



**Institute of
Regional Studies**

P E S H A W A R

Research | Dialogue | Development

SEMINAR REPORT

Energy Crises and Water Resources of KP

Khyber Pakhtunkhwa



**WATER
RESOURCES**



**HYDROPOWER
POTENTIAL**



**ENERGY
SECURITY**



**SUSTAINABLE
DEVELOPMENT**



**PROSPEROUS
KP**

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*Water Today
Energy Tomorrow
Prosperity Always*

INTRODUCTION

A Seminar on “Energy Crises & water resources of KP-Pakistan” was held at the Institute of Regional Studies (IRS), Peshawar. The seminar brought together experts and professionals to examine Pakistan’s interconnected challenges of energy insecurity, water scarcity, inadequate storage, climate change, and underutilization of hydropower resources.

The discussions particularly highlighted the enormous potential of Khyber Pakhtunkhwa (KP) in water resources and hydropower generation and emphasized the need for better planning, investment, institutional coordination and political ownership for early completion of on-going projects — accelerating feasibility studies of others.

OPENING AND INTRODUCTORY REMARKS

The proceedings formally commenced at 5:30 PM with the recitation of the Holy Quran.

Dr. Muhammad Iqbal Khalil (Chairman Institute of Regional Studies' Peshawar Pakistan) delivered the introductory remarks. He referred to the Islamabad incident (PIMS, Islamabad) and drew attention to the seriousness of Pakistan’s broader national challenges.

He particularly identified electricity as one of the country’s major neglected sector — its related issues, and highlighting the extremely high cost of electricity for ordinary citizens and the national economy.

Dr Muhammad Iqbal Khalil indicated reservations of Pakistan’s continued heavy dependence on energy of Independent Power Producers (IPPs) and less focus on utilization of un-irrigated lands despite availability of significant indigenous water and hydropower resources. He emphasized that domestic water reservoirs and hydropower projects could contribute substantially to reducing Pakistan’s energy burden — optimum utilization of water for agriculture.

He also stressed that beside the country, the Khyber Pakhtunkhwa province possesses considerable untapped water and hydropower resources that should be developed strategically for national economic development and food — energy security.

1: HYDROPOWER POTENTIAL, INSTALLED CAPACITY AND WAY FORWARD

The presentation by **Engineer Aziz Ul Haq** (Director AGES Peshawar) highlighted the critical role of the energy sector in **economic growth, industrial and agricultural development, infrastructure, employment generation, and national resilience.**

It emphasized that **hydropower is generally more economical and sustainable than thermal power**, while Pakistan’s increasing dependence on fossil fuels has placed a heavy burden on the struggling economy. The presentation also highlighted the changing trend between hydropower and IPP-based thermal generation, along with Pakistan’s installed power capacity and electricity generation/consumption.

The key message was that Pakistan should **reduce dependence on expensive imported fossil fuels and accelerate the development of its indigenous hydropower resources**, particularly the substantial hydel potential in northern Pakistan and Khyber Pakhtunkhwa.

Way Forward: Pakistan should prioritize hydropower development, utilize indigenous energy resources, improve the power-generation mix, and pursue cost-effective and sustainable energy policies to achieve **energy security, economic stability, and long-term national development.**

WAY FORWARD

ANOTHER INITIATIVE

In November 2024, the Federal Govt. approved to split National Transmission and Dispatch Company (NTDC) into Three (3) Separate Entities.

National Grid Company of Pakistan (NGCP)

Role: Serves as the primary transmission network operator.

Key Functions: Maintains, operates, and expands the high-voltage transmission assets (500kV and 220kV lines) and grid infrastructure across the country to ensure reliable power dispatch.

Energy Infrastructure Development and Management Company (EIDMC)

Role: Project management and execution body.

Key Functions: Engineering planning, managing development projects, preventing cost/time overruns, and attracting private sector investment into energy infrastructure.

Independent System Market Operator (ISMO)

Role: Operates as an independent market operator and grid dispatcher.

Key Functions: Manages system operations, balances energy demand/supply, and facilitates a competitive electricity market. It ends the state's central purchasing monopoly of CPPA-G

2: WATER AND LAND RESOURCES OF PAKISTAN

SPEAKER: SHAFIQR REHMAN (Former Chief Engineer, Irrigation Department, KP)

The second major presentation focused on Pakistan's water and land resources and their relationship with agriculture, food security and economic development.

Sector-wise water consumption – Agriculture remains by far the largest consumer of water in Pakistan succeeded by Agriculture: approximately 96%, Industry: approximately 2% and the Remaining 2% consumption by the domestic and other uses.

Pakistan's land resources were presented as follows:

- Total geographical area: 79.61 million hectares
- Cultivable area: approximately 30 million hectares
- Cultivated area: approximately 22 million hectares
- Irrigated area: approximately 19 million hectares

IRRIGATION SYSTEM OF PAKISTAN

Pakistan possesses one of the world's major irrigation systems, with its historical roots extending back to the Indus Valley Civilization. Major developments in the modern irrigation system include the construction of major reservoirs, barrages, canals and link canals as such the main rivers and reservoirs are inter-linked with each other for regulation of flows amongst various command areas.

In presentation, major irrigation systems were highlighted which follows:

3 major reservoirs: Tarbela, Mangla and Chashma

18 Barrages ,12 link canals ,41 irrigation systems

The development of these dams, link canals and irrigation systems, Tarbela and Mangla dams represented major milestones in Pakistan's water-management history. However, the seminar emphasized that the country's existing infrastructure is under increasing pressure because of population growth, climate change, sedimentation, inefficient water use and need for additional storage of water wasted in flood seasons.

GLOBAL WATER AND LAND RESOURCES

The presentation also placed Pakistan's land and irrigation resources within a global context.

Approximate global figures presented were:

- Total agricultural land: 4,781 million hectares
- Cultivable land: 1,600 million hectares
- Irrigated land: 350 million hectares
- Unirrigated agricultural land: 1,250 million hectares

PAKISTAN'S WATER RESOURCES AND THE INDUS WATERS TREATY

Pakistan's water security depends heavily on the Indus River Basin and the Indus Waters Treaty (1960), which allocates the eastern rivers to India and the western rivers to Pakistan. Recent tensions, including India's decision to place the treaty in abeyance was highlighted with reference to the Indus Water Treaty 1960 in which no country without the consent of other can make changes. The dispute resolution mechanism is reference to the international arbitrator followed by reference to international court of justice for decision. It was highlighted that an agreement on water apportionment is also required with Afghanistan as in Peshawar basin, Kurram basin and Gomal basin, the water resource rivers are shared. To resolve the conflicts of Indus Water Treaty and steps to be initiated for water apportionment accord with Afghanistan, Pakistan needs to strengthen water diplomacy, conservation, storage, and long-term water-security planning.

RESERVOIRS AND STORAGE CAPACITY

During the seminar, storage capacity of Tarbela, Mangla, Chashma and Warsak canal was highlighted: The presentation emphasized the limitations of Pakistan's usable storage capacity and highlighted substantial water losses/wastage as a major national concern. The core message was that Pakistan cannot afford to remain dependent on river free flows without storage dams as at present about 25 MAF water is wasted to ocean during flood seasons. The early completion of Mohmand dam, Bhasha — Diamer dam was also emphasized.

WATER RESOURCES OF KHYBER PAKHTUNKHWA

Khyber Pakhtunkhwa possesses adequate water resources and at present, the water allocated to the Province under Indus River System Authority (IRSA) Accord 1991, 5.78 MAF out of 117 MAF historically measured at rim stations has been allocated. A further 14% share in future storages and flood water has also been allocated to the province. At present, the province is unable to utilize its share due to inadequate infrastructure. The agreed allocation of 0.78 MAF for Chashma 1st lift canal in D.I Khan has not been utilized since 1991 Accord. The scheme is still lingering on due to funding and implementation issues. Similarly, for utilization of full allocated water out of existing 117 MAF and 14% future storages — floods require strong focus and planning.

3: SPEAKER: ENGINEER MUHAMMAD NAEEM

KEY NOTE PRESENTATION

Engineer Muhammad Naeem presented an overview of Pakistan's growing energy and water challenges. He emphasized that the two crises are closely interconnected and cannot be addressed separately.

- Major challenges identified
- Rapidly increasing population
- Growing water demand
- Expanding energy requirements
- Increasing water scarcity
- Insufficient water-storage capacity
- Circular debt in the power sector
- Climate change and its impact on water availability
- Growing food and agricultural requirements
- Inadequate infrastructure
- Water-storage comparison

The presentation highlighted Pakistan's extremely limited water-storage capacity compared with several other countries:

Approximate Carry-Over Capacity

The comparison illustrates the vulnerability created by Pakistan's limited capacity to store water from periods of high river flows for use during dry periods.

Pakistan therefore needs a comprehensive strategy for new storage, efficient water management, groundwater protection and climate-resilient infrastructure.

THE SEMINAR IDENTIFIED:

Underutilization of existing canal systems, Problems associated with the Chashmaa Right Bank Canal
Insufficient irrigation infrastructure, Limited development of KP's hydropower potential
Institutional and political barriers.

The discussion emphasized that KP should take greater ownership of projects involving its water and hydropower resources.

MAJOR POINTS OF CONCERN

Several structural problems were highlighted during the seminar.

Infrastructure deficit

Pakistan requires additional dams, reservoirs, canals, transmission infrastructure and modern irrigation systems.

Kalabagh Dam controversy

The political dispute surrounding the Kalabagh Dam continues to demonstrate the difficulty of achieving national consensus on major water projects.

Basha Dam and KP

The seminar highlighted concerns regarding the ability to construct canals in KP from future storage associated with the Diamer-Bhasha project and continuing issues related to the Chashmaa system.

ENERGY GENERATION: HYDROPOWER VERSUS OTHER SOURCES

- The presentation provided an overview of Pakistan's electricity generation mix.
- Total generation was presented at approximately 121 billion units, of which:
- Hydropower: 37 billion units — approximately 31%
- Other sources: 84 billion units — approximately 69%
- Other sources include thermal generation, nuclear power, IPP-based generation, renewable energy and biofuels.

CLIMATE CHANGE AND ENERGY-WATER SECURITY

Climate change has emerged as a major threat to both Pakistan's water and energy security.

Changes in: rainfall patterns, glacier behavior, snowmelt, floods, droughts, temperature, river flows, can directly affect hydropower generation and agricultural water availability.

Consequently, future hydropower and water projects must incorporate climate-risk assessments and resilience measures.

RECOMMENDATIONS AND WAY FORWARD

The seminar emphasized the need for **integrated and sustainable reforms in Pakistan's water and energy sectors**. The key recommendations were to:

Strengthen the water sector through increased investment, improved irrigation infrastructure, reduced water losses, better governance, groundwater protection, and climate-resilient planning.

Expand hydropower development, particularly small and medium projects, while giving greater ownership to the KP Government and improving coordination among WAPDA, provincial governments, and other stakeholders.

Reform the power sector by retiring inefficient plants, reducing transmission and distribution losses, combating electricity theft, upgrading infrastructure, and gradually phasing out IPPs as contracts expire.

Diversify Pakistan's energy mix by promoting hydropower, solar, wind, nuclear, indigenous fuels, and energy efficiency rather than depending heavily on any single energy source.

Overall, the seminar called for greater investment, stronger governance, institutional coordination, and a diversified energy strategy to achieve water security, energy security, and sustainable economic development.