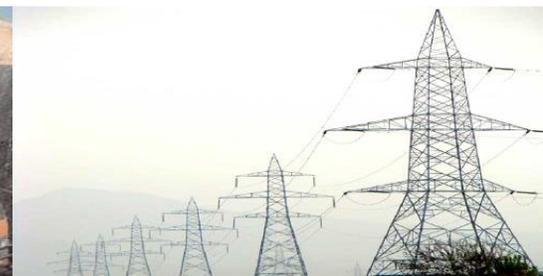


THAR COAL: A GATEWAY TO ENERGY SECURITY

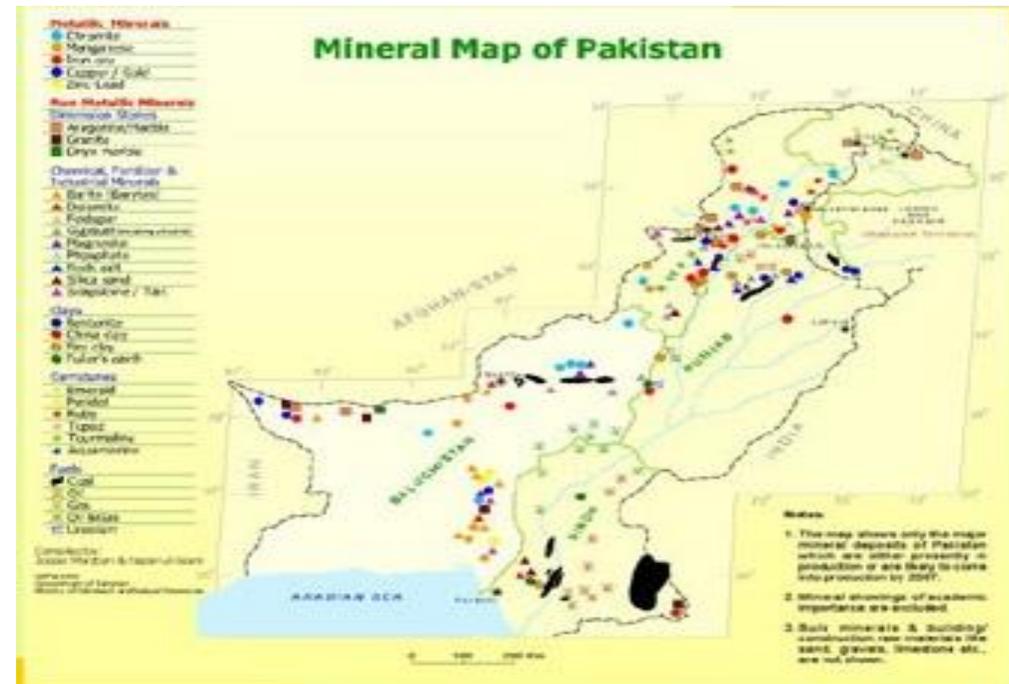
Nasir Soomro
Assistant Director
Coal Mines Development
Energy Department, Sindh.



Non-Renewable Natural Resources Of Pakistan

Among The World's 200 Plus Countries Pakistan Has

- ▶ 6nd Largest Coal Reserves
- ▶ 2nd Largest Salt Mines
- ▶ 5th Largest Gold Reserves
- ▶ 7th Largest Copper Reserves
- ▶ 6th Largest Gas Producing Capacity In Asia Pacific
- ▶ 436.2 Million Barrels Of Proven Oil Reserves
- ▶ 31.3 Trillion Cubic Feet Of Proven Gas Reserves





Himalayan Mountains

AFGHANISTAN

Highlands

PAKISTAN

Indus River

Thar Desert

Arabian Sea

INDIA

What is “Coal”

Initially the peat is converted into lignite or 'brown coal' - these are coal-types with low organic maturity. In comparison to other coals, lignite is quite soft and its color can range from dark black to various shades of brown.

“Lignite” or “Brown Coal”

Bituminous Coal

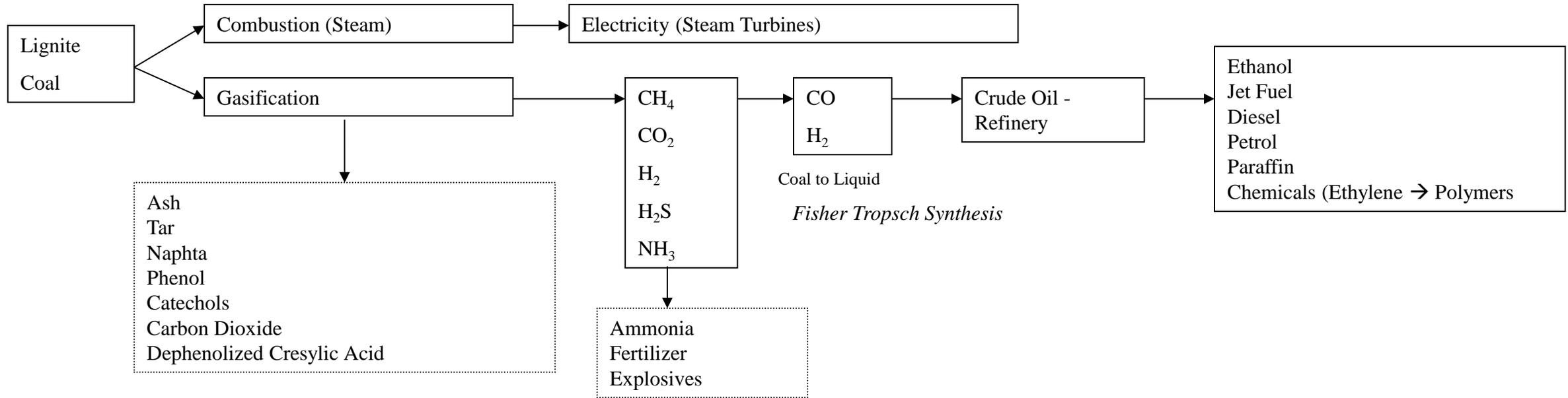
“soft coal”

“Hard Coal” or “Black Coal”

Sub-Bituminous coal



Uses of Lignite

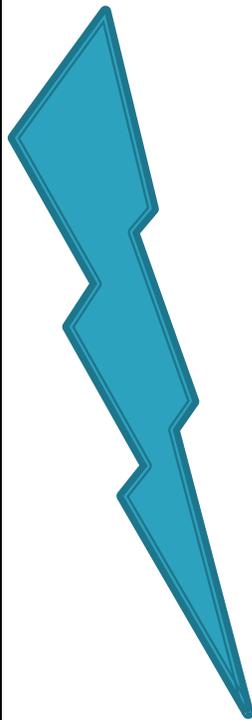


Source: Syngas and Coal Technology, R & D, SASOL - Mr Johannes Van Heerde

History

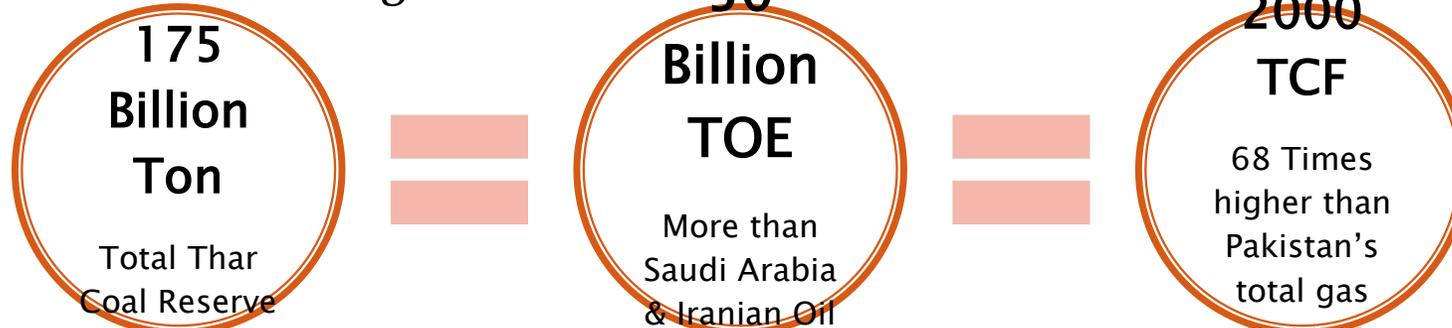
- ▶ The deposits - 6th largest coal reserves in the world, were discovered in
- ▶ 1992 by usaid team while they were searching water
- ▶ After that it's presence was confirmed by 5 international institution
- ▶ USGS
- ▶ RWE DEA (German Petroleum Corporation)
- ▶ SCA (Sindh Coal Authority)
- ▶ GSP (Geological Survey Of Pakistan)
- ▶ SHENHUA (China Company)

COAL is
GOLD



Thar Lignite

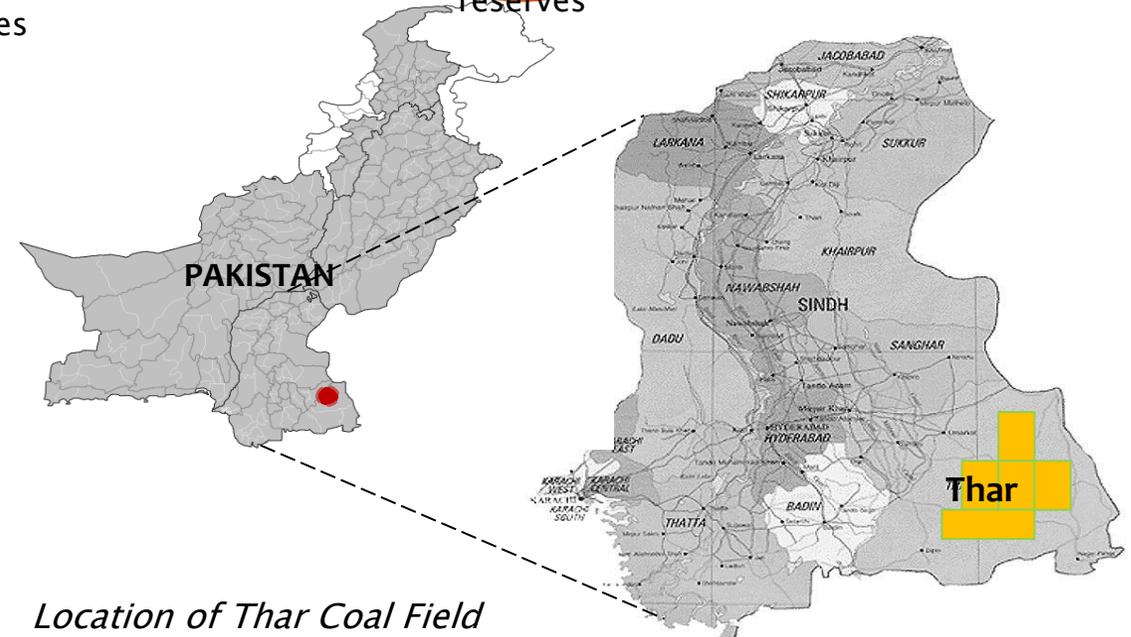
Thar Desert contains the world's 7th largest coal reserves



1% = 25%

Thar Coal Reserves = Pakistan's Power Generation Capacity in 2010 - 5000MW

- Thar Block II has been allocated to SECMC
- According to **Competent Person Report (CPR) by RWE - Germany**, Thar Block-II contains **2 Billion tons** of Lignite reserves, out of which **1.57 Billion tons** are exploitable. Thar Block-II alone can produce **5,000 MW for 50 years!**
- Mine Lease for **30 years** (extendable to 60 years) has been issued to SECMC for Block II



Location of Thar Coal Field

CREDIBILITY OF RESERVES

Studies Conducted By:

- USGS
- John T. Boyd
- RWE
- Shenhua
- GSP
- SCA

▶ **All studies confirm presence of huge coal reserves**

Background Primer on Coal:

- ▶ Coal consists of the fossilized remains of ancient plant life that have been transformed through metamorphosis into carbon-rich mineral deposits. Coal mineral classification considers type, rank, and grade. The plant life that coal originated from determines its type, and the degree of metamorphosis determines its rank, grade, and the amount of inorganic mineral matter present. Qualities such as moisture, carbon, sulfur, and ash content contribute to a coal's heating value as a fuel (measured in British thermal units Btu).

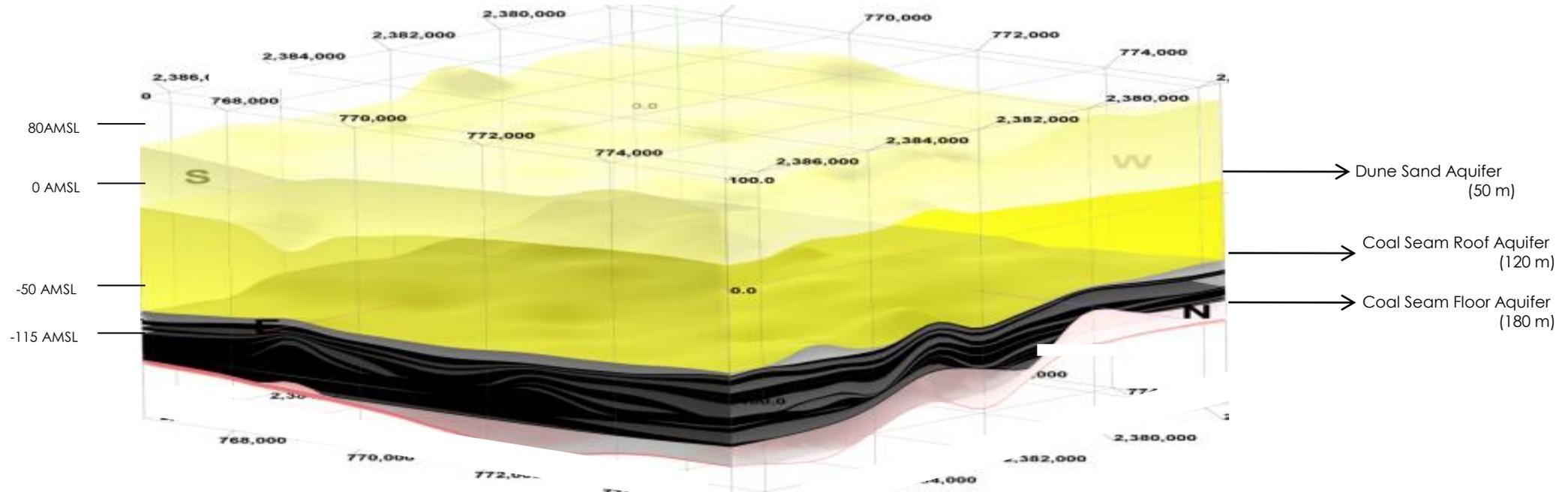
- ▶ Pakistan is facing an unprecedented energy crisis due to surging demand and supply gap. Its current energy needs are heavily dependent on oil and gas and the demand far exceeds its indigenous supplies. Pakistan's primary energy supplies heavily depend upon the imported crude oil and petroleum products due to which the country's oil import bill has exceeded US\$ 14.5 billion, which is a huge burden on the economy. In order to curtail the oil import bill to a sustainable level and to cater for the energy needs of all sectors, the Government is pursuing policies of attracting private investment in the energy sector with greater reliance on indigenous resources such Coal (Thar).

- ▶ The present energy scenario suggests that an affordable and sustainable energy road map for the country is essential to capitalize on the use of indigenous resources in our energy mix. The country produces 16,000 megawatts of electricity and local demand variably stands at around 22,000MW

THAR COAL FIELD

- ▶ The **Thar coalfield** is located in Thar Desert, Tharparkar District of Sindh province in Pakistan. The deposits – 6th largest coal reserves in the world, were discovered in 1991 by Geological Survey of Pakistan (GSP) and the United State Agency for International Development.
- ▶ Pakistan has emerged as one of the leading countries – seventh in the list of top 20 countries of the world after the discovery of huge lignite coal resources in Sindh. The economic coal deposits of Pakistan are restricted to Paleocene and Eocene rock sequences. It is one of the world's largest lignite deposits discovered by GSP in 90's, spread over more than 9,000 km². comprise around 175 billion tones sufficient to meet the country's fuel requirements for centuries.

Thar Block Geology



- Ground Elevation varies from 80 to 100 m Above Mean Sea Level (AMSL)
- Overburden thickness varies from 130 to 150 m
- Cumulative Lignite thickness varies from 22 to 32 m
- Main Lignite seam (2-7) has the thickness of 18 m
- 03 Aquifers are present in the area

COAL POTENTIAL OF PAKISTAN

Sindh
186 billion tons

Punjab
235 million tons

Balochistan
217 million tons

KP
90 million tons

Azad Kashmir
9 million tons



Thar Desert contains the world's 7th largest coal reserves:

175 Billion Ton = 50 Billion TOE = 2000 TCF

Total Thar Coal Reserve

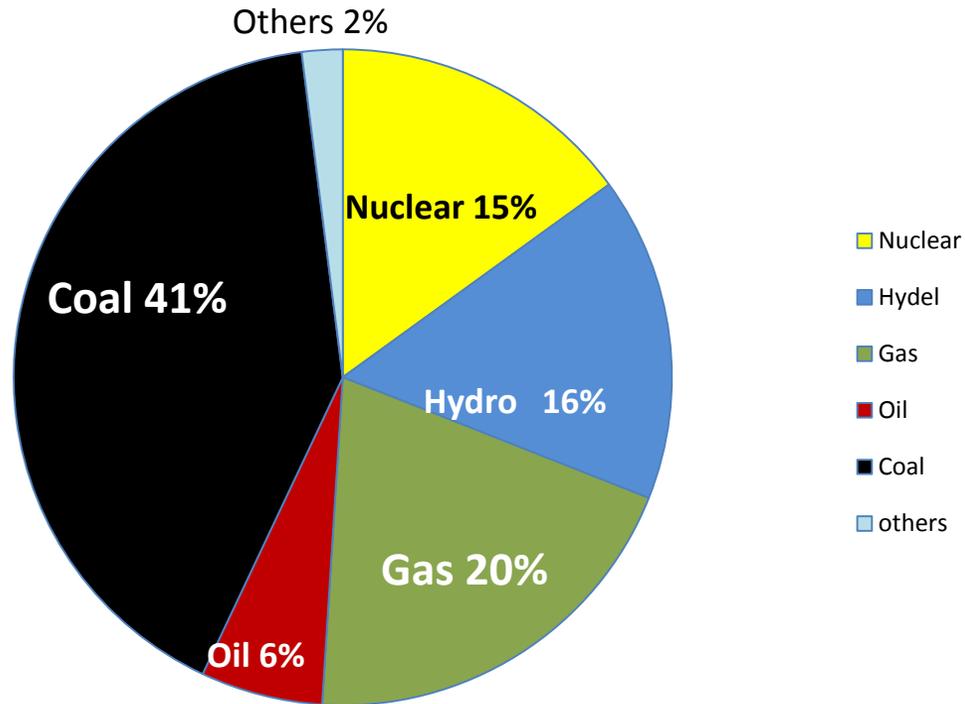
More than Saudi Arabia
& Iranian Oil Reserves

68 times higher than
Pakistan's total gas reserves

A Comparison of Power Generation Fuel Mix

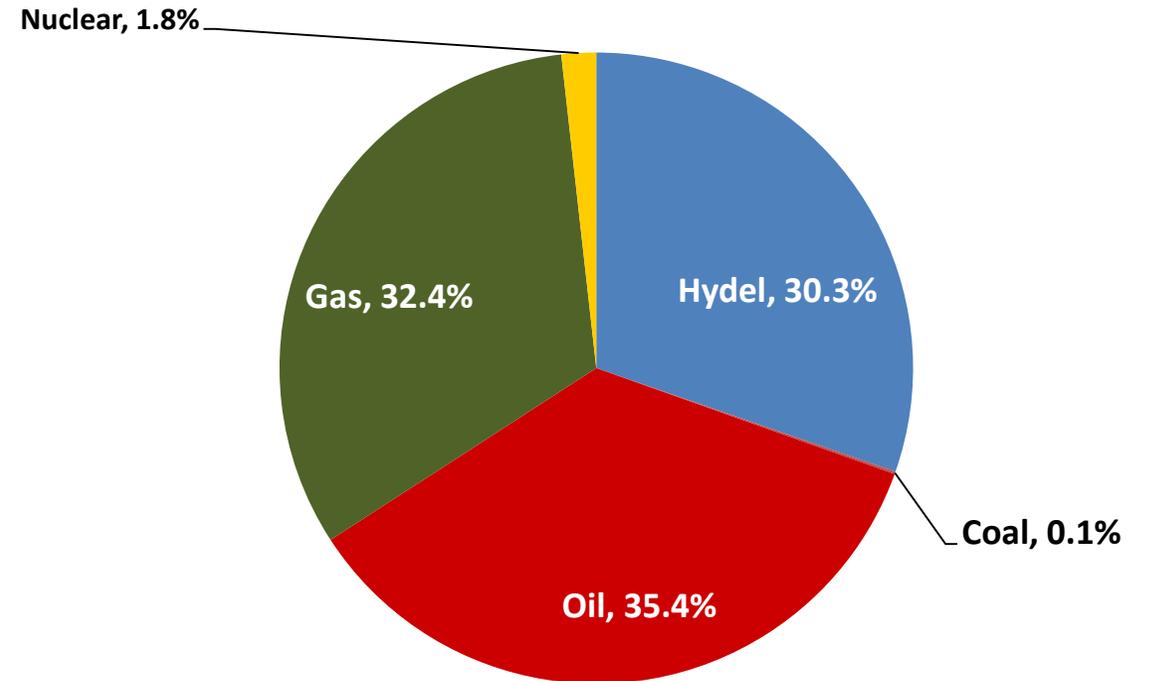
World

World Power Generation fuel Mix 2008-09



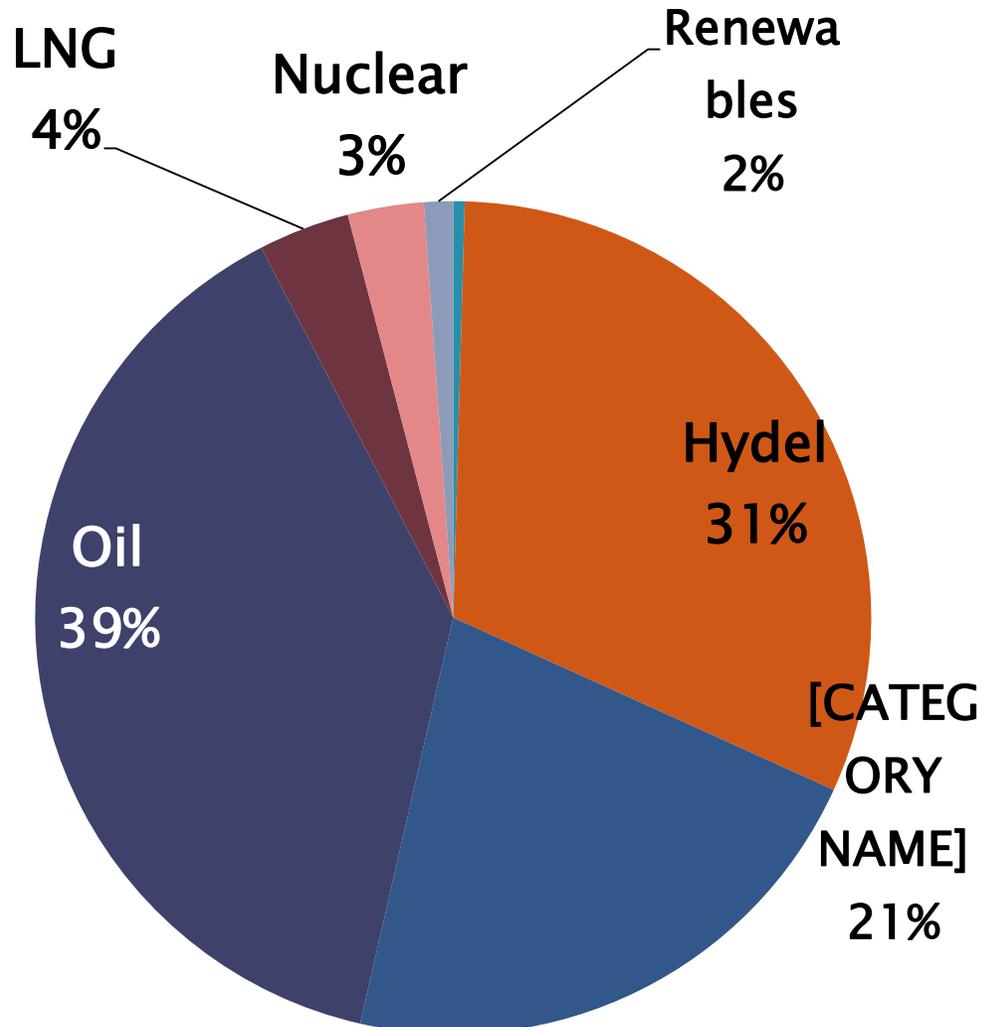
Pakistan

Pakistan Power Generation Fuel Mix 2008-09

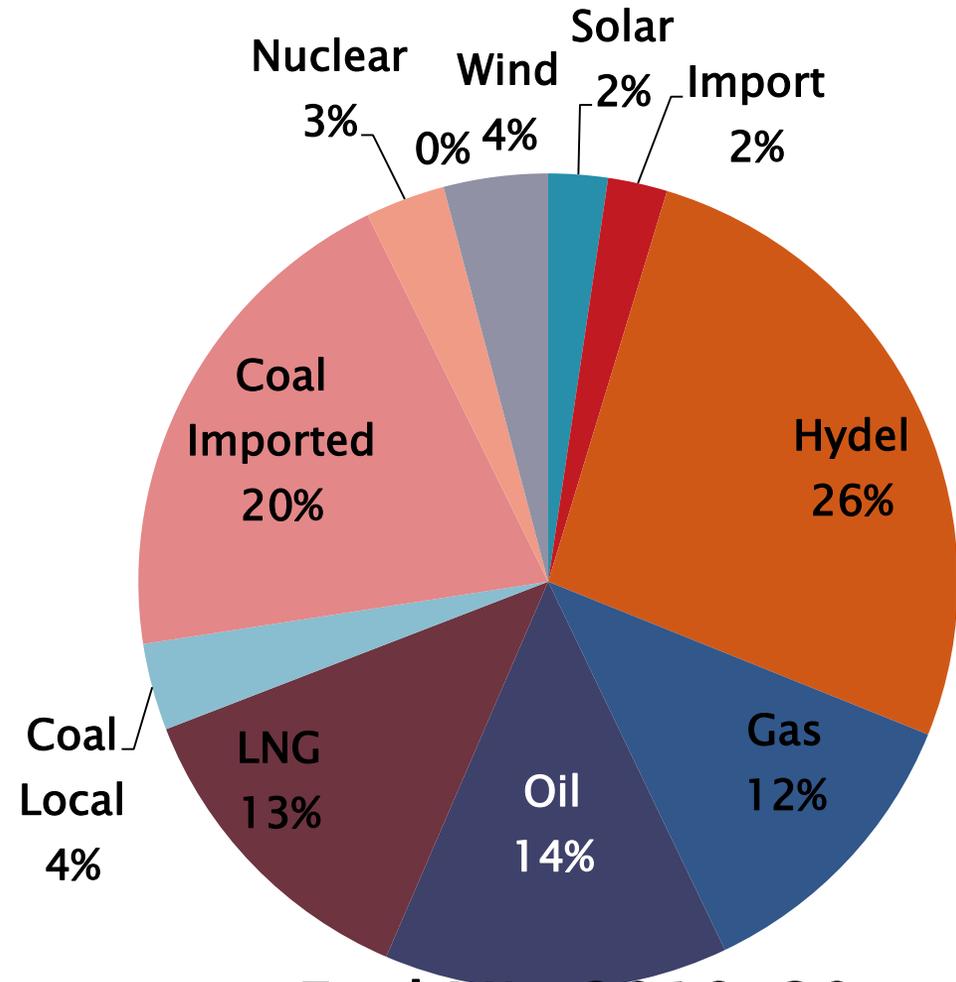


Installed Capacity (MW)	Generation Available (MW)	Peak Demand (MW)	Gap (MW)
21,000	12,755	18,860	6,105

PAKISTAN ENERGY MIX



Current Fuel Mix



Fuel Mix 2019-20

COAL USED IN ELECTRICITY GENERATION & LIGNITE RESERVES

	%age of electricity generated from coal	Lignite produced 2013
Poland	94	63 MT
USA	49	74 MT
china	77	136 MT
Australia	76	41 MT
PAKISTAN	0.1	<5 MT

Why Tar Coal?

- i. Current dependable power supply hovers are around 16,000 MW in winter whereas it increase up 20,000MW in summer.
- ii. On the other hand power demand in year 2030 would reach more than 100,000 MW
- iii. if half of these resources are exploited properly, it would be sufficient for generating 100,000 MW of electricity for 30 years.

What is the THAR Coal Field?

Under the sands of the THAR desert in Pakistan lies one of the World's largest coal Reserves (Lignite A–B). At an estimated 175 billion tons, there is enough energy trapped in the reserves to satisfy the energy needs of Pakistan for the next hundred years, the reserves are buried deep under the desert sands and are separated by giant reservoirs of fossilized aquifers – the exact quality of this water has never been determined so its treatment for potential agricultural use needs to be studied. Any large-scale mining design will have to carefully address the challenge of how to deal with the inevitable release of trapped water in large quantities in the process of mining.

Infrastructure Available at Thar

ROAD NETWORK

- ▶ 70 tonnes load carrying capacity road is available up to Coalfield area.

COMMUNICATION

- ▶ Telephone & Internet communication through Optic fiber cable is available up to Thar Coalfield area.

DRINKING WATER

- ▶ Reverse Osmosis Plants in Thar are available for provision of potable water to the inhabitants of Thar as well as project staff free of cost.

THAR LODGE

- ▶ Thar Lodge at Islamkot with 20-bedded accommodation to facilitate foreign and local investors has been constructed.

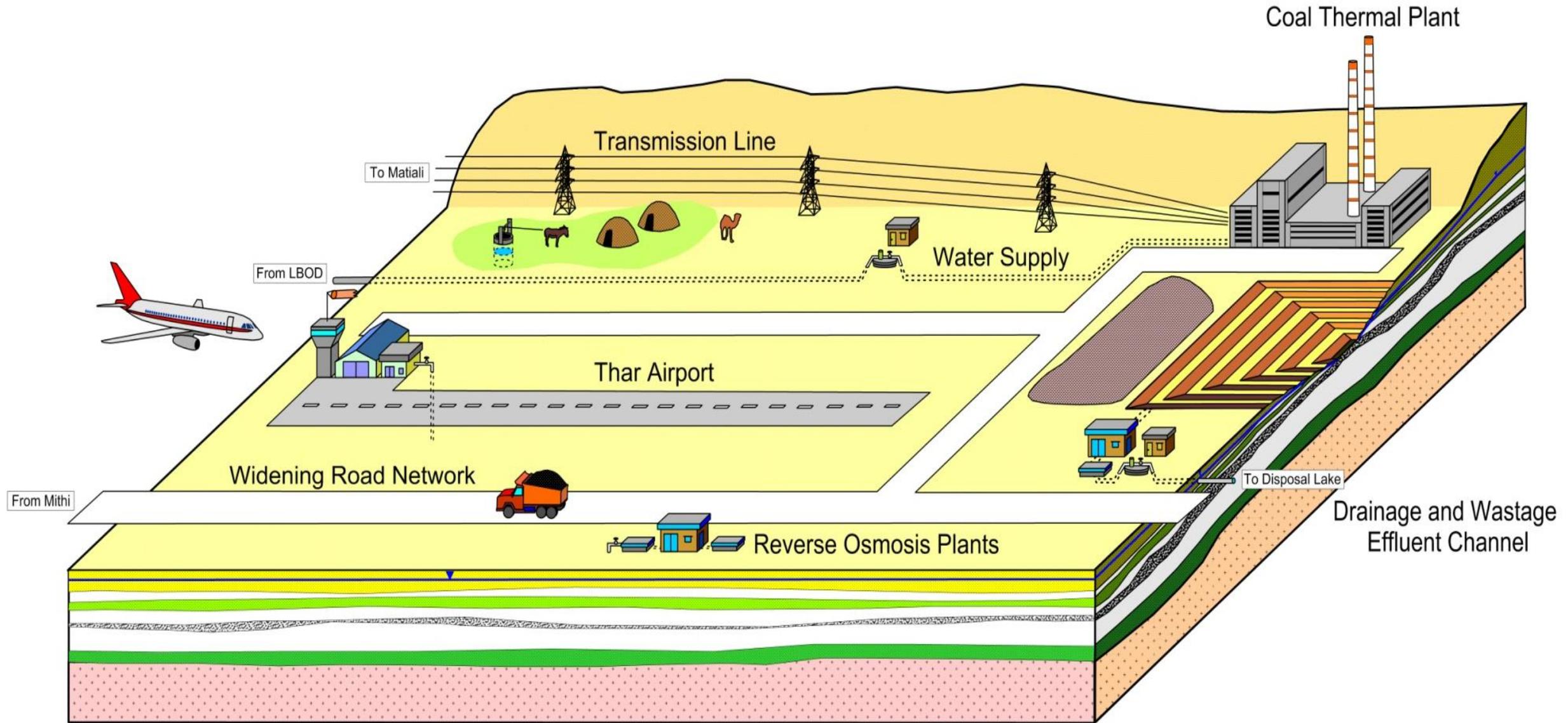
RESCUE STATION

- ▶ Rescue Station in coal mining area at Thar coalfield covering an area of 8,200 sq. ft. has been constructed.

LIBRARY

- ▶ A Coal library containing documents having relevant information on Thar Coal, is situated at office of Sindh Coal Authority.

Schematic Diagram of Infrastructure



COMPARISON OF STRIPPING RATIO, HEATING VALUE & GENERATION OF LIGNITE IN OTHER COUNTRIES

India

Neyvelli lignite 7:1
Heating value = 5200 lb
Total generation = 2,740 MW

Germany

Rhineland lignite 4.9:1
Heating value = 4,514 to 11054 lb
Total generation = 10,289 MW

Hungary

Hungary lignite 9:1
Heating value = 3,035 lb
Total generation = 1,852 MW

THAR COAL

Lignite 6:1
Heating Value: 6200 ~ 11,000 lb
Total generation = 0 MW

Alarm Bell

THE GRAVITY OF SITUATION CAN ONLY BE UNDERSTOOD BY COMPARING THE PROJECTED DEMAND FIGURES WITH THE TOTAL CURRENT FIRM SUPPLY FIGURES OF OUR COUNTRY

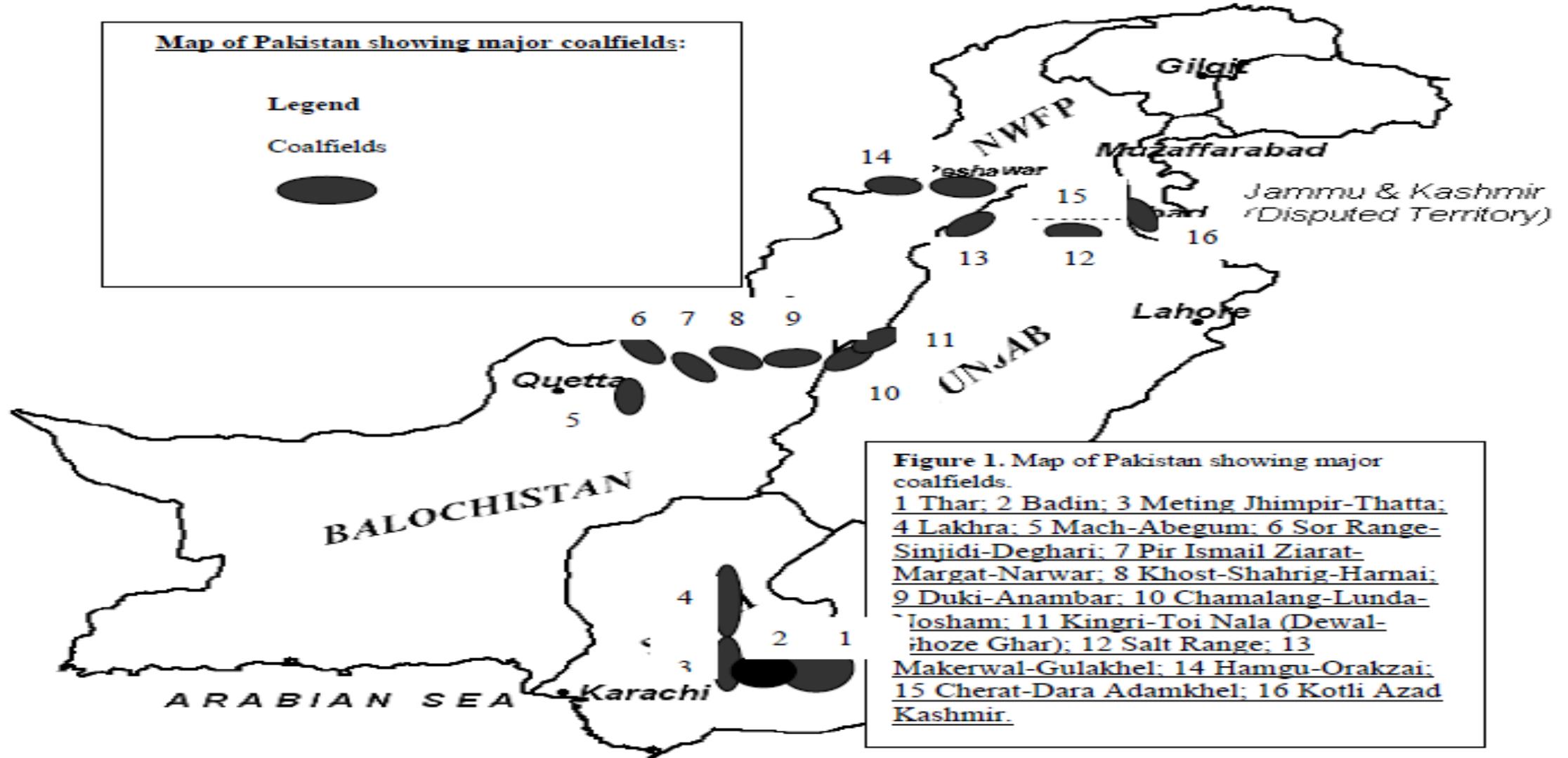
Current Installed (MW) Appro.	Expected Demand		difference (MW)
	Year	(MW)	
17897	2020	54,359	36,462
	2025	80,566	62,669
	2030	1,13,695	95,798

Factors Leading to Energy Crisis

- ▶ Number of electricity of consumers
- ▶ Increased owing to rapid urbanization.
- ▶ Management
- ▶ Accountability.
- ▶ Distribution system

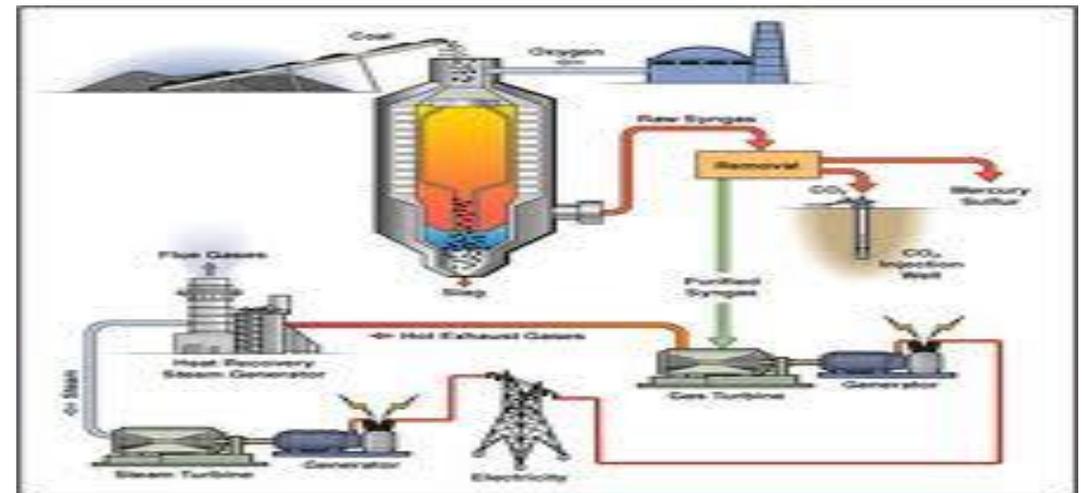


Pakistan Analysis in terms of Coal

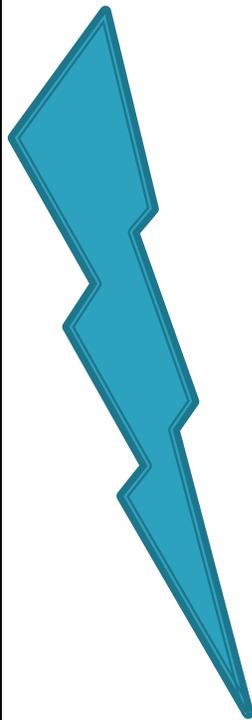


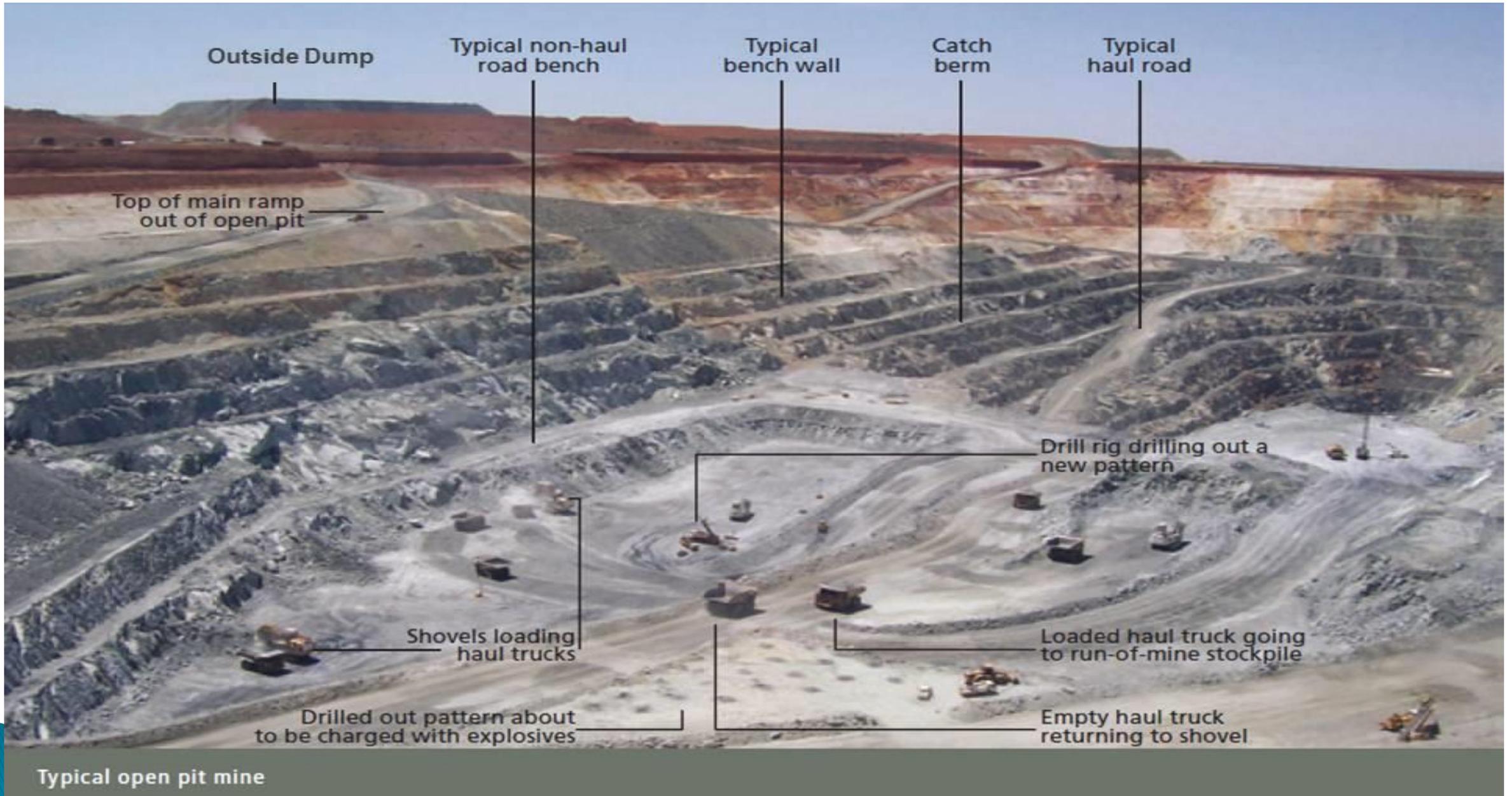
COAL CHALLENGES AND SOLUTIONS

- ▶ Mining challenges (deep mining technology and availability of expertise)
- ▶ Quality of coal is rich
- ▶ Water requirement is
- ▶ Development and construction phase
- ▶ Financing
- ▶ Environmental impact Ass:

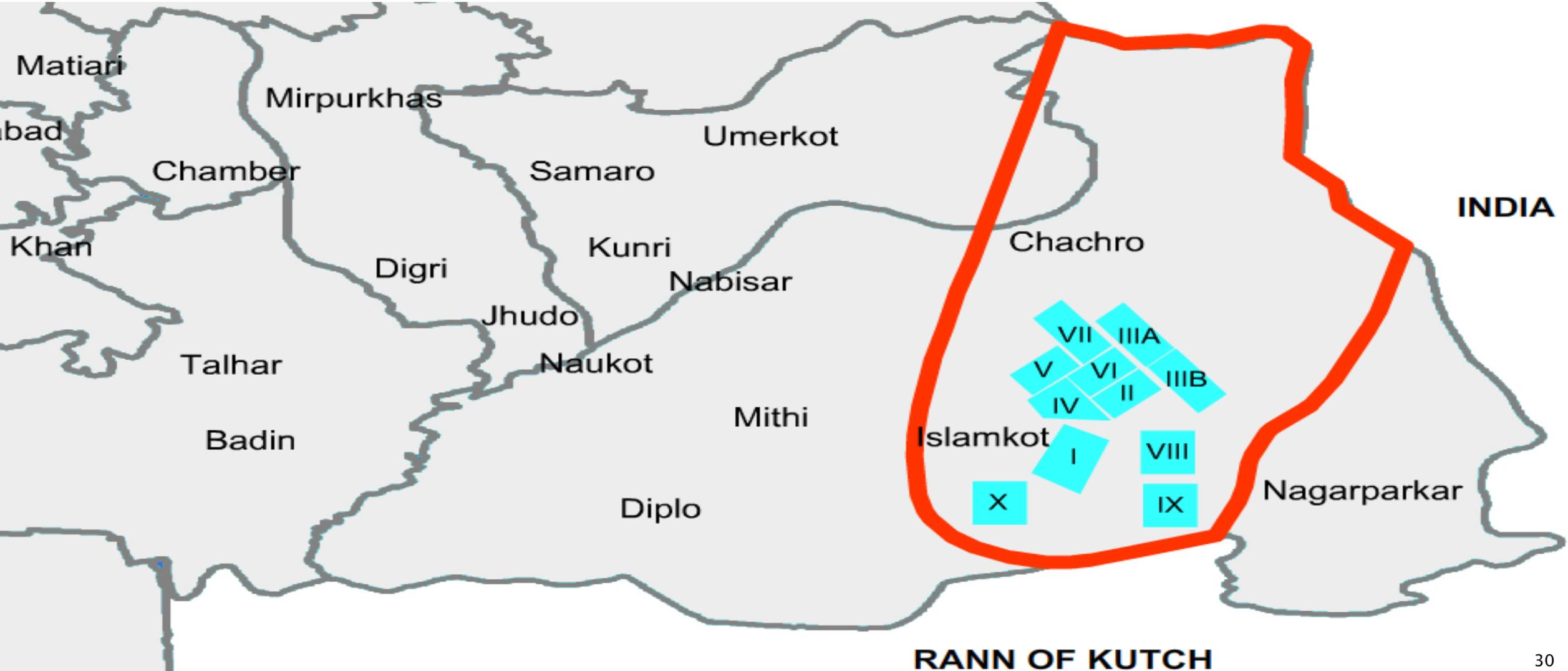


COAL is
GOLD





Thar Coalfield Location



KEY REQUIREMENTS FOR DEVELOPMENT OF THAR COAL

- ▶ Development of Thar region. Presently Thar District ranks lowest on all socio-economic development
- ▶ The infrastructure like school, masjids, markets, grounds, roads, railway line, airport, skill development, health and education etc. will develop in thar area and that will increase as the Thar Coal develops.

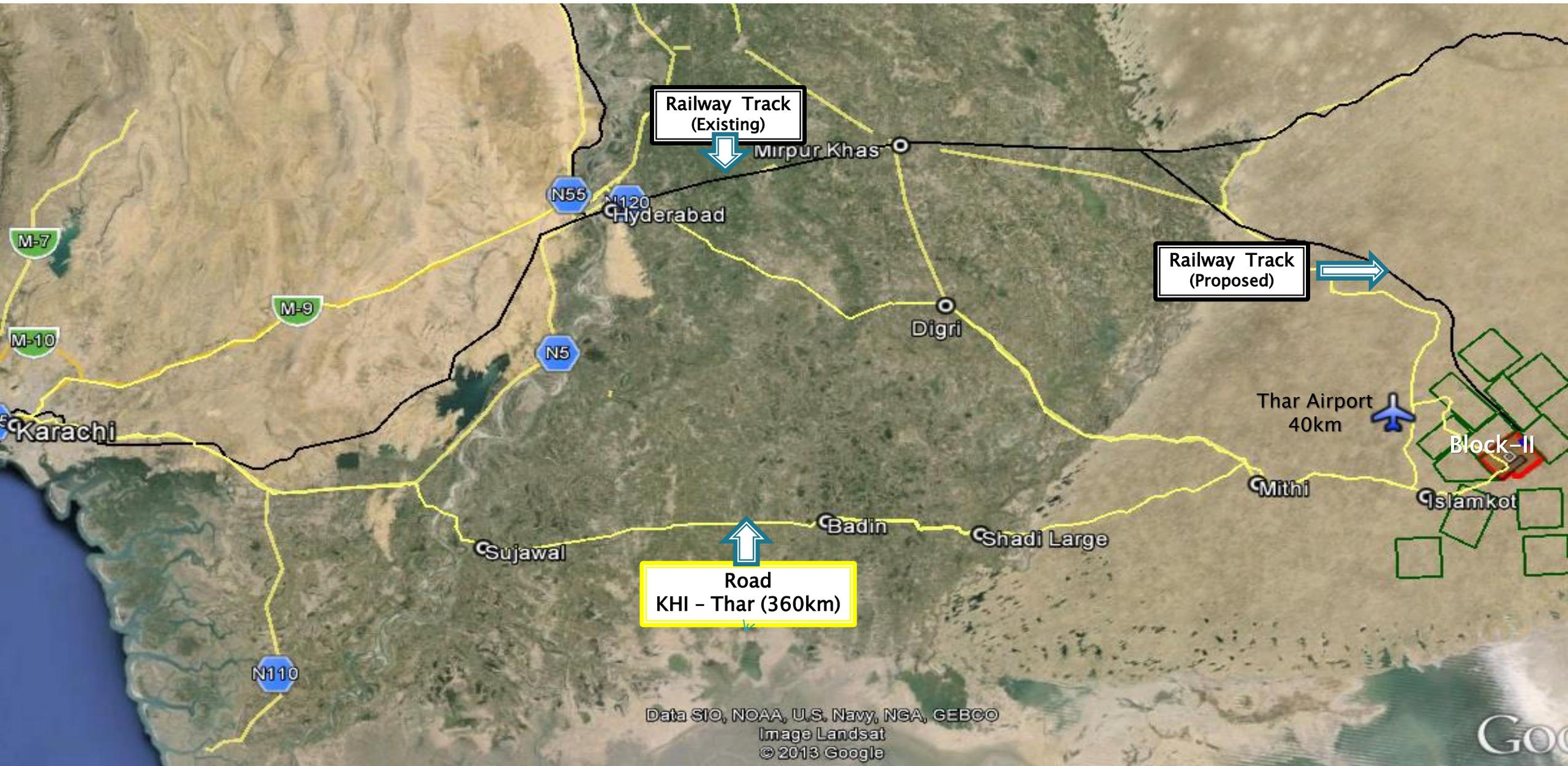
Potential benefits of success of first project

- ▶ Reduction in circular dept through cheap electricity
- ▶ Development of indigenous mining industry
- ▶ 4000 direct/indirect jobs creation
- ▶ Energy security-affordable power
- ▶ Potential conversion of coal to gas ,oil & other chemical

The Coal Cycle

- ▶ After being mined, coal goes through a cleaning prep facility, where it is cleaned and separated by grades. Cleaning upgrades the quality of the coal by removing some of the impurities such as rock, clay, and other ash-producing material. Utilities burn pulverized coal to produce high-pressure steam that powers an electric generator. As coal is burned, emissions are produced that contain sulfur dioxide, nitrogen oxides, carbon dioxide, particulate matter, ash, and mercury. A discussion of coal combustion emissions is found.

Thar Coal Fields : Location



Thar Coal based Power Projects

Block	Investment Firm	Total coal Potential of Block Bn Tons	Power Projects Initiated/Planned MW	Expected COD
Block-I	SSRL (China-Pak)	3.657	2X660	2018
Block-II	SECMC Pakistan	1.584	Phase-I 2X330	2017-18
			Phase-II 2X3300	2019
			Phase-III 4X660	2021
Block-III	Asia Power UK	2.007	2X660	2019-20
Block-IV	Harbin Electric China	2.572	2X660	2019-20
Block-V	UCG Project Pakistan	1.394	2X50	2016-17
Block-VI	Oracle (China-UK)	1.423	2X330	2018-19
Block-VII	FFC Pakistan	2.176	2X660	2019-20

Global Lignite Quality Comparison

Country	Moisture %	Ash %	Volatile Matter %	Sulphur %
Australia	65.5	0.6	17.6	0.1
Bosnia	51	2.0	30.3	0.05
Germany	55	10	19.2	0.2
Greece	52	15.1	18.8	0.2
India	48	6.1	25.6	0.6
Kosovo	51	15	20.8	<1.0
Pakistan (Thar)	46	7.0	28.0	0.7 – 1.1
Poland	52.8	9.8	20.0	0.6
Serbia	45.5	17.0	22.5	0.49
Thailand	30–35	10–28	32	0.8–1.5
Turkey	50	16	22.8	1.7

Source– World Coal Institute Report

Sindh Coal –Chemistry

Field	Reserves Bn tons	Moisture %	Fixed Carbon	Volatile Matter %	Ash %	Sulphur %	Calorific Value Btu/lb	Rank
Lakhra	1.328	28.9	28.0	25.2	18.0	4.7 to 7.0	4622 to 7,552	Lignite A to B
Sonda	7.112	34.0	27.9	25.2	15.0	1 to 2.8	6762 to 11029	Lignite A to B
Badin	1.358	15.4 to 29.8	29.8 to 39.8	31 to 36.3	8.2 to 14.6	3.4 to 7.4	6740 to 11100	Lignite A to B
Thar	175	46.8	23.4	16.7	6.2	0.9–1.2	5,774	Lignite A

Infrastructure Available At Thar

Road Network

- 70 Tones Load Carrying Capacity Metaled Road Is Available Up To Coal Field Area.

DRINKING WATER

- Reverse Osmosis Plants in Thar

Communication

- Telephone & Internet Communication Through Optical Fiber Cable Is Available Up To Thar Coalfield Area.

Thar Lodge

Thar Lodge At Islamkot With 20-bedded Accommodation To Facilitate Foreign And Local Investors Has Been Constructed



INFRASTRUCTURE PLANNED IN PROGRESS AT THAR

PROVISION OF HEAVY DUTY ROAD

Improvement Of Road Network

- From Seaport Karachi To Mithi

TRANSMISSION LINE

The NTDC Is Executing Two Schemes For Power Evacuation From THAR:-

- Phase – I: Transmission Line From Thar Coalfield To Matiari
- Phase – II: Transmission Line From Matiari To Rahim Yar Khan

EFFLUENT DISPOSAL

- The GOS Is Executing A Scheme Of Constructing 50 Cusecs Mine Water Drainage Channel From Thar Coalfield Which Will Be Completed By Dec, 2013.

Railway Link

- PRACS Has Prepared Feasibility For Broad Gauge Rail Link Up To Islamkot.



Current Scenario

Mining Activity at Block-II

- Work for 113Mn BCM overburden removal in Thar Block II



Thar today



Thar Desert



© Wayne Lynch

Thar Tomorrow

An aerial photograph of an oil drilling rig at night. The rig is a complex of metal structures, including a derrick and various support beams, all illuminated by numerous warm, yellow lights. The rig is situated on a flat, snow-covered or icy terrain. In the background, there are more lights and structures, suggesting a larger industrial site. The sky is a deep, dark blue, indicating twilight or night. The overall scene is one of industrial activity in a cold, desolate environment.

Thank You

THANKS