

Fig.(2)

## 6.2 Electrical Requirements and Sources in New Towns.

### 6.2.1 10<sup>th</sup> of Ramadan New Industrial City.

Location : Tenth of Ramadan City is located along the road between Cairo and Ismailia, the chosen area is approximately 50 kms from Cairo.

Purpose of City: The new city has been planned for a first stage population of 150,000 with an ultimate of 500,000 inhabitants, and will include combined industrial and urban projects, and also should be self-sufficient as a new city.

The city will have access roads to facilitate the export - import oriented canal zone cities and the steel industries of the Helwan complex.

### Population and population projections

( all numbers in thousands ).

Year	populat- ion	Economica- lly active population	construction		Industry		Services	
			no.	%	no.	%	no.	%
5	70	29	15	52	10	34	4	14
10	150	53	17	32	21	40	15	28
15	280	90	23	26	36	40	31	34
20	410	123	20	16	49	40	54	44
25	500	155	16	11	60	40	79	49



Load and Energy Requirements:

Year	10		25	
Population	150,000		500,000	
Demand & Consumption	MW	GWH	MW	GWH
- Residential	24	130	80	500
- Services & Light Industries.	12	50	40	200
- Industries	80	350	225	900
TOTAL	116	230	345	1600
Consumption KWH/capita	3500		3200	

Energy Resources and Demand:

A. Electricity : To supply the required loads the Egyptian Electricity Authority ( EEA) and the Rural Electrification Authority (R.E.A.) have started to construct a high tension network comprising :

- One transformer substation 220/66 KV (2x75 MVA), and suitable for future extension which will be connected to the National Grid through the projected Abu Sultan ( Ismailia power station ) to Heliopolis substation in the Cairo area by a double circuit 220 KV transmission line.

- Two transformer substations 66/11 KV ( 2×12.5 MVA ) and 2×25 MVA ), on the city area.
- 220 and 66 KV over head transmission lines (O.H. T.L.) for interconnection of said 220 KV substation to the National grid and the two KV substations to each other.

B. Butane Gas, Oil and Natural Gas :

Natural gas is not assumed to be available to city inhabitants during the first 10 year. Refined oil products would be transported by road within the city & a petroleum pipe line from the Suez - Cairo line may be considered to feed the industrial area later.

Butane gas bottles should be distributed by lorries in a conventional way, and it can be obtained from Cairo, or the Delta by rail and road transport. Fig. 2 and Fig. 4 ).

C. Solar Energy:

A part from minimizing energy import to the city, further advantages could be gained from using solar energy, especially in the later development stages. Roof construction in residential areas could be so arranged that water could be heated by solar collectors to provide domestic hot



CNT ELECTRIC ENERGY PROGNOSIS  
Estimated maximum energy consumption of industries

6Wh/year

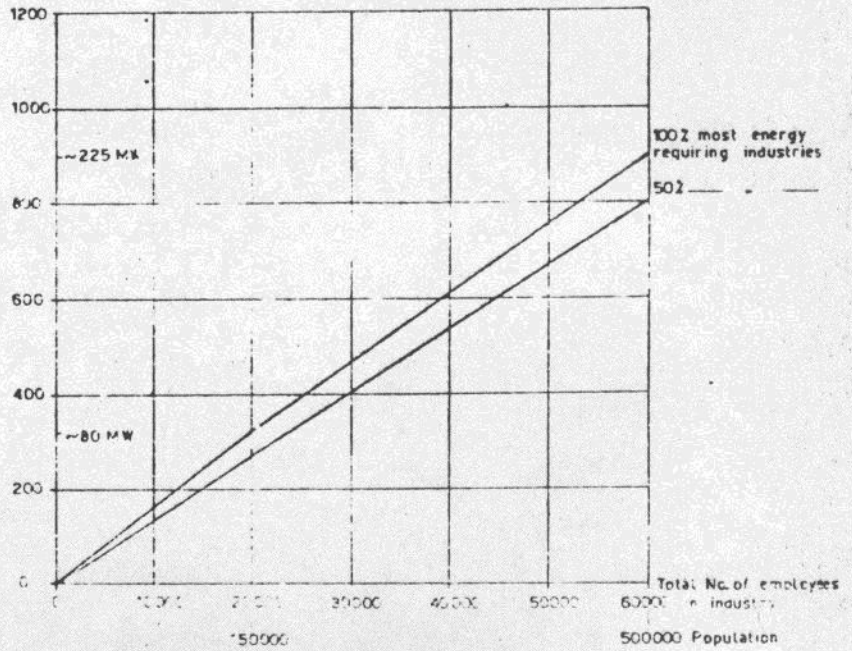


FIG. (3)

ELECTRIC ENERGY AND DEMAND RESIDENTIAL AREA  
(Industrial area and irrigation not included)

6Wh/year MW

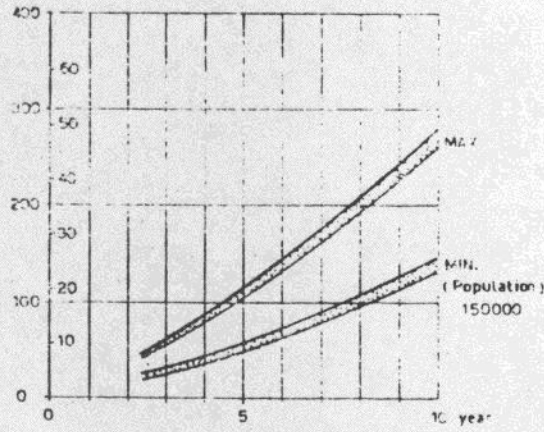
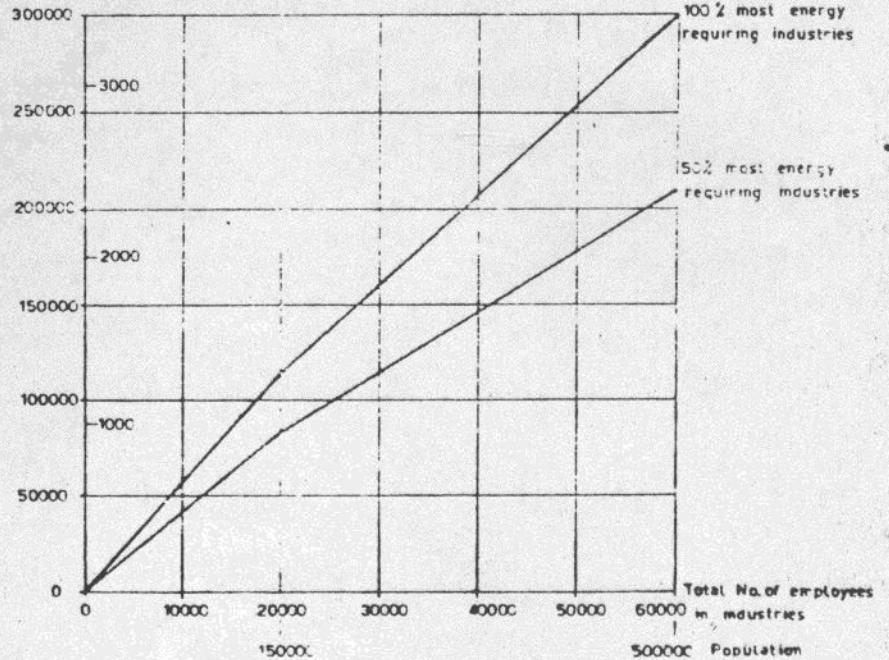


FIG. (1)

CNT OIL ENERGY PROGNOSIS  
Estimated maximum energy consumption of industries

ton/year 6Wh/year



BUTAN GAS RESIDENTIAL AREA  
(Industrial area not included)

ton/year  
mill. bottles/year

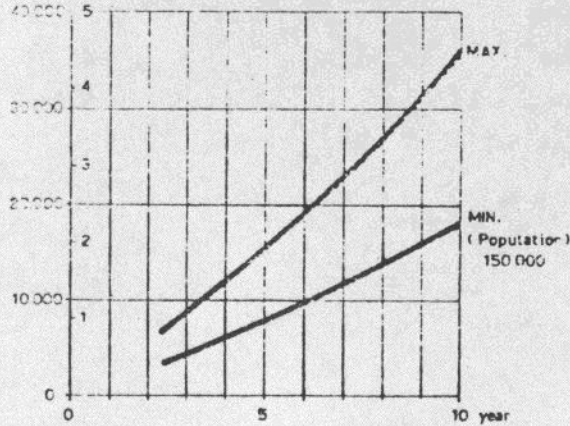
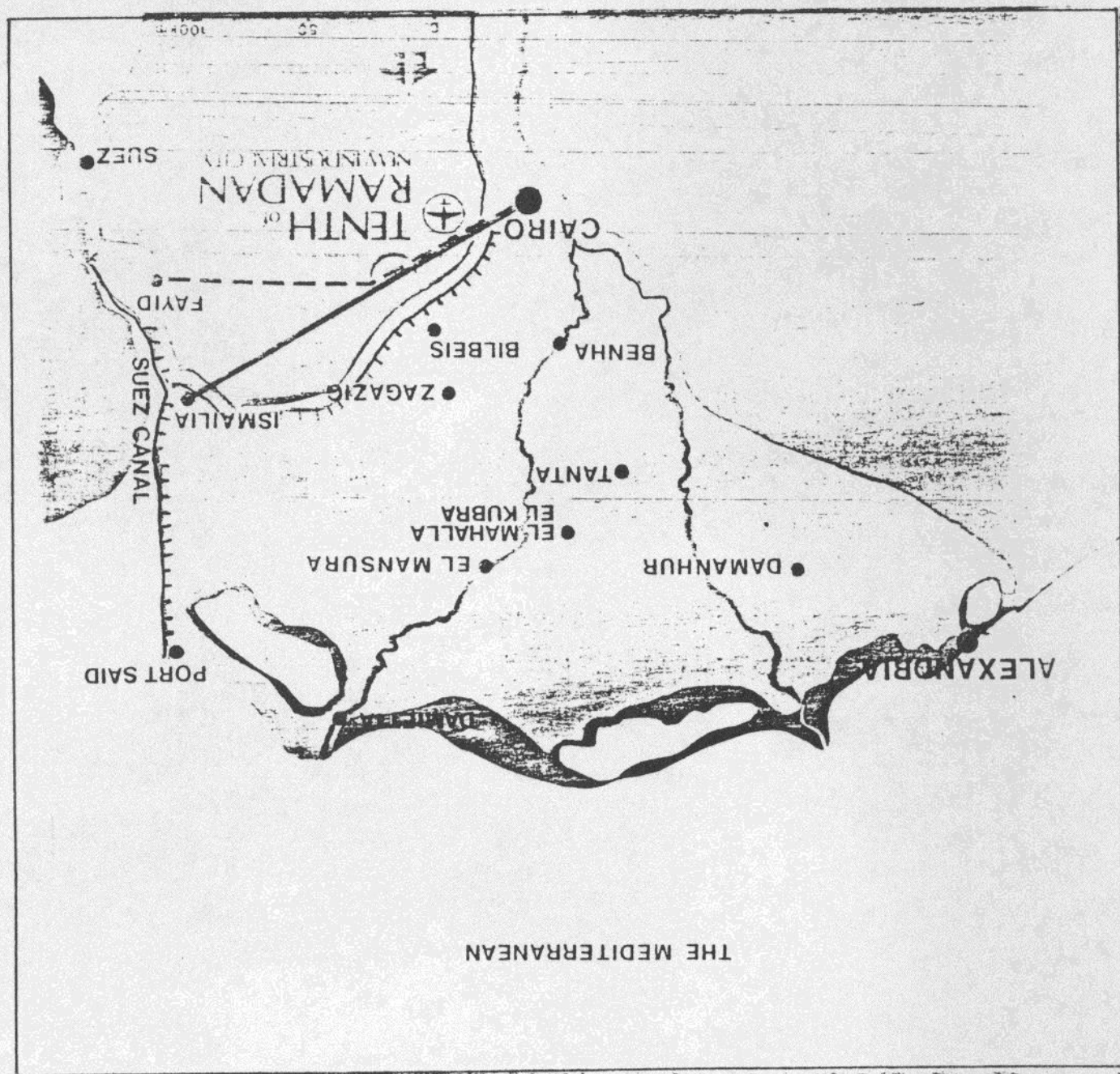


FIG. (2)

FIG. (4)





water and even some heating and space cooling of some special public buildings e.g. hospitals could be facilitated to a certain extent. In this climate, solar energy can also be used for the production of industrial process hot water and process heat for small local industries as well as for solar driven pumps for some irrigation water supply applications.

#### 6.2.2. Suez Canal Region.

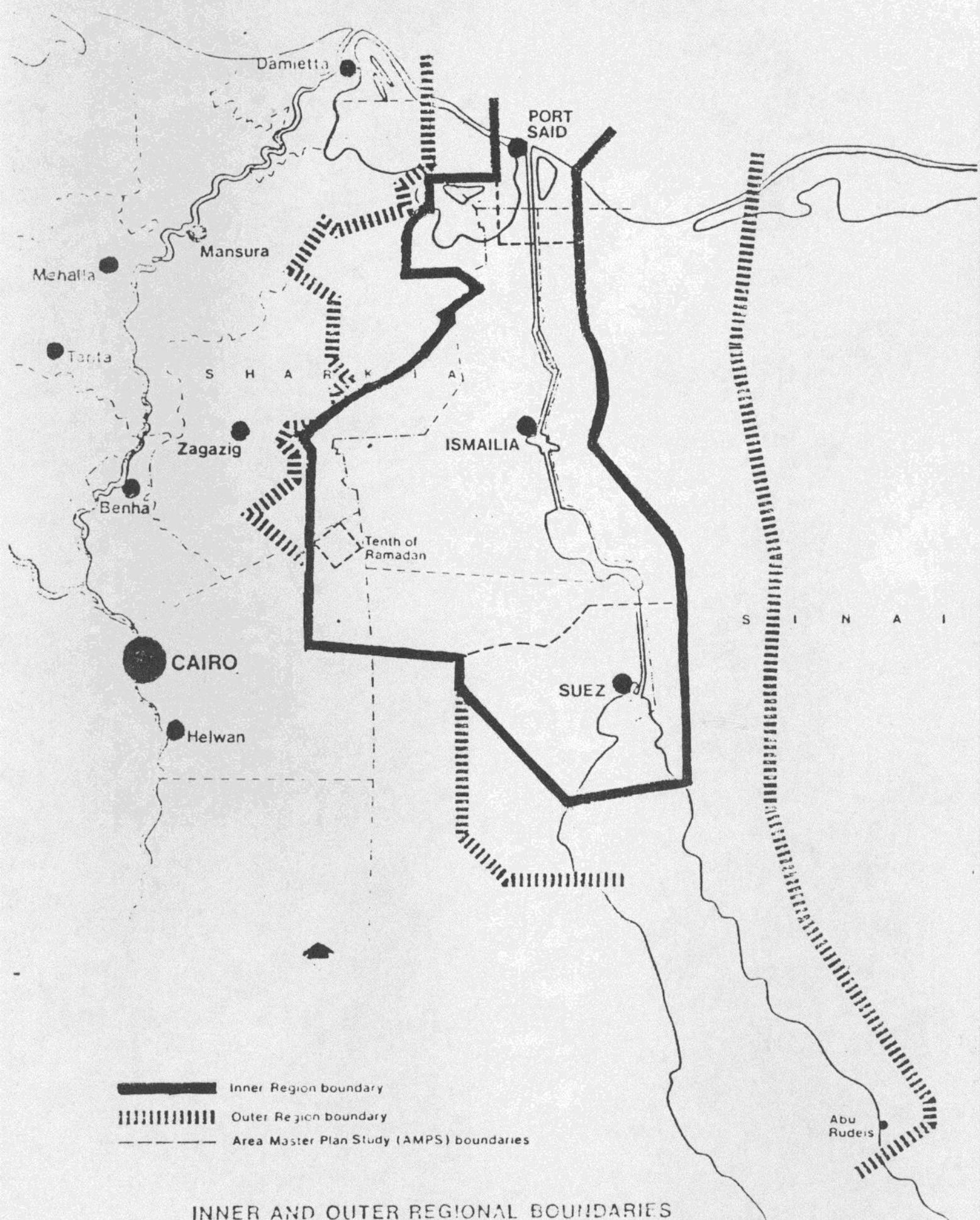
This region comprises three governorates namely, Port-Said, Ismailia, and Suez. The capital cities of these governorates carry the same names :

##### A. Purpose of Development.

Reconstruction and development of economic growth, including industrial utilization of natural resources, land reclamation for agriculture and promotion of tourism.

##### B. Population Targets (1975 - 2000 )

( All numbers in thousands )





Year	1975		1980		2000		2000 Adjusted	
Governorate NAME	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
- Port Said	300	0	380	0	730	48	945	60
- Ismailia	175	200	218	246	560	694	655	805
- Suez	150	16	300	20	1000	56	1250	70
Total	625	216	898	266	2310	798	2850	925
Total popu- lation	841		1164		3108		3785	

### C. Electrical Energy

	Port Said	Ismailia	Suez
a. (1975)	<ul style="list-style-type: none"> <li>- Isolated System</li> <li>- Supply 15 MW</li> <li>- Demand 12 MW</li> </ul>	<ul style="list-style-type: none"> <li>- National Grid</li> <li>66 kv from Zagazing</li> <li>- Supply 22 MW</li> <li>- Demand 7 MW</li> </ul>	<ul style="list-style-type: none"> <li>- National Grid</li> <li>220 kv from Cairo.</li> <li>- Supply (Grid )</li> <li>- Demand 8 MW</li> </ul>

	Port Said	Ismailia	Suez
b. ( 1975 - 1981 )	2 x 21.5 MW + 1 x 25 MW Gas turbines.	1 x 21.5 MW Gas turbine.	1 x 17 MW Gas turbine + 100 MW plant + N. Grid.
c. Project- ed from ( 1981 - 1986 )	220 kv System From Ismailia + National Grid	220 kv System from Zagazig & Suez. 3 x 150 MW plant + National Grid	220 kv System from Ismailia & Cairo. 4 x 150 MW plant + National Grid.

D. Demand Forecast for the Suez Canal Region.

Year	1985*	2000
<u>Peak Load (MW)</u>		
- Port Said	60	145
- Ismailia	80	285
- Suez	130	650**
Total	270	
pipe lines	75	
Cement - plant	75	
Total	420	1080



\*\* Industrial projects included.

- \* The expected loads for Al-Arish is 40 MW, the rest of Sinai is another 40 MW and the load of the 10th of Ramadan city is not to exceed 40 MW.

#### E. Solar Energy :

In this region solar energy could be used, for hot water applications, and for Sea water desalination at coastal sites, or for brackish water desalting at mining areas, particularly at the Sinai side. Small local solar driven pumps for water supply and irrigation can prove to be suitable for isolated areas particularly on the Eastside of the Canal.

#### 6.2.3 Sadat City.

##### Location:

The proposed site of the city, located on the Cairo-Alex. desert road at Kilometer 95, north of Cairo, it is an desert land owned by the government.

##### Purpose of Development:

Sadat city is part of a national development strategy to save agricultural land, to further the nation's economic growth, and to provide jobs and housing away from the overcrowded cities of Cairo and Alexandria.

The city is expected to have a population of at least 500,000 inhabitants and to provide at least 165,000 jobs after 25 years. It is also planned to expand and be able to accommodate up to 1.5 million persons within the next 50 years.

Population Projections:

Year	5	10	15	20	25
Population	61,000	147,000	251,000	361,000	500,000

Population activities projections by year 25 :-

Activity	Manufacturing Industries.	Services Employment.	Construction	Total
No. of Jobs	60,000	85,000	20,000	165,000



Electric Power Usage and Demand Forecast Summary

Year	5		10		15		20		25	
Population	61,000		147,000		251,000		361,000		500,000	
Demand & Consumption	MW	GWH	MW	GWH	MW	GWH	MW	GWH	MW	GWH
<u>- Activity</u>										
- Residential	6.7	10.4	17.1	30.0	30.4	64.0	46.6	110.5	64.5	153.0
- Services	6.4	15.9	14.3	35.7	27.5	69.3	40.8	100.7	60.2	151.9
- Steel production	-	-	258	760	258	760	258	760	258	760
Other industries	6.25	22.5	19.5	63.0	35.1	111.2	58.3	199.7	80.6	249.0
Total	19.4	48.8	308.9	888.7	351	1005	404	1155	464	1314
Consumption KWH/Capita	800		6045		4003		3199		2628	
Alternative Industry With No Steel production	5.4	21.6	21.2	73.1	42.6	137.9	64.0	210.3	85.4	278.0
Alternative Total	13.5	47.9	52.6	138.8	100.5	271.2	151.4	421.6	210.1	583.7
Consumption KWH/ Capita	785		944		1080		1167		1167	

### Basic Design Criteria for Power Supply to Sadat City:

#### A. Power Demand :-

This present estimate, based on the preliminary analysis, excludes the steel production complex ( not presently considered in the city plan ) :-

Year	1980	1983	1988	1993	1998	2003
Population $\times 10^3$	30	60	150	250	360	500
Load (MW)	10	20	53	100	150	210

#### B. Source of Supply :-

The site of the city is located nearly . The routing of the existing double circuit 220 kv ( Cairo 500 substation to Abou-El Matamier Substation). This O.H. T.L. is running west of the Sadat City site by only 1 km at the city approaches.

#### C. Method of Supply in the City :-

11 kv primary distribution feeders energized from a main 220/66/11 kv substation connected to existing 220 kv National grid, and one or more remote 66/11 kv substations connected by 66 kv subtransmission feeders to the main



substation and to each other. These 66/11 kv substations follow more or less the city border line.

D. Main Substation.

This substation is a three voltage level installation 220 kv, 66 kv, and 11 kv, providing source for the 11 kv feeders serving the southern section of the city.

Installation to have as a minimum two main trausfers of adequate capacity  $2 \times 75$  MVA and to be extended by a third one in the fature.

(EEA has already started to acquire Sadat City Substation of 220/66/11 kv and a capacity of  $2 \times 75$  MVA ).

E. Remote Substations ( 66/11 kv )

Two 66/11 kv substations are to be constructed initially one in the industrial area to supply primarily the industrial loads & the second one to supply the west part of the city and its center. A third substation so energized to supply the rest of the city in the future as need develops.

Each substation installation has to have as a minimum two main transformers of adequate capatity of  $2 \times 25$  MVA. At the time being the construction of one 66/11 kv,  $2 \times 25$  MVA substation has started.

F. Subtransmission feeders :

Double circuit over head 66 kv lines steel tower lattice standard construction are connecting the 66 kv substations to the Main Substation.

Application for Solar Energy

Promising near term applications of solar energy in Sadat City are domestic hot water, public buildings and hotels, space heating and cooling, process heat and hot water for local industries and some solar pumping for irrigation and or deep weel pumping.

The use of simple black hot water tanks on the roofs of low income core houses, provide an additional usage for solar water heating.

Space should be allocated within the industrial area of Sadat City for both a solar flat collector manufacturing plant and a solar energy research and development laboratory.

The plan for Sadat City should be allocate a large area in the Western Desert for a future solar energy testing plant, to prove the suitability of solar energy equipment to be used in new cities, in a completely desert environment.