# Engineering News

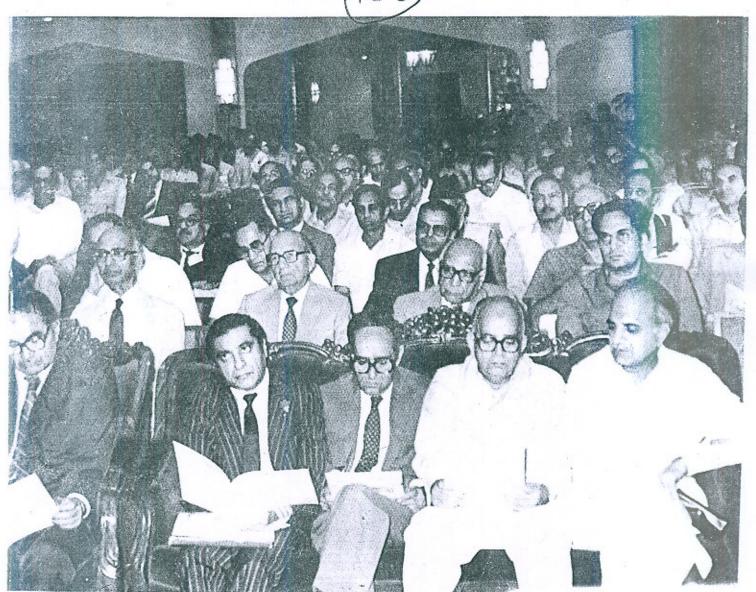


A QUARTERLY JOURNAL OF PAKISTAN ENGINEERING CONGRESS

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## CODE OF ETHICS

#### PAKISTAN ENGINERING CONGRESS

## بسيمالله الرخس الرحييوه

In the name of God, the Beneficent, the Merciful.

WHEREAS Allah enjoineth upon his men to faithfully observe their trusts and and their covenants;

that the practice and profession of engineering is a sacred trust entrusted to those whom Nature in its magnificent bounty has endowed with this skill and knowledge;

that every member of the profession shall appreciate and shall have knowledge as to what constitutes this trust and covenant, and

that a set of dynamic principles derived from the Holy Quran shall guide his conluct in epplying his knowledge for the benefit of society.

Now, therefore, following Code of Ethics is promulgated. It shall be incumbent upon toe members of the Pakistan Engineering Dongress to subscribe to it individually and collectively to uphold the honour and dignity of the engineering profession:

ا ـ إِنَّ اللَّهُ يَا مُرُكُ وَ أَنُ تُؤَدُّ وَالْأَمُنْتِ إِلَى اَهُلِمَا وَإِذَا حَكَمْتُهُ وَبَيْنَ النَّاسِ اَنْ تَحُكُمُوا بِالْعَدُ لِي إِنَّ اللَّهُ وَعِمَا يَعِظُ كُ مُربِهُ \*

"Allahcommands you to render back your trusts to those to whom they are due, and that when you judge between people, you judge with justice. Allah admonishes you with what is excellent".

 You shall be honest, faithful and just, and shall not act in any manner derogatory to the honour, integrity or dignity of the engineering profession.

ا ـ أَوْفُوالْمِكُيُالَ وَالْمِيُزَانَ بِالْقِسْطِ وَلَاَتُخَسُّوا النَّاسَ اَشْيَاءَ هُـ هُودَ لَا تَعْتُوا فِي الْأَرْضِ مُفْسِد سُنَ

"Give full measure and weight justly and defraud not men of their things, and act not corruptly in the land making mischief'. xi: 85

 You shall use your knowledge and skill of engineering for humah welfare, and render professional service and advice which reflects your best professional judgment.

# ٣ وَلاَيَجُ رِمَنَّكُوُ شَنَالٌ تَوْمِعِلْي اَلَّاتَغُولُوْا الْمُولِكُونِ الْمُعْدِلُوُا الْمُعْدِلُونَا الْمُ

"And let not hatred of a people incite you not to act equitably. Be just; that is nearer to observance of duty".

3. You shall not injure maliciously, directly or indirectly, the reputation or employment of another Engineer, nor shall you fail to act equitably while perfo-ming professional duty.

## المُدَاوُفُوا بِالْعُقُودِ ٥

"Fulfil the obligations".

v : 1

4. You shall faithfully observe and fulfil all your obligations.

## ENGINEERING NEWS PAKISTAN ENGINEERING CONGRESS

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59th Annual Session-A view of the distinguished audience on the inaugural day i.e. 3rd April, 1984.

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# Messages of Quaid Azam UNITY FAITH DISCIPLINE

Quaid-e-Azam Muhammad Ali Jinnah to under of the nation declared in his message in the First Pekistan Education Conference in Nov. 1947 that the importance of education and night type of education cannot be overemphasized. Under foreign rule over a century sufficient attention has not been paid to the education of our people and if we were to make a real and speedy, and substantial progress, we must tackle the question, and bring our policy & programme on the lines suited to our genius of people, consonant with our history & culture, having regard for the modern conditions and vast developments that have taken place all over the World. There is immediate & urgent need for giving scientific & technical education to our people to build up our economic life and to see that our people take to science, commerce, trade and particularly well planned industries.

In the message to the First Inaugural Meeting of the Institute held at Dacca on 20th June, 1948,Quaid-e-Azam Mohammad Ali Jinnah said:

"If Pakistan is to take its proper place among the progressive nations of the world, it will have to take up a good deal of leeway in the realm of scientific and technical education which is so necessary for the proper development of the country and the utilization of its resources. The establishment of Institution like the Institute of Engineers will greatly stimulate technical research and help in disseminating available information. The Institute of Engineers will not only benefit the engineers themselves by improving their technical knowledge but also bring lasting benefits to public services which they are called upon to perform.

I wish the Institute every success.

## BOARD OF EDITORS

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- 9. Engr. H.R Toosi.
- 10. Engr. Dr. Amjad Pervaiz

## Editor's Page

The Annual Session of the Pakistan Engineering Congress is the climax of the activities of this august body wherein a large number of Engineers from all over the country participate in its engineering and other social functions.

The last Annual Session was held at Lahore in the Lahore Hilton International from 3rd April, 1984 to 11th April, 1984 and its inauguration was performed by Lt. Gen. Saeed Qadir, Federal Minister for Production with Engr. Daud Beg, President Pakistan Engineering Congress in the chair. More than 600 Engineers were during present the Session.

Engr. Daud Beg presented the address of welcome which is being reproduced in this very issue. In his address, Engr. Daud Beg highlighted the aims and objects of the Congress, its salient activities during the Session for the over-all development of the country.

The Honourable Minister, while addressing the Engineers, eulogised the excellent performance of the Pakistan Engineering Congress and appreciated the outstanding contribution made by the engineers in the over-all development of the country. He advised the Engineers to work with steadfastness and dedication for making the country more prosperous by applying their knowledge and talent to the best of their capability. The chief guest also decorated Engr. S.N.H. Mashhadi and Engr. Dr. N.M. Awan with gold medals for presenting excellent papers during the last sessing.

Engr. Daud Beg, President of the Congress, presented the Congress Shield to the Honourable Guest who after joining with us in the refreshments left the Session. In the same night, an annual dinner was held wherein Engr. Brig. Ghazanfar Muhammad Khan, Provincial Minister for Irrigation, Communications & Works Depart-

ment was the chief guest. In this dinner more than 250 engineers participated and there was a most lively exchange of views amongst the engineers. At the end of the dinner, an excellent musical concert was arranged by Engr. Dr. Amjad Parvez who had participated therein as well as an artist singer.

From 4th to 5th April, 1984 four morning and afternoon technical sessions were held which were chaired and co-chaired by very senior and prominent engineers like late Engr. Dr. S.M.H. Bokhari, Member, WAPDA, Engr. Syed Hamid, Past President, Pakistan Engineering Congress, Engr. Sh. Irshad Ahmad, President, Turk-Pak Consultants, Lahore, Engr. Ch. Mazhar Ali, Agent to the Governor of the Punjab, Engr. S.M. Ayoob, Past President, Pakistan Engineering Congress and Members, WAPDA, Engr. Masihullah Khan, Present President of the Pakistan Engineering Congress, Engr. Ch. Javed Akhtar, General Manager, Power Wing WAPDA, Engr. Shah Nawaz Khan, Chairman, Pakistan Engineering Council, Engr. Mohi-ud-Din Khan, Ex-General Manager, WAPDA, and Engr. Masood-ul-Hassan, ex-Federal Secretary, Government of Pakistan.

In these Sessions the following papers by eminent engineers were presented and later on deliberated upon by discussion.

S. No.	Paper No.	Title of Paper	Name of author
1.	458	Concept, Planning and Design of Khairwala Drainage Pro- ject.	Engr. S. Mansoob Ali Zaidi.
2.	459	A study on Dieselization of Sibi-Khost Section with GEU- 15 and GMU-15 Group-IV Locomotives.	Engr. Mian Ghias ud-Din.
3.	460	Improvement of Bearing Capacity for Foundation of Kotri Gas Turbines Extension Project.	Engr. M. R. Chaudhry.
4.	461	Khanpur Dam Project.	Engr. Dr. Izhar-ul- Haq.

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5.	462	Surface Drainage System Evaluation of Irrigation Projects in Pakistan.	Engr. Dr. N. M. Awan.
6.	463	Selection of Busbar Schemes for Grid Stations and Mathe- metical & Graphic Approach.	Engr. Mohammad Irfan Akhtar.
7.	464	Pumped Storage as Peaking Station in an interconnected Grid Station.	Engr. Daud Beg.
8.	465	Socio-Economic & Financial Aspects of International Water Supply & Sanitation Decade for Pakistan.	Engr. Masih Ullah Khan.

The last Business Session took place on 6th April, 1984 which was attended by a very large number of Engineers. In this Session the Secretary presented the Annual Report and in a very brotherly atmosphere discussions on different problems relating to Engineering profession and engineers were held. The report of this Session is also being re-produced separately in this very issue. At the conclusion of the Session arrangements were finalized for the visit of selected delegates to important Engineering Works in Rawalpindi and Peshawar. Our brother engineers from almost all the Departments visited Engineering Works at Rawalpindi, Wah, Taxila, Lawrencepur, Kamra and Peshawar and returned to Lahore late on 11th April, 1984.

From the brief report as narrated above and from the Secretary's report appearing in the subsequent pages, the usefulness of this most important session of the Engineering Congress which plays a pivitol role for the spread of Engineering know-how cannot be denied as it also provides a platform for the Engineers belonging to all walks of life to meet each other and to refresh their engineering knowledge.

This Session also provides relief to the brother Engineers for a few days from their very busy and dry life where they have to work round the clock under tension, and thus are not in a position to have a direct contact with each other. This is the very much essence/ object for the creation of this august body which by the Grace of God has been continuing its activities from the very time of its creation. It will have to be admitted that this is the only platform where mutual transfer of practical engineering experience takes place.

In the end, I must stress that the prestige of the engineers and engineering prafession can only be enhanced if we the "engineers" play our role with sentimental involvement as has been said by the Founder of the Nation, Quaid-e-Azam Muhammad Ali Jinnah that if our nation is to take its proper place amongst the progressive nations of the world, it will have to take up a good deal of leeway in the realm of scientific and technical education which is so necessary for the proper development of the country and utilization of its resources. The engineers will thus have to play their role in a befitting manner and one of the ways to achieve this goal is to make the Quarterly News Journal more effective by contributing papers of high standared but it is regretted to point out that the non-availability of good papers in time has always been one of the hurdles in the timely publication of the Engineering News Journal. It is hoped that our brother engineers will now concentrate on this important issue and they will not only personally contribute papers for the Engineering News Journal and the Annual Session but will also try to have their papers and works published in the international engineering news so as to get recognition for Pakistani Engineers at international level.

M.

(Engr. Ch. MUHAMMAD RASHID KHAN).

to

Minutes of the 59th Bussiness Session of the Pakistan Engineering Congress Held on 6-4-1984 at Hilton Hotel Lahore, under the C h a i r m a n s h i p of Engr.

Daud Beg, President, Pakistan Engineering Congress,



Business Session commenced with recitation from the Holy Quran by Engr. Qaisar Zaman with Engr. Daud Beg, President of the Pakistan Engineering Congress in the Chair. Thereafter, with the permission of the Chair, the Secretary Pakistan Engineering Congress conducted the business of the Session.

Before taking up the proper agenda for the Session, the Secretary informed the Session that, as is the usual tradition, he would request the Session to offer Fatcha for the following prominent and eminent Engineers who breathed their last during the Session.

- 1. Engr. Sh. Ahmad Tariq
- 2. Engr. Qazi Muhammad Hussain
- 3. Engr. Ch. Mohi-ud-Din
- 4. Engr. Sh. Muhammad Saleem
- 5. Engr. Muhammad Rafique Bangish
- 6. Engr. Nafees Akhtar Ansari
- 7. Engr. Saif-ud-Din Malik
- 8. Engr. Iqbal Hussain
- 9. Engr. Masood Ahmad
- 10. Engr. Abdul Razzaq

He said that they contributed tremendously to the Engineering propession. The Session oppered Fatchapur the departed souls and prayed to the Al-mighty God to grant Sabr-e-Jamil to the bereaved families.

2. Confirmation of the Minutes of the 58th Business Session of the Annual General Meeting.

After condolence, the Secretary informed the Session that the minutes of the 58th Session had already been circulated by the past Secretary Engr. M. R. Chabdhry to all the Members and as for as he knew no objections, amendments/improvements had been received. He further stated that a copy of the same had been circulated to all the Members in this Session alongwith the report which could be seen for adopting the same. No Member present in the Session raised any objection. The House humanimously adopted the minutes of the 58th Session of the Pakistan Engineering Congress.

3. The Annual Report and Accounts for the year Ending 31.12.1983 from Honorary Socretary.

The Sectetary read the annual teport which contained the activities of the last Session, the salient features of which are as below ;-

### 1. Office Bearers.

The Secretary read the name of the out-going Members of the Executive Council and Office Bearers co-opted later on who worked during the Session under the Presidentship of Engr. Daud Beg.

### 2. Committee

- 1. Membership Committee
- 2. Building & Fund Raising Committee
- 3. Academy Committee
- 4. Constitution & Bye-Laws Committee
- 5. Publication Committee
- 6. Annual Session & Proceedings Committee

The Conveners and Members of these Committee worked during the Session whole heartedly and prepared basic recommendations for further deliberations and discussion in the Executive Council Meetings. The Conveners and Members of excellent work done by them.

#### 4. Membership

During the Session, 207 new Members were admitted which is again a proof of the interest being taken by the Engineers into the affairs of the Pakistan Engineering Congress.

## & Trobutcal Papers, Symposium, Seminars and Technical Visits.

(a) Technical Papers. The Executive Council paid special attention to the collection of the technical papers for the Annual Session and by the grace of God,

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there was good response as then papers where collected and printed in the proceedings. These papers have been read during the current session. The study of these papers would indicate that the authors had done excellent work for which he deserved highest appreciation.

- (b) Symposium on Rural Development. The Executive Councial worked very hard to arrange symposium on 'Rural Development'. Although a very good work had been done on that yet unfortunately due to small span of session the same could not be held alongwith the Annual Session. He expressed the hope that it would be Insha Allah held during the next session.
- (c) Mid-term Seminar on Karakuram Highway & Nultar Hydro Project, In the very beginning, Engr. Daud Beg, President had decided that during this session he would try his utmost to carry the activities of Pakistan Engineering Congress out of Lahore. As promised by him, a very successful seminar on Karakuram Highway and Nultar Hydro Project was held on November 17, 1984 at Hotel Flashman, Rawalpindi where the following six papers were read and discussed dy prominent Engineers like Col. Majid Idrees, Engr. Wasif Ahmad Siddique, Engr. S. N. H Mashhadi, Prof. Dr. Kieth Miller and Engr. Daud Beg. A documentary film on Karakuram Highway was also shown to the participants with the courtesy of Lt. Gen. Dr. Ghulam Safdar Butt, Chairman, WAPDA, and at the end of the Seminar, a visit to Gilgit and Karakorum was also arranged with the courtesy of FWO and ACE Ltd. The credit for this very successful seminar and the visit goes to the Executive Council in General and Engr. Daud Beg and Engr. S. N. H. Mashhadi in particular for making all the arrangements.
- (d) Siminar of tile Drainage in Khairpur District. All the arrangements for the holding of this seminar were finalized by Engr. Ch. Muhammad Rashid Khan, Secretary of the Pakistan Engineering Congress with the help of the then General (South) WAPDA, Engr. Sh. Muhammad Rashid but unfortunately due to paucity of time and small span of the Session this Seminar had to be postponed to be held in the next Session.
- (e) Engineering Academy. On the persistent demand of the Pakistan Engineering Congress, the Punjab Engineering Academy has ultimately started functioning. Engr. Mian Khalil-ur-Rehman, a very senior Engineer holding a very high position, has been appointed as its Principal alongwith other teaching staff.
- (f) Constitution & Bye-Laws Committee. The Executive Council in general and the Constitution and Bye-Laws Committee in particular had worked out very hard to revise the Bye-Laws which were ultimately approved in the light of the Constitution adopted in the last Annual General Meeting and by the Grace of God

in future all the functions of the Pakistan Engineering Congress would be held according to the Constitution & Bye-Laws. This was really a pains-taking job for which the Constitution & Bye-Laws Committee and the Executive Council deserved every appreciation.

- (g) Engineering News Journal. Due to non-availability of technical papers and for other reasons beyond our control, the News Journal was published once in the Session for which Engr. Dr. N. M. Awan, Chief Editor, deserves every appreciation
- (h) Construction of Auditorium. As is, in the knowledge of the House, the approval of plans for the auditorium still remained undecided with the Lahore Development Authority which is being approached continuously for early sanction.
- (i) Lease Agreement for the Congress Building: On expiry of lease agreement with M/s State Cement Corporation of Pakistan, the Executive Council has made a fresh agreement for one year and obtained advance rent of Rs. 8, 18, 125/-. Out of this advance rent Rs. 2 lacs had been paid to M/s National Construction Company, who were still to be paid their arrears. Their remaining amount would be paid later on.
- (j) Accounts: The Accounts showing the receipts and payments for the year ending 31, 12, 1983 were put up before the House by the Secretary which after a detailed discussion were adopted. When the Secretary concluded his report, some honourable Members sought clarification which were given by the Secretary.

Thereafter the report and accounts submitted by the Secretary were unanimausly adopted.

The House profusely applauded the excellent work done by Engr. Daud Beg, President, Engr. Ch. Muhammad Rashid Khan, Secretary and the Executive Council during the Session though it was a short session as compared to the previous sessions. The Engineers in particular applauded the efforts of Engr. Daud Beg for arranging some activities outside Lahore after a long time during this session.

#### 3. To Elect office Bearers & Douncil Members for the years 1984-85.

The Secretary informed the House that as had been the tradition, elections are to be held in accordance with the Constitution & Bye-Laws during this very business for which the Members present in the Session would form a proper Electorate. The Secretary informed the Session that nominations had already been received by the Election Committee which had been approved and displayed on the notice board and for which announcement had also been made accordingly.

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The elections were held accordingly in a very peaceful atmosphere through secret ballots and the Election Committee after counting all the votes declared the following as elected:-

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SI. No.	Name of the Office		Member- Ship No.	Remarks
1.	I. President	Engr. Masihullah Khan, Chief Engineer, Public	,528	Unopposed
		Health Engineering Department, Lahore.	0,10	
	II. Vice Presidents:			
2.	Irrigation & Power	Engr. Mian Masud Akhtar	72	-do-
	Department (2 Seats)	Secretary to Government of the Punjab, Irrigation Department, Lahore.		
3.	Buildings Department	Engr. Raja Mnhammad	690	-do-
	(1 Seat)	Akhtarullah, Chief Engineer.		
4.	Highway Department	Engr. Zafrullah Khan	690	.do-
	(1 Seat)	Superintending Engineer.		
4.	Wapda (Power)	Engr. Ch. Muhammad Rashie	d 862	-do-
	(1 Seat)	Khan,		
		Superintending Engineer.		
5.	Wapda (Water) (1 Seat)	Engr. S. M. Ayoob	156	-do-
6.	Miscellaneous	Engr. Khalid Habib,	1173	-c'o-
	(1 Seat)	Telephones & Telegraph		
		Department.		
7.	Consultants (1 Seat)	Engr. Sultan Ali Burque	356	-do-
8.	University of Eugg.	Engr. Nasser Ahmad Gillani	1318	-do-
	& Technology, Lahore.			
	III. Executive Council			
	Members	a teach		
	(i) Northern	No nomination		81
	Zone (1 No.;)			
	(ii) Western Zone	Engr. Abdul Razziq Khan		-do-
	(1 No; (iii) Southern Zone	1 Proc Matth M. A. At.	A10	
	(3 Nos).	1. Engr. Malik M. A. Ahad	213	-do-
	(3 1103).	2. Engr. Sh. Abdul Rashid	1001	-do-
		3. Engr. Ch. Haider Ali	1001	-do-

(iv) Eastern Zone (4 Nos).	1. Engr. S. Mansoob Ali Zaidi	213	Elected
	2. Engr. Ch. Muhammad	1 11	
	Siddique	556	-do-
State of the state of the	3. Engr. Safdar Hussain Khan		-do-
	4. Engr. M. A. Hamid		
	Rehmani	224	-do-
(v) Central Zone	1. Engr. H. R. Toosi	248	-do-
(16 Nos).	2. Engr. Javed Ahmad Malik	561	-do-
	3. Engr. Azhar Irshad Chaudh	ry	-do=
	4. Engr. S. N. H. Mashhadi	392	-do-
	5. Engr. Ch. Abdul Khaliq	189	-do-
	6. Engr. Ashfaq Ahmad		
	Kureshi	679	-do-
	7. Engr. Muhammad Rafiq Sha	d 727	-do-
	8. Engr. Ch. Mazhar Ali	510	-do-
80.500	9. Engr. Rana Muhammad Saed	ed	
	Ahmad Khan	139	-do-
	<ol><li>Engr. Abdul Hamid Arif</li></ol>	257	-do-

The Secretary informed the General Body that according to the Constitution & Bye-Laws the vacant seats of the Executive Council and the nomination of other Office Bearers would be made by the elected Executive Council later on.

#### 4. Any other item with the permission of the chair.

The Secretary, after getting permission from the chair, asked the Members to come out with any suggestion or measures so as to improve the working of this august body and also to improve the over-all condition of the engineers and the engineering profession.

(1) Engr. Azhar Irshad Chaudhry vehemently opposed the idea of bringing some prominent figure as our chief guest. He was of the view that we should request some senior most engineer to inaugurate the Annual Session and to preside over the neeting. After detailed discussion the general consensus of the opinion was that as a principle we should not waste time on requesting some dignitary to inaugurate the Session which results in dely but instead we should fix our date and place of meeting and request either the President or any other Federal Minister to inaugurate the Session and if none of them is available then we should request some senior engineer to inaugurate the meeting.

- (2) Engr. R. N. Batra said that it would be advisable to specially invite all the past Presidents and Senior Members of the Pakistan Engineering Congress who have served the engineering profession to attend the dinner without any payment. A good number of engineers spoke on this subject and ultimately it was deciced that in future the list of all the past Presidents and Senior Engineers will be prepored will be given special invitation.
- (3) Some of the Members expressed the views that complete compliance of of the Pakistan Engineering Council Act was not being made by the different organizations either in public or private sector as a result of which the problems of unemployment cropped up. So it was unanimously resolved that the Government may be requested to issue instructions that all the engineering posts should be filled in by the professional engineers, may be in public or private sector, and the Pakistan Engineering Council should take a serious notice if a non-engineer is posted against the post of an Engineer.
- (4) Some of the Engineers pointed out that the Annual Confidential Reports of the Engineers working in different organizations were being written by the Deputy Commissioners which is not proper. The House unanimously showed resentmans against these instructions and asked the Government to discontinue this practice and instead the reports of Engineers should be written by their seniors under whom they are working and to whom they are answerable for their official work.
- (5) Some of the young engineers brought to the notice of the House the attitude of senior engineers to them during their day-to-day work and complained that they were not given proper respect and prestige as young brother engineers. The House, after through discussion appealed to all the Engineers to work as a family and to see that the young engineers should respect their senior engineers and the at same time the seniorengineers should demonstrate the attitude of affection and love to give them due guidance and patronization so that they work in a brotherly atmosphere and are in a position to delizer goods for the over-all development of the country.
- (6) Some engineers pointed out that foreign consultants were being engaged whereas equally capable Pakistan Consultants were available. They requested this august body to request the Government that no foreign consultants be engaged for any Project in Pakistan if the necessary talent and know how is available and that Pakistan Consultants and Construction Firms working in private or public sectors should be given complete patronization. The General Body unanimously agreed to this view point and hoped that the Government will difimuly adhere to this principle in the over-all interest of the nation.

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ging uest the it as the ting the ineer (7) Some young engineers pointed out that in the past severe punishments have been given to them even on ignorable and minor irregularities. There was good discussion on this issue and consequently, the House expressed the view that as Engineers have to perform multi-farious duties they should under no circumstances be punished for ignorable irregularities. On the other hand the House decided that in case some engineers do really outstanding work they should be properly acknowledged and decorated.

(8) The Secretary specially drew the attention of the Government of Pakistan to the fact that though engineers have played vital role in the over-all development of the Nation by constructing dams, canal new work, large communication systems, barrages and bridges, transmission and grid systems projects like Pakistan Steels Mills and Karakorum Highway etc yet unfortunately the services of Engineers have not been recognized. He made an appeal to the Government that in future while decorating other professions the engineers giving prominent performance should be also properly decorated like the artists, educationlists, scholars and other professions.

While summing up his report, the Secretary said that from the above it was clear that the session had been held in a most cordial and brotherly atmosphere where all the engineers, senior or junior belonging to various Departments had participated in the deliberations and discussions relating to different problems and as the basic aims of this Organization was to provide an opportunity to the Engineers to exchange views on Engineering problems and techniques and develop family atmosphere

Engr. Daud Beg, President, Pakistan Engineering Congrees then addressed the brother engineers and thanked them for their coming to Lahore from all over Pakistan to participate in the 59th Annual Session of the Pakistan Engineering Congress being held from 3rd April to 11th April, 1984. He said that such a large attendance during the inaugural session, technical sessions and business session is an indication of the fact that engineer brothers have got complete confidence in this oldest august body. He also thanked all the Vice Presidents their participation and assistance as without their help he would not have been in a position to deliver goods which they were seeing themselves. He also eulogised the services and excellent work done by the Honorary Secretary, Engr. Ch. Muhammad Rashid Khan who had been working during the Session whole-heartedly.

Engr. Daud Beg said that he had promised to hold two seminars out of Lahore during this Session, but unforunately due to short span of the Session, he could only hold one Seminar at Rawalpindi on Karakorum Highway and Nultar Hydro Project. He hoped that his successor would be in a position to hold more seminars, and

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only ject. especially the seminar on Tile Drainage for which present Honorary Secretary had made all the arrangements and only the programme had to be finalized which would be definitely held.

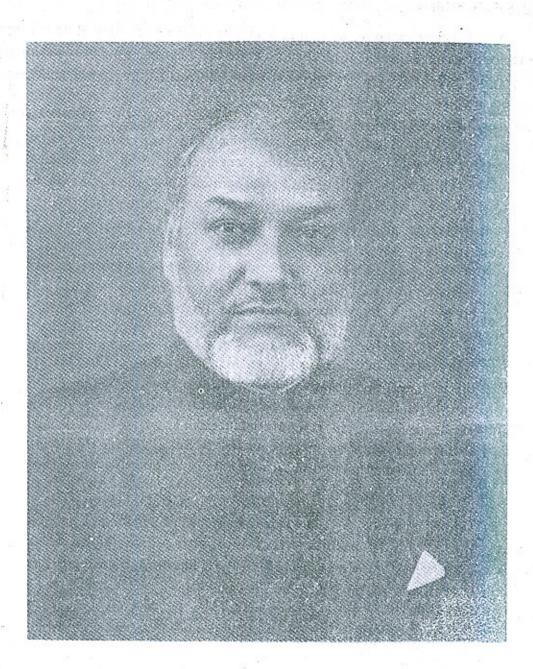
Under heavy applause, he said that as was promised by him while taking over the Office of the President that he circumstances the Session would be prolonged as the people had been complaining in the past, he was happy that he had been in a position to close this session in time and the progress during the Session as you have witnessed from the report of the Secretary had been satisfactory. He requested the Members to participate in the technical visit which had been arranged for Rawalpindi entoute to Peshawar for visit to important engineering works. He said that it was not only an important Session but in his opinion it was the climax of the Session because it afforded an opportunity to the Members to learn to refresh their engineering knowledge, to meet the delegates from different parts and to make permanent friendship with each other. He also hoped that his successor, Engr. Masihullah Khan, who was an experienced engineer, would be in a position to provide very dynamic leadership to the Pakistan Engineering Congress which would further prosper under his guidance and patronization. The Engineers present in the meeting high tributes to the President Engr. Daud Beg by heavy clapping of hands.

On the request of the House, Engr. Masihullah Khan. the President (Elect) addressed the Engineers and promised that in his own humble way he would try his utmost to run the affairs of the Engineering Congress in a most befitting manner and he would endeavour to see that maximum engineering know-how and knowldge was spread by arranging technical lectures, seminars, technical visits. He also hoped that the new Executive Council would fully co-operate with him to achieve the aims and objects of t'e Congress.

He , aid rich tributes to the President Engr. Daud Beg for not only conducting session in time but for doing extraordinary work during this Session. He promised teat he would Insha Allah definitely hold the next Session in October as per Constitution and Bye-Laws in time and the precedent set by Engr. Daud Beg would be definitely followed.

Thereafter the meeting ended with a vote of thanks to the Chair.

Engr. Ch. MUHAMMAD RASHID KHAN
(Secretary)



Engr. MASIH ULLAH KHAN, President P.E.C.

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## Introducing the Present President, PED

Born on July 10, 1928 at Agra (India), Engr. Masih Ullah Khan graduated from Agra University in 1946 and later earned his Civil Engineering Degree from the Muslim University Aligarh in 1949.

After migration to Pakistan, he joined Military Engineering Services and worked as pioneer engineer at Wah Ordnance Factories from 1949 to 1951.

Having over-weighing inclination/aptitude for the civil service he left the Military Services to join the Punjab PWD Buildings and Roads Department in 1951 where after serving for more than 30 years in various capacities and on different assignments he rose to the present position of Chief Engineer, Public Health Engineering Department.

During his brilliant career he had the opportunities of attaining higher academic qualifications first of post-graduate course in Public Health Engineering from the Imperial College of Science and Technology London in 1964 where he was awarded the much coveted Diploma and thereafter an advanced course in Management and Administration at the Pakistan Admin. Staff College Lahore in 1881.

Rich with the life long professional experience he had been instrumental in executing major national projects/works such as:

- (i) Planning of the Capital of Pakistan in respect of Water Supply and Sewerage from 1959 to 1963 in collaboration with Dr. Doxiadis Associates of Athens, Consultants for Islamabad Project.
- (ii) Town Planning, area development scheme, Estate Management, Construction of Roads and general development of Multan in the capacity of Chief Engineer-cum-Director General of Multan Development Authority.
- (iii) As Chief Engineer and Advisor to the Govt. of Punjab he is responsible for promoting technical, financial and administratives activities of the Province.

He has to his credit contribution of various technical papers such as "Pinancial Aspects of Urban and Rural Water Supply and Sanitation" and "Technological Options in the Provision of Sanitation in Rural Areas" read at the National Conference on drinking water supply and sanitation at Islamabad in 1981 and published in 1984 & Paper on "Socio-Economic and "Financial Aspects of International Water Supply and Sanitation Decade for Pakistan" published in the Pakistan Engineering Congress Proceedings Volume-59 in 1983.

Because of his relentless and meritorious services he was nominated to attend Seminars/Conferences not only at home but also abroad, when in 1984 he attended Seminar on "Socio-economic and Financial Aspects in System Planning" at Moghadeshu, Somalia under the auspices of WHO.

He is a Fellow of the Royal Society of Health (London), Institute of Public Health Engineers and a Fellow of the Institution of Engineers, Pakistan.

Quite mindful of the financial constraints/worries the families of Co-workers are confronted with in the event of the bereavement of the bread winner especially when the present day relief provided by the Government has been rendered quite insignificant, he has founded a P. H. E. D. Engineers Welfare Cooperative Society which would prove to be the first of its nature.

His services to the engineering community cannot be overemphasized either. He has been the Vice Chairman of the Institution of Engineers Hyderabad and very deservedly is the President of the Pakistan Engineering Congress for the 60th Session.

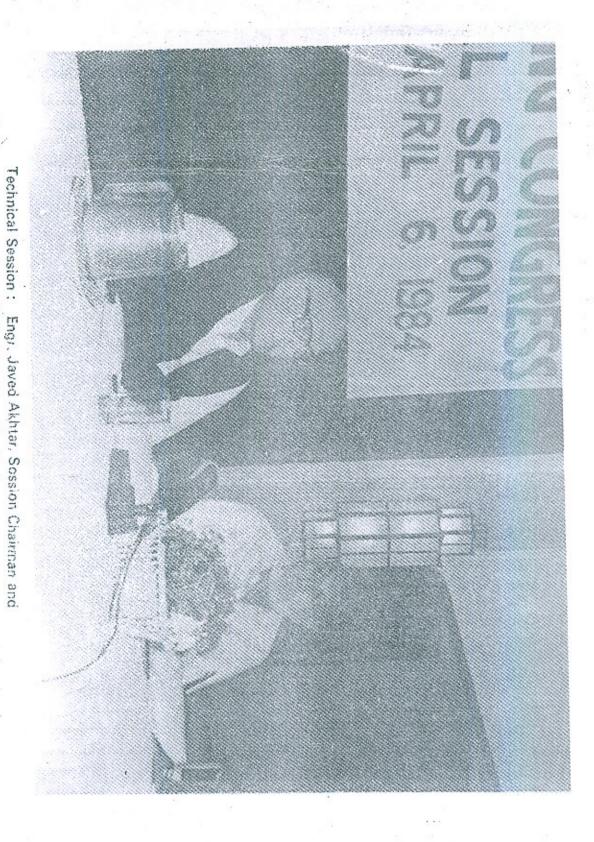
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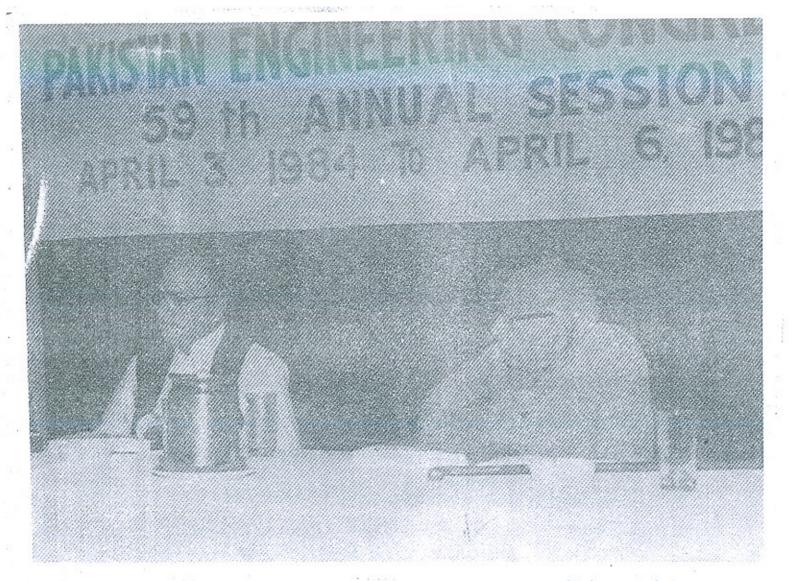
cially quite ociety Engr. Masih Ullah Khan, Co-Chairman.

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Technical Session: Engr. S. M. Ayoob, Session Chairman and Eugr. Mohiud Din Khan, Co-Chairman.



Technical Session: (Late) Dr. S. M. H. Bokhari, Session Chairman and Engr. Sayyid Hemid, Co-Chairman.



Technical Session: Engr. Sh. Irshad Ahmad, Session Chairman and Engr. Ch, Mazhar Ali, Co-Chairman.

### Space Research in Pakistan

by
MR. SALIM MEHMUD
Chairman, SUPARCO

Pakistan Space and Upper Atmosphere Research Committee, which is known by its more familiar name of SUPARCO, was established in 1961, with the assignment to promote peaceful exploration and applications of space science and technology. SUPARCO was completely reorganised through promulgation of a Presidential Ordinance in May 1981, which step not only upgraded the status of SUPARCO to that of a national Commission but also brought in its wake a series of healthy changes in its methods of work and identification of long term goals as well as assignment of a phased programme for achieving these goals. This event after 20 years of existence of SUPARCO can truly be called a landmark of high significance for the organisation by virtue of its importance in terms of implications for rapid growth of the activities of SUPARCO.

SUPARCO has launched over 200 rockets into upper atmosphere and space, soaring as high as 500 kilometres, for scientific research. It started the programme of rocket launchings with the launching of first rocket of REHBAR series on 7th June, 1962, from Sonmiani Rocket Range, located about 50 kilometres North-West of Karachi. The Rehbar series and some other types of rockets were imported and only assembled in Pakistan. SUPARCO has since established its own rocket production plant where rockets required for high alitude scientific research are manufactured. The quality of these rockets meets international standards in terms of their performance and safety.

Since electronics and other instrumentation play very vital role in space research. SUPARCO has also established a number of instrumentation laboratories which are centrally airconditioned and house sophisticated electronic equipment. The laboratories offer work space as good as available in high technology laboratories in the advanced world. The engineers and scientists of these laboratories have developed a number of electronic equipment like frequency counters which are used to automatically count the frequency of radio signals; electric power supplies

especially to meet the requirements of integrated circuits; time signal receivers to receive high precision time signal pulses being transmitted by a number of radio stations all over the world and a programmable digital controller which employs a small digital computer to independently control swithcing-on and switching-off of a large number of units according to a preprogrammed time sequence. More recently special attention has been given to the design and production of microwave assemblies used in the satellite ground receiving stations. Noteworthy feature of this activity is the successful production of all the items needed for a Television Receive only (TVRO) terminal. These include dish antennae, waveguide assemblies, low noise amplifiers (LNAs) and down converters. A number of these stations have been successfully operating for more than a year. SUPARCO has now embarked upon a programme of assembling these stations in numbers to meet the national requirements.

On the scientific research and applications side, SUPARCO is mainly concentrating in three areas. The first area relates to planning of scientific rocket launching experiments and analysis and interpretation of data received through such experiments. In the second area research work is going on to study the population and behaviour of electrons in the Ionosphere which is a region extending from altitudes of 40 to 600 kilometres. As is well known one of the everyday impact of the electrons at high altitudes is to permit global high frequency radio communications. The data for this research work is obtained through ground stations at Karachi and Islamabad. A third station is planned to be commissioned at Multan shortly. Third area of activity relates to acquisition of data from a number of satellites in orbit around the earth and to put it to use for multifarious applications. The data received from satellites may be in the form of pictures of cloud cover for the purpose of large area weather forecasting; or radio signals to study the electron population in the Ionosphere; or radio signals for accurate position fixing which is necessary for land surveys; or pictures of the Earth that hold wealth of data on the resources of the planet and so on; just to name a few of the examples. SUPARCO's Remote Sensing and Applications Division is routinely engaged in the analysis of Earth Resources Survey Satellite pictures for the purpose of identification, quantisation and management of resources of the Earth,

The last area of activity is particularly quite broad based and pervasive because of numerous possibilities for applications of the data obtained through the analysis of satellite pictures. SUPARCO is providing services such as supply of satellite pictures, making available of its expartise and advice in application areas and allowing scientists of outside agencies to work in its analysis laboratories, to over 45 national user agencies. It has either completed studies or is presently

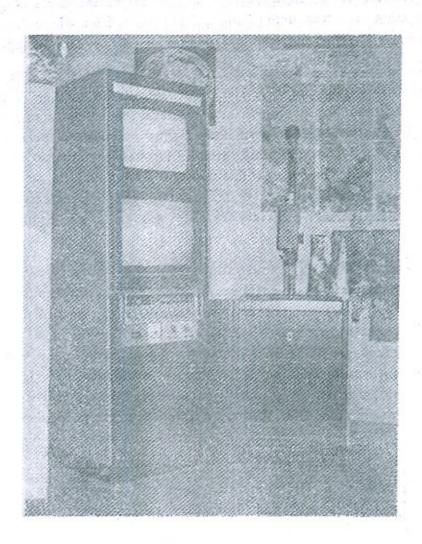
engaged in studies such as identification of different crops, establishing areas under these crops, carrying out of snow surveys in the catchment areas of Indus basin rivers, localisation of areas under flood and the points from where the flood water frequently breaks out, minerological and geological surveys and mapping of areas under waterlogging and salinity.

As for future plans of SUPARCO, it intends to further strengthen its capability in space and upper atmospheric research, including monitoring of contaminants in the atmosphere, use of satellites for communication purposes particularly to exploit the potential of these satellites for mass communication that is on a nation-wide basis. Such a mass communication technology is considered very relevant for a developing country like Pakistan for reaching inaccessable areas and for the promotion of adult literacy in the rural areas where 70 percent of its population lives.

There is no doubt that to continue with the above type of programmes, SUPARCO needs scientists and engineers in hundreds if not thousands. It has established facilities for training of fresh scientists and engineers for periods ranging from six to nine months, both in theory and practice in the new fields of Space Science and Technology. SUPARCO intends to develop the present training establishment into an Aerospace Institute with a view to broaden the scope and content of the training programmes. Additionally whenever necessary SUPARCO's scientists and engineers are sent abroad for on the job training and higher studies.

SUPARCO has maintained regular liasion with space organisations of the other countries with a view to seek collaboration and cooperation with them. Pakistan is a member of the UN Committee on the Exploration and Peaceful Uses of Outer Space and its Scientific and Technical Sub-Committee and the Legal Sub-Committee. Pakistan is also a member of the Committee on Space Research known as COSPAR. Pakistan has recently participated in the UN Conference on the Exploration and Peaceful Uses of Outer Space called UNISPACE '82 which was held in Vienna from 9th to 21st August, 1982. The contributions of Pakistan in this important UN Conference have been appreciated and Pakistan was elected as one of the Vice Presidents of the UNISPACE '82.

Ultimate objective of SUPARCO is to contribute toward the advancement of science and technology in Pakistan for socio-economic uplift of the society as a whole through perfecting and promoting the necessary techniques suitable for local conditions for solution of national problems.

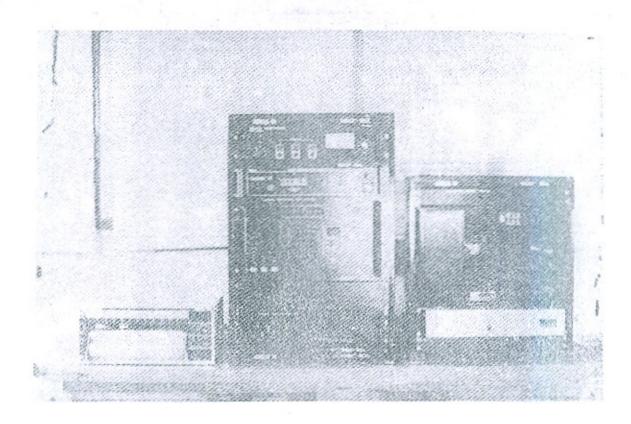


Density Slicer Equipment for analysis of satellite imagery. The equipment breaks variations of shade of grey into 10 distinctive colours and thus converts a black and white picture into a colour picture. Such a conversion is very useful for quantitative and qualitative studies of various features as contained in the picture,

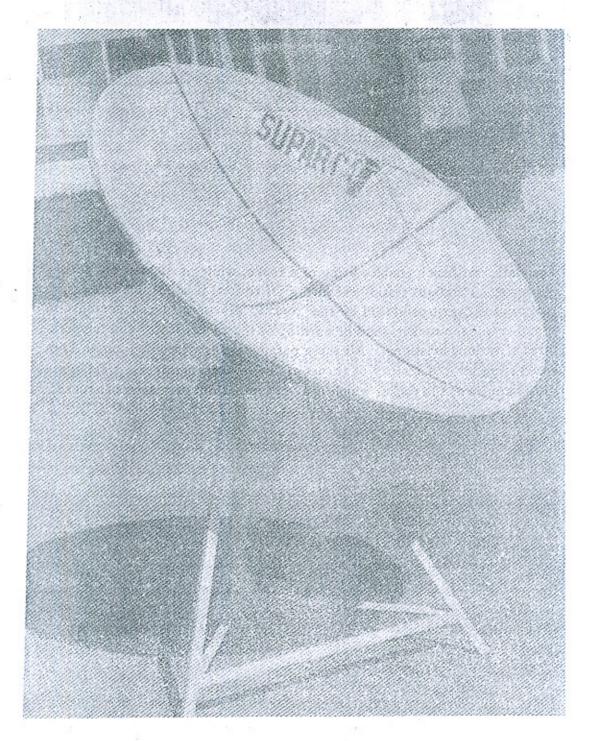




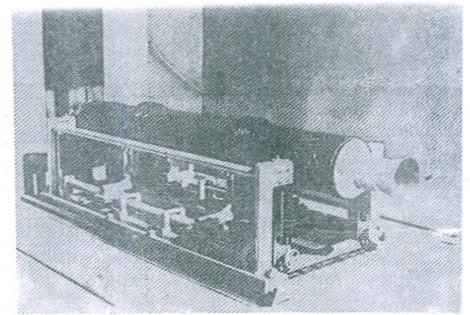
An inexpensive television receive only (TVRO) station showing the antenna unit and the electronics unit. The two combined together allow an ordinary television receiver to receive television signals from a direct broadcasting satellite.



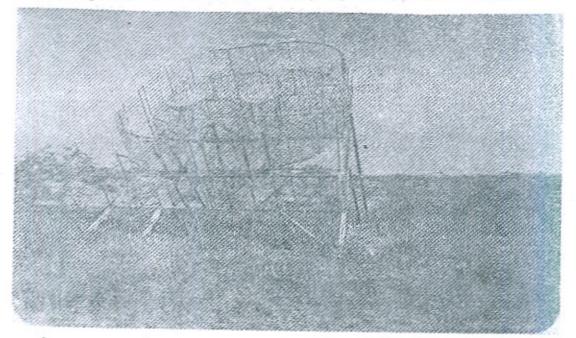
The geomagnetic laboratory measures the magnetic field of the Earth on 24 hoursbasis. The equipment comprises a very highly sensitive measuring probe, amplifier equipment and recorders. The entire station essentially relies on a digital computer which programmes data acquisition, its recording and final analysis.



A fibre-glass dish antenna built by SUPARCO for DBSR T. V. Reception.



The static test bench enables firing of a rocket while it is tied on to the platform. Through static test firing of rocket, it is possible to measure the forward thrust produced by the rocket, pressure of the combustion chamber of the rocket, time of burning of the rocket motor and temperatures at various locations. All these parameters are recorded on a high speed recorder. A history of thrust of the rocket motor vs. time gives total impulse of the rocket which is a very important parameter of a rocket.



An antenna assembled by SUPARCO's engineers for reception of signals from a scientific satellite beaming radio signals the, study of which yields total number of electrons in the path of the radio beam. In scientific terms, it is known as 'total columnar electron density'. The data so obtained is an important input for scientific research relating to Ionosphere which is a media, apart from other things, responsible for bouncing back high frequency radio signals thus allowing long distance radio communications possible.

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## Solar-Efficient Buildings

by

#### (M. IDREES ANJUM DIRECTOR OF WORKS Pakistan Agricultural Research Council

Personal experience prevalent over a span of 14 years in building Industry bears witness to the fact that due attention is not given for optimum use of natural agencies such as wind and sun while siting the buildings.

It has been noticed very surprisingly that during full swing summer, the upper floor of building are hot like oven and during winter the houses are cold like freezer.

The very candid and vivid reason is that the buildings are not properly and intelligently oriented. Orientation may be partially defined as the science of combining the demands made by the sun wind and the view, the latter two having a subsidiary importance in areas with a hot and dry climate. Consequently, the sun must be faced and tamed by the designer from the moment, it starts designing a building. This can be best done by beginning with an intelligent orientation of the structure, together with providing wall-openings of an appropriate size as demanded by orientation. The main purpose is to regulate the amount of sun coming in through wall openings by geographic means. Thus correct orientation can only be determined by taking consideration of the angle of the sun at various hours of the day and seasons of the years, the prevailing winds, etc. Other factors influencing the orientation of a building are the contours of the site, zoning and building code practices, the relative humidity, the surrounding buildings, surface cover such as trees and shrubs and other natural conditions affecting the microclimate of the areas. However, the behavioural pattern of the sun and local winds are the two most important factors affecting the orientation of a building.

#### Orientation for sun

Orientation for sun means in such a manner that it is insulated either against heat or cold depending on the climate. In such cold conditions the suns heat is welcome and a building in such a climate should be positioned to receive as much as rediation as possible, similarly under conditions of excessive heat, the orientation

of building should be such that the heat impact of the sun is mitigated as far as possible. The effect of the sun on a particular region should be determined with the aid of bioclimatic charts. The op:im on orientation of site is that which affords maximum rediation during the colder season while reducing the effect of the sun to a minimum in hot periods.

#### Orientation for wind

In order to specifically evaluate the effects of wind on human consumption, both annual and monthly variations of wind prevalance, its velocity and its temperature must be analysed by direction. One has to study the effects of prevailing winds both on the outside and the inside of Dwellings. In order to achieve a comfort balance, air movement have to be evaluated as both positive and negative. They should be blocked as much as possible during the under heated periods, but should be admitted and utilized during the hotter seasons. However, the high velocity air flow does not enhance confort, so a limit should be set of 90 meters per minute at night for air movements insided structure. If this does not balance the heat or vapour pressure conditions, mechanical conditioning should be employed. Below fig indicates best orientation for wind and sun.

#### Sun Control and Shading Devices

Any building surface such as window, walls and the roof, exposed to the sun can admit solar radiation. To avoid inward flow of heat either direct or indirect, the surfaces on which the suns rays fall must be protected. Many types of solar penetration control are available for windows but as each environment requires a different solution, the selection of the most suitable one necessitates careful, consideration. Besides preventing direct penetration of sun an efficient control system should take into consideration the following:-

- 1. Minimisation of glare and reduction of eye strain.
- 2. Maximisation of solar heat entering rooms in winter.
- 3. Protection against rain and wind.
- 4. Provision of adequate ventilation at all times.
- 5. Control of insects, dirt and dust.
- 6. Providing privacy when needed.
- 7. Adequate exterior vision.
- 8. Maintenance versus original costs of sun control devices.
- 9. Exterior appearance i. c, the architectural or aesthetic factor,

The following are some of the techniques for controlling the amount of sun entering through windows and openings.

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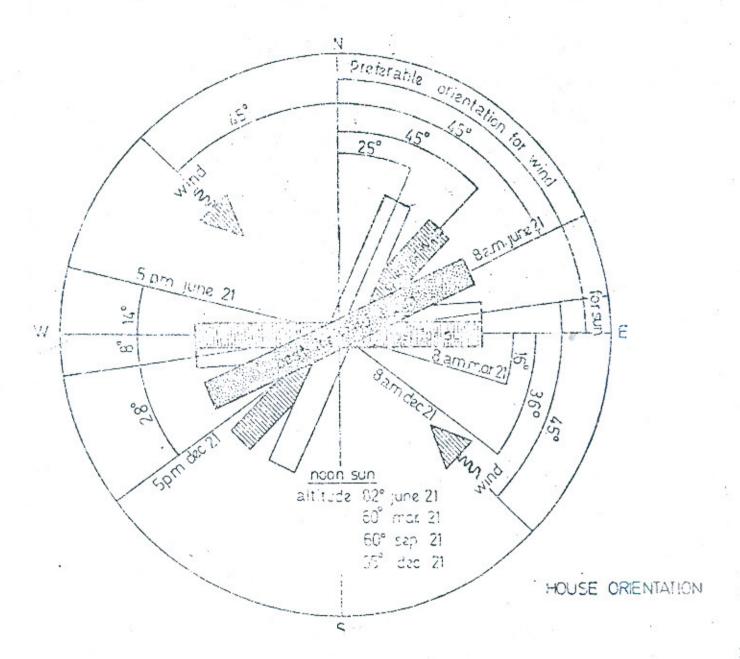
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- (a) Natural Devices Building orientation, trees and Shrubs.
- (b) Internal Devices: Curtains metal venetian, blinds application of various film coatings or chemical sprays.
- (c) External Devices: Roof overhangs, louvers (Which can be fixed or adjustable or both, vertical or horizontal) heat absorbing glasses.

# REFLECTION CO-EFFCIENTS OF DIFFERENT MATERIALS

The reflection co-efficient of a material determines the quantity of rediant heat for the sun which is reflected from its surface. Below are produced reflection co-efficients of a number of materials.

Material	Colour finish etc	Reflection Co-efficient
Slates	Silver Grey	0.21
	Dark Grey (smooth)	0.11
Clay-Tiles	Machine-made (red)	0.38
Concrete Tiles	Uncoloured	0.35
	Brown	0.15
Asbestos Cement	White	0.58
Galvanized Iron	New	0.36
	White washed	0.78
Copper	Polished	0.82
	Tranished	0.36
Asphalt	New	0.09
	Wheathered	0.18
Mortar Screed	Cement finish	0.27



# Energy Policy Options for Pakistan

# by MR. M. SOHAIL QURESHI

Director General (Energy Resources) Ministry of Petroleum and Natural Resources to the Pakistan Engineering Congress on 30th August, 1984,

If policy development is defined as a sigacious and prudent conduct to charter a course of action that the Government should develop it would be essential to briefly review the growth in energy supply mix and energy sources development in the cuontry. Such an analysis has been made in 1980. From it appears that the development of energy resources in Pakistan since its inception have been necessitated with the rise in demand particularly by the expending industrial base in the national economy. Pakistan inhereted an electric generation capacity of 110.4 mw which was shared about 30% by hydel and the balance by thermal sources generating 215 million kw/hr. Regarding crude oil, like-wise the consumption of petroleum crude was over. 210,000 mt/year. With the indigenous production of crude oil processed was at about 51,000 mt/year. The total commercial energy available in Pakistan in 1949, in terms of joules, was 44.7 billion joules. Petroleum share was 75%, coal 24% and 1% by hydel power. Till 1954 the energy production increased to 74.5 billion joules, it was shared by petroleum at 74%, coal 22% and hydel 4%. The strategy at this stage appeared to be to rapidly develop hydel power as first priority, meet other requirements of petroleum products and leave the balance to coal. Till this time coal was used both for electric generation and also by railways and industries.

2. The discovery of natural gas in 1954 changed the energy supply mix priorities in the country. In 1955 natural gas shared 3% of energy supply reducing the share of coal to 17%. During 1955-56 petroleum shared 66% of national energy supply with coal being at 19%, natural gas at 10% and hydel power 5%. This mix by end of first plan period i.e. 1959-60 was 59% petroleum products. 18% natural gas and 5% hydel. Five years after 1960 the petroleum share was 56%, coal 14%,

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natural gas increased to 24% and hydel to 6% of the energy mix. In 1970 i.e. the year before energy was available, the energy supply mix was 49% for petroleum products, 9% of coal, natural gas increasing to 33% and hydel increasing to 9%. This brief review clearly indicates that the energy strategy was to achieve a gradual reliance on natural gas and hydel power reducing dependence on petroleum crude and leaving the balance to coal. In fact the share of coal had not been planned to grow because of natural gas discovery; the fact is that the use of coal in production sectors of power and industry had began to be substituted with natural gas. Till middle of 1970, 49% of the energy, primarily petroleum crude and products, was imported.

 The energy development in Pakistan can be catagorized in five strategical groups:

### Group I

Group I will constitute of the period 1949 till 1954-55. During this period the crude production index increased from 32.5 in 1949-50 to 88.86 in 1954-55. No crude was imported. Only deficit products i.e. finished petroleum products were imported. The imports of deficit products increased from an index of 60 in 1949 to 92 in 1954-55. Hydel power increased from an index of 10 to 60 at the end of the 6 years period. Natural gas started to contribute at an index of 11 in 1954-55 coal shared at 60 rising to 72 in 1954-55.

Enercy Policy Group 1

	Indigenous crude	Imported crude	Deficit products imports	Coal	Natural gas	Hydel
1949-50	32.53	Nil	60.22	59.62	Nil	9.79
1950-51	33.13	Nil	77.00	68.90	Nil	11.55
1951-52	56.33	Nil	72.15	81.86	Nil	19.96
1952-53	77.71	Nil	70.36	79.67	Nil	36.20
1953-54	83.74	Nil	76.15	75.58	Nil	47.36
1954-55	88.86	Nil	92.16	72,17	11.17	60.08

#### Group II

Group II covered period of 1955-56 to 1960-61. In this period the production of indigenous crude stayed around an index of 95 with 1958-59 being 100, while on

bydel power rising to 126 and natural gas grown to 147 startiag with an index of 47 in 1955-56. The coal consumption increasing from 82 to 123 in 1960-61.

Energy Policy Group 2

Ð	Indigenous crude	Imported crude	Deficit products imports	Coal	Natural gas	Hydel power
1955-56	91.27		88.59	88.00	47.06	81,60
1956-57	94.88	_	101.02	70.26	70.59	85.52
1957-58	97.29	-	107.33	81.31	88.24	88.06
1958-59	100.00		100.00	100.00	100,00	100.00
1959-60	84.64		112.61	111.46	117.65	99.22
1960-61	98.19		119.00	122.92	147.06	126.22

### Group III

Group III constitutes of the period of 1961-62 to 1965-66. The production of indigenous crude during the period increased from an index of 110 in 1961-62 to 143 in 1965-66. This period also begins with import of crude in the country which started at an index of 116 and increased to 935 in 1965-66. This is the period where the first refinery at Karachi was set up to reduce the imports of finished products and optamise the added value and marginal gain through processing crude in the country rather than continue to import finished products. The facts were that the import of finished products which were at an index of 112 in 1961-62 reduces to 14 in 1965-66; this decline in 1962-63 when the imports were indexed at only 30, the natural gas increased to 359 in 1965-66, hydel power to 279 and coal gradually to 173.

Energy Policy Group 3

	Îndigênous crude	Imported crude	Deficit products imports	Coal	Natural gas	Hydel power
1961-62	110.84	115.09	111.93	133.56	170.59	184.93
1962-63	129.22	529.82	29.56	166.85	194.12	230.14
1963-64	136.15	733.33	19.42	168.72	247.00	267,32
1964-65	138.55	840.35	10.31	165.35	300.00	266.54
1965-66	142.77	934.74	13.80	173.40	358.82	278.87

# Group IV.

This group comprises of the period 1966-67 to 1970-71. The production of indigenous crude stayed at around an index figure of 145 per year while the imported crude increased to 180 in 1970-71 with the finished deficit products increased to an index of 33 from 14 in 1966-67. Natural gas consumption increased to an index of 636 and hydel to 675. Coal stayed at constant index of 173 indicating a decline terms of actual coal used.

Energy Policy Group 4

	Indigenous crude	Imported crude	Deficit products imports	Coal	Natural gas	Hydel
1966-67	135.24	914.39	14.03	179.81	394.12	299.41
1967-68	138.86	1,038.94	16.35	170.94	417.65	485.71
1968-69	150.00	1,103.50	4.09	169.85	523.53	534.05
1969-70	150.90	1,071.22	21.98	165.21	611.71	570.45
1970-71	136.15	1.079.64	32.79	179.26	635.29	674.95

### Group V

This covers the period 1971-72 to 1978-79. The indigenous production of crude reached a scale of 160 in 1976-77 and then declined to 153 in 1978-79. The imported crude was scaled at 1256 when the third refinery also came on stream. During this period the deficit product imports started to increase gradually from a scale of 35 in 1971-72 ending with 129 in 1978-79. The natural gas increasing to 1259 and hydel power to 610 with coal being stationery at 170 figure on the index scale. The significant observation in this group is the addition of nuclear generation of electricity at Karachi which started in 1970-71.

These facts indicates that the energy policy till 1978-79 has been;

- (a) To affect growth in energy supply to meet the growing demand of industrialization in the country and also meet the requirements of gradual increase in mechanisation of agriculture.
- (b) Meat energy requirements of urban areas for residential consumption and providing fuel to feed the public sector need particularly in the transport sector.
- (c) Reduction in imports of liquid fossil fuel sources.
- (d) Continuous and repaid development of natural gas and hydel substituting t e use of coal in production sector and of petroleum products.

41 Energy Policy Group 5

	Indiegenous crude	Imported crude	Deficit products imports	Coal	Natural gas	Hydel power
1971-72	129.52	1,055.78	35.09	173.53	670.59	719.96
1972-73	131.63	1,051.29	42.50	153.48	782.35	848.34
1973-74	122.89	1,123.50	63,46	162.76	905.88	810.37
1974-75	105.12	981.40	91.82	173.94	976.47	853.03
1975-76	108.13	998.60	75.13	141.61	970.59	1,062.04
1976-77	169.15	1,034.73	84.16	161.12	1,029.41	1,014.48
1977-78	140.36	1,217.19	93.61	163.71	1,170.58	1,456.36
1978-79	152.21	1,256.14	128.28	170.67	1,258.82	1,610.95

- 4. The analysis of facts subsequently to 1978-79 are indicative of the followings:
  - (a) The use of indigenous sources were not properly planned and thus resulted in an indiscriminate use of indigenous resources particularly natural gas with its price being the cheapest of all the energy sources including imported energy.
  - (b) The energy policy in its proper perspective was never made inspite of the energy crisis which started with rationalization of prices of petroleum crude by oil producing developing countries raising the prices more than four times between November, 1973 to March, 1974.
  - (c) The first study in the country on resources assessment and forcast was completed in 1975 and since then the recommendations which would have constituted energy policy for the next 15 years based on the facts of 1975 were hardly developed further and reviewed.
  - (d) The first effort to give a direction to the development of energy policy precipitated in 1979 with the directive of the Presidenc to constitute an Inter-ministerial National Energy Policy Committet to coordinate energy activities in the country, develop energy policy and reviewed its implementation on regular basis.
- 5. The 1975 study on energy situation has made certain policy recommendations which included:

- (i) Development of Renewable Sources of Energy and determining its scope.
- (ii) Energy supply and demand management approach.
- (iii) Energy Conservation.
- 6. The prognosis of the first Pakistan energy resources survey was cautionsly optimistic. The prospects for self-sufficiency in liquid hydro carbon appeared progressive and substantial scope for development in coal, natural gas and of hydel was seen. The compelling subject was the method to be adopted for exploration and optamization of such sources in the next 10 years; this needed a large element of flexibility i.e. development of options was considered essential. It was seen at that time that long term i.e. beyond 10 years capital investments may not be committed since an early discovery of larger oil reserve and production of natural gas could render such schemes un-necessary. Among identifying the situation existing then the study also stated the capability of Lakhra to fuel a 250 mw thermal plant and need of availability of more natural gas and oil for increasing thermal generation. It also emphasised the need to develop and convert non-commercial energy resources into use able form of energy. The recommendations made included the followings:

# 1. Petroleum and Natural Gas

- (i) Drilling of 600 wells till 1990 was considered as an essential target.
- (ii) The conditions of concessions needed review to interest and encouraged investment both from out-side and inside the country into all exploration activities. Cash bonus incentives were suggested and maximum size for exploration was proposed to be 5000 square miles to be explored over a period of 5 years.
- (iii) Proper exploration and development of the sesmic data and its interpretation was considered necessary in addition to strengthening of OCDC with an appropriate professionals and financial disciplines was recommended.
- (iv) Formation of an Oil and Gas Pricing Commission to deal with the pricing at different levels was recommended. At that time i.e. at 1975 costs the well head price was recommended to be 5.5 to 6 \$ per barrel and gas at 20 cents per MCF.
- (v) Commitment to foreign imports was suggested to be restricted to 3 or for 4 years.
- (vi) Towards consumption pattern of petroleum products between diesel engine driven trucks and buses in favour of the gasoline powered trucks was considered useful.

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- Lakhra coal reserves were suggested to be accurately defined for use of thermal electric generation.
- (ii) 5 to 10 years development plan to ensure exploration, development and production of indigenous coal was considered a priority.
- (iii) Review of pricing policy regulations and others since lack of it was seen to limit investment in coal at that time.

#### Electric Power Generation

- (i) The study considered that Chashma Nuclear Plant would not be required until after 1985 unless it is combined with the pumped storage hydel scheme to ensure a high utilization.
- (ii) A 500 kv transmission line between Tarbela, Lyallpur Guddu and Karachi was considered a priority in 1975.
- (iii) The need for carrying out a ranking study of the various hydel aroject sites was considered a priority. Meanwhile Lakhra Mines-mouth thermal generation was recommended to be brought on stream by 1985. Pumped storage hydel possibilities at Tarbela had to be considered.
- (iv) Immediate need was felt to indicate major improvement in the electric distribution net work to cut losses from the present high level to reach a target of 25% in 1985 and 15% in 1990.
- (v) A better management coordination between WAPDA, KESC and Pakistan Atomic Energy Commission was seen essential.

# 4. Non-Commercial Energy

- (i) Plans and programmes was suggested to be developed to change the existing non-commercial energy use pattern to a useable form of energy like, Biogas, Solar Wind etc.
- (ii) Study to increase affrostation cultivating fire-wood varieties for domestic fuel was suggested.
- (iii) Development of new commercial fuel was suggested to be undertaken.

### Administrative Measures

 (i) Coordination of all energy development was suggested to be the responsibility of an Energy Policy Coordination Cell similar to the then Energy

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Resources Cell. It proposed small well qualified group of expertise concentrating in energy policy planning, review of energy policies in light of new developments and optamise policy changes.

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- (ii) Standardization of energy statistics and development of such expertise to be set-up within the energy policy coordination organizations.
- (iii) Strengthening of the different Directorates within the Energy Ministries alongwith decentralization.

These recommendations were ignored till 1979.

- 7. At this stage it would be appropriate to compare the Pakistan position in terms of its being self-relient in energy as compared with other developing countries. Also a brief mention to the energy relationship with economic growth would appear essential. These factors are pragmatic towards further identification of the energy policy in the country. The energy consumption in the developing countries account for about 17% of the world consumption while its growth rate has been fairly rapid. In 80's the growth rate in energy consumption, considering the commercial sources of energy, will be at 6.2% a year. The relationship between annual CNP growth and their energy demand was about 1 to 1.3 in 25 years preceeding 1973 while with the rationalization of the prices of crude oil, this ratio dropped to 1 to 0.8 during the period 1975-80. The continued rise in the real prices of oil would further dampen the consumption in the developing countries.
- 8. Among about 110 developing countries, 28 developing countries are net exporter of oil. Out of remaining 92 of the developing countries the dependence on import of oil varies. Chud Chashma Ivorycoast and Pakistan have potential to become self-sufficient while Brazil, Republic of Korea and Turkey would increase their dependence on imported crude. 64 countries of 92 countries dependence is rated at more than 75% of their commercial supplies on imports of petroleum products alone. According to an estimate the annual compound growth rate during the decade of 1980-90 for development of electricity in developing countries is 15.8% for gas 14.2% and growth rate averaging for overall energy sources in developing countries is 12.3%.
- 9. As mentioned earlier it is necessary to appreciate the relationship between the economic growth rate and availability of energy and compare this situation both for the developing economies and developed economies, for this purpose the elasticity has been taken for the final energy to gross domestic product. The value for all developing countries, in different regions, is in access of a ratio of 1. It varies

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between 1.17 to 1.53 for the developing countries and for developed economies it ranges between 0.68 to 0.84,

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10. Final energy to gross domestic product elasticity of less than 1 indicates that the GDP growth is not much influenced by further increase in energy supply. While this value being greater than 1 the economic growth is dependent on energy supply. An other interpretation would be that the final energy use is to grow faster than the economy while the value being less than 1 economy is going faster at low energy growth rate. Thus the economic growth for developing countries including Pakistan requires a rapid growth in energy supply in all economic sector both productive and non-productive.

In 1980 the demand projection study was completed by local consultants. To optamise the growth pattern the consultant used a co-efficient of clasticity which is applicable to a situation of developed economy and not developing economies like Pakistan. Other studies made extending the period to the year 2000 indicate that the demand for energy estimated at 27 TOE in 1987-88 will grow to 37.83 in 1993 and further to 51.8 in 1998 and 69.5 million TOE in 2003. Till the year 2003 the import crude oil etc. is expected to continue. The imports of crude oil and petroleum will rise from a 9.17 MTOE in 1987-88 would go to 31.78 million TOE in 2003. These observations make following implications.

- (i) The economic growth rate as projected in the current plan if continued till year 2003, the energy supply will be the major impediment unless sizeable and timely discoveries of fossil fuel, natural gas and non-fossil energy source; mainly the nuclear energy is devoloped.
- (ii) Further more the supply mix of the fuels would change more in favour of nuclear and probably to coal and the renewable sources of energy the later playing considerable part in meeting the domestic requirements only. The renewable energy system makes it viable only for domestic use and can not be considered as a major source of energy; this situation is true even when seen in the global context of energy growth pattern.

Energy conservation both form energy demand management aspect and energy supply management, can play a certain role but not significant enough to quickly add up to the energy supply. The only option is to raise additional capacity on the ground and improve the efficiency of the existing systems. Within this balance of energy mix the self-reliance is the most vital factor and for a sustained growth in the next 19 years it has to be looked at more realistically.

The performance during the last 5 years plan is most relevant in the 5th Five Year Plan period the energy supply was to be increased by 46.8% against which the achievement was a consumption of 46.6% giving an annual compound growth rate of energy supply of over 9% which is 12.5% better than the targets. Increase in supplies in the five years under review work out at 53% taking 1977-78 as the base year. The natural gas production reached the targeted production 950 MMCFT per day and the Quetta pipe lines has been completed. Petroleum product consumption was expected to increase to 5.2 million tons while the actual consumption met at the end of the 5 year plan period was 5.68 million tons.

The indigenous oil production was to increase substantially about 2.5 times to 1.7 million tons per year, which is over 35,000 barrels per day. The crude oil refining capacity did increase to 6.7 million tons of crude processing capability per year but use of the capacity was much short of the capacity installed. Two refineries at Karachi operated at 68% capacity while ARL capacity utilization being at 31% since the crude oil in anticipation of which availability the capacity of ARL was raised to 2.1 million tons was not available. In addition the 4 million barrels per day pipelines was made available to support the normal oil transportation facilities. The present indigenous oil availability is about 20 thousand barrels per day out of which 1300) is being supplied to the refineries and the balance will be made available as the logistics are completed.

Considering the sector-wise consumption of different energy sources:

- (a) The residential sector where the growth rate has been the largest for natural gas at 26% followed by electricity at 20%, the consumption of oil and coal has declined with the net growth rate in the residential sector being at 12%.
- (b) The commercial sector registered a growth rate of 13% for natural gas, the largest growth in consumption in this sector being for oil at 15% and electricity at 10.5%.
- (c) In industrial sector the largest growth rate has been for electricity at 10.1% followed by coal used in brick kilns, giving an over growth rate of 8.45%.
- (d) In transport sector, except aviation fuel which registered a net decline, the major increase has been in HSD of over 14% and of more than 17% for fuel oil. With an annual compound growth rate of all fuels in transport at 11%.

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(e) Agriculture sector used electricity with a growth of 11% and decline in use of diesel oil thus giving a total annual compound growth of 4% for this period. The decline in use of diesel oil is indicative of good rains and better irrigation levels.

### C. Power Sector

Used oil at annual compound growth rate of 22%, gas increasing at 5.4% and total decline in use of coal. The over all growth rate in fossil fuel consumption was 7.3%. This brief analysis is indicative of comparatively effective implementation of the targets the credit for which can only be given to the growth implementation agencies and the national energy policy committees set up by the President in 1979 which started its operations in March, 1980.

Consumption of energy, both primary and secondary, in all the economic sectors of the national economy is fraught with energy waste in certain applications in alarming dimensions. The heat losses alone are enormous. To arrest this waste of energy, energy management has to be achieved. The first deliberation on energy conservation took place in December, 1979. Surprisingly enough, one of the leading English dailies under an editorial captioned "Energy and Economy" of 20th December, 1979 considered energy conservation measures naive. I have mentioned this particularly to emphasise that until 1979 the impression of the country was that energy is available in abundance. It was around the same time when the Executive Committee of the National Economic Council constituted a sub-committee to propose a 20% cut in energy consumption in next 2 years.

The energy conservation started with the first phase of educating masses on energy demand management and the basic fact of causing an awareness of world energy crisis and that Pakistan was no acception to it. Simultaneously development of renewables like Biogas, as a substitute of kerosene oil, which is the second largest deficit petroleum product imported in the country and of Solar electric application as supplement to the use of electricity in remote and such areas where national grid could not be connected economically, began in 1980. As a part of the 1st phase the first national symposium on energy conservation was held in Pakistan. The symposium deliberated on sectoral energy demand management and energy supply management problems and came out with practical and precise recommendations separately for the industrial sector, transport sector, domestic and commercial sector, agriculture sector and policy areas, which were placed before 1st meeting of NEPC in April, 1980.

In the second phase the energy management legislation was drafted and guide books for consumers to abate energy waste were developed and distributed through limited means, but it created a very clear impact. In the second phase energy audit in industries has been started.

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In the Third phase promulgation of the energy management legislation is envisaged. To mention a few salient aspects of the legislation, the legislation does not require a separate man-power and organization for its implementation. The total field man-power is 7 energy inspectors plus 10 deputy energy inspectors while the industries under the legislation would, as a mandatory provision, employee and train qualified process engineers in energy audit and management. On the administrative side the additional staff on public accounts is a grade 19 officer and 2 grade 18 officers which would be coordinating the field activities and the authority would rest with the Director General Energy Resources.

The more important recommendations identified in the national symposium for major consumption sectors were:

### Industrial Sector

- (a) Industries using petroleum products and natural gas other than as process component, should be gradually converted to furnace oil and ultimately to indigenous coal through coal gasification or other techniques for using coal for such purposes.
- (b) Co-generat'on from waste heat should be made compulsory through a legislation alodgwith energy supply management i.e. energy audit. Heat insulation on the process lines and material transmission lines in industry should be improved to save heat losses and re-cycling of flue gases should be optamised.

A complete energy balances and optimum use of the indigenous energy by the future industries i.e. Sankey diagram should be an important part of examination of the proposal before its approval by the Government.

The efficiency of furnaces and boilers must be optamised. Transport Sector

Standardization of public transport was proposed to enable proper planning of fuel needs, determine potential of inter-fuel substitution and for designing appropriate roads communication.

Power alcohol manufacture to be encouraged to substitute the imports of high octane blended component in transport. Simultaneously diesel combustion system should be encouraged in the field of public transport, while private transport to use more gasolines.

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All vehicles having an engine capacity more than 1000 cc should be discouraged for imports under all catagories.

The three grade gasoline luxury be reduced to 80 octane and 100 octane gasolines which two grades can meet the requirement of any mix needed for different compression engines.

Development of inland water ways where applicable should be done expeditiously.

Electric traction of railways should be rapidly developed.

# Domestic and Commercial Sector

- 1. Use of pressure cookers be promoted which can save kerosene worth Rs. 30 crore every year.
- 2. The building design should optamise use of Solar energy for heating and cooling of the houses and the officers. Research on construction material with poor thermal conductivity should be undertaken.
- Standardization of domestic appliances should be made mandatory in the country.
- 4. Substitution of kerosene oil which is basically needed for domestic sector be substitute with biogas, solar heaters etc.
- 5. Florescent tube lights, use be encouraged to save atleast 40% of electric consumption.
- 6. Desert coolers be encouraged to be used, in areas beyond Hyderabad instead of air-conditioners which use was expected to grow fast with Government policy to allow such appliances to be imported by Pakistani working abroad.

# Agriculture Sector

- 1. Standardization of the size of tubewells should be made and consumer provided a ready reckon to determine the minimum horse power needed to get certain out put of water. Biogas should be developed on the national level to replace imported kerosene oil, improve environments and health conditions and increase provision of nitrogen enriched manure.
- Fuel wood affrostation to be encouraged for northern areas specially where road communication is not proper to meat the requirements of fuel-wood, specially in winter.

3. Optimum use of chemical fertilizer mix to achieve essential quantity of fertilizer use.

# Policy Matters

- It was considered essential that the prices of different energy products should be reviewed and equalized keeping in view the socio-economic conditions and needs of different wage baskets in the country.
  - 2. Energy management must be drafted and enforced.
- One day a week holiday for gasoline and diesel retail out let must be made compulsory,
- 4. An inter-fuel substitution study should be taken to optamise use of surplus energy products and reduce reliance on imports. Coal gasification should be taken for use in industry and proper coal development policy including prices policy be announced by the Government.
- The power losses in electric transmission be improved and the load factor in thermal generation be raised on priority basis to generate more kwh.
- 6. Formation of a high level national energy commission to coordinate and take decision on policies on the national energy situation.

# Energy for next 10 years

- 1, In 1980, based on the work done in different studies and the forecast prepared in the DCER, the first step accomplished in 1979 was the provision of basic information with appropriate interpretation to facilitate the work of economists, engineers and consultants who would make exercises on long term energy forecast and policy. For this purpose and for the first time in the country, Energy Year Book was published in 1979 which reflected the energy situation in Pakistan in 10 years prior to 1979. Since then this vital document is published every year and is now an authentic document with Wolrd Bank, IEA and other global organizations.
- 2. The long term energy policy proposed to the first meeting of the National Energy Policy Committee in 1980 kept following objectives in view:
  - (i) Achieve a decline in annual growth rate of primary energy which is imported through abating wasteful energy use.

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(ii) Inter-fuel substitution of primary sources of energy primarily petroleum and natural gas products with furnace oil, coal and for domestic sector with renewable sources of energy. y of

(iii) Development of a coal policy in the country to rapidly provide incentives and develop the coal industry, in the country.

ducts and (iv) Identify policy areas which should have priority with the Government to achieve self-sufficiency in the shortest time possible and to achieve affective demand mangement.

3. The above objectives were to be achieved without having any slowing

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effect on the growth rate of industry and agriculture and curtail supplies if necessary to non-productive sector of the economy.

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4. Other than the import of equipment for production of electricity the recommendations developed foreign exchange expenditures based on supply source, on the 10 years energy demand supply position which are equally true today.

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# Petroleum and Products

It was necessary that on the basis of the forecast and historical energy situation the estimated costs of procurements of deficit petroleum products was developed. This was done keeping the following facts in view:

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(i) Consumption pattern of petroleum products in developed economies, rate of inflation in developed economies as reflected in prices of their capital and other goods and cost of services as imported by developing economies, including oil producing developing countries.

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(ii) Cut in consumption through energy conservation and alternate energy sources development by the developed countries to reduce its demand on petroleum products on rest of the world.

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(iii) OPEC and other oil producing countries keeness to retain a real value for their supplies i.e. extent to which the inflation according of their current accounts is made.

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The total energy consumed till 1970-74 by developed countries was 50% higher than the total production of primary energy by these countries. The consumption of liquid and gaseous fossil fuels was 3 times their own production. In the developing countries including African, North and South America, Middle East, Turkey Far East etc., the consumption in 1970 was only 30% of their total production of primary energy and about 21% of their liquid and gaseous fossil fuels production. Considering the consumption of total commercial energy as compared to primary energy sources, world consumed about 93% of the primary energy production in 1970. The developed countries consumed 140% of it out stipping its production

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