)
2006	15072	15483 (-411)
2007	**15091**	**16548 (-1457)**
2008	15055	17689
2009	15055	19080
2010	15055	20584 (-5529)

Major Causes of Load shedding

- Gap between supply and demand is caused by
  - Increase in Demand
  - No increase in generation capacity
  - Expensive purchase of power from IPPs
  - Fault in power generators
  - Excessive load on transformers
  - Breakdown of transmission and distribution lines
  - Line Losses and Theft

Causes of Load shedding Survey by Gallup Pakistan, **May 25, 2007**

- 41% inefficiency of WAPDA, KESC
- 28 % shortage of water resources
- 16 % the faulty electric lines
- 13 % the improper maintenance of the power cables

Effects of Load shedding

- Economic losses up to 1.7% of GDP
- Public displeasure, distrust and discomfort
- It restrains the prospective investors
- low productivity
- Sleepless nights

QUOTATION

Ecologist William Rees believes that

> “To avoid a serious energy crisis in coming decades, citizens in the industrial countries should actually be urging their governments to come to international agreement on a persistent, orderly, predictable, and steepening series of oil and natural gas price hikes over the next two decades.”

Alternative Sources of Energy

- Some experts argue that the world is heading towards a global energy crisis due to a decline in the availability of cheap oil and recommend a decreasing dependency on fossil fuel. This has led to increasing interest in alternate power/fuel research such as fuel cell technology, hydrogen fuel, biomethanol, biodiesel, Karrick process, solar energy, tidal energy and wind energy. To date, only hydroelectricity and nuclear power have been significant alternatives to fossil, with big ecological problems (residues and water spending). Hydrogen gas is currently produced at a net energy loss from natural gas, which is also experiencing declining production in North America and elsewhere. When not produced from natural gas, hydrogen still needs another source of energy to create it, also at a loss during the process. This has led to hydrogen being regarded as a 'carrier' of energy rather than a 'source'.

Alternative Sources of Energy

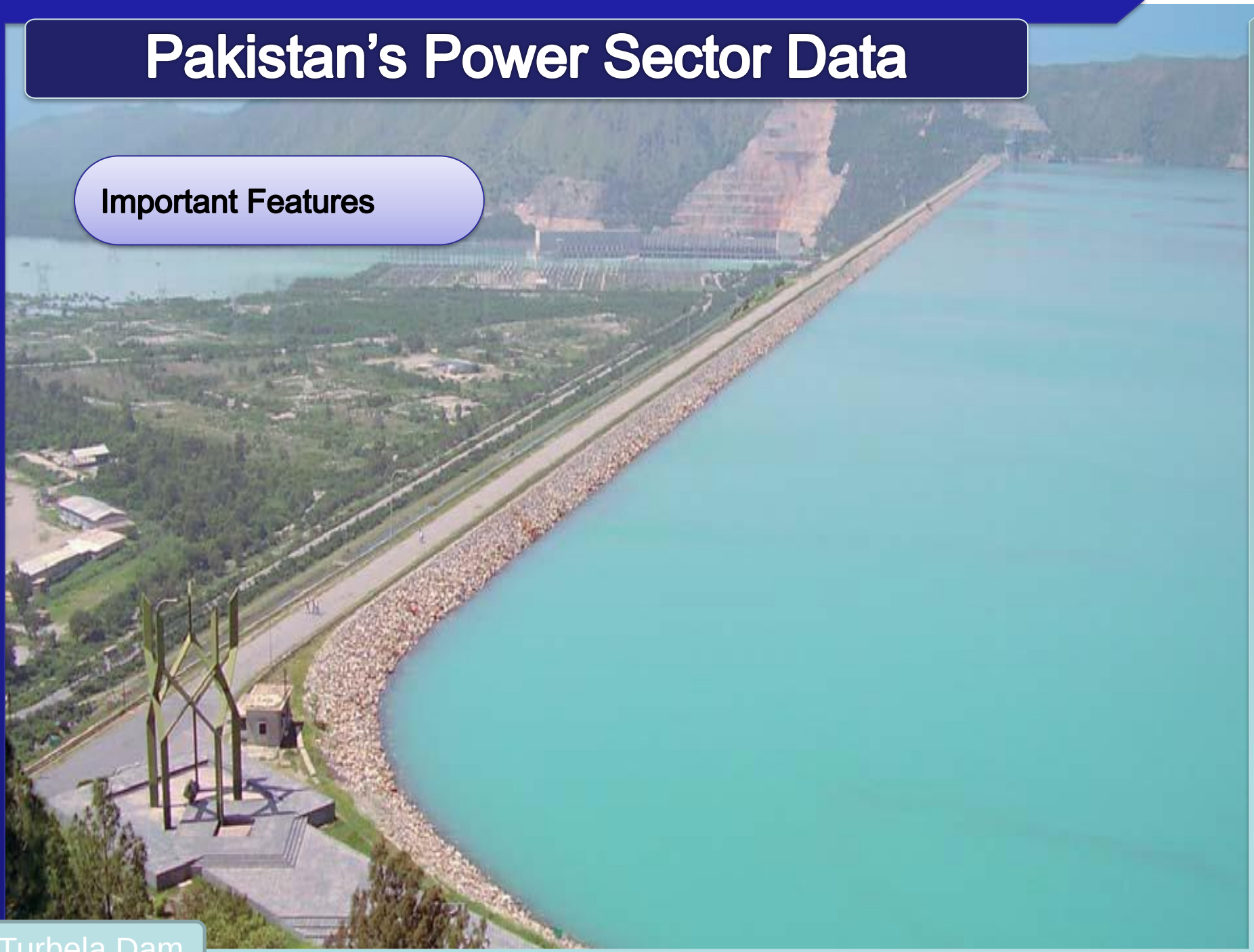
- There have been alarming predictions by groups such as the Club of Rome that the world would run out of oil in the late 20th century. Although technology has made oil extraction more efficient, the world is having to struggle to provide oil by using increasingly costly and less productive methods such as deep sea drilling, and developing environmentally sensitive areas such as the Arctic National Wildlife Refuge. The world's population continues to grow at a quarter of a million people per day, increasing the consumption of energy. The per capita energy consumption of China, India and other developing nations continues to increase as the people living in these countries adopt western lifestyles. At present a small part of the world's population consumes a large part of its resources, with the United States and its population of 296 million people consuming more oil than China with its population of 1.3 billion people.

- Efficiency mechanisms such as Negawatt power can provide significantly increased supply. It is a term used to describe the trading of increased efficiency, using consumption efficiency to increase available market supply rather than by increasing plant generation capacity.

ANALYSIS OF ENERGY CRISIS IN PAKISTAN

Pakistan's Power Sector Data

Important Features



Turbela Dam

Pakistan's Power Sector Data

- Generation Data
- Length of TM lines
- Total Grids in Pak
- Total Losses in TM lines
- Energy Crisis in Pak
- Solution

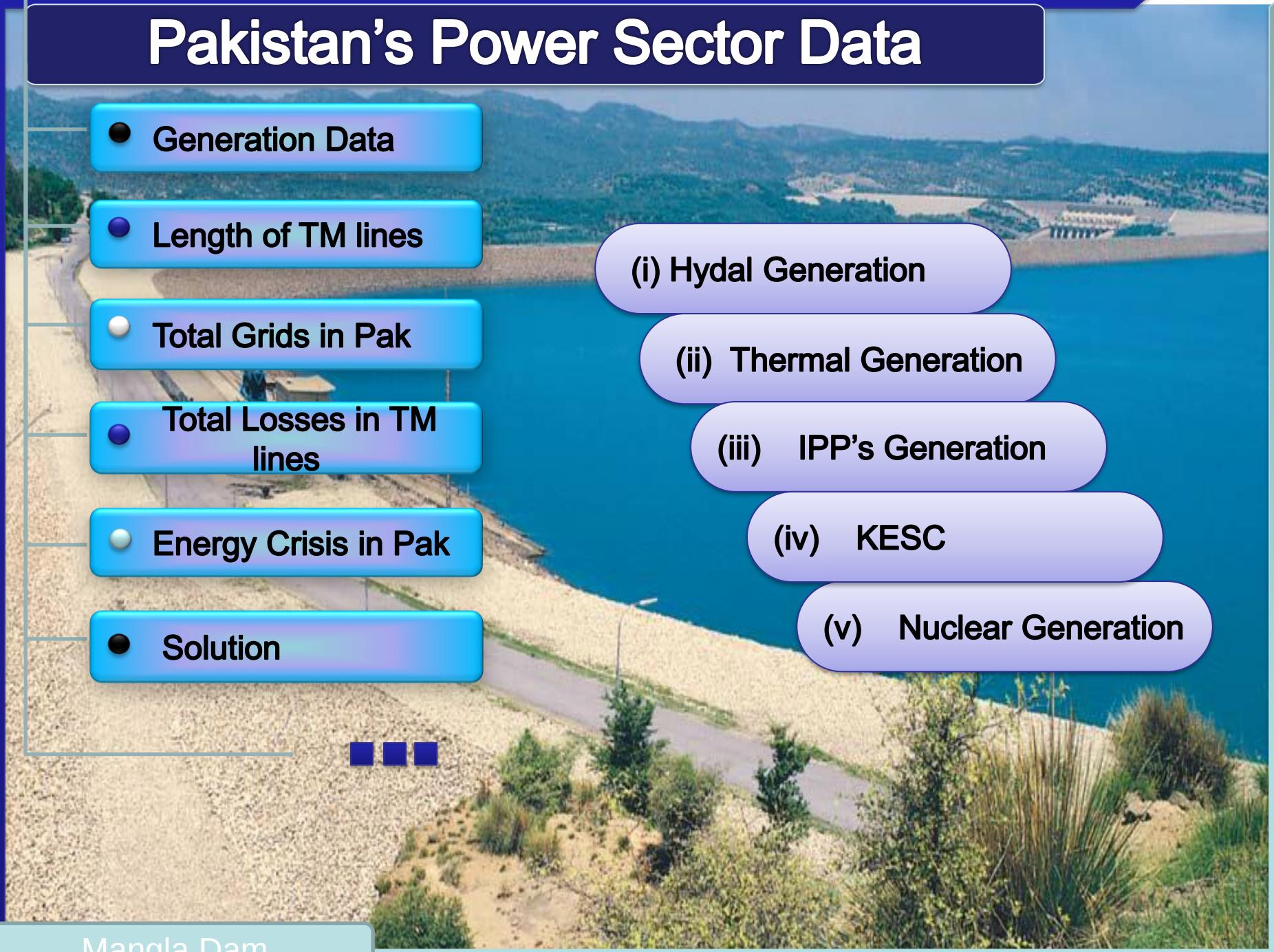
(i) Hydal Generation

(ii) Thermal Generation

(iii) IPP's Generation

(iv) KESC

(v) Nuclear Generation



Mangla Dam

Sr.No	Name of Station	Location	Installed capacity (MWs)
1	Tarbela	Indus River	3478
2	Ghazi Barotha	Indus River	1450
3	Mangla	Jehlum River	1000
4	Warsak	Kabul River	240
5	Chashma	Indus River (Mianwali)	184
6	Rajdhani	Poonch	132
7	Duber Khwar	Duber Khwar River	130
8	Allai khwar Dam	Allai khwar River	121
9	Gulpur	AJK	120
10	Gabral	Kalam	101
11	Kotli	AJK	100
12	Jinnah Hydropower Project	Jinnah Barrage	96
13	New bong escape (Lehri)	Jehlum River	84
14	Matiltan	Swat River	84
15	Malakand III	Dir	81
16	Khan khwar Dam	Besham	72
17	Jagran	AJK	30
18	Rasul	River Jehlum (Mandi Bahauddin)	22
19	Jabban	Swat canal	22
20	Malakand	Swat River	20
21	Dargai	Swat River	20
22	Naltar	Hunza River	18
23	Gomal Zam Dam	Gomal River	17.5
24	Nandipur	Upper chenab	14
25	Shadiwal	Canal from river jehlam	14
26	Chichoki Malian	Upper chenab canal	13
27	K.Garhi & Renala	Kachkot chanal	5
28	Satpara	Satpara Lake (Skardu)	5
		ludko	1

Pakistan's Power Sector Data

- Generation Data

(ii) Wapda Thermal Genratn

S.No	Name of Station	Location	Installed Capacity (MW)
1	Gas Turbine Power Station	Shahdra	59 MW
2	Steam Power Station	Faisalabad	132 MW
3	Gas Turbine Power Station	Faisalabad	244 MW
4	Gas Power Station	Multan	195 MW
5	Thermal Power Station	Muzaffargarh	1350 MW
6	Thermal Power Station	Guddu	1655 MW
7	Gas Turbine Power Station	Kotri	174 MW
8	Thermal Power Station	Jamshoro	850 MW
9	Thermal Power Station	Larkana	150 MW
10	Thermal Power Station	Quetta	35 MW
11	Gas Turbine Power Station	Panjgur	39 MW
12	Thermal Power Station	Pasni	17 MW
	Total Thermal		**4811 MW**
			http://en.wikipedia.org/wiki/List_of_power_stations_in_Pakistan

Thermal Power Station, Jamshoro

Pakistan's Power Sector Data

- Generation Data
- Length of TM lines
- Total Grids in Pak
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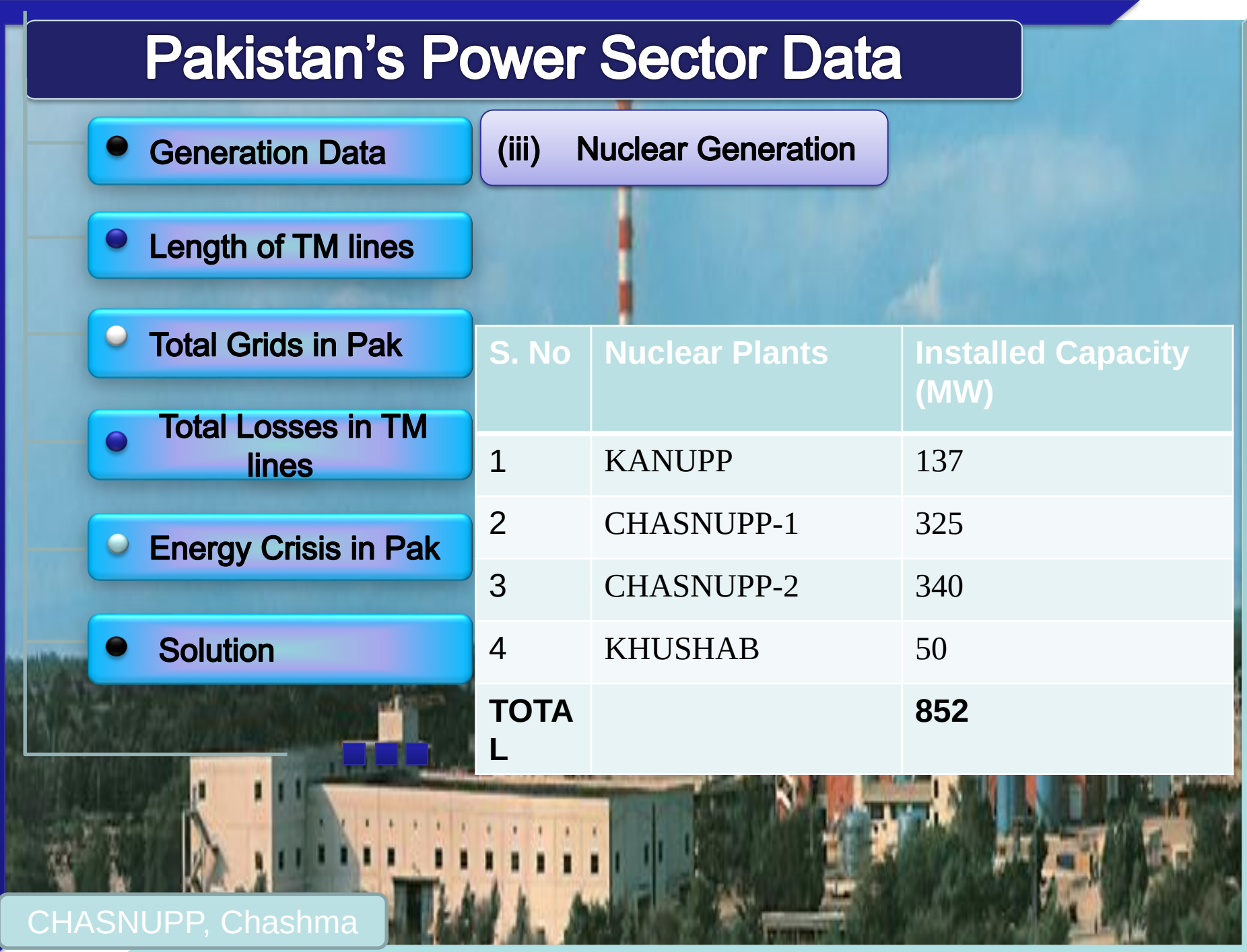
- Solution

(iii) Nuclear Generation

S. No	Nuclear Plants	Installed Capacity (MW)
1	KANUPP	137
2	CHASNUPP-1	325
3	CHASNUPP-2	340
4	KHUSHAB	50
TOTAL		**852**



CHASNUPP, Chashma

Pakistan's Power Sector Data

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(iv) Karachi Electric Supply Company

S. No	Power Plants	Installed Capacity (MW)
1	Thermal power Station, Korangi	316
2	Gas Turbine power station, Korangi	80
3	Gas Turbine Power station. SITE	100
4	Thermal power station, Bin Qasim	1260
TOTAL		**1756**

S.No	Power Projects	Capacity (MW)
1	Hub Power Project	1292
2	AES Lalpir Ltd, Mahmood Kot Muzaffargar	362
3	AES Pak Gen, Mahmood Kot Muzaffargar	365
4	Altern Energy Ltd, Attock	29
5	Fauji Kabirwala Power Company, Khanewal	157
6	Gul Ahmad Energy Ltd, Korangi	136
7	Habibullah Coastal Power Limited	140
8	Japan Power Generation, Lahore	120
9	Kohenoor Energy Limited, Lahore	131
10	Liberty Power Limited, Ghotki	232
11	Rousch Power, Khanewal	412
12	Saba Power Company, Sheikhupura	114
13	Southern Electric Power Company Limited, Raiwind	135
14	Tapal Energy Limited, Karachi	126
15	Uch Power Limited, Dera Murad Jamali, Nasirabad	586
16	Attock Gen Limited, Morgah Rawalpindi	165
17	Atlas Power, Sheikhupura	225
18	Engro Energy Limited, Karachi	
19	Kot Addu Power Company Limited (Privatized)	1638
20	Saif Power Plant Qadirabad, Sahiwal	225
21	Sitara Energy	80
22	Nishat Chunian Power	200
23	Nishat Power Limited	200
24	Jamshoro Power Company	1054
25	TNB Liberty Power Plant,Dharki	250
		8374

Atlas power

Pakistan's Power Sector Data

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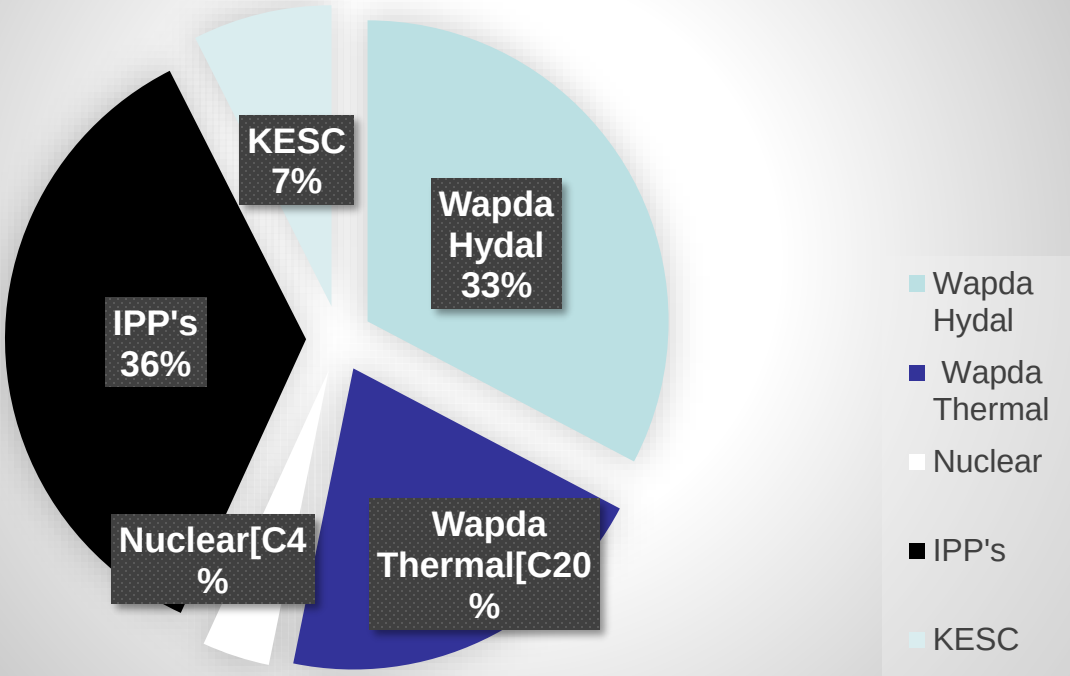
Total energy Production

Hydal = 7674.5 MW
Thermal = 4811 MW
Nuclear = 852 MW
KESC = 1756 MW
IPP's = 8374 MW

Total = 23,467.5 MW



Pakistan's Power Sector Data

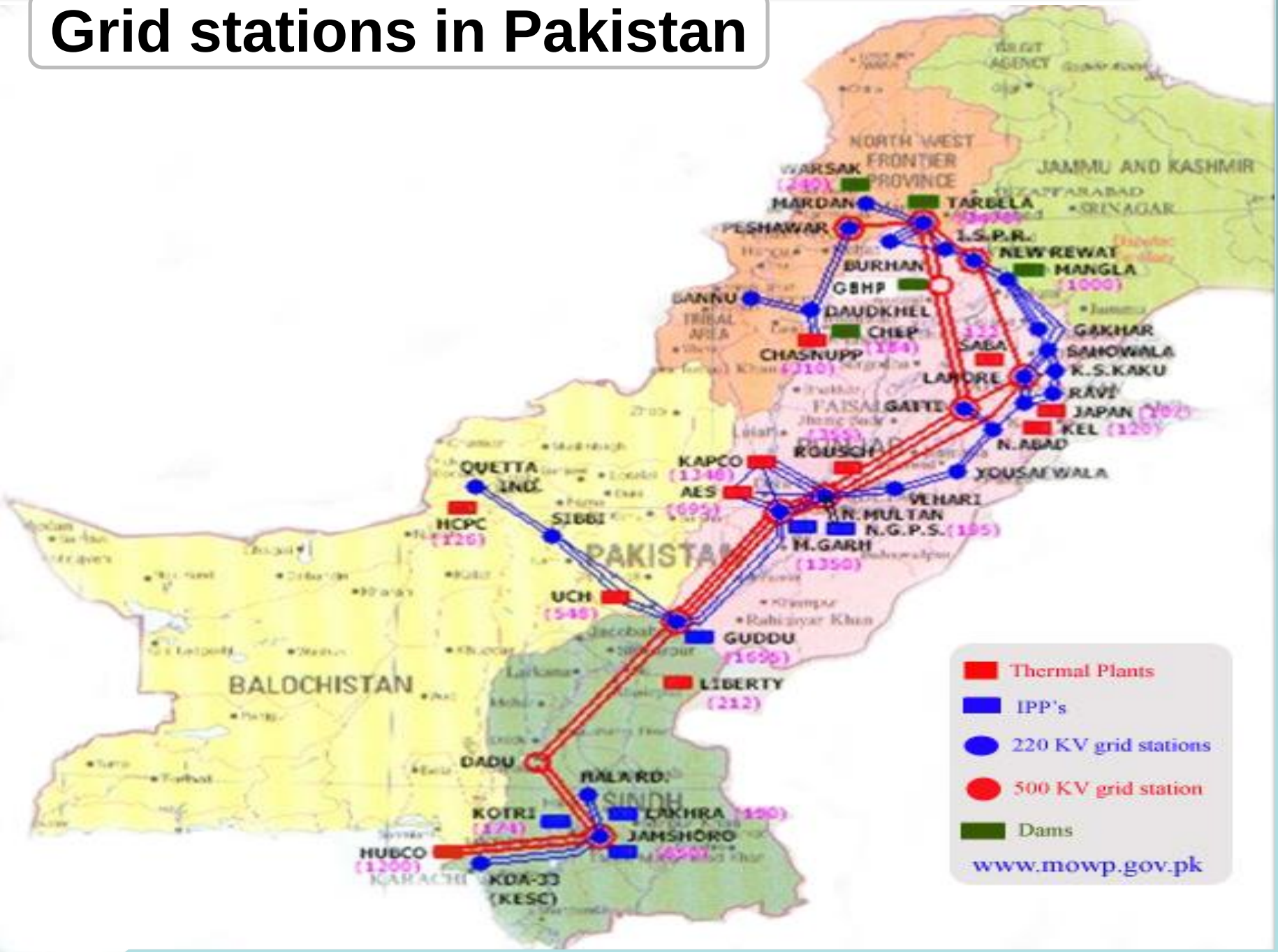
- Generation Data

Future Feasibility Planning

S. No.	Project	River	Location	Installed Capacity (MW)	Estimated Construction Cost (US$)
1	Keyal Khwar	Keyal Khwar	Patan	122	160 million
2	Kohala	Jhelum	Kohala	1100	1.7 billion
3	Dasu	Indus	Dasu	4000	6.5 billion
4	Lower Spat Gah	Spat Gah	Patan	610	700 million
5	Lower Palas Valley	Chor Nullah	Patan	621	700 million
6	Bunji	Indus	Gilgit	7100	6 billion
7	Phandar	Ghizar	Gilgit	80	65 million
8	Basho	Basho	Skardu	28	30 million
9	Lawi	Shishi	Darosh-Chitral	70	120 million
10	Thakot	Indus	Thakot	2800	5 billion
11	Patan	Indus	Patan	2800	5 billion
12	Golen Gol	Golen Gol-Mastuj	Chitral-Mastuj	106	130 million
13	Harpo	Harpo-Lungma	Skardu	33	40 million
		Indus	Skardu	3000	6 billion

Bunji power Project

Grid stations in Pakistan



Pakistan's Power Sector Data

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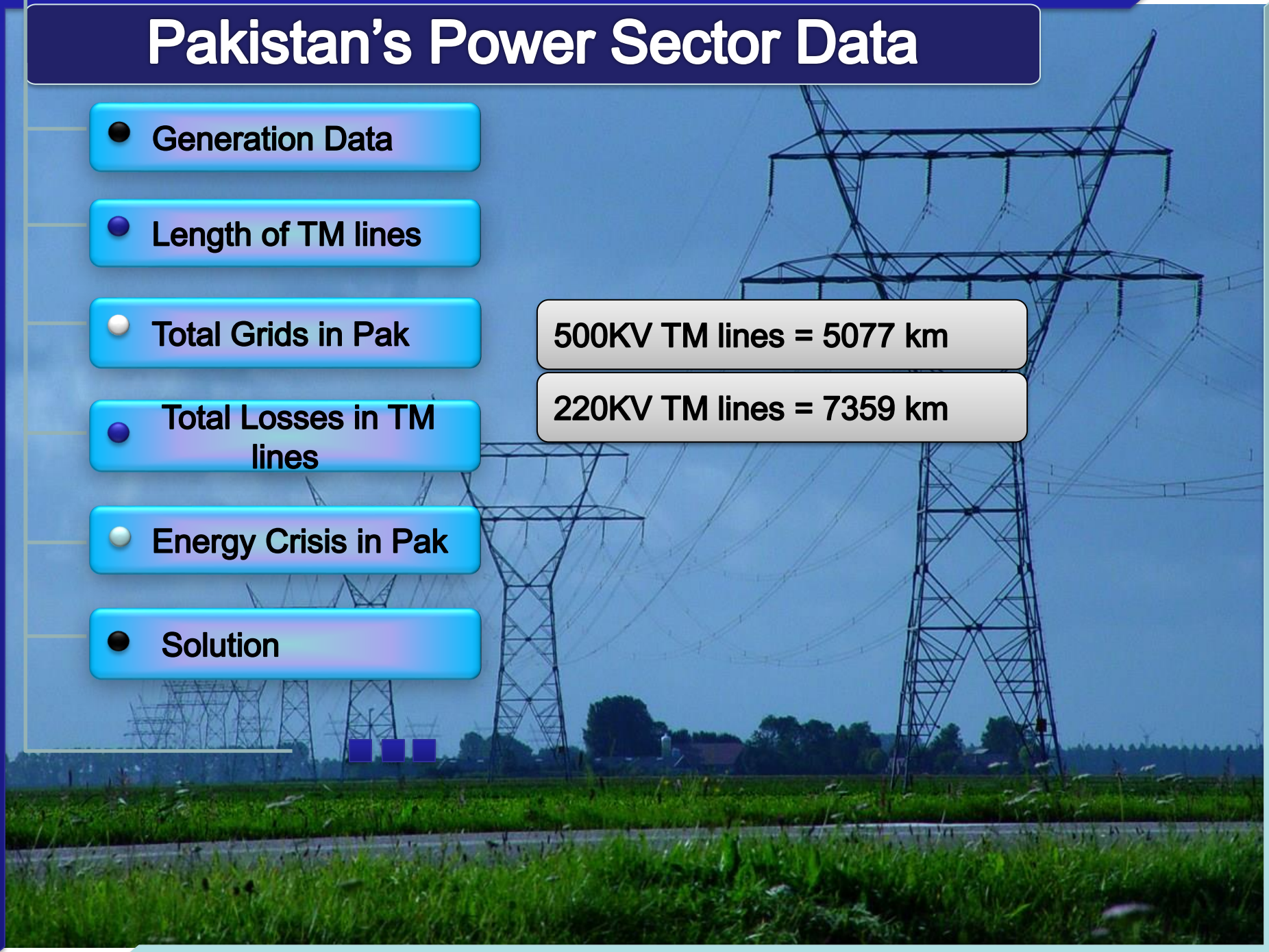
500KV TM lines = 5077 km

220KV TM lines = 7359 km



Pakistan's Power Sector Data

- Generation Data

Length of TM lines

PUNJAB	500KV	220KV	132KV	66KV	Total
2012	5,078	7,367	23,994	9,069	45,508

Sindh	500KV	220KV	132KV	66KV	Total
2012	1,216	795	3,736	1,802	7,549

KPK	500KV	220KV	132KV	66KV	Total
2012	175	750	2,739	1,187	4,851

Baluchistan	500KV	220KV	132KV	66KV	Total
2012	27	768	3,994	1,496	6,285

Mangla Switchyard

Pakistan's Power Sector Data

- Generation Data
- Length of TM lines
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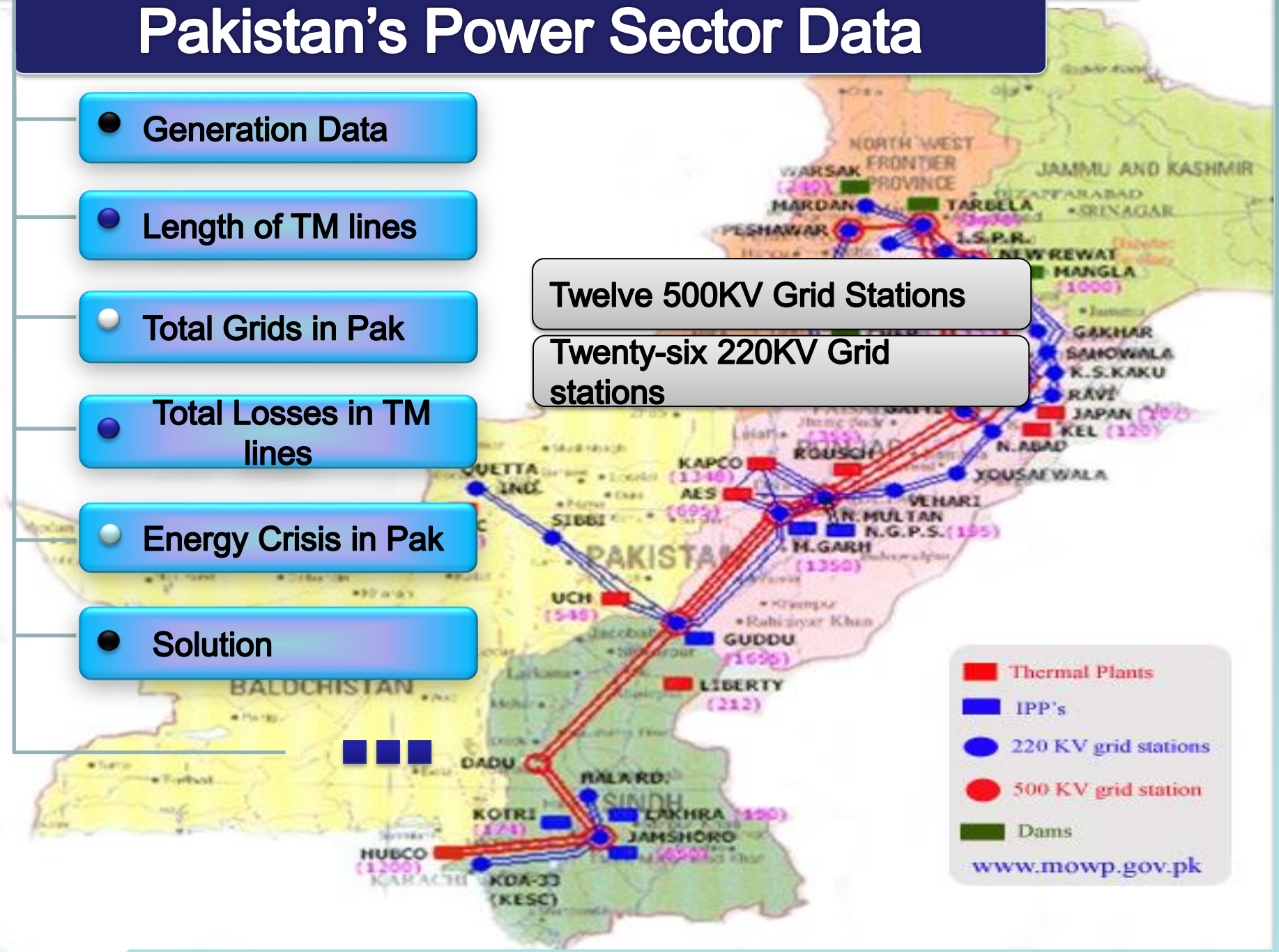
- ■ ■ ■

Twelve 500KV Grid Stations

Twenty-six 220KV Grid stations



Pakistan's Power Sector Data

- Generation Data
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- Solution

Total grids in Pak

Twelve 500KV Grid Stations

1	GRID STATION SHEIKH MUHAMMADI PESHAWAR
2	GRID STATION REWAT
3	GRID STATION SHEIKHUPURA
4	GRID STATION GATTI FAISALABAD
5	GRID STATION NOKHAR
6	GRID STATION NEW MULTAN
7	GRID STATION MUZAFARGARH
8	GRID STATION SAHIWAL (YOUSAFWALA)
9	GRID STATION GUDDU
10	GRID STATION DADU
11	GRID STATION JAMSHORO
12	GRID STATION NKI

Pakistan's Power Sector Data

- Generation Data
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Total Grids in pak

Twentysix 220KV Grid Stations

1	GRID STATION DADU KHAIL
2	GRID STATION BANNU
3	GRID STATION MARDAN
4	GRID STATION BURHAN
5	GRID STATION ISPR (SANGJANI)
6	GRID STATION UNIVERSITY ISLAMABAD
7	GRID STATION SHAHI BAGH PESHAWAR
8	GRID STATION GAKHAR
9	GRID STATION SIALKOT
10	GRID STATION KALASHAH KAKU
11	GRID STATION RAVI LAHORE
12	GRID STATION BUND ROAD LAHORE
13	GRID STATION KOTLAKHPAT LAHORE
14	GRID STATION SARFRAZNAGAR
15	GRID STATION NISHATABAD FAISALABAD
16	GRID STATION JARANWALA ROAD FAISALABAD
17	GRID STATION SUMMANDRI ROAD FAISALABAD
18	GRID STATION LUDEWALA SARGODHA
19	GRID STATION VEHARI
20	GRID STATION BAHAWALPUR
21	GRID STATION MUZAFARGARH
22	GRID STATION SIBBI
23	GRID STATION QUETTA INDUSTRIAL AREA
24	GRID STATION HALA ROAD HYDERABAD
25	GRID STATION SHIKARPUR
26	GRID STATION T.M.KHAN ROAD, HYDERABAD

Pakistan's Power Sector Data

- Generation Data
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(i)Conductor Heating/Power losses

To reduce conductor loss simply shorten the transmission line or use a larger diameter wire.

(ii) Dielectric heating losses

A difference of potential Between two conductors of a metallic transmission line causes dielectric heating.

(iii) Radiation losses

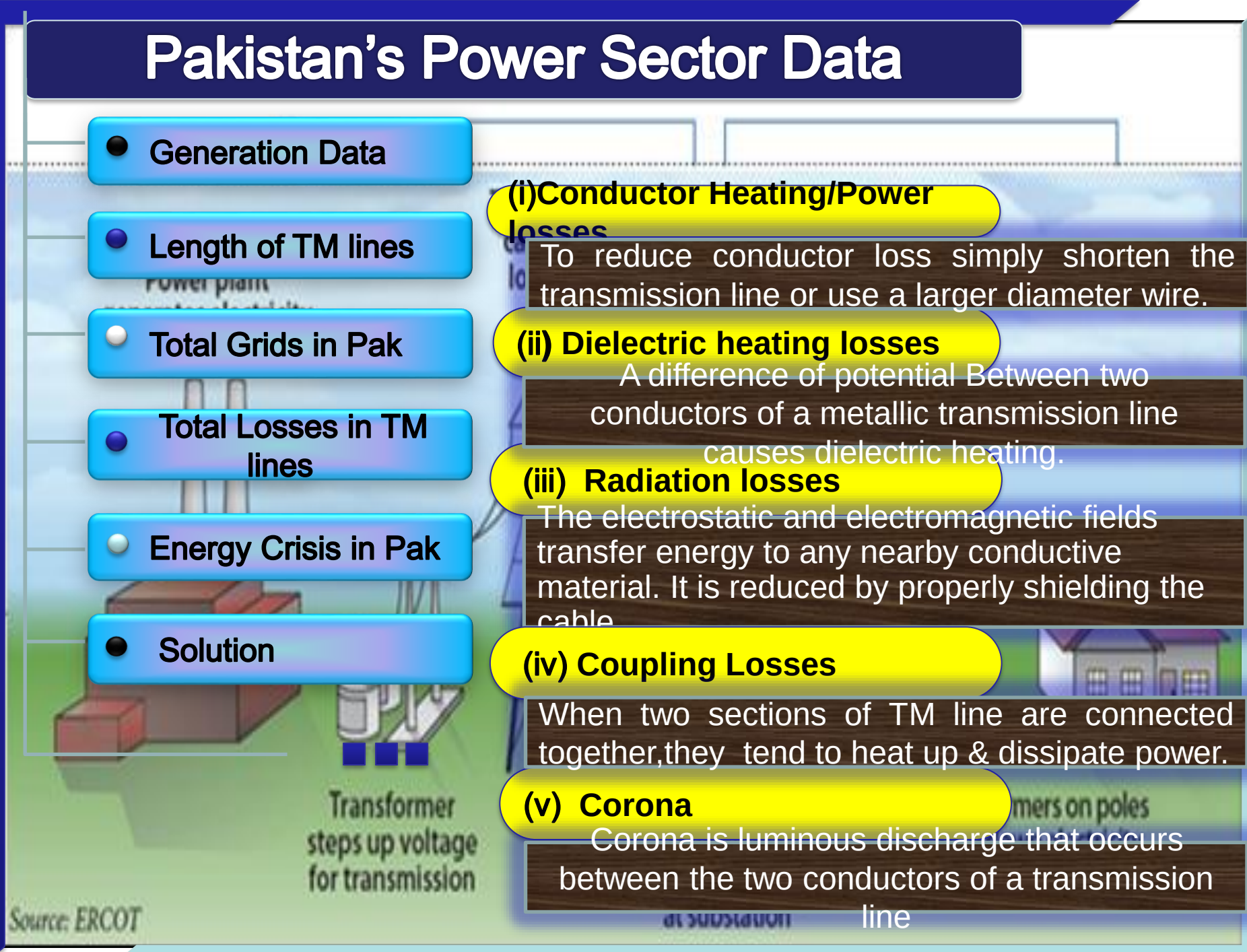
The electrostatic and electromagnetic fields transfer energy to any nearby conductive material. It is reduced by properly shielding the cable

(iv) Coupling Losses

When two sections of TM line are connected together,they tend to heat up & dissipate power.

(v) Corona

Corona is luminous discharge that occurs between the two conductors of a transmission line



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- Energy Crisis in Pak
- Solution

The present crisis started around 2007-2008 as a gradual increase in demand in power consumption.

The actual available capacity has always remained below 14,000 MW because the (IPPs) have not been able to buy the fuel oil.

Total **electricity generation** has virtually remained flat since 2008.

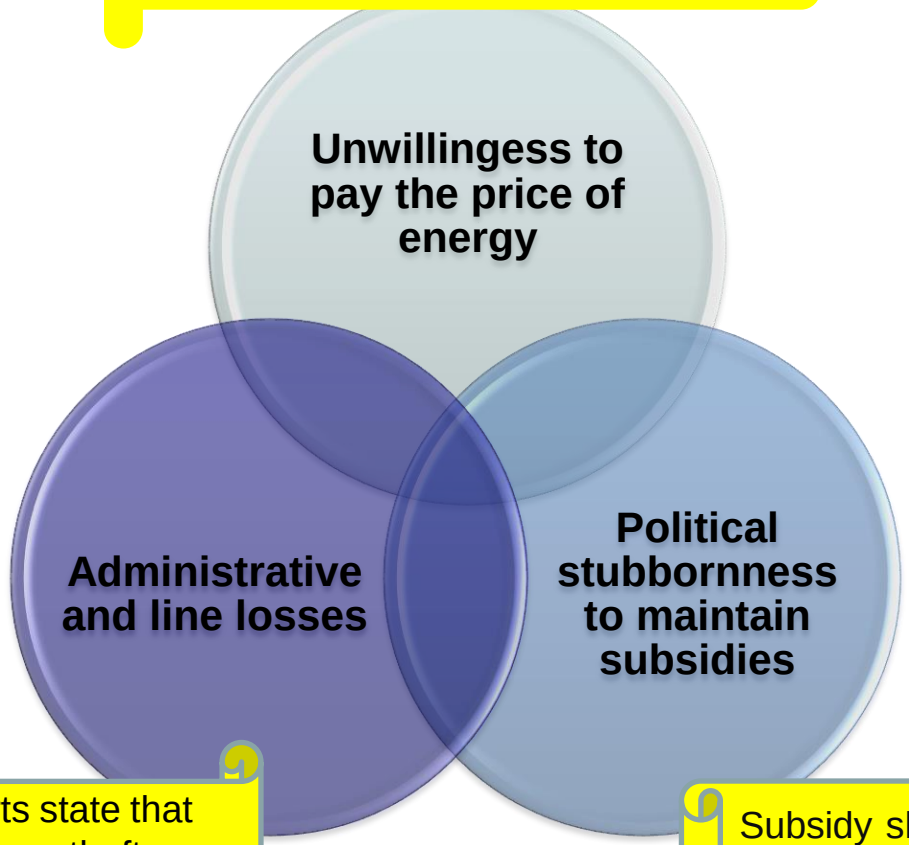
Lack of maintenance of power stations, public sector power plants lost nearly 1/3 of their capacity & nearly 17% of their thermal efficiency due toplant degradation

The **tear & wear in Transmission** lines has caused enormous fall in power, termed as line losses.

Power-theft is also common in various parts of the country, which has facilitated downfall in power output.

Pakistan's Power Sector Data

People use energy, and don't pay bills, and legislation about Power-theft is too week to Wipe this menace.



- 2013 MOWP reports state that Pakistan line losses + theft = PKR 150 Billion
- 23770 cases registered in 2013, but only 3 cases were punished.

Subsidy should be given to poor, but here subsidy does not reach poor, instead the political wells compel them to subsidize their love-ones.

Pakistan's Power Sector Data

- Generation Data
- Length of TM lines
- Total Grids in Pak
- Total Losses in TM lines
- Energy Crisis in Pak
- Solution

(1) Stand-alone power projects

(2) Provincialization of National Grids

(3) Initiation of Mega-Dams

(4) Reciprocation of oil and gas.

(5) Improving efficiency of TM lines

(6) People-awareness about power theft

(7) Initiating projects on coal.

(8) Improvement of Metering system

(9) WAPDA employees

Neelum Jehlum Project

Pakistan's Power Sector Data

S.No.	River/ Tributary	Power (MW)
1.	Indus River	35760
2.	Tributaries of Indus river of NWFP	5558
	Sub Total (1+2)	41318
3.	Jhelum River	3143
4.	Kunhar River	1250
5.	Neelum River & its Tributaries	2459
6.	Poonch River	397
	Sub Total (3+4+5+6)	7249
7.	Swat River & its Tributaries	2388
8.	Chitral River & its Tributaries	2282
	Sub Total (7+8)	4670
9.	Schemes below 50 MW on Tributaries	1290
	TOTAL	**54527**

IPPs Under Construction

Tot. Capacity: 2539 MW

Tot. Inv: US$2.6 Billion

PUNJAB

AttockGen Power Project	165	Dec-08
Atlas Power Project	225	Mar-09
Orient Power Project	225	Apr-09
Muridke (Sapphire) Power Project	225	Jul-09
Nishat Power Project	200	Dec-09
Sahiwal (Saif) Power Project	225	Feb-10
Hubco Narowal	220	Mar-10
Nishat Chunian Power Project	200	Dec-10
Bhikki (Halmore) Project	225	Dec-10
Liberty Power Tech Project	200	Dec-10

SINDH

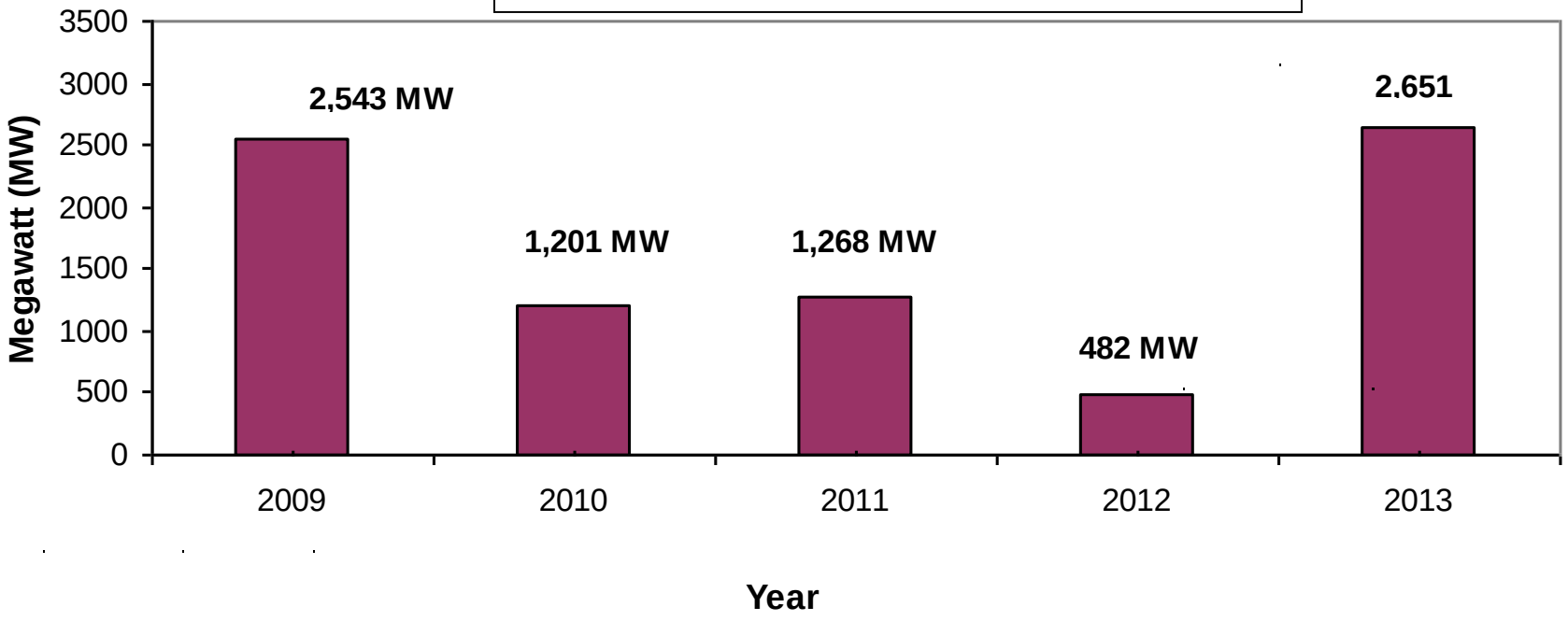
Fauji Mari Power Project	202	Sep-09
Engro Power Project	227	Dec-09

Private Sector Capacity Addition in Next 5 YRS (2009 - 13)

Oil based	2,960 MW
Gas/Fuel	2,118 MW

Hydel	667 MW
Coal based	2,400 MW

Total IPPS Capacity Addition: 8,145 MW




Thank you

Situation Analysis: Policy level

- **No new capacity added to WAPDA's system in the past five years**

- **In 2003, two new power projects of 900MW in Karachi, were proposed by PPIB, but could not materialize due to no gas supply**

Situation Analysis: Policy level

- In pre-privatization period, the KESC was not allowed to add new capacity
- New KESC management refused to purchase electricity from Tapal Group and Fauji Foundation, with a view to construct its own capacity -Dawn

Situation Analysis: policy level

- Failure of Power policy 2002 to attract sufficient IPPs for hydel and coal projects

- Incorrect Forecast of growth in power demand

Situation Analysis: operation level

- Failure to revamp or replace obsolete transmission lines by the KESC and NTDC.

- Failure of Distribution companies to plan growing load and new grid stations, transformers to avoid overheating of equipments.

Situation Analysis: Operation level

- Failure of distribution companies to mitigate line losses and power theft

- Low Motivation level, poor work ethics and lack of integrity of employees

Government's Load Management and Conservation Strategy

- Closure of The shops in big cities
- The rest of the shortage would be met through load-shedding.
- The farmers advised to operate their tube wells during off peak hours
- load-sharing by the consumers

Way Forward

- Construction of new dams
- Exploitation of nuclear energy
- Greater use of coal reserves
- Alternate Energy Development Policy
- Securing the uninterrupted energy supplies

Way Forward

- Cutting of line losses and power theft
- Upgrading the plants, transmission and distribution lines
- Negotiating an effective rates with IPPs
- Consumer awareness campaign

Pakistan's Energy Policy

- It invites investment from the private sector for following categories of proposals:
- Independent power projects, or IPPs (for sale of power to the grid only)
- Captive cum grid spillover power projects. (i.e., for self-use and sale to utility)
- Captive power projects (i.e., for self or dedicated use)
- Isolated grid power projects (i.e., small, stand-alone)
- Except for Category (a) above, these projects will not require any LOI, LOS, or IA from the Government.
- Electricity purchase by NTDC/CPPA from qualifying renewable energy-based generation projects has been made mandatory.

- It permits an investor to generate electricity based on renewable resources at one location and receive an equivalent amount for own use elsewhere on the grid at the investor's own cost of generation plus transmission charges (wheeling).
- It allows net metering and billing so that a producer can sell surplus electricity at one time and receive electricity from the grid at another time and settle accounts on net basis. This will directly benefit the economics of small scale, dispersed generation and optimize capacity utilization of installed systems.
- It de-licences and deregulates small scale power production through renewable resources (up to 5 MW for hydro and 1 MW for net metered sales) to reduce the transaction costs for such investments. This will be particularly beneficial for micro, mini and small hydro as well as solar-based electricity production.

- It lays down simplified and transparent principles of tariff determination.
- In insulates the investor from resource variability risk, which is allocated to the power purchaser.
- It facilitates projects to obtain carbon credits for avoided greenhouse gas emissions, helping improve financial returns and reducing per unit costs for the purchaser.

SOLUTION FOR PAKISTAN

- The ideal solution to Pakistan's energy crisis is constructing pipelines that will allow it to import gas from other countries, the development of hydro-electric power, through the creation of dams, thermal power, construction of energy plants and increasing the use of solar and wind power. Some of these options, particularly thermal power, are cost prohibitive, which means that they must be viewed as longer term projects. However, the Pakistan government has begun to work in partnership with the Chinese in an effort to speed up the process of regenerating existing infrastructure and the dam building projects.

Iran-Pakistan-India Natural Gas Pipeline Route

- Increase the share of coal in the energy-mix being used by the country. China uses coal to serve around 70% of its needs. India uses it for 60% of its energy needs. There is no reason why the same can not happen in Pakistan. In fact even a share of 30 to 35% taken up by coal during the next ten years will serve as a major boost for the oil-gas dependent energy sector of Pakistan.

Sequence of Presentation

- Definition
- Major Causes of Load shedding
- Effects of Load shedding
- Situation Analysis
- Government’s Strategy for Load Management and Energy conservation
- Way Forward
- Conclusion

Definition

Load shedding: cutting off the electric current on certain lines when the demand becomes greater than the supply

wordnet.princeton.edu/perl/webwn

Major Causes of Load shedding

- Gap between supply and demand is caused by
  - Increase in Demand
  - No increase in generation capacity
  - Expensive purchase of power from IPPs
  - Fault in power generators
  - Excessive load on transformers
  - Breakdown of transmission and distribution lines
  - Line Losses and Theft

Causes of Load shedding Survey by Gallup Pakistan, **May 25, 2007**

- 41% inefficiency of WAPDA, KESC
- 28 % shortage of water resources
- 16 % the faulty electric lines
- 13 % the improper maintenance of the power cables

Effects of Load shedding

- Economic losses up to 1.7% of GDP
- Public displeasure, distrust and discomfort
- It restrains the prospective investors
- low productivity
- Sleepless nights

Power Supply and Demand

Source PPIB

year	Firm Supply (MW)	Demand (MW)
2004	15046	13831
2005	15082	14642 (440)
2006	15072	15483 (-411)
2007	**15091**	**16548 (-1457)**
2008	15055	17689
2009	15055	19080
2010	15055	20584 (-5529)

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Conclusion

- Pakistan has tremendous potential for electricity generation from water, coal, oil, gas, nuclear, wind and solar resources. But this requires development of capacity in terms of human resources and capital formation and technological development to exploit these resources to over come shortage of power and minimize problem of load shedding.

Thanks

- Q&A