

Mention the full qs statement for proper evaluation. Without that these are just notes and cannot be awarded marks

Date:

## Energy Crisis in Pakistan

Energy security and self-sufficiency are fundamental pre-requisites for the progress and prosperity of any nation. Energy, defined as capacity to do work, fuels economic activities and significantly influences various facts of society - sources can be renewable (solar, wind) and non-renewable (fossil fuels, like coal, oil) with renewable being eco-friendly, cost effective and sustainable.

### Pakistan's Energy Crisis:-

As of right now, the world is facing a shortage of energy and it has sent shock waves from Europe to Asia and Pakistan is no exception.

### The Asian Development Bank

published a white paper in 2019 claiming that Pakistan is an energy-insecure country. The recent increase in energy costs has given us glimpse into future where market

Date: \_\_\_\_\_

disruptions might result if transition to low-carbon energy sources is not adequately managed.

The energy crisis is worsening as Middle Eastern suppliers, crucial for imports, are affected by Europe's fuel and gas shortages. Currently, Pakistan faces **7500 megawatt** shortfall leading to 10-18% loss of load-shedding. The available supply is 18000 megawatt, falling short of the required 25000 - 25,500 MW.

Use blue and black colors only

## How the Energy sector of Pakistan Operates:-

### 1. The use of Hydrocarbons (HC)

In 2022-23,  
oil - almost 588000 barrel oil used per day → 83000 produced locally and remaining 500000 barrels imported.

Gas - 1 billion cubic feet (bcf) per day consumed → 36% produced locally; rest imported.

Date:

big coal area in Thar.

Coal — in Dec 2021, 7.53 tonne produced. 6500 MW electricity produced per day by coal whereas 2500 MW generated by local coal while other from imported coal.

**Hydrocarbon Importers** — PSO, Shell, Attock Group of companies.

**Producers** — OGDCL, POL, MOL

↳ Pakistan consumes more hydrocarbons, the local production is less therefore it has to import more and more HC

## 2. The hydrocarbon suppliers in Pakistan:

(a) PSO — all importers and local producers of oil handover the oil to PSO.

If it is refined oil, it is directly disbursed but

if it is crude oil then it is sent to the refineries like Attock refinery, Karachi refinery, Hub refinery etc.

36% oil can be refined

Date: \_\_\_\_\_

maximum and the rest is considered as waste material.

The ~~refine~~ refinery capacity of U.S is 91%, Saudi Arabia 85%, China more than 86%.

PSO disbursed the oil to the electricity producers, fuel pumps, industries etc)

(b) Sui Southern and Sui Northern:

Sui Southern Gas Company SSGC has been engaged in the business of transmission and distribution of natural gas besides installation of high-pressure transmission and low-pressure distribution system in the franchise provinces of Sindh and Balochistan since 1954.

Sui Northern Gas Pipelines Limited (SNGPL) is the largest integrated gas company serving more than 6.8 million consumers in North central Pakistan through an extensive network in Punjab, KPK and AJK. They are gas

Date: \_\_\_\_\_

suppliers to the industries, electricity producers and domestic sectors

(c) National Transmission Dispatch Company (NTDC) — the supply of electricity from the national grid to the consumer is taken by NTDC.

The company operates fourteen 500 KV and forty three 220 KV grid stations, 5843 km of 500 KV transmission lines and 10963 km of 220 KV transmission lines in Pakistan.

Its present headquarters are located at WAPDA House, Lahore.

↳ DISCOs —

On grass root level or district level, it has local disbussing bodies DISCOs — IESCO, LESCO, PESCO, FESCO, HESCO, K-electric etc.

**The decision making bodies :-**

(a) NEPRA — major decisions of electricity are taken by NEPRA.

In FY-2024-25, NEPRA has

Date: \_\_\_\_\_

raised the uniform national tariff by nearly 20% to secure approximately Rs 3.8 ~~to~~ trillion funding for the 10 ex-Wapda electricity distribution companies

(b) OGRA — all major decisions of oil and gas are taken by OGRA.

#### 4. Major electricity Producers:-

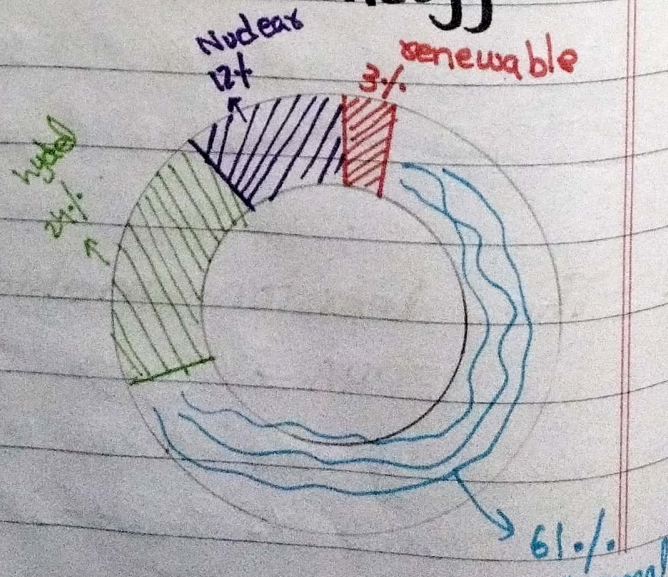
(a) WAPDA — 28-30% produce  
at power producers (GPPs) coal,  
solar based  
projects: 2200 MW produced  
3.4 (Chasma Projects) each  
10 MW electricity

Pakistan is also using nuclear technology to produce electricity - During July-March FY 2022, gross capacity of nuclear power plants rose by 39% to 3530 MW delivering 12885 million units of energy to the national grid.

#### 5. The role of Bank in energy sectors:-

Pakistan's energy mix consist of 58.8% thermal, 25.8% hydel and 8.6% nuclear power. Economy survey of Pak 2022-23

diagram →



Date: \_\_\_\_\_

## Energy Profile of Pakistan:

The Government of Pakistan has unveiled a number of initiatives to facilitate the public access to energy, spur economic expansion and find a solution to the energy issues. The initiatives include:

### • The National Power Policy 2013:

The policy aimed to develop a power production, transmission and distribution system that was effective and could fulfil the requirements of the populace while boosting the economy of the nation in a cost-effective and sustainable way.

### • Power Generation Policy 2015:

The fundamental goal of the policy was to have enough cheapest available power production capacity while emphasizing the use of domestic resources, enabling all parties engaged in the trade and protecting the environment.

### • Alternative and Renewable Energy

Date: \_\_\_\_\_

**Policy 2019:-** The major objective of 2019 policy was to encourage and support the nation's development of renewable resources.

Pakistan's domestic oil production necessitates substantial imports, which surged by 95.9% to US \$17.03 billion from July to April of FY2022. If we see consumption of electricity throughout Pakistan:

Units Sold (GWh)	Household	Commercial	Industry	Agriculture	others	Total
FY 2020-21 (July-March)	41,508	6,246	22,280	7558	7,008	84,600
FY 2021-22 (July-March)	42,055	6,448	25,160	8,151	7,347	89,361

Energy consumption per sector



Date: \_\_\_\_\_

## Reasons for the Looming Energy Crisis in Pakistan:-

### 1. Dependency on hydrocarbons:

→ Pak generate 60% from HC  
→ 12000 MW units are installed with capacity of diesels, more than 7000 MW of LNG and around 6500 MW of coal.

→ Diesel is most expensive, LNG is second most and 3<sup>rd</sup> the coal.

→ Almost all HC are imported.

### 2. Conflict b/w Ukraine and Russia:

The conflict between Ukraine and Russia has spiked fuel prices, disrupting supply chains and complicating Pakistan's power plant operations as long-term LNG shipments were cancelled, directly resulted in problems for Pak.

### 3. Devaluation of Rupee:

All the HC has been purchased in Dollars while Rupee has been devalued against dollars. In 2021,

Date: \_\_\_\_\_  
if 1-billion dollar oil is import had a cost of 178 billion PKs, today it has more than 275 billion PKs.

#### 4. Expensive agreements with (GPP):

The installed capacity is more and the requirement is less than results into higher cost of electricity and more and more capacity payment.

→ GPPs were installed in

- 1994 and 2005 to address low generation capacity and high demand.
- 2011 and 2015 to reduce oil dependency and shift to LNG & coal.

→ Result →

installed capacity — 42000 MW (as of June 2024) and breakdown

- Diesel: 12000 + MW
- LNG: 7000 + MW
- Coal: ~ 7000 MW
- Hydel: 5000 - 7000 MW
- Solar: 1500 MW
- Civil Nuclear: 3300 + MW
- Wind: 1000 MW

Date: \_\_\_\_\_

## 5- Electricity Demand and capacity payment:-

Maximum demand: 26000 MW in summer 2024

13000 MW in winter 2024

Installed capacity: 42000 MW (exceed by 16000 MW & 13000 MW)

Capacity payments to GPPs are the main reason for expensive electricity.

Payments are made based on maximum demand, regardless of actual usage.

Pakistan paid 1.3 Trillion PKR to GPPs in FY-2023-24 with 2.6 Trillion PKR still pending.

## 6- IMF conditionalities lead to Electricity price hike:-

- In Oct 2022, the Agreement with IMF renegotiated and renegotiated against in March 2023.

- IMF conditionalities:

- increasing electricity price per unit

- removing subsidies

- Raising fuel prices (affecting 60% of electricity production).

Date: \_\_\_\_\_

- Devaluing PKs.
  - Devaluation led to higher electricity prices due to
    - HC purchases in dollars
    - IPP payments in dollars.

Resultantly, electricity price ↑.

## 7. Problems in Electricity Distribution and Transmission:

- Total loss : approx. 33%
  - Transmission loss: 17% (highest in Asia)
  - Distribution loss : 16%
- Because —
  - outdated transmission lines (before 2000)
  - Electricity theft (top in South Asia) like more common kunda system, meter tampering.
  - Non-payment of bills in certain areas.
  - Pending bills from government dept.s
  - Subsidized / free electricity.

Date: \_\_\_\_\_

accumulation of unpaid bills within the energy supply chain, primarily b/w GENCO & DISCOs.

## 8- Circular debts:

The circular debt in Pakistan's energy sector is a significant financial challenge. It refers to the accumulated unpaid bills among power generation, distribution and transmission companies. The circular debt has reached a staggering amount of 2.5 trillion PKR, which is 10% higher than previous fiscal.

## Impacts of Energy Crisis on Pak:

### 1- Industry and Textile Sector severely impacted by Energy crisis:

- Continuous energy constraints have stifled manufacturing processes in major and small-scale industries and  
↳ Supply of gas and electricity to industries <sup>was</sup> ~~has been~~ shut off.
- Textile sector most impacted, ~~account~~ accounting for 60% of Pakistan's export.
- Electricity deficit has resulted

Date: \_\_\_\_\_

in 7000 MW shortage ( $\frac{1}{5}$  of Pakistan's generation capacity)

• Consequence:-

- over 200 industries closed Pakistan in last 3 years.
- Decline in exports (textile, leather etc).
- Economic ~~crisis~~ crisis worsened by inflation, depreciating rupee and shrinking foreign exchange reserves.

### 2- Setback for agriculture:-

More than 30% of agriculture of Pakistan relies on tube wells and digwells. cost of agri products rise with  $\uparrow$  of elect

### 3- Balance of Payment crisis worsens:

Pakistan's products become less competitive in international markets due to high cost which decreases exports and increases imports. Resultantly,

- pressure on dollar reserves  $\uparrow$
- Govt. forced to acquire loans from IMF and

Date: \_\_\_\_\_

#### 4- Implication on Domestic life:

Over 40% of lower middle class earnings spent on electricity bills due to unprecedented price hikes.

Disturbed household budgets due to loadshedding.

#### 5- Commercial Market: → price of commercial unit has increased.

Increased 3 times electricity prices ~~in~~ in commercial - Shopkeepers pass on electricity costs to consumers. Loadshedding forces use of generators, adding to costs and burdening consumer.

#### 6- Public life:

Deindustrialization leads to increased unemployment

Date: \_\_\_\_\_

## Solutions:

### ① Renegotiate the agreements of IPPs:

Successive governments delayed renegotiation of 1994 and 2005 IPP agreement. Until 2020, when these agreements were renegotiated no more capacity payment, local IPPs would pay off in PKR (instead of dollars).

It was +ve development but has solved 40% problem. As majority of IPPs being installed in 2011 will renegotiate in 2026 and 2015 in 2030.

### ② Local and Cheaper Electricity Projects:

Energy policy 2030 aims for indigenization of electricity generation

Target:-

- - 1500 MW by hydel projects:- in which → Diamer Basha Dam add 4500 MW by 2029
  - ↳ Dasu add 4300 MW by 2027
  - ↳ Mumand Dam (800 MW by 2025)
  - ↳ Karol add 730 MW already generation and



Date: \_\_\_\_\_

↳ Sukhi kinosi add 883 MW.

• Secondly, increasing focus on electricity from local coal of Thar, as one project of 1320 MW and 4 projects of 320 MW each are already completed.

• Thirdly, 4500 MW would be produced by wind turbines and 10000 MW from solar projection, 10000 MW from civil nuclear reactor.

↳ The objective of Pakistan is to achieve zero percent of dependency on important hydrocarbons for electricity by 2030.

③ Revamp the transmission lines:-

expensive but country in dire need

④ Improve state's writ to:

- stop electricity theft

- ensure timely bill payment.

- no dept. gets free electricity

⑤ Privatization:-

of DISCOs, k-electric can be reduced to loss from 33 to 17%.