PAKISTAN ENGINEERING CONGRESS

68TH SESSION
MID-TERM SYMPOSIUM

ON

NEED FOR HYDRO-POWER DEVELOPMENT TO SOLVE ENERGY CRISIS

VOLUME : XXXVI APRIL, 1999 LAHORE

PAKISTAN ENGINEERING CONGRESS
THE EXECUTIVE COUNCIL FOR THE 68TH SESSION

PRESIDENT
Engr. S.N.H. Mashhadi

VICE PRESIDENTS

Engr. Zafar Hanif
Engr. Abdur Raziq Khan
Engr. Ikram-ul-Haq
Engr. Muhammad Khalid Cheema
Engr. Dr. Bagh Ali Shahid
Engr. Riaz Ahmad Khan
Engr M. Siddiq Chattha
Engr. Syed Akhtar Ali Shah
9. Engr. Ch. Muhammad Shafiq
10. Engr Dr. Izhar Ul Haq
11. Engr Ch. M. Rashid Khan
12. Engr. Zaffarullah Khan
13. Engr. Prof. Syed Ali Rizwan
14. Engr. Anwar-ul-Hasan Syed
15. Engr. Faqir Ahmad Paracha

OFFICE BEARERS

Engr. Syed Mansoob Ali Zaidi ..... Secretary
Engr. Pir Muhammad Jamil Shah ..... Joint Secretary
Engr. Ch. Khuda Yar ..... Treasurer
Engr. Akhtar Abbas Khawaja ..... Publicity Secretary
Engr. Zubair Latif ..... Business Manager
Engr. Muhammad Iqbal Khokhar ..... Chief Editor: Engg. News

EXECUTIVE COUNCIL MEMBERS.

Engr. Khalid Latif Khawaja
(Immediate Past President)
Engr. Ch. Haider Ali
Engr. Najam Waheed
Engr. Ch. Ghulam Hussain
Engr. Muhammad Saeed
Engr. M. Saleem Cheema
Engr. M. Amin Khan Mazhar
Engr. Riaz Haider Ali
Engr. Ahmad Nadeem
Engr. Anwar Ahmad
Engr. Ch. Aftab Ahmad Khan
Engr. Capt(R) M. Qadir Khan
Engr. Husnain Ahmad
Engr. Iftikhar Ahmad
Engr. Ijaz Ahmad Cheema
16. Engr. Irfan Mahmood
17. Engr. Khalid Javed
18. Engr. Liaqat Bashir
19. Engr. Mian Riaz Ahmed
20. Engr. Muhammad Tashfeen Haider
21. Engr. Muhammad Anis Butt
22. Engr. Muhammad Amjad
23. Engr. Muhammad Naeem Chughtai
24. Engr. M.M. Khan
25. Engr. Nayyar Saeed
26. Engr. Qasim Shafi
27. Engr. Rana Ghulam Dastgir
28. Engr. Ch. Muhammad Azam
29. Engr. Tahir Anjum Qureshi
30. Engr. Sabir Khan Sadozai

PAKISTAN ENGINEERING CONGRESS

68TH SESSION
MID-TERM SYMPOSIUM

ON

NEED FOR HYDRO-POWER DEVELOPMENT TO SOLVE ENERGY CRISIS

VOLUME : XXXVI APRIL, 1999 LAHORE

The Pakistan Engineering Congress as a body does not hold itself responsible for the opinions expressed by different authors in this Volume

Compiled and Edited

By

Engr.Ch. Ghulam Hussain
Convener Symposium Committee

Published

By

Engr.Prof. Syed Ali Rizwan
Convener Library and Publication Committee

ON BEHALF OF

PAKISTAN ENGINEERING CONGRESS

Price
Members - Free
Others - Rs. 100.00

Printed at

Zarreen Art Press
61-Railway Road, Lahore
☎: 042-7356697, 7220521

TABLE OF CONTENTS

Sr. No.	Paper No.	Title of Paper	Author's Name	Page No.
1		Key Note Address	Engr. Ch. Ghulam Hussain, Convener, Symposium Committee	i
2	217	Hydro-electric Power Potential Identified under Pakistan-German Technical Cooperation with GTZ Additional to Potential on main Stem of River Indus.	Herbert Kuntz	1
3	218	Role of Low head Potential to Meet the Energy Crisis in Pakistan	Engr. Mahmood Ahmad Malhi and Engr. Muhammad Farooq Ahmad	20
4	219	Available Data Banks and Information on Hydro-power	Dr. J.J. Victoria	36
5	220	Facilitation of Hydro-power Development by Independent Power Producers	Engr. Riaz Nazir Tarar	44
6	221	Feasibility Studies Rready for Involvement of Private investment under 1998 Power Policy	Engr. G.M. Iliass & Engr. Javed Rashid	66
7	222	Development of Hydro-Power to Meet Energy Crisis of the Country	Engr. Ghulam Abbass & Engr. Fayyaz Asghar	80
8	223	Manpower Requirements in Hydro-Power Engineering	Dr. J.J. Victoria & Dr. Muhammad Latif	102
9	224	Optimization of Hydro-Electric Projects	Engr. Ch. Altaf-Ur-Rehman	114

NEED FOR HYDRO POWER DEVELOPMENT TO SOLVE ENERGY CRISIS IN PAKISTAN

KEY NOTE ADDRESS

BY

ENGR. CH. GHULAM HUSSAIN[1]

Honourable Gauhar Ayub Khan, Federal Minister for Water and Power, Engr. S.N.H. Mashhadi, President Pakistan Engineering Congress, Professional Colleagues, Ladies and Gentlemen, **Assalam-o-Alaikum !**

As introduced by the President, the Pakistan Engineering Congress is the premier professional organization created in 1912 for the promotion of engineering profession, knowledge and expertise. To achieve these objectives, Congress holds lectures, seminars / symposia on topics covering technical and related financial problems that affect the national economic growth and this Symposium is also a part of those efforts.

Ladies and Gentlemen, the effects of current energy crisis on the national economy cannot be over-emphasized. Pakistan, despite being endowed with large indigenous hydropower resources, has recently suffered a rapid switch over to expensive thermal power development which has caused a significant rise in tariff for consumers. The ratio of hydel vs thermal power generation was about 60:40 in sixtees which has been converted to about 32:68 in 1997 due to postponement of the construction of major hydro power projects that have after quite some-time been ready for execution. Consequently, the economy of the country had to suffer not only in energy sector but also significantly in agriculture and industrial sectors. Due to drastic rise in tariff, major consumers have started to generate their own energy resources which is liable to give rise to another sort of crisis.

The energy demand has an inclining trend and the power shortfall will keep on accumulating causing future energy crises in the country. It is expected that the peak power demand in 2018 will be 46681 MW. It will result in shortage of 31625 MW required to be met through either hydel or expensive thermal development.

Pakistan is gifted with abundant hydel resources. It is a pity that Pakistan's power shortages are met from thermal power rather than cheaper hydel alternative, which is not only environmental friendly but its eternally available / renewable source of energy is a bounty of nature in contrast to environmentally hazardous, non-renewable (and sometimes imported) sources of energy for thermal power.

Pakistan has a potential of at least 35,000 MW of hydel power still awaiting to be harnessed on the main rivers and another approximately 10,000 MW on the side valleys. In addition to this high head potential in the mountainous areas, there is another 550 MW of low head potential in

---

1) Convener, Symposium Committee of Pakistan Engineering Congress and Partner National Development Consultants.

the plains on existing canals and barrages. However this vast energy potential is presently not being developed. There is a definite need to streamline the development of hydro power in Pakistan.

In view of the paramount significance of the current energy crisis and its devastating effects on the national economy, the Executive Council of Pakistan Engineering Congress decided to hold this mid-term symposium of its 68th session on "The Need of Development of Hydro power to Solve Energy Crisis in Pakistan". A call for writing papers on this highly important issue was made to all the members of the Congress and experts in hydro power in January 1999. Response for papers was encourging and eight (8) papers conforming to the standards of the Congress were received within the stipulated short time.

Ladies and Gentlemen, while extensive studies have been carried out in the past by many agencies on the main rivers, involving large storage reservoirs, due attention was not paid to avail of the opportunity to develop cheap hydel power by taking advantage of high heads naturally available in the tributaries in the mountainous areas without building dams to create artificial heads. Similarly, the low head hydel potential available at various canals was also not given the attention it deserved.

The basic ingredient to obtain the parameters for planning and design is a sound data base relating to hydrology, topography, geology, environmental and socio economic factors, water rights, load forecasts, etc, to optimize the studies. While the low head projects are close to consumer centers, and use the steady flows in the canals, the high head projects in the tributaries in the mountainous areas have the advantage of early snow melt and thus early availability of hydel power at critical times of the season when the inflows to Tarbela (whose snow fed catchment is at higher altitudes) are not available for power generation.

It is encourging to know that extensive studies have been carried out by GTZ (A German Govt. Agency for Technical Cooperation) Power Development team over a number of years in collaboration with WAPDA and SHYDO to establish the infrastructure, obtain the data base, prepare inventories and ranking studies of low head and high head power schemes, and feasibility studies.

In compliance with the Prime Minister's Directive for Self Reliance, and the need for sustainability of the Technical Cooperation Programs, it is essential that the knowledge to develop the Hydro power Potential in Pakistan and awareness of its availability and benefits should be disseminated widely with the objective of promotion of Hydro power in Pakistan. Genuine efforts have been made by the authors of the papers included in this symposium towards achievement of this objective.

- I am pleased to inform that in today's symposium there is a paper on "Hydroelectric Potential Identified on the Tributaries of the Indus and additional to the Potential on the Main Stem of the Indus River". This paper identifies the hydropower potential on the side valleys. Another paper captioned "Role of Low Head Hydro power Potential to Meet the Energy Crisis in Pakistan" deals with past, present and future of low-head hydropower development in Pakistan.

- Keeping in mind the present trend for privatization, a paper on "Feasibility Studies Ready for Involvement of Private Investment Under 1998 Power Policy" has been especially included in this Symposium.

- Transformation of power sector into a privatized/ competitive industry will evolve over time, however in the interm period it would be necessary to create an environment of facilitating the efforts of independent power producers (IPP's) towards this end and particularly through development of the indigenous hydro power resources. A paper entitled "Facilitation of Hydropower Development by Independent Power Procedures" will also be presented in to-days Symposium.

- It is obvious that no planning can be done without reliable data banks. It takes a lot of time, effort and money to build up such data banks. I am glad that a paper entitled " Available Data Bank And Information on Hydropower" contains very extensive information in this respect.

- With regard to self reliance, there is a definite need to improve and develop the Local Consultancy Institutions and Construction Industry. To achieve this important goal, we have to build up our own specialized technical manpower. The symposium proceedings include a paper entitled "Manpower Requirements in Hydropower Engineering" to cover this critical aspect.

- Hydro-electric installations are of appreciable size and extent and, therefore, involve huge investments. A paper on "Optimization of Hydro-electric Project" will be presented to highlight the significance of this subject.

- Ladies and Gentlemen, we are passing through a critical phase of Energy Crisis. The dependence on thermal generation to meet energy crisis has caused a drastic increase in tariff. Hydro power development is the correct choice for filling the increasing power demand gap. Hydropower may have higher base costs but would be more sustainable, environmental friendly and cheaper in the long run. Accordingly the major Projects of hydro power development should be carried out in public sector, whereas private sector be encourged to participate in small to medium sized projects.

- I would like to draw your attention to the last technical session will accommodate the panel discussion by the experts. The panel of experts would evolve conclusions and recommendations which will be presented to the concerned quarters of the Government for consideration and necessary action.

Thank you all very much for your kind attention.