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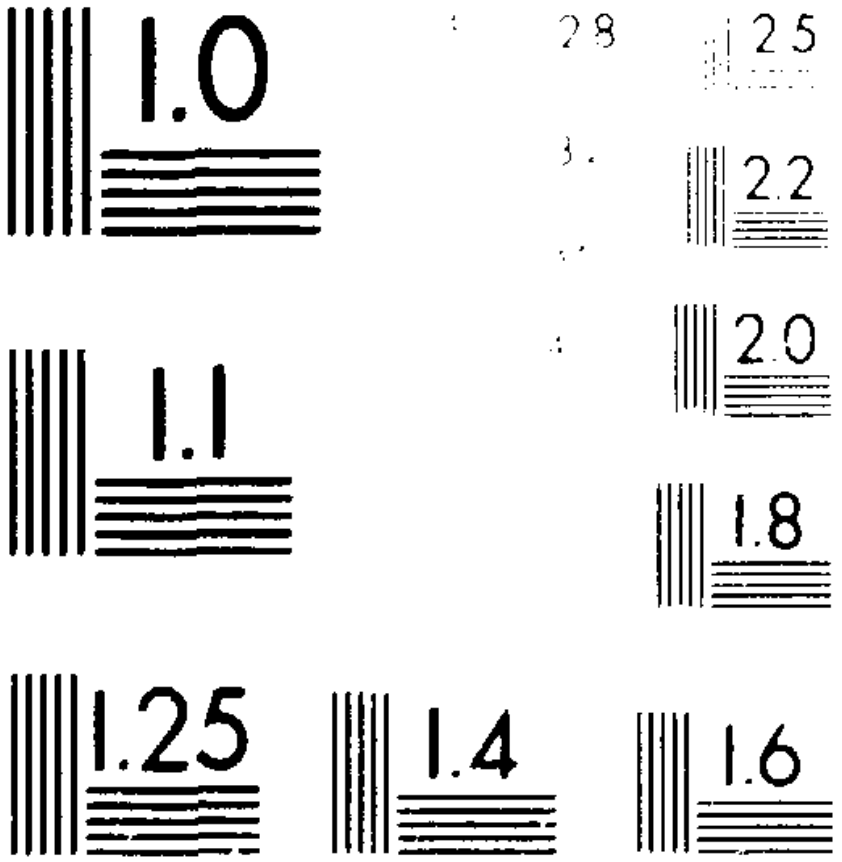

July 1984.

13907

COUNTRY CASE STUDY ON ELECTRIC POWER EQUIPMENT INDUSTRY IN PAKISTAN

BY

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from V Perkovek
July 84

C O N T E N T S.

TABLES & ANNEXURES.

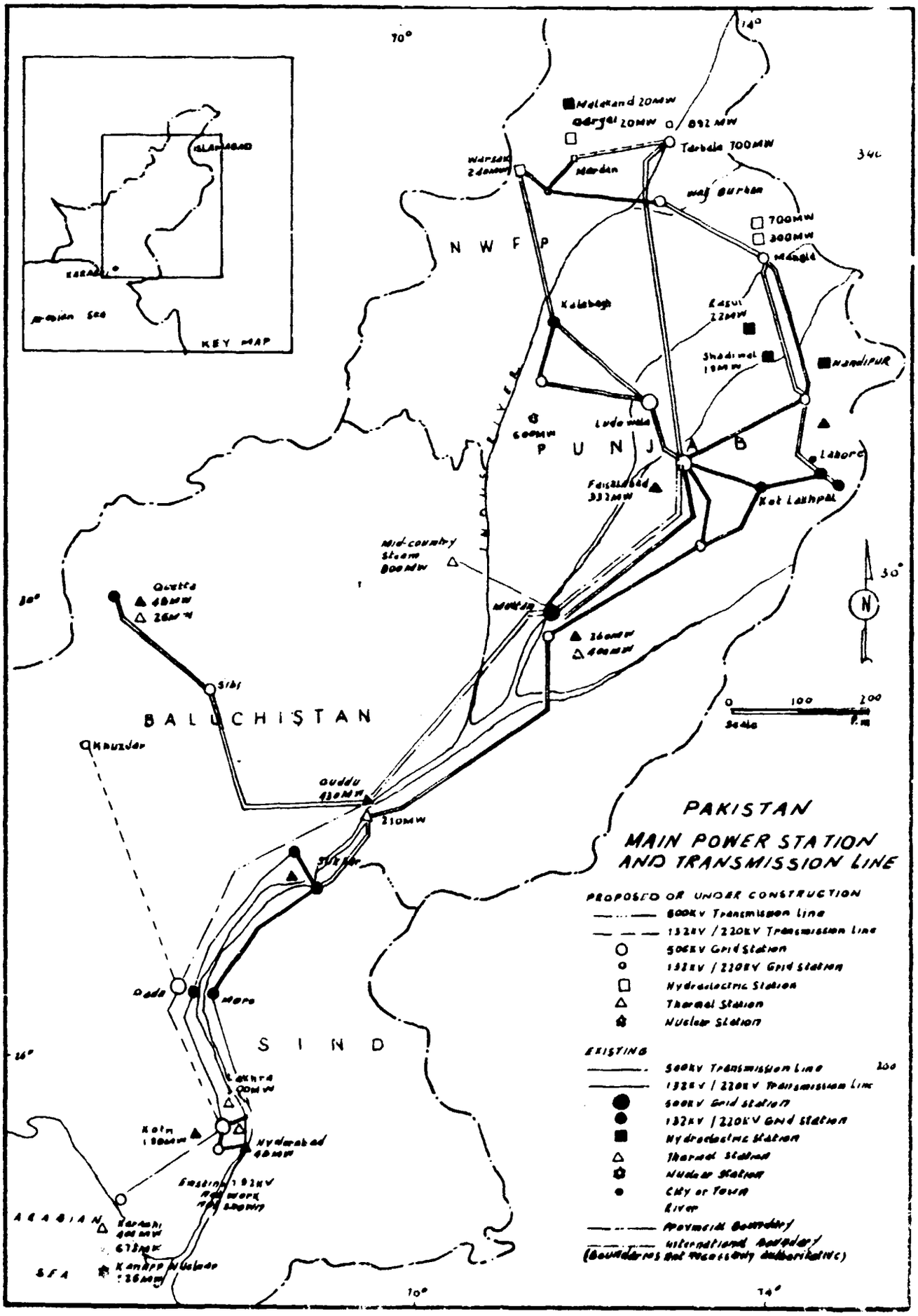
....contd p iii..

1. This country case study on Electric Power equipment Industry in Pakistan has been prepared on the request of UNIDO. Attempt has been made to follow, as far as possible, the draft terms of reference for the country case studies adopted by the experts group meeting on energy related equipment and technology held in Vienna from 19th to 21st December, 1983. These terms of reference had been drafted for preparing a set of country case studies as contribution to the Second Consultation on the Capital Goods Industry with special emphasis on the energy related equipment and technology.

TABLE 1.

P A K I S T A N.

Capital	:	Islamabad
Population	:	87.43 Mn. (1983)
Urban population.	:	28.3 % (1981)
Rural population.	:	71.7 % (1981)
Land area.	:	803,953 sq km
Population Density.	:	106 Persons sq/km(1982)
Access to Electricity	:	25% (1981/82)
Per capita generation	:	204 KWh (1982)
Fiscal year	:	July 1 to June 30.
GNP	:	Rs. 365,213 Mn.
Per Capital GNP	:	Rs. 4176
Exports	:	Rs. 34441.7 Mn.(1982-83)
Imports.	:	Rs. 68,150.8 Mn(1982-83)
Outstanding Foreign Debts:		US $ 309 Mn. (1981-82)
Inflation Rate	:	8 % (1982-83)
Exchange Rate	:	US $ 1.00 = Rs. 13.65(March '84)


PAKISTAN
MAIN POWER STATION AND TRANSMISSION LINE
PROPOSED OR UNDER CONSTRUCTION
800KV Transmission line
132KV / 220KV Transmission line
500KV Grid Station
132KV / 220KV Grid Station
Hydroelectric Station
Thermal Station
Nuclear Station
EXISTING
500KV Transmission Line
132KV / 220KV Transmission Line
500KV Grid station
132KV / 220KV Grid Station
Hydroelectric Station
Thermal Station
Nuclear Station
City or Town
River
Provincial Boundary
International Boundary
(Boundaries not necessarily authoritative)
KEY MAP
ISLAMABAD
KARACHI
Arabian Sea
N W F P
P U N J A B
BALUCHISTAN
S I N D
INDUS RIVER
Malakand 20MW
Dargai 20MW
892 MW
Tarbela 700MW
Warsak 240MW
Mardan
Haripur
700MW
300MW
Mangla
Kalabagh
Kasur 22MW
Shadiwal 19MW
Nandipur
600MW
Lyallpur
Lahore
Faisalabad 332MW
Kot Lakhpat
Mid-country Steam 800MW
Multan
Quetta 48MW 26MW
Sibi
Khuzdar
Guddu 410MW
210MW
Sukkur
Dadu
Moro
Sakhra 200MW
Kotri 180MW
Hyderabad 48MW
Existing 132KV network 200MW
Karachi 400MW 672MW
Kanupp Nuclear 137MW
ARABIAN SEA
Scale 0 100 200 Km
N
30°
34°
26°
70°
74°

3. ENERGY CONSUMPTION.

During 1982-83, Pakistan's energy consumption was 27 Mn. t.o.e. The share of natural gas was 23%, petroleum products 22%, hydro power 9%, coal 3% and non commercial fuels 43% . 93% of the petroleum products consumed were imported. 17% of the primary energy products was used for electricity generation. In 1981, the power sector accounted for 32% consumption of the natural gas. Pakistan's hydro power potential which has been estimated between 20,000 MW to 40,000 MW is in the north on the indus river and its tributaries. By July '83, 2547 MW of this potential had been exploited. Tarbela units 9 and 10 of 175 MW each, will add additional hydro-electric capacity by December 1984 and May 1985. The installed thermal generation capacity in the country by Octobet 1983 had risen to 2317 MW. bringing the total installed capacity (hydro and thermal) to 4864 MW. Coal reserves were stimated in 1980 at 484 Mn. ton of predominantly lignite equivalent to 117 Mn. t.o.e.

4. POWER SUPPLY UTILITIES.

WAPDA (Water & Power Development Authority and KESC (Karachi Electricity Corporation Limited) are the two power utilities for the country. WAPDA supplies power throughout Pakistan except in (i) Karachi area (ii) part of Thatta and (iii) Lasbella. WAPDA was established in 1958 as a statutory corporation. KESC started as a private company in 1913 but since 1951, the major share holders have been the Government or Government controlled financial institutions. KESC is managed by Pakistan Electric Agencies Limited whose Managing Director is also the Chairman of KESC. Both WAPDA as well as KESC are supervised by the Ministry of Water & Power.

Karachi Nuclear Power Plant (KANUPP) is situated in licensed area of KESC. This power plant is operated by Pakistan Atomic Energy Commission but KESC purchases the power generated and distributes it through its own distribution net work.

5. DEMAND FOR ELECTRIC POWER.

WAPDA's energy sales show an average increase of 12.3% from 1977 to 1982. They are projected to grow at 14.8% from 1982-83 to 1986-87, whereas electric power consumption in KESC area has been estimated to increase at the rate of 11.8% a year, from 1982-83 to 1986-87. There is considerable load shedding in WAPDA area during the dry (Winter) season whereas in the case of KESC the demand for electricity out-stripped supply during the summer of 1983 until 210 MW power plant known as Bin Qasim I was added to the system in October, 1983. No load shedding in KESC area is expected during 1984 - 86 after a further addition of 210 MW thermal plant known as Bin Qasim 2 in September, 1984. The total number of consumers is expected to reach the figure of 6.4 Mn by July 1984. During 1981-82, the system losses in WAPDA area were 30.3% and in KESC area they were calculated at 23% .

6. VILLAGE ELECTRIFICATION.

By the end of June 1983, only 35% of the 43,327 villages in Pakistan had been electrified. The supply requirement for rural electrification are expected to increase from 2.56 GWH in 1982-83 to 3.307 GWH by 1989-90. The emphasis on the rural electrification can be seen from the fact that of the total number of villages electrified, over 9,200 villages were electrified during 1977-78 to 1982-83 which is 60.5% of the villages electrified.

7. INSTALLED GENERATING CAPACITY.

The installed generating capacity by the end of 1983 was : thermal 2317 MW and Hydel 2547 MW, making the total generating capacity 4864 MW. In the case of KESC, the installed capacity was 873 MW which was all thermal. 57% of the installed capacity in the case of WAPDA is hydel. WAPDA uses gas turbines at Shahdara Faisalabad, Kotri, Quetta and Hyderabad to meet the peak demand in Winter and Summer months. Other thermal stations are at Multan (285 MW), Guddu (439 MW) Faisalabad 140 MW) and Sukkur (50 MW). The hydro electric units are at :

Tarbela	1400 MW
Mangla	800 MW
Warsak	240 MW
Small hydels	107 MW.
Total hydel in WAPDA :	2547 MW.

By June 1982 WAPDA had 400 grid stations of 220,132,66 KV and more than 16,000 kilo meter of high tension lines. An extensive 220 MW and 500 KV transmission line will link WAPDA's hydro power in the north with thermal plants in the centre and south of the country in 1985 and will extend the 500 KV / 220 KV system to Hyderabad in Sind province and Karachi.

8. In the case of KESC, the transmission facilities ranging from 66 KV to 220 KV had a total length of 444 kilo meter in 1982. An additional 68 milo meter of 220 KV over head line has been commissioned during 1983-84.

9. After the addition of 210 MW steam unit in October, 1983, KESC has another 210 MW unit under

construction at Bin Qasim. The second unit is scheduled to go in operation in September 1984. After commissioning of second unit, power shortage in Karachi / Lasbela area is likely to vanish for a few years. WAPDA has already commissioned 4 x 175 MW hydro power lines at Tarvela. Two additional units of 175 MW each (9 and 10) will be commissioned by 1985. A steam unit of 250 MW is under installation at Guddu. Other few schemes planned by WAPDA include 450 MW Combined Cycle Power Station at Guddu and Lakhra Power project (600 MW) Future plans of KESC include :

1. Conversion of SITE Gas Turbine Station to Combined Cycle Operation with additional generation of 50 MW by March, 1986.

2. 50 MW Low Speed Diesel Generating Station consisting of 5 x 10 MW machines at Hub by March, 1987.

3. Bin Qasim IV and V of capacity 210 MW each in December 1987 and December 1988 respectively.

10. ORGANISATION & MANAGEMENT,

WAPDA has two largely independent wings, a power wing - responsible for construction and operation of power generation and distribution facilities and a water wing which is responsible for planning of water resources development projects. The top management in WAPDA vests in a four-man Authority consisting of three members responsible for power, water and finance and headed by the fourth member who is the Chairman. Six General Managers incharge of generation, transmission

grid stations, distribution, finance, coordination and planning & design and protection, help the Member (Power) WAPDA. In order to decentralise the operational responsibility, WAPDA established eight area electricity boards. By June 1982 the total staff of the power wing was estimated to be about 88 thousand.

11. KESC is headed by a Chairman, assisted by three Chief Engineers, a Financial Adviser and a Chief Manager Administration. The three Chief Engineers are responsible for generation, transmission & distribution and Project development and execution respectively. KESC had approximately ten thousand employees on its pay roll by June 1983. *

12. INDUSTRIAL POLICY,

During the fiscal year 1982-83, the Government of Pakistan adopted a number of measures to encourage industrial production. These measures are also applicable to the electric power equipment industry. The major steps included adjustment in customs, excise and sales taxes. A de-regularisation committee was set up to remove un-necessary control and regulations that were impeding industrial growth. For example, no permission from any Government agency is necessary for establishing industrial unit involving a total investment not exceeding Rs.30 Mn. and a foreign component upto Rs. 15 million. Previously these limits were Rs. 20 million and Rs. 10 million respectively.

12.1 FISCAL MEASURES DURING 1982-83. *

A policy during the Federal Government Budget for 1982-83 sought to mobilize additional resources of Rs. 5.1 billion consisting of Federal and Provincial Government's tax measures Rs. 4 billion and non tax measures Rs. 1.1 billion. Net effect of tax and non tax measures was an additional revenue of Rs. 2.6 billion. Tables showing Federal Government's expenditure and financing of Federal Government expenditure may be seen at annexure 'A' and annexure'B'.

12.2 A summary of the main taxation and other fiscal measures with some relevance to the electric power equipment industry follow :

12.3 CUSTOMS,

12.3.1 A 5% surcharge was levied on imports with exception of accompanied baggage and parcel post.

12.3.2 Repayment of duty and taxes as admissible for exports was also allowed to locally made engineering goods supplied to organisations and projects entitled to duty free orconcessional imports.

12.3.3 The duty concessions available to principal manufacturing units were also made available to their recognised and registered vendors.

** Based on State Bank of Pakistan Annual Report 1982-83 - Chapter on Public Finance and Fiscal Policy.

12.3.4 Engineering units making complete and near complete industrial plants against confirmed export orders were made eligible for duty free imports of specified quantities of raw materials and components required in meeting export orders.

12.3.5 Jigs, tools, and dies used in the engineering industry were exempted from import duty.

12.3.6 Concessionary rate of duty of 20% was allowed on import of billets etc. used in manufacture of wire rods.

12.4 Generators of 650 KVA and above for industrial use were exempted from duty and sales tax.

12.5 The duty on switch boards and control panels of pressure upto 11 kv was raised to 85%

12.6 An anti-dumping and countervailing legislation was promulgated to check dumping of imported goods or import of subsidized goods or discouraging the local industry.

12.7 Lifts, airconditioning plants and operation theatres equipment for private hospitals, clinics, and nursing homes, with a minimum capacity of 25 beds were exempted from duty.

12.8 Under the finance leasing arrangements the banks and financial institutions being lessors were allowed initial depreciation of 40%.

12.9 Dividend declared by non listed companies was exempted upto Rs. 5 thousand within the over all ceiling of Rs. 15 thousand.

12.10 Rates of tax on inter corporate dividend was reduced from 10% to 5 % for public companies and from 30% to 20% for other Pakistani companies.

12.11 Tax credit to investing company for investment in an approved Pakistani company presently available in the year of setting up of the new undertaking was made admissible subject to certain conditions in the year of investment.

12.12 Banks advances to private sector manufacture of electrical machinery, aparatus and applicances increased to Rs. 616 Million on 31.3.1983 as compared to the figure of Rs. 459 Million on 30.6.1982.

12.13 It is interesting to note that the share price index computed by State Bank of Pakistan in the case of engineering sector which included electric power equipment industry showed a percentage change of + 65.85% in 1982-83 as compared to 1981-82.

12.14 The imports of electrical machinery in 1982-83 rose to 163.6 million US $ as compared to 159.8 million US$ in 1981-82.

12.15 Under the Export Finance Scheme, export finance continued to be provided by the banks to the exporters at the concessional rates of interest of 3% per annum. Refinance in turn was provided by State Bank of Pakistan at zero rate of interest. Export finance was provided by banks on case by case basis against confirmed irrevocable letters of credit or firm orders.

12.16 Under the scheme for financing locally manufactured machinery it was decided that all exports from the tariff area of Pakistan to the Export Processing Zone, would be treated as export from Pakistan for the purpose of concession available under the export financing scheme.

12.17 In January 1983, State Bank of Pakistan approved a new institution called Banker's Equity Limited for providing finance for export sales under the scheme for financing locally manufactured machinery. This was in addition to the scheduled commercial banks and investment banks known as NDFC (National Development Finance Corporation).

12.18 Under the scheme for financing local sales and export of locally manufactured machinery the State Bank of Pakistan sanctioned limits of Rs. 150 million to IDBP (Industrial Development Bank of Pakistan), Rs. 221 million to Bankers' Equity Limited, Rs. 100 million to PICIC (Pakistan Industrial Credit and Investment Corporation) Rs. 21.80 million each to the United Bank Limited , National Bank of Pakistan Habib Bank Limited and Rs. 13.08 million to Muslim Commercial Bank and Rs. 8.72 million to Allied Bank Limited.

12.19 Banks were allowed to provide finance for meeting the working capital needs of trade and industry on a selective basis under the technique of ' Musharika', which is a temporary partnership in that both the customer and the bank contribute financially on the basis of sharing in profit and loss. Under this arrangement, the customer will operate and manage the venture , while the bank will evaluate and monitor the performance. The share

of profit or loss between the customer and the bank will be as follows :-

12.20 A certain proportion of profit in a venture will be payable to the client as management fee. The remaining profit will be distributable between the bank and the client on the basis of their respective funds employed in the venture, calculated on daily product basis. It has been decided to allow complete flexibility, for the time being, to the banks to negotiate with their clients the proportions of the management fee, the sharing ratio of the remaining profit and the weightage where necessary , to be given to the banks or the clients funds employed in the venture. However, the sharing ratio of the remaining profit (viz profit left after payment of management fee) as determined in relation to a venture, will not be alterable. The proportion of profit payable to the client as management fee (subject to achievement by the client of profit at the projected level) as well as the sharing ratio of the remaining profit between the bank and the client or those of the bank will be mutually determined on the basis of profit projection given by the client. If the actual profit turns out to be more than projected, the bank may at its discretion, enhance the management fee and vice versa. However, the sharing ratio of the remaining profit, and the weightage, where necessary, given to the client's or the bank's funds as orginally determined shall remain unalterable. In case of loss, the loss will be borne by the bank and the client strictly in the ratio of their respective funds employed in the venture calculated on daily product basis.

13. ELECTRIC POWER EQUIPMENT INDUSTRY.

There is considerable installed capacity in the country for manufacture of :-

(a) transormers upto 33 KV.

(b) a small capacity for transfers of 66 KV and 132 KV.

(c) Switch gear and control gear including LT panel, HT panel, relay and control panel, power factor improvement units , motor control centre and distribution boards of various types and sizes.

(d) generating sets upto 650 KVA.

(e) Electric motors upto 375 KW.

(f) PVC cables including LT and HT (11 KV) cables.

(g) ACSR and all aluminium and copper conductors.

(h) Electric meters.

(i) Insulators.

(j) 11 KV drop out fuse fittings.

There is considerable un-utilised capacity. The capacity utilisation is from 20% to 60%. The main category of electric power equipment are discussed below in detail :-

13.1 TRANSFORMER UPTO 33 KV.

The eight recognised units in the country manufacture different sizes of transformers of 11 and 33 KV. The transormer capacity ranges from 25 KVA to 10,000 KVA. This range covers the demand of distribution transformer from WAPDA, KESC and industrial consumers.

Installed capacity	Annual demand	Capacity utilisation	Estimated demand in 1988.
1.	2.	3.	4.
2500 MVA	1500 MVA	40% - 60%	2015 MVA.

Capacity utilisation in 1983 demand have been based on actual purchases made by WAPDA, KESC and private sectors. 10% growth rate has been estimated onwards from 1982 demand, worked out as follows :-

TABLE 2.

WAPDA.

25 KVA	= 5374 Nos.	= 134.35 MVA
50 MVA	= 4813 Nos.	= 240.65 MVA
100 MVA	= 2221 Nos.	= 222.10 MVA
200 MVA	= 524 Nos.	= 104.80 MVA
400 MVA	= 44 Nos.	= 17.60 MVA
630 MVA	= 50 Nos.	= 31.50 MVA
Total:	13026 Nos.	751.00 MVA
KESC		100.00 MVA
Private		100.00 MVA
		951.00 MVA,

13.2 TRANSFORMERS ABOVE 33 KV,

Only one manufacturer can fabricate transformers of 66 KV and 132 KV but two more units are expected to start production in 1984. The total annual demand of 66 KV transformers is as follows :

TABLE 3.

132 / 66 KV	40 MVA	= 5 Nos.
132 / 11 KV	66 MVA	= 25 Nos.
132 / 11 KV	13 MVA	= 30 Nos.
66 / 11 KV	13 MVA	= 20 Nos.

It is estimated that by 1984-85, major part of the requirement of 132 KV / 11 KV upto 26 KVA could be met by local industry provided testing facilities

are improved.

13.3 SWITCH GEAR AND CONTROL GEAR.

Five units in the private sector and one unit in public sector are manufacturing switch gear and control gear. Production range includes LT panels, HT panels relays and control panels, power factor improvement equipment, motor control centres and distribution boards of various types and sizes.

Installed capacity	Annual demand	Capacity utilisation	Estimated demand.
1.	2.	3.	4.
6,000 panels and boards	2000 panels and boards	30% - 50%	4000 panels & boards.

A limited quantity of circuit breakers are also being manufactured. If WAPDA and KESC standardize these items, production can be boosted. Under utilisation of capacity is due to lack of demand and because of imports under international loans and credits by WAPDA and KESC and industrial sector for new plant and machinery.

13.4 GENERATING SETS UPTO 650 KVA.

Installed capacity	Annual demand	Imports	Capacity utilisation	Estimated demand '88
1.	2.	3.	4.	5.
100,000 KVA	70,000 to 100,000 KVA	50000 to 80000 KVA	20%	130,000 KVA.

Production of generators and generating sets started

only a few years ago. Initially three units tarted manufacturing the generators and diesel ge rating sets but at present only one is in operation while seven had to suspend production on account of competetion against imports at low price and low rate of custom duty on imported sets. Generating sets of 650 KVA and above are exempted from custom duty. Rate of duty on sets upto 66 KVA is 40%.

13.4.1 It would, however, be appropriate to set up an engineering design and contracting organisation in close collaboration with private as well as public sector manufacturing units. Such an organisation should employ qualified and experienced administrators, scientists, engineers, accountants and economists in order to have good multi-disciplinary back-ground. Such an organisation should specialise in keeping upto date knowledge of the range of capacities and specifications of various capital goods specially in the electric equipment sector. In this way, it will be able to make use of the existing capacity by first preparing appropriate engineering designs of various types of plants required in the country and then through special contracting they will be able to coordinate the manufacturing and commissioning of such plants. Such an organisation could also participate in joint venture schemes and large projects like Tarbela dam extension, Kala Bagh dam (mainly for power generation). Such an organisation can ultimately help in attaining an optimal mix of local and imported electrical capital goods.

13.5 ELECTRIC MOTORS.

Installed capacity	Annual demand	Imports	Capacity utilisation	estimated demand.
1.	2.	3.	4.	5.
700,000 HP	400,000 to 500,000 HP	200000 to 300000 HP	30% to 40%	800,00 HP.

There are at present twenty recognised units that are manufacturing electric motors in the country. The range of production is upto 500 HP of various types and designs. This is the hardest hit sector to liberal import from socialist countries. The present tariff of 85% custom duty is not enough to discourage imports.

13.6 CABLES.

Installed capacity	Annual demand	Imports	capacity utilisation	estimated demand.
1.	2.	3.	4.	5.
20,000 tons	8,000 to 10,000 tons	3,000 to 5,000 tons	20% to 30%	30,000 tons.

There are seven units producing LT and HT cables. The main problem of this industry is under invoicing of imported cable to escape from full rigour of custom duty.

13.7 ACSR AND ALL ALUMINIUM CONDUCTORS.

Installed capacity	Annual demand	Capacity utilisation	Estimated demand '88
1.	2.	3.	4.
30,000 tons	15,000 to 20,000 tons	50% to 60%	50,000 tons.

Eight manufacturing units are producing all sizes and various types of conductors. Capacity utilisation is limited by market conditions.

13.8 ELECTRIC METERS .

Installed capacity	Annual demand	Imports	Capacity utilisation	Estimated demand
1.	2.	3.	4.	5.
7,58,000	300000 to 350000	100000 to 150000	30% to 35%	700000

There are six units with a capacity to produce 6,94,000 single phase meters and 64,000 three phase meters. Under-utilisation of capacity is due to mis-management in some of the manufacturing units, import by commercial importers as well as by WAPDA.

13.9 INSULATORS.

Installed capacity	Annual demand	Capacity utilisation	Estimated demand.
1.	2.	3.	4.
3,000 tons	1,800 tons	60%	2,900 tons.

There are only one unit producing porcelain insulators of various types and sizes required by WAPDA, KESC, T&T (Telephone & Telegraph) and other consumers.

13.10 11 KV DROP OUT FUSE FITTINGS.

Installed capacity	Annual demand	Capacity utilisation	Estimated demand.
1.	2.	3.	4.
300,000 numbers	60,000 numbers	20%	120,000 numbers

Seven manufacturing units are producing 11 KV drop out fuse fittings. Under utilisation of capacity is due to size of the market and lack of penetration of foreign markets.

Note:

Capacitors mentioned above are based on single shift per day.

14. PROPOSAL FOR A HEAVY ELECTRICAL COMPLEX IN PAKISTAN.

There have been demands and studies for setting up of a Heavy Electric Complex at Texila very near the Heavy Mechanical Complex and Heavy Foundry and Forge. The Heavy Foundry and Forge and Heavy Mechanical Complex have already been set up. A feasibility report on the Heavy Electric Complex was prepared by Messrs. Salzgitter as early as 1965. In this report the recommended production programme included :-

(i) power transformers of 33-132 KV.

(ii) distribution transormer of capacity upto 2000 KVA.

(iii) circuit breakers in the range of 33- 132 KV

(iv) Isolators for 33 - 132 KV

(v) 11 KV auto re-closing switches

(vi) large industrial motors in the range upto 1000 HP.

(vii) traction motors for diesel/electric locomotives in the range of 300-500 HP.

(viii) generators in rating from 300-500 HP.

(ix) capacitors rated voltage 11 KV.

(x) ceramic insulators.

A study was sponsored by Pakistan Engineering Limited in May 1974. According to this report there was possibility of collaboration with :

(1) Energo Investment (Yugoslavia)

(2) G.E.C. (United Kingdom)

(3) Brown Boveri (Germany)

(4) Megreni Galileo (Ittaly).

There was also possibility of equity participation by the foreign firms as well. The project, however,could not materialise.

14.1 A planning proforma (P.C I) was submitted to the Government in 1976. The proposal envisaged the manufacture at Texila of high voltage (66 KV and above) power current and voltage transformers. The scheme was based on the discussion with firms of repute in Ittaly, France, UK, West Germany and Romania. At that time, the best offers were considered to be from Unnikexport-import of Romania, Brown Boveri and BBC of West Germany and Switzerland for technical as well as financial

collaboration. The production programme was to be split into two separate projects. BBC's proposal covering manufacture of high voltage switch gears (circuit breakers and isolators) on the existing Lahore project of State Electrical Corporation of Pakistan and the other part of the project was to come up near Texila. The project however, could not be implemented.

14.2 Standing Committee for setting up of a Heavy Electrical Complex was set up in 1983 by Government of Pakistan under the Chairmanship of Additional Secretary, Ministry of Production. A large number of firms in as many as 14 countries are being contacted to find out their interest in the project. The objective is to set up a complex in Texila and to improve the manufacturing facility available at State Electrical Corporation of Pakistan unit at Lahore.

15. RECOMMENDATIONS.

From the above, it would be clear that there is idle capacity in all sectors of Electrical Capital Goods Industry in Pakistan. It may be interesting to note that the following priorities have been adopted during sixth Five Year Plan (1983 - 88) for the development of Engineering Goods Industry in general.

(a) Increase in capacity utilisation from 30% to 40% while the local production share should increase from 42% to 60%.

(b) Utilisation of 60% indigenous resources in the construction of power projects and the utilisation of coal for generating power.

(c) Development back-up support/logistics conducive to the growth of these sectors.

Reasons for underutilisation of capacity, problems faced by manufacturers and recommendations to improve the situation follow :-

15.1 PROTECTION TO INDUSTRY.

A firm policy on the part of the Government is required to protect and develop these industries. The Electric Equipment Industry qualifies for protection and facilities that an industry in its infancy justifies. The imports have to be restricted, if necessary by imposing import quotas. The protection should be given only for a specific period.

(a) These items should not be included in the scope of supplies under international license / credits that are being manufactured locally.

(b) Items for which idle capacity exists should be removed from the free list part 'A' ***

(c) The rates of customs duty for import of these items should be enhanced where capacity utilisation is below 50% .

(d) Rate of customs duty on raw material and components should be reduced below 20%

(e) When these items are exported, the compensatory rebate should be increased from 12.5% to 20%.

*** 'A' comprises items importable by all registered importers. 'B' covers such items as are exclusively imported by industrial consumers. Items importable by public sector agencies are in part C.

15.2 REMOVAL OF FISCAL ANAMOLIES.

In many cases, the raw material for the electric power equipment industry are heavily taxed while the finished goods are taxed less heavily. This is inspite of the fact that in general the import policy since many years fore-sees liberal import of raw material and components for electric goods companies. However, various notifications issued by the Government dilute this policy to some extent. In these notifications, the industry has to get its requirement of raw material and components approved by the Customs authorities for each and every item manufactured and quantity of material and components required for these items. It would be worth while if for each category a total value of imported raw material and component are fixed and allowed to be imported without subjecting them to tortuous official procedures.

15.3 EFFECTIVE LEGISLATION.

Effective legislation is required to control and prevent dumping of goods by foreign suppliers in the home market.

15.4 It is not necessary for countries like Pakistan that have already set up some basic Engineering Goods Industries to set up integrated plants for manufacture of electric power equipment. Instead the existing facilities available can provide the necessary technical linkage. These industries in Pakistan are :

(i) Heavy Mechanical Complex.
(ii) Heavy Foundry & Forge.
(iii) Pakistan Machines Tool Factory.
iv) Karachi Shipyard & Engineering Works.
(v) a number of units in the private and public sector dealing with light engineering.

15.5 It would be worth while for a country like Pakistan to publish a detailed directory of industrial establishment giving the range of capability of various units of the engineering sector including facilities available for designing . Such a directory should include the range of specifications of various engineering goods that can be manufactured. Such a directory will be useful not only for fabricating various parts of the electrical goods but will also help in pin-pointing and ultimately eliminating those electrical parts of integrated plants that are being imported into the country.

15.6 Power transformers in the range of 66 KV and above can only be manufactured properly if high voltage testing facilities are created in Karachi and Lahore. Preferably the testing voltage facilities should be provided by the Government as part of the engineering universities in these two cities. No single manufacturer will be able to set up the required testing facilities at his own expense.

15.7 From the point of view of transfer of technology it is necessary for developing countries to evolve a system of feed-back by analysing past contracts relating to power projects. The planning ministeries of developing countries can organise this analysis in collaboration with local management of such power projects. The objective of this exercise should be to find out with the help of hindsight, how contracts should have been negotiated in order to ensure maximum substitution of the imported parts and components. To illustrate, considerable material and structure required in various power projects can be locally

manufactured. Such components include cladding materials, steel structures, various types of components, control generators, switch gear and control gear as well as electric motors and a host of other engineering goods that go into the making of power generation projects. At the moment such opportunities are being missed for lack of sympathy on the part of foreign consultants. In fact, UNIDO can commission a study analysing past contracts with foreign suppliers of various developing countries and then recommend suitable negotiating strategy.

14.8. Developing countries like Pakistan should insist that foreign consultants, while making tender documents, should clearly identify those electrical / engineering goods that can be manufactured locally and prepare separate tender documents for such parts /components. It is also worth while that the tender documents are issued and evaluated within the developing country where a project is being put up even if such a project is internationally financed.

15.9 Developing countries can insist that consultants appointed for detailed engineering design take into consideration the specifications of locally produced electrical equipment. Cases are known where foreign consultants adopt specifications in such a way that local production is effectively excluded.

15.10 It would be worth while if the design engineers of important manufacturing units in Pakistan form an association and the Government allows them to remain in contact with foreign consultants appointed for large projects in order to ensure that the detailed engineering designs are not un-necessarily weighted against the local manufacture.

FEDERAL GOVERNMENT EXPENDITURES.

ANNEXURE 'A'

EXPENDITURE	1981-82 Provisional Actuals	1982-83 Budget Estimates
	1.	2.
1. REVENUE EXPENDITURES.		
A. Current Expenditure		
(i) General Administration		
(ii) Defence.		
(iii) Law and Order.		
(iv) Community Services.		
(v) Social Services		
(vi) Economic Services		
(vii) Subsidies.		
(viii) Debt-servicing, investible Funds and grants.		
(ix) Unallocable		
Total Current Expenditure.	37,886	48,511
B. Development Expenditure	5,217	5,335
Total Expenditure met from Revenue (A+B)	43,103	53,847
II. Capital Disbursements.		
A. Current Expenditure on Capital Account.	8,622	9,609
B. Development Expenditure	18,358	23,240
Total Capital Disbursements, Development and Current(A+B)	26,980	32,849
III. Total expenditure(Revenue and Capital Accounts) (I + II)	70,083	86,696

Contd Page 2.

(From Pre Page 1)

FEDERAL GOVERNMENT EXPENDITURES.

ANNEXURE'A'

EXPENDITURE	1982-83 Revised Estimates	Percentage Change in 3 over 2	Percentage Change in 3 over 1.
	3.	4.	5.
1. REENUE EXPDITURES.			
A. Current Expenditure			
(i) General Administration			
(ii) Defence.			
(iii) Law and Order.			
(iv) Community Services.			
(v) Social Services			
(vi) Economic Services			
(vii) Subsidies.			
(viii) Debt-servicing, investible Funds and grants.			
(ix) Unallocable			
Total Current Expenditure.	50,950	5.03	34.48
B. Development Expenditure	5,090	-4.60	-2 42
Total Expenditure met from Revenue	56,040	4.07	30.01
II. Capital Disbursements.			
A. Current Expenditure on Capital Account.	12,840	33.62	48.91
B. Development Expenditure	20,769	-10.63	13.13
Total Capital disbursements, Development and Current(A+B)	33,608	2.31	24.57
III. Total expenditure(Revenue and Capital Accounts)(I+II)	89,648	3.41	27.92

Source:- Annual Budget Statement of the Federal Government, 1983.84

F I N A N C I N G OF FEDERAL GOVERNMENT EXPENDITURE.

ANNEXURE 'B'
(Rs. in Million)

	1981-82 Provisional Actuals	1982-83 Budget Estimates
	1.	2.
I. Revenue Receipts (Net)	41,934	52,313
II.Capital Receipts (Net)		
A. Internal Resources:		
(i) Federal Consolidated Fund:		
(a) Permanent Debt (net)		
(b) Floating Debt (net)		
(c) Recoveries of Investment.		
(d) Recoveries of loans & Advances.		
(ii) Public Account :		
(a) Unfunded Debt (Net)		
(b) Deposits Interest-Bearing.		
(c) Deposits Non-Interest Bearing.		
(d) Advances Non-Interest-Bearing.		
(e) Accounts - All types.		
TOTAL INTERNAL RESOURCES (i + II)	11,485	13,072
B. External Resources:	11,148	15,655
(a) Project Aid(Excluding guaranteed loans)	3,571	5,799
(b) Commodity Aid	1,862	3,684
(c) Food Aid.	927	955
(d) Other Aid	4,788	5,175
(e) Rupee Grants.	-	42
TOTAL EXTERNAL RESOURCES.	11,148	15,655
C. Total Internal & External Resources (A + B)	22,633	28,727
III. Total Receipts (Revenue & Capital) Accoutns (I+II)	64,567	81,040
IV. Cash Balance Utilisation.	5,516	5,656
TOTAL RESOURCES (III+IV)	70,083	86,696

Contd Page '2'

FINANCING OF FEDERAL GOVERNMENT EXPENDITURE. ANNEXURE 'B'

From Pre Page '1')

(Rs. in Million)

	1982-83 Revised Estimates	Percentage Change in 3 over 2	Percentage Change in 3 over 1.
	3.	4.	5.
I. Revenue Receipts (Net)	49,937	-4.54	19.09
II. Capital Receipts (Net)			
A. Omterma; Respirces :			
(i) Federal Consolidated Fund:			
(a) Permanent Debt (net)			
(b) Floating Debt (net)			
(c) Recoveries of Investment.			
(d) Recoveries of loans & Advances.			
(ii) Public Account :			
(a) Unfunded Debt (Net)			
(b) Deposits Interest-Bearing.			
(c) Deposits Non-Interest Bearing.			
(d) Advances Non-Interest-Bearing.			
(e) Accounts - All types.			
TOTAL INTERNAL RESOURCES (i + ii)	18,657	42.72	62.45
B. External Resources:	15,864	-5.05	33.33
(a) Project Aid (Excluding guaranteed loans)	4,723	-18.56	32,27
(b) Commodity Aid	3,523	- 4.37	89.18
(c) Food Aid.	1,228	28.60	32.36
(d) Other Aid	3,350	3.38	11.74
(e) Rupee Grants.	41	- 3.33	-
TOTAL EXTERNAL RESOURCES.	14,864	- 5.05	33.33
C. Total Internal &External Resources (A+B)	33,521	16.69	48.11
III. Total Receipts (Revenue & Capital) Accounts (I + II)	83,458	2.98	29.26
IV. Cash Balance Utilisation.	6,191	9.45	12.22
TOTAL RESOURCES (III+IV)	89,648	3.41	27.92

Source: Annual Budget Statement of Federal Government 1983-84

ANNEXURE 'C'

DOMESTIC PRODUCTION OF PRIMARY ENERGY(IN TERAJOULES - TJ)

*** *** ***

Year	Energy source	Coal		Other solid fuels		Crude petroleum	
		TJ	%	TJ	%	TJ	%
		1(a)	1(b)	2(a)	2(b)	3(a)	3(b)
1972		24122	3.8	453058	71.3	18000	2.83
1973		24614	3.73	455189	69.05	18000	2.73
1974		24943	3.6	468979	67.72	18000	2.59
1975		26651	3.79	462791	65.94	18000	2.56
1976		21712	3.08	464718	66.08	18000	2.56
1977		24696	3.35	479888	65.21	18098	2.46
1978		25746	3.38	492895	64.62	18941	2.48
1979		28149	3.57	495038	62.87	19824	2.52
1980		34785	4.15	494641	59.01	19108	2.28
1981		41306	4.6	512317	57.1	18420	2.05
1982		51634	5.46	525364	55.58	19077	2.02
1983		44998	4.59	538329	54.96	20397	2.08

(cont'd next page)

Note :

- Sources of coal data are Energy Year Book of Pakistan 1983 and Pakistan Mineral Development Corporation.
- Data on other solid fuels taken from Agricultural Cencus Commission Report and Pakistan Economic Survey and relates to Fire Wood, Cowdung and bagasse.
- Data on crude petroleum and Natural Gas obtained from Pakistan Energy Book 1983 and does not include imported petroleum.

ANNEXURE 'C'
(Page 2)

Energy source	Natural gas		Electricity		T o t a l	
	TJ	%	TJ	%	TJ	%
	4 (a)	4 (b)	5 (a)	5 (b)	6 (a)	6 (b)
Y e a r						
1972	125843	19.79	14371	2.26	635394	100
1973	144135	21.86	17012	2.58	658950	100
1974	164112	23.69	16176	2.33	692210	100
1975	177141	25.24	17027	2.42	701610	100
1976	177276	25.2	21234	3.02	702940	100
1977	192799	26.2	20246	2.75	735727	100
1978	195578	25.64	29164	3.82	762324	100
1979	211154	26.82	32629	4.14	678794	100
1980	255087	30.43	34054	4.06	837675	100
1981	289630	32.26	35336	3.9[illegible]	897009	100
1982	311504	32.96	37210	3.9[illegible]	944789	100
1983	331054	33.8	44402	4.53	979180	100

N o t e :
Con'd

- Data on Electricity obtained from figures published by Water and Power Development Authority which includes only hydro electricity there being no Geothermal Electricity.

- In the case of year 1972-1977 the production of Crude Petroleum has been estimated on average basis for the purpose of over all calculation.

ANNEXURE 'D'

PRODUCTION OF OTHER FUELS IN PAKISTAN IN TERAJULES .

*** ***

Year	Fire wood	Cowdung	Bagasse	Total.
1.	2.	3.	4.	5.
1972	3903.30	394963.00	54190.75	453057.05
1973	3621.30	399195.00	52372.86	455189.16
1974	2918.00	403471.20	62590.20	468979.40
1975	2178.60	407793.83	52818.10	462790.53
1976	3796.80	412329.60	48591.47	464717.87
1977	6978,79	416756.69	56152.14	479887.62
1978	3290.60	421219.66	68384.68	492894.94
1979	7123.40	425789.19	62124.92	495055.51
1980	3042.70	429081.02	62517.40	494641.12
1981	3194.70	435548.63	73573.53	512316.86
1982	3354.00	443479.63	78530.28	525363.91
1983	3488.00	451020.25	83821.48	538329.73

Note:

- Data for cowdung extrapolated for years 1972-75 on the basis of trends from 1976-82.
- Firewood data for years 1982 and 1983 is based on trend between 1971-87.
- Sources of data are Agriculture Cencus Commission Reports and Pakistan Economic Survey.

ANNEXURE 'E' 2

P-1

ELECTRIC ENERGY GENERATION & CONSUMPTION
(PAST AND PRESENT DATA) P A K I S T A N

(MEGAWATTS)

Installed Capacity (MW)	1972	1973	1974
1.	2.	3.	4.
Public & self producer total	1837	1836	2135
Hydro	667	667	867
Conventional thermal	1033	1032	1131
Nuclear	137	137	137
Geothermal	0	0	0
Public total	1837	1836	2135
Hydro	667	667	867
Conventional thermal	1033	1032	1131
Nuclear	137	137	137
Geothermal	0	0	0
Consumption GWH (Gigawatt-hour)			
Total (net production + imports - exports - transmission and distribution losses)	5408.589	5981.675	6301.778
Industry and construction	3409.240	3675.590	3881.280
Transport.	-	-	42.000
Household and other consumers	1999.349	2216.085	2378.498
Generation per installed capacity			
GWh (1000 hours.	0.469174	0.529363	0.486348

...contd...p2....

From pre page 1.

ANNEXURE 'E'

P-2

ELECTRIC ENERGY GENERATION & CONSUMPTION (PAST AND PRESENT DATA) P A K I S T A N.

Installed capacity (MW)	1975	1976	1977
	5.	6.	7
Public & Self producer total	2255	2450	3150
Hydro	867	867	1567
Conventional thermal	1251	1446	1446
Nuclear	137	137	137
Geothermal	0	0	0
Public total	2255	2450	3150
Hydro	867	867	1567
Conventional thermal	1251	1446	1446
Nuclear	137	137	137
Geothermal	0	0	0
Consumption GWH (Gigawatt - hour)			
Total (net production + imports - exports - transmission and distribution losses).	6847.	6926.932	7037.113
Industry and construction	3802.530	3802.380	3724.460
Transport	63.000	45.000	43.000
Household and other consumers	2982.414	3079.552	3269.653
Generation per installed capacity.			
GWh (1000 hours).	0.508772	0.477959	0.389758

....contd....p.3

(from pre-page 2)

ANNEXURE 'E'
P-3

Installed capacity (MW)	1978	1979	1980
	8.	9.	10.
Public & Self producer total	3265	3395	3605
Hydro	1567	1567	1567
Conventional thermal	1561	1691	1901
Nuclear	137	137	137
Geothermal	0	0	0
Public total	3265	3395	3495
Hydro	1567	1567	1567
Conventional thermal	1561	1691	1791
Nuclear	137	137	137
Geothermal	0	0	0
Consumption GWH(Gigawatt - hour)			
Total (Net production + imports -exports - transmission and distribution losses)	8283.932	8946.043	10193.567
Industry and construction.	4188.680	4531.120	5000.780
Transport.	42.000	43.000	46.000
Household and other consumers.	4052.931	4371.923	5146.787
Generation per installed capacity.			
GWh/(1000 hours) MW	0.432717	0.439969	0.464032

cond.... p 4.....

from pre page 3.

ELECTRIC ENERGY GENERATION & CONSUMPTION (PAST & PRESENT)

PAKISTAN.

ANNEXURE 'E'

P-4.

(MEGAWATTS)

Installed capacity MW)	1981	1982	1983.
	11.	12.	13.
Public & Self producer total	4174	4174	5024
Hydro	1847	1847	2547
Conventional thermal	2190	2190	2400
Nuclear	137	137	137
Geothermal	0	0	0
Public total.	4064	4064	4974
Hydro	1847	1847	4974
Conventional thermal	2080	2080	2290
Nuclear	137	137	137
Geothermal.	0	0	0
Consumption GWh (Gigawatt - hour)			
Total (net production + imports - exports- transmission and distribution losses.	11208.117	12788.268	14147.614
Industry and construction.	5481.600	5951.360	6686.829
Transport.	44.000	42.000	44.000
House hold and other consumers	5682.517	6794.908	7416.785
Generation per installed capacity.			
GWh/ (1000 hours) MW.	0.442930	0.497928	0.475637

EXISTING ELECTRIC POWER EQUIPMENT. ANNEXURE "

II. Transmission

TRANSMISSION LINE

K. E. S. C.

Commissioning DATE	Voltage, KV		km	Equipment	Local Content %
Dec. 1956	66 KV	SITE W/W	10.26	Tower 46Nos * Conductor 34 KM ** Insulator 920 Fittings LOT	NIL NIL NIL NIL
Dec. 1956	66 KV	SITE-Malir	2.4KM	Tower 11¼ Nos Conductor 79.2 Insulator 2280 Fittings LOT	NIL NIL NIL NIL
April 1957	66 kV	Drigh Rd/ W/W	Not Existing Now 26 KM	Tower 132 NOS Conductor 89 KM Insulator 2460NOS Fittings LOT	NIL
April 1957	66 KV	Drigh Rd/ Landhi	Not Existing Now 7 KM	Towers 15 NOS Conductor 23 KM Insulator 330 NOS Fittings LOT	NIL
Dec. 1958	66 kV	Landhi/ Malir	11.5	Tower 25NOS Conductor 38KM Insulator 500NOS Fittings LOT	NIL
Oct 1962	66 kV	Federal/ SITE		Towers 99 NOS Conductor 65 KM Insulator 3960 NOS Fittings LOT	NIL NIL NIL NIL
Oct 1962	66 KV	Federal/ Malir	13.6	Tower 57 NOS Conductor 45 KM Insulator 1140 Fittings LOT	NIL
April 1963	66 kV	Elander Rd/ W/W Elander Rd/ Drigh Road.	8.0 Cable Not Existing Now		NIL
Sept. 1964	66 kV	Valika/	13	Towers 51 NOS Conductor 43KM Insulator 1020NOS Fittings LOT	NIL
Sept. 1964	66 kV	Valika/ Federal	6.0 (10.0)	Tower 23(Loop) Conductor 19 KM Insulator 460NOS Fittings -	NIL

III. Transmission

TRANSMISSION LINE

Commissioning D A T E	Voltage, KV		km Equipment	Local Content%
1964	66 KV	WW/SITE CKT-II	10.26 (Only Conductor) 34 KM	NIL
Aug 1965	132 kV	'C' STN/ LANDHI	13 Tower 60NOS Conductor 43 KM Insulator 2400NOS Fittings LOT	NIL
Aug 1965	132 KV	'C' STN/	16.8 Tower 70 Nos Conductor 55KM Insulator 2800 Fittings LOT	NIL
March 1966	132 KV	Landhi/ Korangi Town	7.2 Tower 30 NOS Conductor 24 KM Insulator 1200NOS Fittings LOT	NIL
March 1966	132 KV	K.Town/ Gizri	15.5 Tower 41 Nos Conductor 51 KM Insulator 1640NOS Fittings LOT	NIL
Oct. 1968	132 KV	Dhabeji/ Landhi	31 Tower 139NOS Conductor 103 KM Insulator 5500NOS Fittings LOT	NIL
March 1969	132 kV	Gharo / Dhabeji	12.4 Tower 52 NOS Conductor 40 KM Insulator 2090 NOS Fittings LOT	NIL

III. Transmission

TRANSMISSION LINE

Commissioning DATE	Voltage, KV		km	Equipment	Local Content %
Feb. 1971	132 KV	Queens Rd/	Only 2nd Ckt.	Conductor 55 KM Insulator 2800 Fitting LOT	NIL
April 1971	132 KV	'C' STN/ Landhi-II	Only 2nd Ckt	Conductor 43 KM Insulator 2400NOs Fitting LOT	NIL
April 1971	132 KV	Landhi-II/	Only 2nd Ckt	Conductor 103NOS Insulator 5500 Fittings LOT	NIL
April 1971	132 KV	Dhabeji/ Gharo-II		Conductor 40KM Insulator 2080 Fittings LOT	NIL
July 1971	66 KV	Gulshan/ Malir	13.5	Loop Tower 29 NOs Conductor 90 KM Insulator 1150 Fittings LOT	NIL NIL 30% NIL
July 1971	66 KV	Gulshan/ Federal	13.5	Towers 19 Loop Conductor 30 KM Insulator 760 NOS Fitting LOT	NIL NIL 100% NIL
June 1972	132 KV	Landhi/ Valika	49.8	Tower 175 NOS Conductor 190 KM Insulator 7000 Fittings LOT	NIL NIL 100% NIL
August 1973	66 KV	Mauripur / W/W	4.66	Tower 21 Nos (Loop Town only) Conductor 31 KM Insulator 840 Fittings LOT	NIL NIL 100%
Dec. 1975	132 KV	Landhi/ Pipri Pipri/ Dhabeji	12.8	(Loop Tower) 9Nos Conductor 85 KM Insulator 720 Fittings LOT	NIL NIL 100% NIL
May 1978	132 KV	Valika/ Jamshoro	190	(WAPDA) Cond. 626 KM Ins. 30400	100% 100%
Oct. 1978	132 KV	Fed/Valika "/Landhi	6.3 43.5	(Loop Tower 29 NOS) -do- Cond. 42 KM Ins. 2320 Fittings LOT	NIL NIL 100%
March 1979	132 KV	SITE/ KANUPP	24.4	Tower 105 NOS Conductor 160 KM Insulator 8400 Fittings LOT	NIL NIL 100% NIL

III. Transmission

TRANSMISSION LINE

Commissioning D A T E	Voltage, KV		km	Equipment	Local Content
March 1979	132 KV	SITE/ Valika	11.85	Tower 39 Nos Conductor 39 KM Insulator 1560 Fittings LOT	NIL NIL 100% NIL
May 1979	132 KV	Hub/ Kanupp	37.3	Loop Towers 74 NOS Conductor 246 Insulator 5920 Fittings LOT	NIL NIL 100% NIL
May 1979	132 KV	Hub/ Valika	28.6	(Only Conductor) Conductor 246 KM Insulator 5920 Fittings LOT	NIL NIL 100% NIL
Sept. 1979	132 KV	Valika/ Javedan	01	XLPE Cable	NIL
March 1980	132 KV	SITE GT/ Valika	12.4	Tower 1 No Conductor 1 KM Insulator 80 NOS Fittings LOT	NIL NIL 100% NIL
March 1980	132 KV	SITE GT/ Kanupp	23.7	Tower 1 No Conductor 1 KM Insulator 80 NOS Fittings LOT	NIL NIL 100% NIL
March 1980	132 KV	SITE GT/ SITE SD/ CKT-I	0.8	Conductor 3 KM (Only Conductor) Insulator 80 NOS	NIL 100%
March 1980	132 KV	SITE GT/ SITE SD/ CKT-II	0.8	Tower 6 NOS Conductor 5 KM Insulator 80 Fittings LOT	NIL NIL 100% NIL
July 1980	66 KV	Malir/ Gadap T-Off	2.87	9 Pole ST 153 PCC Conductor 10 KM Insulator 3240 Fittings LOT	100% NIL 100% NIL
Sept. 1980	132 KV	Pipri/ Dhabeji	21.7	-	-
Sept. 1980	132 KV	Pipri/ Landhi	16.1	-	
Oct. 1980	132 KV	Hub/ Vinder	43.5	Tower 198 NOS Conductor 145 KM Insulator 7920 Fittings LOT	100% NIL 100% NIL

III. Transmission -: 5 :-

TRANSMISSION LINE

Commissioning DATE	Voltage, KV		km	Equipment	Local Content %
Oct. 1980	132 KV	Vinder/ Uthal	60.3	Tower 267 Nos Conductor Insulators Fittings	100% NIL 100% NIL
Oct. 1980	132 KV	Uthal / Bela	53	Towers 232 NOS Conductor 200 KM Insulators 10680 Fittings LOT	100% NIL 100% NIL
May 1982	132 KV	P.Qasim/ Landhi	10.5	(1 Loop Tower)	NIL
May 1982	132 KV	P.Qasim/ Gharo	39.8	(1 Loop Tower) Conductor 1 KM Insulator 40 Fittings LOT	NIL
May 1982	66 KV	N/Naz/ SITE	4.52	(1 Loop Tower) Conductor 1 KM Insulator 40 Fittings LOT	NIL NIL 100% NIL
May 1982	66 KV	N.Naz/ Valika	6.16	(1 Loop Tower) Conductor 1 KM Insulator 40 Fittings LOT	NIL NIL 100% NIL
Oct. 1982	132 KV	T/Sultan/ Gizri	7.7	(16 Loop Tower) Conductor 25 KM Insulator 640 Fittings	NIL NIL 100% NIL
Oct. 1982	132 KV	T/Sultan /Korangi	7.8	(16 Loop Towers) Conductor 25 KM Insulator 640 NOS Fittings Lot	NIL NIL 100% -
Oct. 1982	132 KV	Airport/ Landhi	11.5	(14 Loop Towers) Conductor 38 Insulator 560 Fittings LOT	NIL NIL 100% -
Oct. 1982	132 KV	Airport/ Korangi	4.5	(14 Loop Towers) Conductor 38 KM Insulator 560 Fittings LOT	NIL NIL 100% NIL
Sept. 1983	220 KV	D/Stn/ Pipri West	8.7	Towers 39 Nos Conductor 58 KM Insulator 3120 Fittings LOT	NIL
Dec. 1983	220 KV	Pipri West/ KDA-33	30	Towers 94 NOS Conductor 200 KM Insulator 12400 Fittings LOT	NIL

TOTAL:		
	220 KV	38.7 KM
	132 KV	386.18 KM
	66 KV	93.15 KM

NOTE

ON OVER ALL EXPENDITURE FOLLOWING IS THE % AGE OF F.C. & L.C.

MATERIAL	-	FOREIGN EXCHANGE
DUTY TAXES	-	15.20 % LOCAL
FREIGHT	-	F.C.
ERRECTION	-	10 - 15 % L.C.
TOTAL	-	F.C. 65 %
		L.C. 35 %

* APPROXIMATION WITHIN 5%

** APPROXIMATION WITHIN 10%

IT IS NOT POSSIBLE TO GIVE POWER RATINGS OF CONDUCTORS INDIVIDUALLY AS THERE ARE DIFFERENT TYPES AND SIZES OF CONDUCTOR.

EXISTING ELECTRIC POWER EQUIPMENT.

TRANSMISSION LINES.

WAPDA.

II. TRANSMISSION.

Commissioning date.	Voltage	KM	Equipment	Local content
1.	2.	3.	4.	5.
1971-72	132 KV	45	Tower 247 Nos. Conductor 135 KM Insulator Disc. 9800 Nos. Fitting Lot	100 % 100 % 100 % NIL.
1972-73	220 KV	121 KM	Towers 484 Nos Conductor 363 KM Insulator Disc. 30492 Nos. Fitting. lot.	NIL 100 % 100 % NIL
1972-73	132 KV	388 KM	Tower 2134 Nos. Conductor 1164 Nos. Insultor Dis. 85360 Nos Fitting Lot.	100 % 100 % 100 % NIL.
1972-73	66 KV	79 KM	Tower 395 Nos. Conductor 237 KM Insutor 7900 Nos. Fitting. Lot.	100 % 100 % 100 % NIL.
1973-74	132 KV	528 KM	Towers 2904 Nos. Conductor 1584 Nos. Insultor disc. 1,16,160 Nos Fitting. Lot.	100 % 100 % 100 % NIL.
1973-74	66 KV	32 KM	Towers 160 Nos. Conductor 96 KM Insulator Disc 3360 No. Fitting Lot.	100 % 100 % 100 % NIL

II. TRANSMISSION.
WAPDA continues.

Commissioning date.	Voltage.	KM	Equipment		local content %
1.	2.	3.	4.		5.
1974-75	132 KV	363 KM	Tower	1966 Nos.	100 %
			Conductor	1089 KM	100 %
			Insulator	7984 Nos.	100 %
			Fitting	Lot	NIL
	66 KV	4.6 KM	Tower	23 Nos	100 %
			Conductor	13.8 KM	100 %
			Insulator	483 Nos.	100 %
			Fitting.	Lot.	NIL
1975-76	220 KV	3.2 KM	Tower	16 Nos	NIL
			Conductor.	9.6 KM	100 %
			Insulator	3843 Nos.	100 %
			Fitting.	Lot	NIL
1975-76	132 KV	734 KM	Tower	4037 Nos.	100 %
			Conductor.	2202 KM	100 %
			Insulator Disc.	161480 No.	100 %
			Fitting.	Lot.	NIL
	66 KV	509 KM	Tower.	2545 Nos.	100 %
			Conductor.	1527 KM	100 %
			Insulator.	53445 Nos.	100 %
			Fitting.	Lot.	NIL
1976-77	132 KV	267 KM	Tower.	1468 Nos.	100 %
			Conductor.	801	100 %
			Insulator	58720 Nos.	100 %
			Fitting.	Lot.	NIL
	66 KV	438 KM	Tower	2190 Nos.	100 %
			Conductor.	1314 KM	100 %
			Insulator	30828 Nos.	100 %
			Fitting.	Lot	NIL
1977-78	132 KV	274.4 KM	Tower.	1510 Nos.	100 %
			Conductor	823.2 KM	100 %
			Insulator.	60400 Nos.	100 %
			Fitting.	Lot.	NIL
	66 KV	232 KM	Tower	1160 Nos.	100 %
			Conductor.	696 KM	100 %
			Insulator.	24360 Nos	100 %
			Fitting.	Lot.	NIL

II. TRANSMISSION

(WAPDA continues)

Commissioning date.	Voltage	KM	Equipment		local content
1.	2.	3.	4.		5.
1978-79	132 KV	604.6 KM	Tower	3325 Nos.	100 %
			Conductor.	1813.8	100 %
			Insulator	13300 Nos.	100 %
			Fitting.	Lot.	NIL
	66 KV	233 KM	Tower	1165 Nos.	100 Nos.
			Conductor.	699 KM	100 %
			Insulator.	24465 Nos.	100 %
			Fitting.	Lot.	NIL
1979-80	500 KV	329.6 KM	Tower	1318 Nos.	NIL
			Conductor	990 KM	100 %
			Insulator.	158160 No.s	100 %
			Fitting.	Lot.	NIL
	132 KV	364.2 KM	Tower	2003 Nos.	100 %
			Conductor	1092 KM	100 %
			Insulator	80120 Nos.	100 %
			Fitting.	Lot	NIL
	66 KV	82.9 KM	Tower	497 Nos.	100 %
			Conductor	248.7 KM	100 %
			Insulator.	10437 Nos.	100 %
			Fitting.	Lot	NIL
1980-81	500 KV	519 KM	Tower	2076 Nos.	NIL
			Conductor	1557 KM	100 %
			Insulator.	249120 Nos.	100 %
			Fitting.	Lot	NIL
	220 KV	519 KM	Tower	2000 Nos.	NIL
			Conductor	1557 KM	100 %
			Insulator	126000 No	100 %
			Fitting.	Lot.	NIL
	132 KV	416.2 KM	Tower	2290 Nos.	100 %
			Conductor	1248 KM	100 %
			Insulator	91600 Nos.	100 %
			Fitting.	Lot.	NIL
	66 KV	259.2 KM	Tower	1555 Nos.	100 %
			Conductor	766.6 KM	100 %
			Insulator	32655 Nos.	100 %
			Fitting.	Lot.	NIL

II. TRANSMISSION.
WAPDA continues.

Commissioning date.	Voltage.	KM	Equipment		Local content %
1.	2.	3.	4.		5.
1981-82	132 KV	388 KM	Tower	2134 Nos	100 %
			Conductor	1164 KM	100 %
			Insulator	85360 Nos.	100 %
			Fitting.	Lot.	NIL
	66 KV	285 KM	Tower	1425 Nos.	100 %
			Conductor	855 KM	100 %
			Insulator	29925 Nos.	100 %
			Fitting.	Lot.	NIL
1982-83	220 KV	77 KM	Tower	308 Nos.	NIL
			Conductor	231 KM	100 %
			Insulator	19404 Nos	100 %
			Fitting.	Lot.	NIL
	132 KV	655 KM	Tower	3602 Nos	100 %
			Conductor	1965 KM	100 %
			Insulator	144080 Nos.	100 %
			Fitting.	Lot.	NIL
	66 KV	201 KM	Tower	1206 Nos.	100 %
			Conductor	603 KM	100 %
			Insulator	25326 Nos.	100 %
			Fitting.	Lot.	NIL
	33 KV	128 KM	Tower	1024 Nos.	100 %
			Conductor	384 KM	100 %
			Insulator	12080 Nos.	100 %
			Fitting.	Lot.	100 %

ANNEXURE 'EE'

ELECTRIC ENERGY GENERATION (PAST AND PRESENT DATA- PAKISTAN.

GENERATION GWh(gigawatt-hours)	1972	1973	1974
	1.	2.	3.
Public & self producer total gross	7570.697	8513.943	9095.973
Hydro	3679	4355	4141
Conventional thermal	3843.297	3721.573	4500.387
Nuclear	48.400	437.370	454.400
Geothermal	-	-	-
Public total	7570.697	8513.943	9095.973
Hydro.	3679	4355	4141
Conventional thermal	3843.297	3721.573	4500.387
Nuclear	48.400	437.370	454.4 00
Geothermal	-	-	-
Net production	7296.057	8210.592	8737.310
Transmission & distribution losses	1887.468	2228.917	2435.532
Imports	-	-	-
exports.	-	-	-

	1975	1975	1977
	4.	5.	6.
Public & self producer total gross	10050.186	10285.956	10754.991
Hydro	4359	5436	5183
Conventional thermal	5086.516	4208.296	5180.961
Nuclear	604.670	641.660	391.030
Geothermal	-	-	-
public total	10050.186	10285.956	10754.991
Hydro	4359	5436	5183
Conventional thermal	5086.516	4208.296	5180.961
Nuclear	604.670	641.660	391.030
Geothermal.	-	-	-
Net production.	9726.223	9911.706	10346.560
Transmission & distribution losses	2878.279	2984.774	3309.447
Imports.	-	-	-
Exports.	-	-	-

...contd...p2...

ELECTRIC ENERGY GENERATION (PAST AND PRESENT DATA - PAKISTAN.

ANNEXURE 'EE'

P-2

GENERATION GWh(gigawatt - hours)	1978	1979	1980.
	7.	8.	9.
Public & self producer total gross	12376.325	13084.768	14694.192
Hydro	7466	8353	8718
Conventional thermal	4679.795	4626.028	5974.192
Nuclear	230.530	105.740	2.000
Geothermal.	-	-	-
Public total	12376.325	13084.768	14694.192
Hydro.	7466	8353	8718
Conventional thermal.	4679.795	4626.028	5974.192
Nuclear	230.530	105.740	2.00
Geothermal.	-	-	-
Net production.	11985.534	12317.924	14262.442
Transmission & distribution losses	3701.743	3767.881	4068.875
Imports	-	-	-
Exports.	-	-	-

	1981	1982	1983
	10.	11.	12.
Public & self producer total gross	16195.411	18206.376	10307.936
Hydro.	9046	9526	11367
Conventional thermal	6999.770	8497.306	8779.216
Nuclear	149.640	183.070	161.720
Geothermal	-	-	-
Public total.	16119.811	17738.676	19654.436
Hydro.	9046	9526	11367
Conventional thermal	6924.170	8029.606	8125.716
Nuclear	149.640	183.070	161.720
Geothermal	-	-	-
Net production.	15584.647	17159.788	19065.387
Transmission & distribution losses	4434.230	4658.820	5345.097
Imports.	57.700	287.300	352.700
Exports.	-	-	-

EXISTING ELECTRIC POWER SUB-STATIONS EQUIPMENT

ANNEXURE'

II. Transmission

K. E. S. C.

Commissioning D A T E	Voltage, KV	Power MVA	km Equipment	Local content%
		SUB-STATION		
Dec. 1956	66 kV (SITE)	2x20=40MVA	Transformers = 2 Nos Switchgear Brk= 4 Nos Isolators = 12 Nos Control = 4 Nos	NIL
April 1957	66 kV (Drigh Rd).	1x10=10	Transformer = 1 Nos Switchgear Brk= 3 Nos Isolators = 9 Nos Control = 3 Nos	NIL
Dec. 195[illegible]	66 kV Landhi	1x20=20MVA	Transformer = 1 No Switchgear Brk= 3 Nos Isolators = 9 Nos Control = 3 Nos	NIL
Oct. 1962	66 kV(Federal	1x10=10MVA	Transformer = 1 No Switchgear Brk= 3 Nos Isolator = 9 Nos Control = 3 Nos	NIL
April 1963	66 kV (Elander Rd)	2x20=40MVA	Transformer = 2 Nos Switchgear Brk= 4 Nos Isolator = 12 Nos Control = 4 Nos	NIL
Sept. 1964	66 kV(Landhi)	1x20=20MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control = 1 No	NIL
Sept. 1964	66 kV(Valika)	1x10=10MVA	Transformer = 1 No Switchgear Brk= 3 Nos Isolator = 9 Nos Control = 3 Nos	NIL
Sept. 1964	66 kV (Valka)	1x10=10MVA	Transformer = 1 No Switchgear = 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL
August 1965	132/66 kV (Landhi)	1x75=75MVA	Transformer = 1 No Switchgear Brk= 2 Nos (1 of 132 kV) (1 of 66 kV) Isolator = 6 Nos Control Pannel= 2 Nos	NIL
August 1965	132kV(Landhi)	2x20=40MVA	Transformer = 2 Nos Switchgears = 5 Nos Isolator = 15 Nos Control Pannel= 5 Nos	NIL

II. Transmission

Commissioning D A T E	Voltage, KV	Power MVA	km Equipment	Local content%
		SUB-STATION		
Oct. 1965	132/66 kV (Queens Rd)	1x75 =75MVA	Transformer = 1 No Switchgear Brk= 1of 132 =1of 66 Isolator = 6Nos Control Pannel= 2Nos	NIL
March 1966	132 kV (K/Town)	1x20= 20MVA	Transformer = 1 No Switchgear Brk= 3 Nos Isolator = 9 Nos Control Pannel= 3 Nos	NIL
April 1967	66 kV(Valika)	1x20 =20MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL
August 1967	66 kV (Federal)	1x10=10 MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL
Sept. 1968	66 kV(Valika)	1x20= 20MVA	Transformer = 1 No Switchgear Brk= - Isolator = - Control Pannel= -	NIL
Oct. 1968	132 kV (Dhabeji)	1x20 =20MVA	Transformer = 1 No Switchgear Brk= 3 Nos Isolator = 9 Nos Control Pannel= 3 Nos	NIL
March 1969	132 kV(Gharo)	1x20 = 20MVA	Transformer = 1 No Swtichgear Brk= 4 Nos Isolator =11 Nos Control Pannel= 4 Nos	NIL
February 1969	66kV Elander Road.	1x20 = 20MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL
April 1969	66kV (SITE)	1x20=20MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel==1 No	NIL
July 1969	66kV(Elander Road)	1x5 =5 MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 Nos	NIL
July 1969	132/66 kV	1x80 = 80MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 6 Nos Control Pannel= 2 Nos	NIL

II. Transmission.

Commissioning D A T E	Voltage, KV	Power MVA	km Equipment	Local content %
		SUB-STATION		
March 1970	66 kV (Elander Rd)	1x20 =20MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3Nos Control Pannel= 1 No	NIL
March 1970	66 kV (Federal)	1x20=20MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3Nos Control Pannel= 1 No	NIL
May 1970	132 kV (Korangi Town)	1x40= 40MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3Nos Control Pannel= 1 No	NIL
June 1970	132/66 kV (Valika)	1x80=80MVA	Transformer = 1 No S/gear(132KV) = 1 No " (66kV) = 1 No Isolator = 6Nos Control Pannel= 2Nos	NIL
Sept. 1970	66 kV(SITE)	1x20=20MVA	Transformer = 1No Switchgear Brk= 1No Isolator = 3Nos Control Pannel= 1No	NIL
Nov. 1970	132 kV (Valika)	1x20=20MVA	Transformer = 1 No Switchgear Brk= 3Nos Isolator = 9Nos Control = 3Nos	NIL
Dec. 1970	66 kV(Elander Road).	1x10=10MVA	Transformer = 1 No Switchgear Brk= - Isolator = - Control Pannel= -	NIL
Jan. 1971	132kV(Landhi)	1x20=20MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3Nos Control Pannel= 1 No	NIL
Dec. 1958	66 kV(Malir)	1x5= 5 MVA	Transformer = 1 No Switchgear Brk= 3 Nos Isolator = 9 Nos Control Pannel= 3 Nos	NIL
1967	66 kV(Malir)	1x10=10MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL

II. Transmission

Commissioning D A T E	Voltage, KV	Power MVA	km Equipment	Local content
		SUB-STATION		
June 1971	66 kV (Eladner Rd)	1x20=20MVA	Transformer = 1(Replacement) Switchgear Brk= - Isolator = - Control Pannel= -	NIL
July 1971	66 kV(Gulshan	1x20=20MVA	Transformer = 1 No Switchgear Brk= 3Nos Isolator = 9Nos Control Pannel= 3Nos	NIL
Nov. 1971	132 kV (Korangi Town	1x40=40MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL
April 1972	132 kV(Valika)	1x20=20MVA	Transformer = 1 No Switchgear Brk=1 No Isolator = 3Nos Control Pannel=1 No	NIL
Oct. 1972	132 kV (Dhabeji)	1x20=20MVA	Transformer = 1 No Switchgear Brk=1 No Isolator = 3Nos ControlPannel= 1 No	NIL
Nov. 1972	132 kV (Gizri)	1x20=20MVA	Transformer = 1No Switchgear Brk= 1No Isolator = 3Nos Control Pannel= 1No	NIL
August 1973	66 KV (Mauripur)	1x20=20MVA	Transformer = 1No Switchgear Brk= 3Nos Isolator = 9Nos Control Pannel= 3Nos	NIL
Nov. 1973	66 KV(Malir)	1x10=10MVA	Transformer = 1 No Switchgear = - Isolator = - Control Pannel=-	NIL
March 1974	132 kV(Valika)	1x10=10MVA	Transformer = 1 No Swticghear = 2Nos Isolator = 6Nos Control Pannel= 2Nos	NIL
May 1976	66KV Gulshan	1x20=20MVA	Transformer = 1No Switchgear = 1No Isolator = 3Nos Control Pannel= 1No	NIL
June 1976	132 KV (Gizri)	1x20=20MVA	Transformer = 1No Switchgear = 1No Isolator = 3No Control Pannel= 1No	NIL

II. Transmission

Commissioning D A T E	Voltage, KV	Power MVA	km Equipment	Local content
		SUB-STATION		
June 1976	132 kV (Queens Rd)	1x40=40MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL
August 1976	66 KV (Mauripur)	1x20=20MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL
Dec. 1976	132 kV (Pipri)	1x20=20MVA	Transformer = 1 No Switchgear Brk= 3 Nos Insolator = 9 Nos Control Pannel= 3 Nos	NIL
May 1977	66 KV (Federal)	1x20=20MVA	Trasnformer = 1 No Switchgear Brk= - Isolator = - Control Pannel= -	NIL
1977	66 KV (Mauripur)	1x10=10MVA	Transformer = 1 No Switchgear Brk= - Isolator = - Control Pannel= -	NIL
Dec. 1977	132 KV(SITE)	1x80=80MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 6 Nos Control Pannel= 2 Nos	NIL
Dec. 1977	132 KV (SITE)	1x30=30MVA	Transformer = 1 No Switchgear Brk= 1 No Isolator = 3 Nos Control Pannel= 1 No	NIL
July 1978	66 KV (Aga Khan)	1x10=10MVA	Transformer = 1 No Switchgear Brk= 3 Nos Isolator = 9 Nos Control Pannel= 3 Nos	NIL
OCT 1978	132 KV (Federal)	1x30=30MVA	Transformer = 1 No Switchgear Brk= 3 Nos Isolator = 9 Nos Control Pannel= 3 Nos	NIL
May 1979	132 KV (Hub)	1x20=20MVA	Transformer = 1 No Switchgear Brk= 4 Nos Isolator =13 Nos Control Pannel= 4 Nos	NIL
June 1979	132 KV (Federal)	1x30=30MVA	Transformer = 1 No Switchgear Brk=1 No Isolator = 3 Nos Control Pannel=1 No	NIL

II. Transmission.

Commissioning D A T E	Voltage, KV	Power MVA	km Equipment	Local content%
		SUB-STATION		
July 1979	66 KV (Aga Khan)	1x20=20MVA	Transformer = 1 Nos Switchgear Brk = - Isolator = - Control Pannel = -	NIL
June 1980	132 KV (Landhi)	1x40=40MVA	Transformer = 1No Switchgear Brk = - Isolator = - Control Pannel = -	NIL
July 1980	66 KV(Gadap)	1x5=5 MVA	Transformer = 1 Nos Switchgear Brk = 1Nos Isolator = 1 No Control Pannel = 1 No	NIL
Jan. 1982	132 KV (Pipri)	1x20=20MVA	Transformer = 1 No Switchgear Brk = 10Nos Isolator = 38Nos Control Pannel = 10Nos	NIL
15th.Oct1980	132 KV (Vinder)	1x10=10MVA	Transformer = 1 No Switchgear Brk = 2 Nos Isolator = 4 Nos Control Pannel = 3 Nos	NIL
17th.Oct.1980	132 KV (Uthal)	1x2=20MVA	Transformer = 1 No Breaker = 2 Nos Isolator = 4 Nos Control Pannel = 3 Nos	NIL
17th.Oct.1980	132 KV(BELA)	1x10=10MVA	Transformer = 1 No Switchgear Brk = 1 No Isolator = 1 No Control Pannel = 2 Nos	NIL
16th.Oct.'80	132 KV (Korangi)	1x30=30MVA	Transformer = 1 No Breaker = 1 No Isolator = 3Nos Control Pannel = 1No	NIL
17.3.1981	132 KV (Federal)	1x20=20MVA	Transformer = 1 No Breaker = 1 No Isolator = 2 Nos Control Pannel = -	NIL
July 1981	66 KV (W/Wharf)	1x10=10MVA	Transformer = 1 No Breaker = -- Isolator = -- Control Pannel = --	NIL
July 1981	132 KV (Federal)	1x20=20MVA	Transformer = 1 No (Replacement) Breaker = -- Isolator = -- Control Pannel = --	NIL

II. Transmission.

Commissioning D A T E	Voltage, KV	Power MVA	km Equipment	Local content%
		SUB-STATION		
Jan. 1982	66 KV (Federal)	1x10= 10MVA	Transformer = 1No Breaker = - Isolator = " Control Pannel = -	NIL
May 1982	132 KV (Port Qasim)	1x20=20MVA	Transformer = 1No Breaker = 3Nos Isolator = 11" Control Pannel = 3Nos	NIL
May 1982	66 KV (N.N'abad)	1x20=20MVA	Transformer = 1No Breaker = 3Nos Isolator = 9Nos Control Pannel = 3Nos	NIL
Sept. 1982	66 KV (Mahripur)	1x20=20MVA	Transformer = 1 No Breaker = - Isolator = - Control Pannel = -	NIL
Oct. 1982	132 kV (T/Sultan)	1x30=30MVA	Transformer = 1 No Breaker = 3 Nos Isolator = 11 Nos Control Pannel = 3 Nos	NIL
Oct. 1982	132 KV (Airport)	1x30=30MVA	Transformer = 1 No Breaker = 3 Nos Isolator = 11Nos Control Pannel = 3Nos	NIL
Dec. 1982	66 KV (Gadap)	1x10=10MVA	Transformer = 1 No Breaker = - Isolator = - Control Pannel = -	NIL
March 1982	132/220KV Pipri West	1x250=250MVA	Transformer = 1No Breaker = 6Nos Isolator = 18Nos Control Pannel = 6Nos	NIL
Aug. 1983	66 KV (Aga Khan)	1x10=10MVA	Transformer = 1No Breaker = - Isolator = - Control Pannel = -	NIL
Dec. 1983	132/220KV (Scheme-33)	1x250=250KVA	Transformer = 1 No Breaker = 6Nos Isolator = 17Nos Control Pannel = 6Nos	NIL

TOTAL GRID STATIONS	26	NOS
TOTAL MVA CAPACITY	1635	MVA

IN OVER ALL COST OF GRID STATION EQUIPMENT FOLLOWING IS F.C. & L.C. % AGE.

EQUIPMENT	=	F.C.
DUTY TAXES	=	L.C. - 15-20 % ON C&F
FREIGHT	=	F.C.
ERRECTION	=	L.C. - 10-15 % ON C&F

F.C.	65 %
L.C.	35 %

Please see next page for WAPDA

ANNEXURE G-I.

P-1

EXISTING ELECTRIC POWER EQUIPMENT.

I.GENERATING STATIONS.

Commissioning date.	Plant size, MW	Equipment	Local content %	Foreign supplier
		HYDRO ELECTRIC		
1973 1974 1977 1981 1982	1 x 100 Mangla 1 X 100 Mangla 4 x 175 Tarbela 2.x 100 Mangla 4 x 175 Tarbela	Fabricated parts Turbine Generator Sub-station Control and instrumentation	NIL	-
		CONVENTIONAL THERMAL		
1974	2 x 110 Guddu	Boiler & boiler house equipment Turbine Generator Sub-station Control and instrumentation	NIL	Czechosalavakia
		GAS TURBINE.		
1972 1973 1975 1975 1978 1981	1 x 5.7 Quetta 1 x12.25Quetta 1 x25 Quetta 8 x 25 Faisalabad 2 x 25 Kotri 2 x 25 Kotri	Compressor turbine Generator Sub Station Control and instrumentation.	NIL	-

contd....P2....

from pre-page P1

EXISTING ELECTRIC POWER EQUIPMENT.

I.GENERATING STATIONS.

Commissioning date.	Plant size, MW	Equipment	Local content %	Foreign supplier
		HYDRO ELECTRIC		
		Fabricated parts Turbine Generator Sub-station Control and instrumentation		
		CONVENTIONAL THERMAL		
1977	1 x 125 Korangi (KESC)	Boiler & boiler house equipment Turbine Generator Sub-station Control and instrumentation	NIL	Hitachi (Japan) Hitachi (Japan) Hitachi (Japan) BBC (Germany) KENT/Hitachi/BBC
		GAS TURBINE.		
		Compressor turbine Generator Sub Station Control and instrumentation.		

.....cond....p3

from pre page 2

EXISTING ELECTRIC POWER EQUIPMENT.

I, GENERATING STATIONS.

Commissioning date.	Plant size, MW	Equipment	Local content %	Foreign supplier
		HYDRO ELECTRIC		
		Fabricated parts Turbine Generator Sub-station Control and instrumentation		
		CONVENTIONAL THERMAL		
1977	1 x 210 Guddu	Boiler & boiler house equipment Turbine Generator Sub-station Control and instrumentation	NIL	Russian.
		GAS TURBINE.		
1979	4 x 25 Korangi (KESC)	Compressor turbine Generator Sub Station Control and instrumentation.	NIL	Hitachi (Japan) Hitachi (Japan)
1980	5 x 25 SITE (KESC)			BBC (Germany) Hitachi (Japan)

...contd....p4....

(from pre-page 3)

EXISTING ELECTRIC POWER EQUIPMENT.

I. GENERATING STATIONS.

Commissioning date.	Plant size, MW	Equipment	Local content %	Foreign supplier
		HYDRO ELECTRIC		
		Fabricated parts Turbine Generator Sub-station Control and instrumentation		
		CONVENTIONAL THERMAL		
1980	2 x 55 Steel Mill. Karachi.	Boiler & boiler house equipment Turbine Generator Sub-station Control and instrumentation	NIL	Russian.
		GAS TURBINE.		
		Compressor turbine Generator Sub Station Control and instrumentation.		

...cond..... p5...

EXISTING ELECTRIC POWER EQUIPMENT.

I.GENERATING STATIONS.

Commission-ing date.	Plant size, MW	Equipment	Local content %	Foreign supplier
		HYDRO ELECTRIC		
		Fabricated parts Turbine Generator Sub-station Control and instrumentation		
		CONVENTIONAL THERMAL		
1983	1 x 210 Bin Qasim K.E.S.C.	Boiler & boiler house equipment Turbine Generator Sub-station Control and instrumentation		Hitachi (Japan) Hitachi Hitachi Hitachi BBC / Hitachi.
		GAS TURBINE.		
		Compressor turbine Generator Sub Station Control and instrumentation.		

EXISTING ELECTRIC POWER EQUIPMENT.

SUB-STATION EQUIPMENT. ANNEXURE 'C'

II. TRANSMISSION.

Commissioning date.	Power MVA	Km. Equipment	Local content %
1.	2.	3.	4.
1971-72	83.5 MVA	* Transformer Switch gear Isolators Conductor.	NIL NIL NIL NIL
1972-73	591 MVA		"
1973-74	588 MVA		"
1974-75	853.5 MVA		"
1975-76	575 MVA		"
1976-77	622.85 MVA		"
1977-78	684 MVA		"
1978-79	734 MVA		"
1979-80	465.5 MVA		"
1980-81	582 MVA		"
1981-82	661.5 MVA		"
1982-83	735.5 MVA		"

* All equipment used in Grid stations is imported.

EXISTING ELECTRIC POWER EQUIPMENT ANNEXURE 'II'

CABLE.

II. Transmission

K. E. S. C.

132 kV / 66 kV UNDERGROUND CABLE

Commissioning D A T E	Voltage, KV	power, MVA	km Equipment	Local Content%
1974	132 kV		6 km	NIL
1979	132 kV		4 km	NIL
1955	66 kV		1.136km	NIL
1956	66 kV		5.76 km	NIL
1957	66 kV		0.592 km	NIL
1960	66 kV		1.248 km	NIL
1976	66 kV		0.096 km	NIL
1977	66 kV		1.049 km	NIL

TOTAL UNDERGROUND CABLE

132 kV = 10 KM

66 kV = 9.881KM

EXISTING ELECTRIC POWER EQUIPMENT. ANNEXURE "F"

K. E. S. C.

III. Distribution

SUB-STATION

Voltage, kV	Power, MVA	Total Number of Units for each voltage and Power range	km	Equipment		Local content %
1948 11kV	13.2	5 Nos	*	Transformer	5	NIL
			**	Switchgear	15	NIL
1949 11kV	15.7	10 Nos		Transformer	8	NIL
				Switchgear	74	NIL
1950 11kV	21.7	9 Nos		Transformer	7	NIL
				Switchgear	71	NIL
1951 11kV	25.9	9 Nos		Transformer	13	NIL
				Switchgear	42	NIL
1952 11kV	34.04	14 Nos		Transformer	14	30%
				Switchgear	54	30%
1953 11kV	45.7	18 Nos		Transformer	14	35%
				Switchgear	45	35%
1954 11kV	57.9	15 Nos		Transformer	25	35%
				Switchgear	90	35%
1955 11kV	72.8	30 Nos		Transformer	23	35%
				Switchgear	81	35%
1956 11kV	87.09	27 Nos		Transformer	21	35%
				Switchgear	192	35%
1957 11kV	107.04	26 Nos		Transformer	17	60%
				Switchgear	266	60%
1958 11kV	123.8	23 Nos		Transformer	25	60%
				Switchgear	44	60%
1959 11kV	138	26 Nos		Transformer	15	75%
				Switchgear	100	75%
1960 11kV	149.6	25 Nos		Transformer	25	75%
				Switchgear	44	75%
1961 11kV	160.5	22 Nos		Transformer	33	100%
				Switchgear	39	100%
1962 11kV	183.8	35 Nos		Transformer	54	100%
				Switchgear	68	100%
1963 11kV	218.1	67 Nos		Transformer	68	100%
				Switchgear	30	
1964 11kV	254.3	81 Nos		Transformer	68	100%
				Switchgear	40	
1965 11kV	293.7	87 Nos		Transformer	65	100%
				Switchgear	68	
1966 11kV	358.8	75 Nos		Transformer	67	100%
				Switchgear	135	

Distribution

SUB-STATION

Voltage, KV	Power, MVA	Total Number of Units for each voltage and Power range	km	Equipment		Local content %
1967 11kV	395.8	97 Nos		Transformer Switchgear	50 97	100 %
1968 11kV	457.7	108 Nos		Transformer Switchgear	114 166	100 %
1969 11kV	535.8	76 Nos		Transformer Switchgear	61 106	100 %
1970 11kV	585.2	72 Nos		Transformer Switchgear	52 82	100%

III. Distribution

SUB-STATION

Voltage,kV	Power,MVA	Total Number of Units for each Voltage and Power range	km	Equipment		Local content %
1971 11kV	646.8	87 Nos		Transformer Switchgear	74 87	100 %
1972 11kV	690.3	62 Nos		Transformer Switchgear	66 48	100 %
1973 11kV	739.8	112 Nos		Transformer Switchgear	104 129	100 %
1974 11kV	785.2	91 Nos		Transformer Switchgear	87 127	100 %
1975 11kV	833.5	89 Nos		Transformer Switchgear	70 119	100 %
1976 11kV	876.7	79 Nos		Transformer Switchgear	62 95	100 %
1977 11kV	918.4	124 Nos		Transformer Switchgear	101 169	100 %
1978 11kV	951.1	155 Nos		Transformer Switchgear	145 106	100 %
1979 11kV	974.7	140 Nos		Transformer Switchgear	125 186	100 %
1980 11kV	1100.8	122 Nos		Transformer Switchgear	104 151	100 %
1981 11kV	1208.8	138 Nos		Transformer Switchgear	121 180	100 %
1982 11kV	1292.6	35 Nos		Transformer Switchgear	35 98	100 %
1983 11kV	1383.6	60 Nos		Transformer Switchgear	40 80	100 %

TOTAL G.D. STATIONS 974 NOS
B.S. STATIONS 339 NOS
POLE MOUNTED TRANSFORMER 1017 NOS

* Transformers are manufactured in Pakistan
%age of imported / local material is 60% : 40 %

** % of Switch gear Material FC: LC is 70 : 30 %

EXISTING ELECTRIC POWER EQUIPMENT ANNEXURE 'K'

(Transmission lines)

III. Distribution H.T. O/H K.E.S.C.

Voltage, KV	Power, MVA	Total Number of Units for each voltage and Power range	km	Equipment	Local Content %
1948 11kV	-	-	24	Poles 5 Conductor 120 Insulator 16 Fittings LOT	NIL NIL NIL 100%
1949 11kV	-	-	1.19	Poles 36 Conductor 5.95 Insulator 114 Fittings LOT	NIL NIL NIL 100%
1950 11kV	-	-	2.4	Poles 39 Conductor 12KM Insulator 123NOS Fittings LOT	NIL NIL NIL 100%
1951 11kV	-	-	1.14	Poles 19 Conductor 5.7 Insulator 60 Fittings LOT	NIL NIL NIL 100%
1952 11kV	-	-	3.76	Poles 62 Conductor 18.80 Insulator 195 Fittings LOT	NIL NIL NIL 100%
1953 11kV	-	-	0.8	Poles 14 Some Spans Converted into U/G Conductor Insulator } LOT Fittings	30%
1954 11kV	-	-	0.08	Poles 2 Conductor 0.40 Insulator 6 Fittings LOT	* 30% ** 20% *** 80% 100%
1955 11kV	-	-	8.48	Pole 239 Some Spans Converted into U/G Conductor) Insulator) LOT Fittings)	30%
1956 11kV	-	-	4.0	Poles 66 Some Spans Converted into U/G Conductor 18KM Insulator 72 Fittings LOT	30% 20% 80% 100%
1957 11kV	-	-	0.96	Poles 16 Conductor 4.80 Insulator 50 Fittings LOT	30% 20% 100% 100%
1958 11kV	-	-	4.16	Pole 68 Conductor 20.80 Insulator 214 Fittings LOT	30% 20% 100% 100%

III.Distribution

Voltage,KV	Power,MVA	Total Number of Units for each Voltage and Power range	km	Equipment	Local Content %
1959 11kV	-	-	4.96	Pole 19 Conductor 24.8 Insulator 60 Fittings LOT	30% 20% 100% 100%
1960 11kV	-	-	3.20	Pole 53 Conductor 16 Insulator 167 Fittings LOT	30% 20% 100% 100%
1961 11kV	-	-	22.32	Poles 366 Conductor 111.6 Insulator 11153 Fittings LOT	30% 20% 100% 100%
1962 11kV	-	-	26.2	Poles 413 Conductor 131 Insulator 1301 Fittings LOT	30% 20% 100% 100%
1963 11kV	-	-	29.5	Pole 500 Conductor 147.5 Insulator 1575 Fittings LOT	30% 20% 100% 100%
1964 11kV	-	-	23.8	Pole 390 Conductor 119 Insulator 1208 Fittings LOT	30% 20% 100% 100%
1965 11kV	-	-	25.6	Pole 387 Conductor 128 Insulator 1219 Fittings LOT	30% 20% 100% 100%
1966 11kV	-	-	24.6	Pole 403 Conductor 123 Insulator 1270 Fittings LOT	30% 20% 100% 100%
1967 11kV	-	-	14.0	Pole 281 Conductor 70 Insulator 885 Fittings LOT	30% 20% 100% 100%
1968 11kV	-	-	34.5	Pole 491 Conductor 172.5 Insulator 1547 Fittings LOT	30% 20% 100% 100%
1969 11kV	-	-	18.68	Pole 166 Conductor 93.4 Insulator 523 Fittings LOT	30% 20% 100% 100%

III. Distribution

Voltage, KV	Power, MVA	Total Number of Units for each Voltage and Power range	km	Equipment	Local Content %
1970 11kV	-	-	6.08	Pole 99 Conductor 30.4 Insulator 312 Fittings LOT	30% 20% 100% 100%
1971 11kV	-	-	11.20	Pole 184 Conductor 56 Insulator 580 Fittings LOT	30% 20% 100% 100%
1972 11kV	-	-	21.24	Pole 348 Conductor 106.2 Insulator 1096 Fittings LOT	30% 20% 100% 100%
1973 11kV	-	-	14.12	Pole 231 Conductor 70.6 Insulator 728 Fittings LOT	30% 20% 100% 100%
1974 11kV	-	-	31.36	Pole 515 Conductor 156.8 Insulator 1622 Fittings LOT	30% 20% 100% 100%
1975 11kV	-	-	40.32	Pole 661 Conductor 201.6 Insulator 2082 Fittings LOT	30% 20% 100% 100%
1976 11kV	-	-	15.1	Pole 247 Conductor 75.5 Insulator 778 Fittings LOT	30% 20% 100% 100%
1977 11kV	-	-	9.0	Pole 148 Conductor 45 Insulator 466 Fittings LOT	30% 20% 100% 100%
1978 11kV	-	-	4.58	Pole 75 Conductor 22.9 Insulator 236 Fittings LOT	30% 20% 100% 100%
1979 11kV	-	-	15.82	Pole 259 Conductor 79.1 Insulator 816 Fittings LOT	30% 20% 100% 100%
1980 11kV	-	-	16.7	Pole 274 Conductor 83.5 Insulator 863 Fittings LOT	30% 20% 100% 100%
1981 11kV	-	-	7.41	Pole 121 Insulator 37.05 Insulator 381 Fittings LOT	30% 20% 100% 100%

III. Distribution

-: 4 :-

Voltage, KV	Power, MVA	Total Number of Units for each voltage and Power range	km	Equipment	Local Content %
1982 11kV	-	-	15.99	Pole 262 Conductor 79.95 Insulator 825 Fittings LOT	30% 20% 100% 100%
1983 11kV	-	-	23KM	Pole 376 Conductor 114KM Insulator 1183 Fittings LOT	30% 20% 100% 100%

TOTAL

POLES = 7852 NOS

CONDUCTOR = 479 KM

INSULATOR = 27482 NOS

* POLES ARE FABRICATED IN PAKISTAN STEEL IS IMPORTED.

** COPPER IS IMPOITED & REDRAWN IN PAKISTAN.

*** INSULATORS ARE ALL LOCAL.

**** FILLING ARE MADE LOCALLY.

EXISTING ELECTRIC POWER EQUIPMENT

K. E. S. C.

ANNEXURE 'L'

III. Distribution

TRANSMISSION LINES - L.T. O/H

Voltage, KV	Power, MVA	Total Number of Units for each voltage and Power range	km	Equipment	Local Content %
1948 11kV	-	-	1.4	Poles 16 Conductor 4.0 Insulator 101 Fittings LOT	NIL NIL NIL 100%
1949 11kV	-	-	2.1	Poles 24 Conductor 10.5 Insulator 151 Fittings Lot	NIL NIL NIL 100%
1950 11kV	-	-	5.0	Poles 58 Conductor 25 Insulator 365 Fittings LOT	NIL NIL NIL 100%
1951 11kV	-	-	29.9	Poles 345 Conductor 149.5 Insulator 2174 Fittings LOT	NIL NIL NIL 100%
1952 11kV	-	-	69.64	Poles 915 Conductor 348.2 Insulator 5764 Fittings LOT	NIL NIL NIL 100%
1953 11kV	-	-	75.76	Poles 875 Conductor 378.8 Insulator 5512 Fittings LOT	30% 20% 100% 100%
1954 11kV	-	-	60.8	Poles 1857 Conductor 304 Insulator 11169 Fittings LOT	30% 20% 100% 100%
1955 11kV	-	-	91.6	Poles 958 Conductor 458 Insulator 6035 Fittings LOT	30% 20% 100% 100%
1956 11kV	-	-	85.9	Poles 992 Conductor 429.5 Insulator 6249 Fittings LOT	30% 20% 100% 100%
1957 11kV	-	-	132.66	Poles 1532 Conductor 663.3 Insulator 9651 Fittings LOT	30% 20% 100% 100%
1958 11kV	-	-	53.34	Poles 613 Conductor 266.5 Insulator 3861 Fittings LOT	30% 20% 100% 100%

III. Distribution

TRANSMISSION LINES

Voltage, KV	Power, MVA	Total Number of Units for each Voltage and Power range	km	Equipment	Local Content %
1959 11kV	-	-	50.5	Poles 580 Conductor 252.5 Insulator 3654 Fittings LOT	30% 20% 100% 100%
1960 11kV	-	-	48.48	Poles 560 Conductor 242.4 Insulator 3528 Fittings LOT	30% 20% 100% 100%
1961 11kV	-	-	64.00	Poles 739 Conductor 320 Insulator 4655 Fittings LOT	30% 20% 100% 100%
1962 11kV	-	-	82.02	Poles 947 Conductor 410.1 Insulator 5966 Fittings LOT	30% 20% 100% 100%
1963 11kV	-	-	95.2	Poles 1100 Conductor 476 Insulator 6930 Fittings LOT	30% 20% 100% 100%
1964 11kV	-	-	132.7	Poles 1533 Conductor 663.5 Insulator 9657 Fittings LOT	30% 20% 100% 100%
1965 11kV	-	-	87	Poles 1004 Conductor 435 Insulator 6325 Fittings LOT	30% 20% 100% 100%
1966 11kV	-	-	106	Poles 1225 Conductor 530 Insulator 7906 Fittings LOT	30% 20% 100% 100%
1967 11kV	-	-	91.4	Poles 1055 Conductor 457 Insulator 6646 Fittings LOT	30% 20% 100% 100%
1968 11kV	-	-	169.84	Poles 1962 Conductor 849.2 Insulator 12360 Fittings LOT	30% 20% 100% 100%
1969 11kV	-	-	128.76	Poles 1487 Conductor 643.8 Insulator 9368 Fittings LOT	30% 20% 100% 100%
1970 11kV	-	-	173.3	Poles 1586 Conductor 866.5 Insulator 9878 Fittings LOT	30% 20% 100% 100%

III,Distribution -: 3 :-

TRANSMISSION LINES - L.T. O/H

Voltage,KV	Power,MVA	Total Number of Units for each Voltage and Power range	km	Equipment		Local Content %
1971	-	-	221.78	Poles	2561	30%
				Conductor	1108.9	20%
				Insulator	16134	100%
				Fittings	LOT	100%
1972	-	-	189.32	Poles	2083	30%
				Conductor	946.6	20%
				Insulator	13123	100%
				Fittings		
1973	-	-	158.6	Poles	1832	30%
				Conductor	793	20%
				Insulator	11542	100%
				Fittings	LOT	100%
1974	-	-	394.9	Poles	4561	30%
				Conductor	1974.9	20%
				Insulator	28734	100%
				Fittings	LOT	100%
1975	-	-	422.4	Poles	4879	30%
				Conductor	2112	20%
				Insulator	30737	100%
				Fittings	LOT	100%
1976	-	-	302.59	Poles	3610	30%
				Conductor	1513	20%
				Insulator	22743	100%
				Fittings	LOT	100%
1977	-	-	147.91	Poles	1708	30%
				Conductor	739.6	20%
				Insul-tor	10760	100%
				Fittings	LOT	100%
1978	-	-	98.2	Poles	1035	30%
				Conductor	491	20%
				Insulator	6520	100%
				Fittings	LOT	100%
1979	-	-	12	Poles	138	30%
				Condcutor	60	20%
				Insulator	869	100%
				Fittings	LOT	100%
1980	-	-	182	Poles	2102	30%
				Conductor	910	20%
				Insulator	13242	100%
				Fittings	LOT	100%
1981	-	-	31	Poles	358	30%
				Conductor	155	20%
				Insulator	2255	100%
				Fittings	LOT	100%
1982	-	-	95	Poles	1098	30%
				Conductor	475	20%
				Insulator	6917	100%
				Fittings	LOT	100%

III. Distribution

TRANSMISSION LINE - L.T. O/H

Voltage, KV	Power, MVA	Total Number of Units for each voltage and Power range	km	Equipment		Local Content %
1983	-	-	98	Poles Conductor Insulator Fittings	1035 491 5220 LOT	30% 20% 100% 100%

TOTAL L.T. 4405 KM

TOTAL POLES 50878 NOS

TOTAL INSULATORS 10356 NOS

* POLES ARE FABRICATED IN PAKISTAN STEEL IS IMPORTED

** COPPER IS IMPORTED & REDRAWN IN PAKISTAN.

*** INSULATORS ARE FABRICATED LOCALLY

**** FILLINGS ARE MADE LOCALLY

EXISTING ELECTRIC POWER EQUIPMENT.

CABLE

ANNEXURE ' M'

III. Distribution

K. E. S. C.

CABLE - H.T. U/G

Voltage, kv	Power, MVA	Total Number of Units for each voltage and Power range	km	Cable	Local content%
1948 11kv	-	-	12.16	-	NIL
1949 11kV	-	-	15.46	-	NIL
1950 11kV	-	-	23.74	-	NIL
1951 11kV	-	-	8.26	-	NIL
1952 11kv	-	-	29.8	-	NIL
1953 11kv	-	-	21.6	-	NIL
1954 11kv	-	-	36.8	-	NIL
1955 11kV	-	-	67.0	-	NIL
1956 11kV	-	-	55.5	-	NIL
1957 11kv	-	-	28.5	-	NIL
1958 11kV	-	-	10.7	-	NIL
1959 11kV	-	-	8.72	-	NIL
1960 11kV	-	-	25.92	-	NIL
1961 11kV	-	-	38.86	-	NIL
1962 11kV	-	-	29.3	-	NIL
1963 11kV	-	-	38.1	-	NIL
1964 11kV	-	-	38.6	-	NIL
1965 11kV	-	-	38.3	-	NIL
1966 11kV	-	-	38.3	-	NIL
1967 11kV	-	-	45.9	-	NIL
1968 11kV	-	-	50.1	-	NIL
1969 11kV	-	-	67.4	-	NIL
1970 11kV	-	-	77.5	-	NIL

III. Distribution

CABLE - H.T. U/G

Voltage, kV	Power, MVA	Total Number of Units for each voltage and Power range	km	Cable	Local content%
1971 11kV	-	-	43.16	-	NIL
1972 11kV	-	-	22.6	-	NIL
1973 11kV	-	-	22.9	-	NIL
1974 11kV	-	-	51.8	-	NIL
1975 11kV	-	-	61.62	-	NIL
1976 11kV	-	-	104.48	-	NIL
1977 11kV	-	-	79.7	-	NIL
1978 11kV	-	-	29.2	-	NIL
1979 11kV	-	-	52.52	-	NIL
1980 11kV	-	-	101.21	-	NIL
1981 11kV	-	-	8.8	-	NIL
1982 11kV	-	-	15.01	-	NIL
1983 11kV	-	-	30.	-	NIL

TOTAL H.T. U/G CABLE = 1517.03 KM

EXISTING ELECTRIC POWER EQUIPMENT

K. E. S. C.

ANNEXURE 'N'

III. Distribution

CABLE L.T. U/G

Voltage, KV	Power, MVA	Total Number of Units for each voltage and Power range	km	Cable	Local content %
1948 .4kV	-	-	1.04	-	NIL
1949 .4kV	-	-	2.08	-	NIL
1950 .4kV	-	-	3.28	-	NIL
1951 .4kV	-	-	7.42	-	NIL
1952 .4kV	-	-	3.4	-	60 %
1953 .4kV	-	-	10.1	-	60 %
1954 .4kV	-	-	25.2	-	60 %
1955 .4kV	-	-	2.4	-	100%
1956 .4kV	-	-	16.05	-	100%
1957 .4kV	-	-	4.15	-	100%
1958 .4kV	-	-	4.01	-	100%
1959 .4kV	-	-	14.42	-	100%
1960 .4kV	-	-	3.57	-	100%
1961 .4kV	-	-	6.2	-	100%
1962 .4kV	-	-	4.98	-	100%
1963 .4kV	-	-	4.24	-	100%
1964 .4kV	-	-	4.24	-	100%
1965 .4kV	-	-	4.66	-	100%
1966 .4kV	-	-	10.58	-	100%
1967 .4kV	-	-	8.8	-	100%
1968 .4kV	-	-	5.1	-	100%
1969 .4kV	-	-	21.7	-	100%
1970 .4kV	-	-	10.		100%

III. Distribution

CABLE L.T. U/G

Voltage, kV	Power, MVA	Total Number of Units for each voltage and Power range	km	Cable	Local content %
1971 .4kV	-	-	14.95	-	100 %
1972 .4kV	-	-	6.05	-	100 %
1973 .4kV	-	-	6.89	-	100 %
1974 .4kV	-	-	6.63	-	100 %
1975 .4kV	-	-	6.00	-	100 %
1976 .4kV	-	-	14.20	-	100%
1977 .4kV	-	-	18.45	-	100 %
1978 .4kV	-	-	46.15	-	100 %
1979 .4kV	-	-	3.19	-	100 %
1980 .4kV	-	-	1.40	-	100 %
1981 .4kV	-	-	2.99	-	100 %
1982 .4kV	-	-		-	100 %

TOTAL CABLE = 300 KM

DOMESTIC PRODUCTION OF ELECTRIC POWER EQUIPMENT.

ANNEXURE ' O'

Type of equipment.	Specification (Power & voltage for electromechanical equipment.	Annual production (number of units for electro-mechanical equipment & tons for others.		
		1972	1973	1974
1.	2.	3(a)	3(b)	3(c)
Fuse cut outs	upto 400 A 500 V.	-	-	-
Motor Control centres	upto 3000 A 500 V.	-	-	-
LT Switchboard	upto 3000 A 500 V.	-	-	-
Bus Trunking	upto 2000 A 500 V.	-	-	-
LT distribution Board.	upto 100 A 500 V.	-	-	-
SIEMENS				
Motors	upto 500 HP 400 V.	-	-	-
Motor control gear (power & distribution)	upto 500 HP 400 V.	-	-	-
Transformers	upto 132 KV 20 MVA	-	-	-
Welding sets	upto 500 ADC			
Generating sets	upto 1000 HP 400 V 50 HZ	-	-	-
Switchgear and distribution boards	upto 2500 A 33 KV	-	-	-
Relay and control penals Motor Control centre kiosks - Pad mounted transformers outdoor ring main units Distribution Feeder pillar power factor improvement plant.				

DOMESTIC PRODUCTION OF ELECTRIC POWER EQUIPMENT.

ANNEXURE "C"

Type of equipment.	Specification (Power & voltage for electromechanical equipment.	Annual production (number of units for electromechanical equipment & tons for others.		
		1972	1973	1974
1.	2.	3(a)	3(b)	3(c)
PAKISTAN SWITCHGEAR LTD.				
Control & Relay panels	upto 66 to 132 KV	-	-	-
Switches	15 to 800 A BSS 88	-	-	-
HRC Fuse fittings	2 to 800 A BSS 88	-	-	-
AC DC Auxiliary panels	WAPDA- P-48: 81	-	-	-
Distribution panels	Customer specified	-	-	-
Motor Startors	Customer specified.	-	-	-
Overhead Bus Bars upto 1500 Amps.	Customer specified.	-	-	-
Tube lights fittings	Customer specified.	-	-	-

1975	1976	1977	1978	1979	1980	1981	1982
3(d)	3(e)	3(f)	3(g)	3(h)	3(i)	3(j)	3(k)
	Nos.	Nos.	Nos.	Nos.	Nos.	Nos.	Nos.
-	6510	4	2	-	3500	-	-
-	4	4	2	6	5	5	-
-	27	47	31	51	49	8	-
-	203 ft	325	143	293 ft.	130 ft.	771	-
-	136	146	63	146	240	333	-
SIEMENS. **							
-	82262 HP	79947	89908	10118 HP	132425 HP	117122 HP	99075 HP
-	43585 "	41105	17392	104301 "	200056 "	24929 "	19682 "
-	268 MVA	357	428 MVA	380	399 MVA	544 MVA	441 MVA
-	52 Nos	45 Nos	77 Nos.	141 No.	120 Nos.	35 Nos.	-
-	4577 KVA	7786 KVA	12954 KVA	16184	10753 KVA	7833 KVA	7801 KVA
-	1501 Nos	1054 Nos	742 Nos	1484	1500 Nos	1517 Nos	1524 Nos.
PAKISTAN SWITCHGEAR LTD.							
-	-	-	-	-	149	120	362
-	-	-	-	-	1401	304	630
-	-	-	-	-	21 999	47316	30387
-	-	-	-	-	50 (*)	-	-
-	-	-	-	-	30	20	30
-	-	-	-	-	10	10	15
-	-	-	-	-	20	80	100
-	-	-	-	-	200 ft	300 ft.	500 ft.
-	-	-	-	-	150	-	500

(*) 1978 production.

** Years in respect of messrs. SIEMEN & PSL may pi. be read as, 1974-75, 1975-76,1976-77,1977-78, 1978-79,1979-80, 1980-81,1981-82, 1982-83

ANNEXURE 'O'

(from pre page 2- Annex 'O')

1983	Local content in % as of 1983 or latest data available.	Local Manufacturer.	Source of technology.
3(1)	4.	5.	6.
**	-	M/s Zenat Brothers	-
	58 %	M/s Zenat Brothers	UK/ Japan
	58 %	M/s Zenat Brothers	UK / Japan
	52 %	M/s Zenat Brothers	UK / Japan
	58 %	M/s Zenat Brothers	UK / Japan
SIEMENS			
**	Nil	M/s Siemens Pak.Ltd.	-
	NIL	M/s Siemens Pak.Ltd.	-
	NIL	M/s Siemens Pak.Ltd.	-
	NIL	M/s Siemens Pak.Ltd.	-
	NIL	M/s Siemens Pak.Ltd.	-
	NIL	M/s Siemens Pak.Ltd.	-
PAKISTAN SWITCH GEAR LTD.			
**	30 %	M/s J&P,Siemens,Faizi, PEL,Imperial Electric	GEC UK
	50 %	Faizi,Siemens etc.	GEC UK
	40 %	Faizi etc.	GEC UK
	40 %	Faizi	PSL Pakistan
	40 %	M/s J&P,Siemens,Faizi PEL,Imperial Electric	
	40 %	-do-	
	90 %	-do-	
	80 %	-do-	

DOMESTIC PRODUCTION OF ELECTRIC POWER EQUIPMENT.

ANNEXURE 'O'

Type of equipment.	Specification (Power & voltage for electromechanical equipment.	Annual production (number of units for electro-mechanical equipment & tons for others.		
		1972	1973	1974
1.	2.	3(a)	3(b)	(c)
		Nos.	Nos.	Nos.
Switch Gears and misc.goods	400 to 11 KV and 400 Amp. upto 350 MVA	61900	68000	75000
L.T.Switch Board Distribution Panels Switch Fuses Distribution Board and cut Outs.	upto 600 V and 800 Amp.	8470	9300	10200
L.T. HT Switch Gears	400 V to 11 kv and upto 400 A and 350 MVA	1300	1400	1600
Switch Gears	400 V	4000	N.A	N.A
H.T. Switch Gears	11 KV- 400 Amps and 350 MVA	242	270	290
L.T.Switch Gears	400 V - 800 Amps	120	130	150
Distribution Boards	400 V - 800 Amps	240	260	300
Transfers	11 KV - 1000KVA	9600	10600	11700
PVC/Rubber insulated Cables	230 V -	1800	2000	2200
Enamelled Conducters		46M ton	61 ton	68 ton
		Tons	Tons	Tons
Pre Cables Copers Wire round Bore and enamelled size 44 SWG to 14 SWG and other encluding ACSR and AAC of all sizes and types	230 - 400 V	10300	11500	12800

Contd -P- '2'

1975	1976	1977	1978	1979	1980	1981	1982
3(d)	3(e)	3(f)	3(g)	3(h)	3(i)	3(j)	3(k)
Nos	Nos	Nos	Nos	Nos	Nos	Nos	Nos
82000	90,000	99000	109000	120,000	133000	146000	160,000
11200	12 400	13600	150,00	16 500	18150	19900	21900
1800	1900	2200	2300	2500	2800	3100	3500
N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A
300	350	400	400	500	500	600	600
160	175	200	200	240	260	280	300
320	350	400	400	500	520	600	630
12900	14000	15600	17000	18900	20700	22800	25000
Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
2400	2700	3000	3200	3600	4000	4300	4700
75	82	90	100	110	120	132	145
14000	15700	17500	19500	21600	24000	26700	29000

Contd -P- 3....

ANNEXURE 'O'

(from pre page 2- Annex 'O')

1983	Loca content in % as of 1983 or latest data available.	Local Manufacturer.	Source of technology.
3(1)	4.	5.	6.
Nos			
177000	25%	Faiz Industries Gujranwala	Europe
24100	75%	General Industry Corporation Karachi.	Local.
3800	40%	Johnson and Philips karachi.	U.K.
N A	25%	LA. Electric Gujranwala	Local.
700	25%	Pak. Electric Lahore	Europe/Japan.
350	40%	Pak. Electric Lahore	Europe/Japan
700	100%	Pak. Electric Lahore	Europe/Japan
28000	20%	Climax Ltd Lahore	Europe.
5200 tons	75%	Atlas Rubber Karachi.	U.K.
160tons	25%	Atlas Rubber Karachi.	U.K.
33000tons	25%	Pakistan Cable New Age Cable Atlas Rubber and Plastic Industries AGE Ltd Peshawer Poiner Cables Ltd Beco-Plastic Industries Lahore Choudhry Wire & Cable Lahore and many more	Europe

DOMESTIC PRODUCTION OF ELECTRIC POWER EQUIPMENT.

ANNEXURE 'O'

Type of equipment.	Specification (Power & voltage for electromechanical equipment.	Annual production (number of units for electro-mechanical equipment & tons for others.		
		1972	1973	1974
1.	2.	3(a)	3(b)	3(c)
		Tons	Tons	Tons
H.D.B.C.	600 V 300 A	72	79	87
Conducter	600 V 300 A			
Enamelled	600 V 300 A			
Wire				
L.T. Wire				
and Cable	600 V 300 A			
H.D.B.C.	600 V 300 A	900	1000	1170
Conducter				
Insulated				
Cables	600 V 300 A			
AAC/ACSR	600 V 300 A	484	532	600
Conducter				
		Nos	Nos	Nos
Maintance	600 V and 100 Amps	9000	960	10000
Circuit				
Breaker				
Fuse				
Units	500 V - 15/60 Amps	540000	595000	650000

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From pre page 1 (Annx.'O')

ANNEXURE 'O'

1975	1976	1977	1978	1979	1980	1981	1982
3(d)	3(e)	3(f)	3(g)	3(h)	3(i)	3(j)	3(k)
Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
96	105	115	127	140	154	170	186
1300	1400	1500	1700	1800	2000	2000	2300
650	700	800	850	900	1000	1100	1250
Nos	Nos	Nos	Nos	Nos	Nos	Nos	Nos
10800	11000	12000	1300	13600	14000	15000	16000
700000	800000	850000	950000	1000000	1100000	1275000	1400000

Contd -P- 3...

ANNEXURE 'O'

(from pre page 2- Annex 'O')

1983	Local content in % as of 1983 or latest data available.	Local Manufacturer.	Source of technology.
3(1)	4.	5.	6.
Tons			
200	26%	New Age	Local
2500	25%	Pakistan Cable	BICC U.K.
1400	25%	Pakitan Cable	BICC U.K.
Nos			
17000	25%	AEG Pak	AEG West Germany
1500000	100%	(MFG) Electric Equipment Manufecturing Lahore.	Local.

Contd

ELECTRIC ENERGY GENERATION (PROJECTIONS)

(PAKISTAN) ANNEXURE 'P'

	1983-84	1984-85	1985-86
CAPACITY MW (Megawatts)			
Total	4949	5504	6414
Hydro	2547	2897	2897
Conventional thermal	2265	2470	3380
Nuclear	137	137	137
Geothermal	0	0	0
GENERATION GWh (Gigawatt-hours)			
Total (Gross)	22377	25534	28914
Hydro	PROJECTIONS BY TYPE OF GENERATION NOT AVAILABLE.		
Conventional thermal			
Nuclear			
Geothermal	Nil	Nil	Nil
Non Conventional	"	"	"
Imports	"	"	"
Exports	"	"	"

Contd Page '2'

(2)

ELECTRIC ENERGY GENERATION (PROJECTIONS)

(PAKISTAN) ANNEXURE 'P'

	1986-87	1987-88	1988-89
CAPACITY MW(Megawatts)			
T o t a l	6414	8214	8724
H y d r o	2897	3167	3167
Conventional thermal	3380	4910	5420
N u c l e a r	137	137	137
Geothermal	0	0	0
GENERATION GWh(Gigawatt-hours)			
T o t a l (Gross)	32249	35893	40144
H y d r o	PROJECTIONS BY TYPE OF GENERATION NOT AVAILABLE.		
Conventional thermal			
Nuclear			
Geothermal	Nil	Nil	Nil
Non Conventional	"	"	"
Imports	"	"	"
Exports	"	"	"

Contd Page '3'

ELECTRIC ENERGY GENERATION (PROJECTIONS)

(PAKISTAN)

ANNEXURE 'P'

	1989-90	1994-95	1999-2000
CAPACITY MW (Megawatts)			
T o t a l	11090	20622	30202
H y d r o	4799	8831	14811
Conventional thermal	6154	9854	11614
N u c l e a r	137	1937	3777
Geothermal	0	0	0
GENERATION GWh(Gigawatt-hours)			
T o t a l (Gross)	44886	75450	116179
H y d r o)	PROJECTIONS BY TYPE OF GENERATION NOT AVAILABLE.		
Conventional thermal)			
N u c l e a r)			
Geothermal	Nil	Nil	Nil
Non Conventional	"	"	"
Imports	"	"	"
Exports	"	"	"

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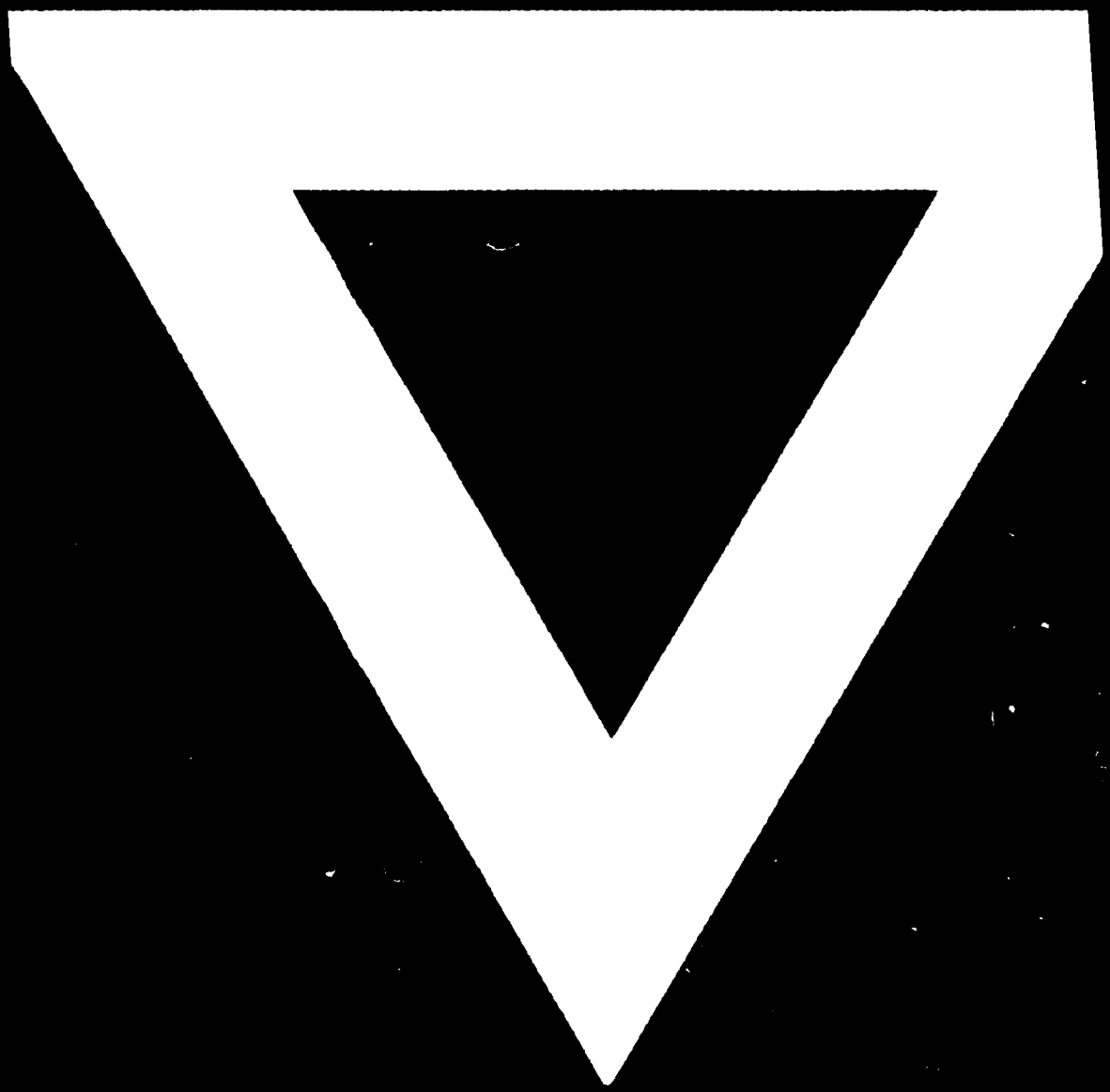

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