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ELECTRICAL AND GAS FACILITIES IN MIDDLESEX COUNTY

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ERRATA SHEET

- p. 3 New Jersey Power & Light Company merged with Jersey Central Power & Light Company.
- p. 5 Figure 1 should show the Sussex Rural Electric Cooperative in the northeast corner of the State in the Rockland Electric Company area.
- p. 19 Jersey Central Power & Light's average consumption in Middlesex County should read "will increase over 73 percent from 92.59 Megawatts per year in 1976 to 160.63 Megawatts per year in 1995.
- p. 21 Source: Issues in the Future Supply of Electricity to the Northeast, P.M. Meier, et. al., June 1976.
- p. 33 The amount of non-methane-type gas entering or produced in New Jersey should total over 17 billion cubic feet (Bcf).

Information to produce this report was obtained and compiled from the following sources:

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INTRODUCTION

The purpose of this addendum is to present in an easily comprehensible, tabular and graphic fashion the current patterns of gas supply and electrical production in New Jersey and the manner in which future demand for energy in the region as a whole may raise the potential for additional electrical and gas facilities to locate in Middlesex County.

Important factors affecting the decision to build additional generating capacity or to increase the supply of natural gas to the region include production capacities of existing energy facilities in the region, planned power facilities and utility projections of future energy demands.

ELECTRIC POWER UTILITIES

In terms of electrical production and transmission, the region examined in this report begins with a broad perspective, to include the northeast United States, narrows to the State of New Jersey, and finally comes to focus on the systems delivering electrical energy in Middlesex County. This approach must be taken due to the fact that electric as well as gas production facilities located in Middlesex County do not exclusively serve customers in this County. Energy generated by these facilities enters a power pool system, with Middlesex County's customers drawing upon that system. Depending upon demand, a customer in Middlesex County may in fact be using power generated at a station located, for example, in Bergen County.

Power Pools

Current utility arrangements for the northeast US region, provide service to Pennsylvania, New Jersey, Maryland, Delaware, and the District of Columbia. The utilities in this power supply area are pooled as part of either the Pennsylvania-New Jersey-Maryland Interconnection Power Pool (PJM), the Allegheny Power System (APS), or the Central Area Power Coordination Groups (CAPCO). Together, these utilities, with the exception of areas in western Pennsylvania and western Maryland, form the Mid-Atlantic Area Reliability Council, a coordinated, supply-reliability area designated by the Federal Power Commission. In 1967, members of the PJM Interconnection formed a service-reliability compact known as the Mid-Atlantic Area Coordination Agreement (MAAC) which requires all new additions or changes in major existing facilities to be reviewed by the Executive Board of MAAC which determines the plan

consistency with established environmental standards of service reliability.

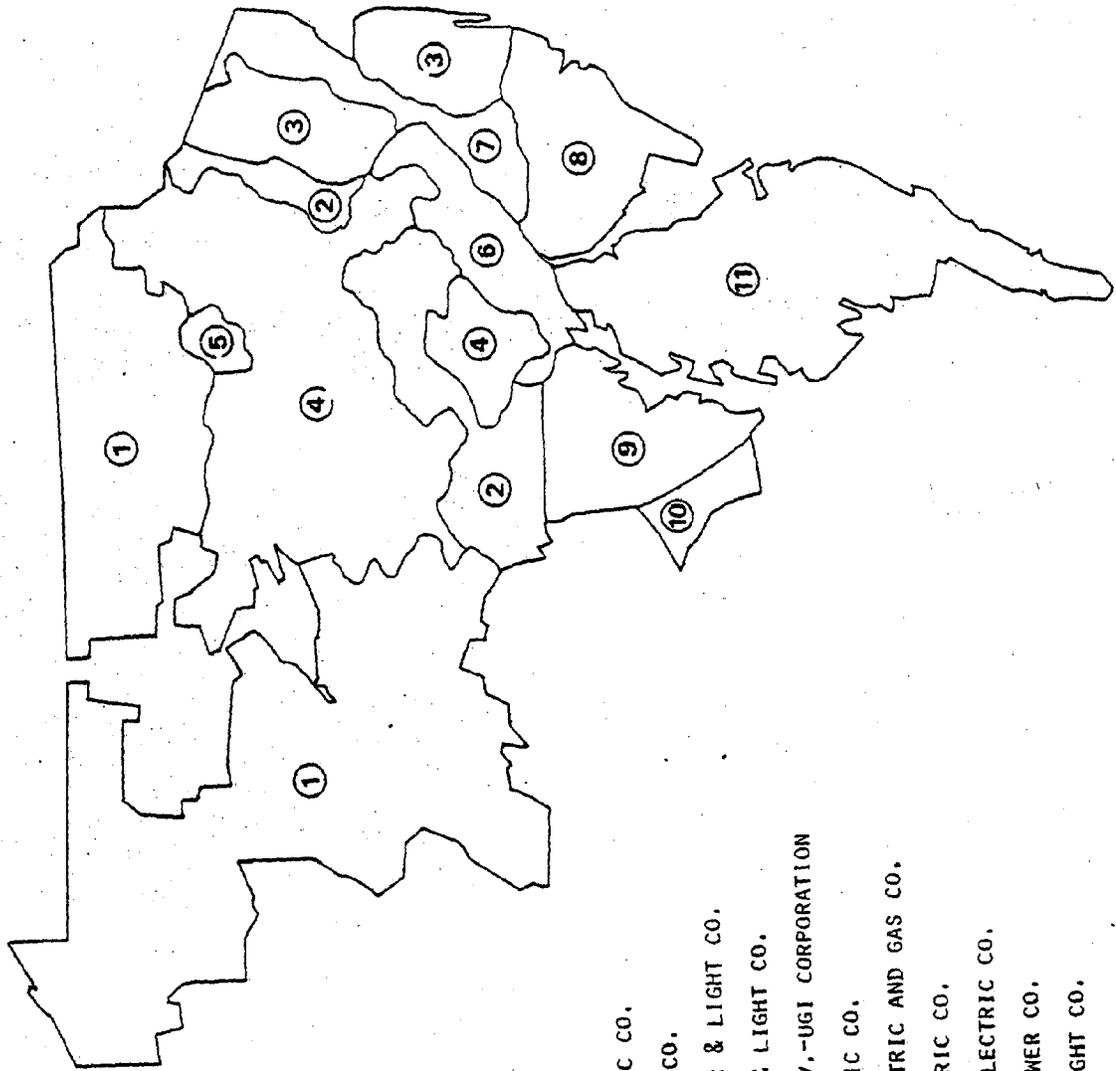
In 1968, MAAC, now acting as a regional coordination area, joined the National Electric Reliability Council (NERC), which comprises virtually all the electric power systems in the United States and Canada. The electric utility industry formed the NERC on a voluntary basis in order to assure greater reliability and adequacy of power supply in North America.

PJM Interconnection

Of primary concern to the State of New Jersey is the PJM power pool whose operations have the most direct impact on the utilities in Pennsylvania, New Jersey and Maryland (Figure 1). Members of PJM pool their bulk power supply as if they were a single system and, in so doing, create reserve power in the amount over and above that which would be economically feasible for any one utility to generate. It should be noted, however, that the reserve capacity in the PJM Interconnection is used strictly for extraordinary periods of peak or high demand and for this reason each company must maintain operations at a level sufficient to meet the daily demands of its own customers, including a reserve capacity of at least 20% to cover periods of peak demand or equipment failure.

Fuel Sources

The production of electricity in the PJM power pool is, at the present time, largely dependent upon fossil fuel for electrical generation. Member PJM utilities rely on coal for approximately 36 percent of their electrical generative capacity generation, while oil-steam account for 28 percent of their system capacity. A relatively large portion of PJM's installed capacity (19.6%) is derived from combustion turbines and diesel engines. In addition, nuclear power represents slightly more than 10% of the total bulk power supplied



LEGEND FIGURE 1

1. PENNSYLVANIA ELECTRIC CO.
2. METROPOLITAN EDISON CO.
3. JERSEY CENTRAL POWER & LIGHT CO.
4. PENNSYLVANIA POWER & LIGHT CO.
5. LUZERNE ELECTRIC DIV., -UGI CORPORATION
6. PHILADELPHIA ELECTRIC CO.
7. PUBLIC SERVICE ELECTRIC AND GAS CO.
8. ATLANTIC CITY ELECTRIC CO.
9. BALTIMORE GAS AND ELECTRIC CO.
10. POTOMAC ELECTRIC POWER CO.
11. DELMARVA POWER & LIGHT CO.

through the Interconnection. The remaining energy sources are from pumped - storage hydropower (3.1%) conventional hydropower (2.3%) and from outside purchases (0.1%).

New Jersey Utilities

At the present time, five private or investor-owned utility companies are in operation to service the population of New Jersey with electrical power (See Figure 2). These include:

1. Atlantic City Electrical Co.
2. Jersey Central Power and Light Co.
3. Public Service Electric and Gas Co.
4. Orange & Rockland Utilities Inc.
5. Sussex Rural Electric Cooperative

In addition several local or municipal systems exist which distribute purchased electrical power in the following franchise areas:

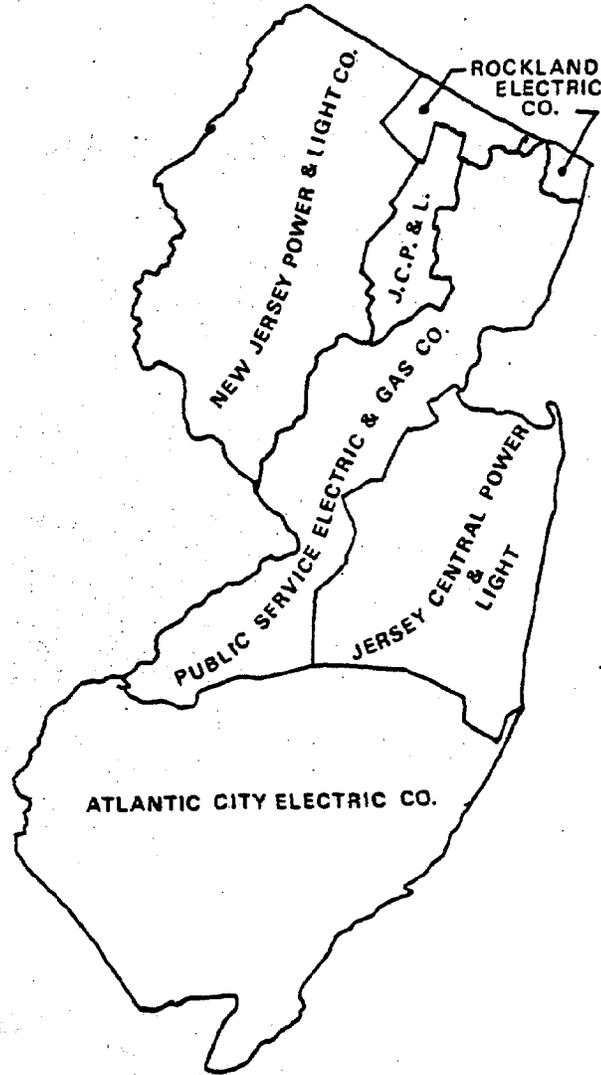
1. Park Ridge
2. Sussex Rural Electric Cooperative Association
3. Madison Electric Co.
4. Butler Municipal Power & Light Department
5. Milltown Boro Municipal Electric Department
6. South River Boro Electric Co.
7. Lavalette Municipal Electric
8. Seaside Heights Boro Electric Department
9. Pemberton Electric Light Department
10. City of Vineland Electric Co.

These electric utilities collectively own and operate 22 major power plants in New Jersey (See Figure 3) which range in capacity from 3,680 kilowatts (kw) to 660,000 kw. The majority of these generating stations are situated in the northeast corner of the state, and are for the most part thermoelectric facilities. However, three hydroelectric plants are in operation in the northwest area of the state: two in Warren County and one in Morris County. The likelihood of additional hydroelectric facilities entering this system is improbable as appropriate sites for generation purposes are virtually exhausted in New Jersey. As adequate sites for pump-storage facilities are similarly limited, utilities in New Jersey will continue reliance on additional combustion turbine units. Given the difficulties projected to occur in securing adequate and economic supplies of oil, one realistic fuel replacement for combustion turbines would be gas produced from coal.

Utilities - Middlesex County

Two major utilities provide electrical power to the 25 municipalities comprising Middlesex County: Public Service Electric & Gas Company and the Jersey Central Power and Light Company. In 1977, Public Service Electric & Gas (PSE&G) produced 27,992,728 Megawatt hours (Mwhrs) of electrical power for nearly 5 million people in its distribution area covering 267 municipalities on 2,550 square miles or 37 percent of the State. The Jersey Central Power & Light Company (JCP&L) services 236 municipalities, representing 43% of the state or 3256 square miles of service area. In 1976, JCP&L produced 11,488,000 Megawatt hours of electricity and served a distribution area with a population estimated at 1,764,000 people.

FIGURE -2



ELECTRIC UTILITIES

MAJOR POWER PLANTS IN NEW JERSEY

Name	Capacity (kw)
1. Martin's Creek	125,000
2. Yards Creek Pumped Storage Project	330,000
3. Portland	413,000
4. Longwood Valley Pumped Storage Project	112,500
5. Whippany	19,200
6. Bergen	600,000
7. Kearney	610,000
8. S.U.M. Hydro	3,680
9. Essex	368,500
10. Marion	125,000
11. Hudson	400,000
12. Linden	520,000
13. Seavren	830,000
14. E. H. Werner	108,400
15. Sayreville on the Raritan River	354,000
16. Gilbert	125,000
17. Mercer	660,000
18. Burlington	495,000
19. Greenwich	12,500
20. Deepwater	326,000
21. Missouri Ave.	60,500
22. B. L. England	283,000
23. Salem 1	1,100,000
24. Salem 2	1,100,000 (1979)
25. Oyster Creek	650,000
26. Forked River	1,140,000 (1983)
27. Atlantic 1 & 2	1,150,000 each (1988 & 1990)

○	Hydroelectric
●	Thermoelectric
⊙	Nuclear Operating
☆	Proposed

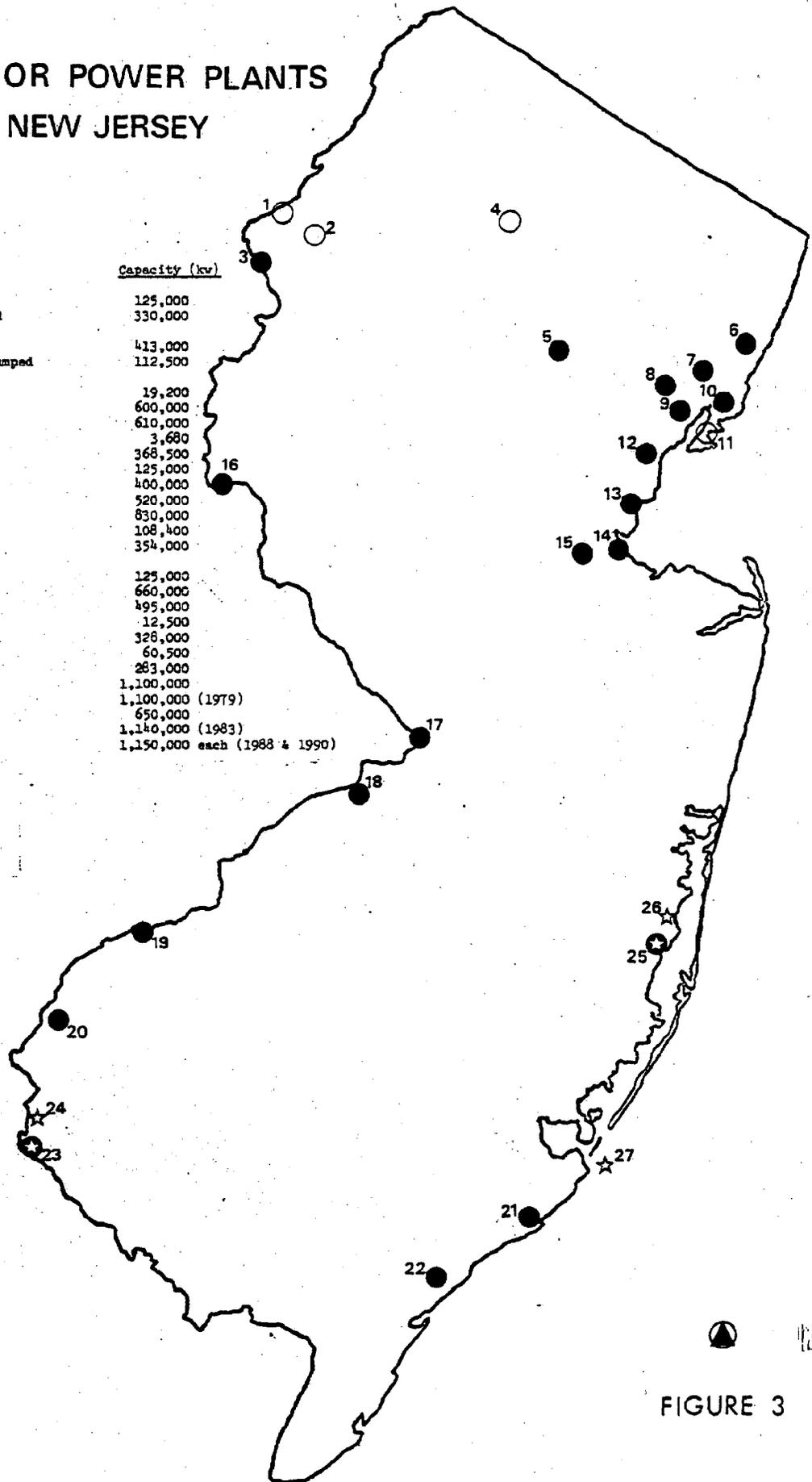


FIGURE 3

Public Service Electric & Gas Company

PSE&G operates one electrical generating station and two gas turbine facilities in Middlesex County. The Sewaren Generating station on the Arthur Kill has a 772 Megawatt capacity and is used for both baseload power requirements and peak demand periods. The existing Sewaren site also includes a gas turbine facility which is capable of producing as much as 62 Megawatts of supplemental power to be utilized during periods of high demand. The other source of supplemental power is its Edison gas turbine facility whose power production capacity is 446 Megawatts. Like the gas turbine facility located in Sewaren, the Edison facility is used strictly for peak - shaving purposes.

Public Service reports a reserve generating capacity of approximately 20% at all times and forecasts their peak load and planned installed capacity loads to be as follows:

PLANNED FACILITY EXPANSIONS

TABLE 1

Year	Peak Load	Installed Capacity	% Reserve
1977	7,100	9,245	30
1978	7,380	9,265	26
1979	7,670	9,740	27
1980	7,970	9,740	22
1981	8,290	9,928	20
1982	8,630	10,328	20
1983	8,990	10,728	19
1984	9,370	11,242	20
1985	9,750	11,762	21
1986	10,130	12,037	19
1987	10,530	12,557	19

Source: PSE&G, 1976 Annual Report

Jersey Central Power & Light Company

JCP&L owns and operates five generating stations in New Jersey. They include

the following: Oyster Creek Station (Ocean County), Gilbert Station (Hunterdon County), Yards Creek Station (Warren County) and the Sayreville and Werner generating stations in Middlesex County.

JCP & L operates two electrical generating stations in Middlesex County: The Sayreville generating station located in Sayreville, NJ, is capable of producing 339,000 kilowatts daily. The Werner electric generating station located in South Amboy has a daily production capacity of 60,000 kilowatts. Both plants are fossil-fueled. In 1969 and by 1970 JCP & L converted from coal to oil to meet sulfur emission standards promulgated by the New Jersey State legislature.

More recently, as part of the Federal Government's (Department of Energy) Coal Conversion Program, the Sayreville plant was considered for conversion back to coal but received exemption from the federal program because of economic infeasibility.

Jersey Central Power and Light Co., does not operate any gas facilities in Middlesex County. Therefore, the municipalities of South Amboy, Sayreville, Old Bridge, Jamesburg, Monroe, Helmetta, Spotswood, and portions of Cranbury, East Brunswick and South Brunswick secure their gas supplies from PSE & G.

JERSEY CENTRAL POWER & LIGHT COMPANY

EXISTING GENERATING CAPACITIES

TABLE 2

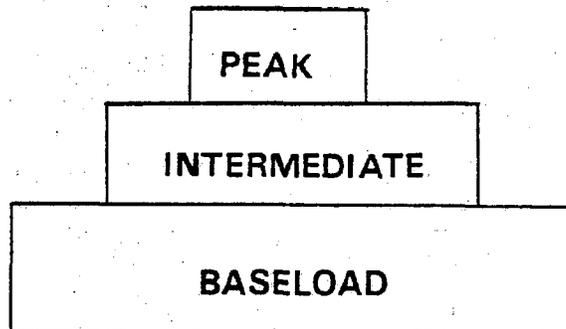
<u>Generating Station</u>	<u>Generating Capability</u>
Oyster Creek Station	650,000
Three Mile Island Station , Pa. (25% interest)	205,000
Gilbert Station	119,000
Sayreville Station	339,000
Werner Station	60,000
Keystone Station , Pa. (16.67% interest)	283,000
Yards Creek Station	165,000
Diesel & Combustion Turbines	<u>1,234,000</u>
Total Capacity	3,055,000

Having noted the County's reliance on PSE & G and JCP & L for electrical energy, it is important to evaluate whether existing and planned facilities capacity will be able to meet projected energy demands in their respective service areas.

Energy Demand Requirements

Utility companies forecast energy needs on the basis of three types of consumer demand requirements: baseload, intermediate and peak demands.

Baseload demand is the amount of electrical power required to service consumers on a day-to-day basis and is by far the largest energy requirement supplied by the utilities. Generating stations, at the very least, must be



capable of producing this volume of electrical energy. Intermediate requirements force a slight rise in electrical production, primarily in response to seasonal weather conditions, during which time generating stations' production moves closer towards their upper capacity limits. Additional generation is secured by operationalizing turbine engines. Peak demand requirements, which are notably highest in the summer when air condition units tax electrical generation systems, are met specifically by combustion turbines whose engines are expensive to operate and are not normally brought on line until energy demands are exceptionally high.

Electric Generating Capacity Requirements in the PSF & G and JCP & L Distribution Areas

This section outlines the methodology for predicting required electric generating capacity on the basis of population served by the respective electric utilities. More detailed projections based upon employment in manufacturing and commerce is beyond the scope of the present work timetable.

Generating facilities are given for the following conditions:

- Present
- Planned
- Future (based upon conditions discussed below).

Facilities are categorized as:

- Baseload (nuclear; fossil steam)
- Intermediate (fossil steam)
- Peaking (fossil steam; internal combustion; conventional hydro)

Electrical Generating Capacity

According to the Federal Power Commission's Electrical Power Systems report (1975) prepared by the center for the Environment and Man¹ (CEM), the allocation of electrical generation in a region is suggested to have the following capacity requirements:

<u>Category</u>	<u>Percent of Total Capacity</u>
• Baseload	55%
• Intermediate	20%
• Peaking	25%

In addition, the relationship between the foremost distinguishing features of an electrical generating system are defined in the report to be as follows:

- Installed Capacity: This is the total capacity represented by nameplate ratings on all generating units. For a large system, there is virtually never a time when all this capacity is available for use.
- Capacity available at time of annual required peak capacity: The annual peak requirements generally occur in the summer (during a hot spell) or in the winter (during a cold snap), depending on local climate. Utilities have good historical data on the growth in the amplitude of the peak generating requirements and approximately when it may be expected to occur. Therefore, they plan scheduled maintenance of units so that an adequate safety margin of capacity is available.
- Peak capacity required: Explained above.
- Average capacity required: This is a hypothetical value. It is derived simply by dividing total energy consumed in a period by the time base of the period. It is the capacity that would be needed if system reliability was perfect and demand uniform throughout the time period.

¹ A Framework for Environmental Impact Evaluation for Electric Power Systems in a River Basin, Federal Power Commission, December, 1975.

Based upon these approximate relationships, the following calculations of electrical generating capacity required for peak, average, and baseload demand, along with the required capacity distributions were derived for the PSE & G and JCP & L distribution region in New Jersey. It should be stressed that the allocations suggested by the CEM report may not apply in all regions but is considered sufficient for illustrative purposes presented in the following examples.

TABLE 3

PUBLIC SERVICE ELECTRIC & GAS COMPANY

1. Average electrical energy consumption (1976):

- Total energy consumed = 27,992,728 Megawatt-hour/year
- Population served = 4,940,855

$$\text{Average electrical energy consumption} = \frac{27,992,728}{4,940,855} = 5.666 \frac{\text{Megawatt -hours/year}}{\text{Capita}}$$

2. Average power required (1976):

$$\frac{27,992,728 \text{ Mwhrs/yr}}{8,760 \text{ hr/yr}} = 3195.5 \text{ Megawatts/yr}$$

3. Required electrical generating capacity (1976):

$$\text{Total Capacity} = \frac{\text{Average Capacity}}{0.45^2} = \frac{3195.5}{0.45} = 7,101 \text{ Megawatts/year}$$

4. Distribution of required electrical generating capacity (1976):

- Baseload: (7,101 Mw/yr) x (0.55) = 3905.55 Mw/yr
- Intermediate: (7,101 Mw/yr) x (0.20) = 1420.2 Mw/yr
- Peaking: (7,101 Mw/yr) x (0.25) = 1775.25 Mw/yr

2 Average Electrical Energy Consumption

TABLE 4

JERSEY CENTRAL POWER & LIGHT COMPANY

1. Average electrical energy consumption (1976):

- Total energy consumed = 11,488,464 Megawatt-hours
- Population served = 1,764,000

$$\text{Average Electrical energy consumption} = 6.513 \text{ Mwhrs/Capita}$$

2. Average power required (1976):

$$\frac{11,488,464 \text{ Mwhrs}}{8,760 \text{ hr/yr}} = 1311.5 \text{ Megawatts/yr}$$

3. Required electrical generating capacity (1976):

$$\text{Total Capacity} = \frac{\text{Average Capacity}}{0.45^2} = \frac{1311.5}{0.45} = 2914.4 \text{ Megawatts/yr}$$

4. Distribution of required electrical generating capacity:

- Baseload: (2914.4 Mw/yr) x (0.55) = 1602.92 Mw/yr
- Intermediate: (2914.4 Mw/yr) x (0.20) = 582.88 Mw/yr
- Peaking: (2914.4 Mw/yr) x (0.25) = 728.6 Mw/yr

²Average electrical energy consumption.

TABLE 5

AVERAGE ELECTRICAL ENERGY CONSUMPTION RATES
BY
DISTRIBUTION AREA (1976)

Jersey Central Power & Light Co.	(11,488,464 Mwhrs/yr)	(1,764,000 1976 pop)	(8,760 hr/yr)	= .0007434 Mw/person/year	x 1000 kw = .7434 kw/person/yr
Public Service Electric & Gas Company	(27,992,728 Mwhrs/yr)	(4,940,855 1976 pop)	(8,760 hr/yr)	= .0006468 Mw/person/year	x 1000 kw = .6468 kw/person/yr

Forecasting Energy Needs

To determine future energy demand in their respective distribution areas Jersey Central Power & Light Company and Public Service Electric & Gas use population projections from the New Jersey Department of Labor and Industry to estimate residential growth in their service regions. These figures are then analyzed according to family size, dwelling types, appliance usage and efficiency, and the state of economy. Following this procedure commercial requirements are assessed, which have historically been a function of residential demand. Industrial forecasts are then defined in relation to residential and commercial sales and with respect to employment levels in the distribution area.

Projected Demand Jersey Central Power & Light

Using this format, JCP & L expects the population in its service area to increase 41% from 1.7 million in 1976 to 2.4 million by 1995. JCP & L representatives note that because the population density in their service region is substantially less saturated than other distribution areas in the State, they expect a perennial growth in the number of customers they serve. They emphasize, however, that the validity of their projections is directly related to the validity of State population projections.

Public Service Electric & Gas

The population projections made by PSE & G are slightly higher than the population projections published by the New Jersey Department of Labor and Industry, which presents data in four types of series that indicate different rates of growth as illustrated below in Table 6.

TABLE 6

NEW JERSEY POPULATIONS PROJECTIONS, 1980-2020

	Series I	Series II	Series III	Series IV
1980	7,487,725	7,780,025	7,958,555	8,095,020
1985	7,693,360	8,032,070	8,298,210	8,596,500
1990	7,859,765	8,283,890	8,658,190	9,068,010
1995	7,028,845	8,535,710	8,997,850	9,594,460
2000	7,198,585	8,787,530	9,357,370	10,101,000

Population projections used by PSE & G, which reflect a 2.6% growth rate compounded annually from 1976 through 1991, predict that PSE & G's service region will have a population of 7,261,268 by 1991. In comparison to the State projections, the population growth rate projected by PSE & G to take place in their distribution region will range from 75 to 92 percent of the State's entire population by 1991.

Considering the heavily populated and densely developed corridor of the State which PSE & G serves, a 2.6 percent linear population projection for the next fifteen years in PSE & G's distribution area seems inappropriate, especially since many municipalities in PSE & G's service region are now approaching, and certainly by 1991 will be reaching, their population ceiling and no longer will be experiencing perennial growth.

Projected Distribution

Applying these utility projections of customer demand and electrical capacity requirements, the following tabulations of future generating capacity distributions can be made.

TABLE 7

PROJECTED ELECTRICAL GENERATING CAPACITY DISTRIBUTION
JERSEY CENTRAL POWER AND LIGHT COMPANY

1. Average electrical energy consumption (projected - 1995):

- Total energy available = 28,262,000 Mwhrs/yr
- Projected population = 2,400,000

- Average electrical energy consumption = .0013442 Mw/capita/yr

2. Average power required (1995):

$$\frac{28,262,000 \text{ Mwhrs/yr}}{8,760 \text{ hr/yr}} = 3226.2557 \text{ Mw/yr}$$

3. Required electrical generating capacity (1995):

$$\text{Total Capacity} = \frac{\text{Average Capacity}}{0.45} = 7169.45 \text{ Mw/yr}$$

4. Projected distribution of required electrical generating capacity (1995):

- Baseload: (7169.4571 Mw/yr) (0.55) = 3943.20 Mw/yr
- Intermediate: (7169.4571 Mw/yr) (0.20) = 1433.89 Mw/yr
- Peaking: (7169.4571 Mw/yr) (0.25) = 1792.36 Mw/yr

TABLE 8

PROJECTED ELECTRICAL GENERATING CAPACITY DISTRIBUTION
PUBLIC SERVICE ELECTRIC AND GAS COMPANY

1. Average electrical energy consumption (projected - 1991):

- Total energy available = 93,732,000 Mwhrs/year
- Projects population = 7,261,268

- Average electrical energy consumption = .0014735 Mw/capita/year

2. Average power required (1991):

$$\frac{93,732,000 \text{ Mwhrs/yr}}{8,760 \text{ Hrs./yr}} = 10,700 \text{ Mw/yr}$$

3. Required electrical generating capacity (1991):

$$\text{Total Capacity} = \frac{\text{Average Capacity}}{0.45} = 23,778 \text{ Mw/yr}$$

4. Projected distribution of required electrical generating capacity (1991):

- Baseload: (23,778 Mw/yr) (0.5) = 13,078 Mw/yr
- Intermediate: (23,778 Mw/yr) (0.20) = 4,756 Mw/yr
- Peaking: (23,778 Mw/yr) (0.25) = 5,944 Mw/yr

Middlesex County - Population Projections

Population projections by county area serviced were not available from utility representatives since utility distribution areas did not necessarily coincide with county, and sometimes municipal, boundaries. In reviewing the official State projections by the New Jersey Department of Labor and Industry, the population projections compiled by the County Planning Board most closely resemble the long-term trends (Series III) projections published by the State. In light of this, population forecasts for the County were obtained from the Middlesex County Planning Board Population Projections for 1975-2000 and are provided for the 25 municipalities comprising Middlesex County. The data are used as a basis for electrical generating capacity in the County. These figures are illustrated in Table 9 and are presented in five-year intervals from 1975 to 2000.

TABLE 9
POPULATION FORECASTS

MCD	YEAR	1975	1980	1985	1990	1995	2000
Carteret		21,893	22,223	22,793	23,249	23,319	23,017
Cranbury		2,321	2,569	2,810	3,417	4,024	4,632
Dunellen		7,294	7,423	7,590	7,742	7,820	7,817
East Brunswick		41,500	45,641	49,788	52,960	56,142	59,324
Edison		70,364	81,782	84,576	86,815	89,126	91,293
Helmetta		975	978	988	1,009	1,027	1,031
Highland Park		14,986	15,424	15,838	16,143	16,340	16,463
Jamesburg		4,955	5,075	5,212	5,341	5,441	5,470
Metuchen		16,260	17,029	17,803	17,797	17,797	17,797
Middlesex		15,560	16,261	16,960	16,959	16,959	16,958
Milltown		6,825	8,224	8,656	8,655	8,655	8,655
Monroe		12,111	13,862	15,612	16,412	17,212	18,015
New Brunswick		42,781	43,621	44,466	45,141	45,816	46,487
North Brunswick		21,581	24,491	28,171	28,782	29,395	30,009
Old Bridge		51,700	57,687	68,916	75,684	82,441	89,133
Perth Amboy		39,670	40,781	41,891	42,443	42,998	43,553
Piscataway		39,563	42,572	45,527	48,624	51,546	53,980
Plainsboro		4,425	7,031	12,566	14,038	15,521	17,026
Sayreville		33,839	37,549	41,535	45,594	49,264	52,495
South Amboy		9,734	9,753	9,723	9,727	9,737	9,751
South Brunswick		51,300	20,049	30,149	34,434	38,719	43,004
South Plainfield		21,943	24,914	27,369	27,586	27,804	28,022
South River		15,814	16,179	16,545	17,204	17,864	18,522
Spotswood		8,460	9,277	10,092	10,091	10,091	10,091
Woodbridge		101,690	101,818	101,945	102,936	103,929	104,920
TOTAL - MC		621,364	672,213	727,501	758,783	788,987	817,465

Source: Middlesex County Planning Board

Energy Requirements - Middlesex County

Projected requirements for Middlesex County as outlined in Table 8 were derived by multiplying consumptive rates projected in Tables 7 and 8 by the appropriate growth rates in Table 9. It should be noted however, that the actual rate of electrical energy consumption increases at a rate proportional to population and employment growth as well as the growth per consuming sector, i.e., residential, industrial, and commercial.

TABLE 10
AVERAGE ELECTRICAL POWER REQUIRED IN MIDDLESEX COUNTY
(Megawatts/year)

Distribution Area	1975	1980	1985	1990	1995	2000
JCP & L	92.59	119.99	138.02	149.48	160.63	155.36
PSE & G	321.36	330.41	350.48	360.74	370.58	393.59
TOTAL	413.95	450.4	488.5	510.22	531.21	548.95

Applying the growth rate projected by JCP & L for their service area to the population projections applicable to municipalities currently served by JCP & L, average energy consumption in Middlesex County will increase over 200 percent from 92.59 Megawatts per year in 1976 to 160.63 Megawatts per year in 1995.

Public Service Electric & Gas is projected on the average to require a smaller percentage increase in electrical power in Middlesex County than that expected to be required in JCP&L's distribution area. While JCP&L's requirements are projected to increase nearly 73 percent by 1995, PSE&G will experience a 15% increase in electrical requirements to meet demand in Middlesex County.

Planned Facilities and Additions

Table 11 illustrates the planned facilities in the Pennsylvania - New Jersey - Maryland Power Pool. These computations clearly indicate that nuclear facilities represent the greatest increase in electrical generation in the power pool immediately involving New Jersey.

Planned nuclear power facilities are expected to provide more than 6.5 times the amount of power coal-generated units will provide by 1985. At the same time, nuclear facilities will generate slightly more than 4.5 times the electrical output of oil-generated facilities. Combustion turbines are expected to furnish the lowest amount of new power supply by 1985, representing less than 5% of the additional electrical generation emanating from new nuclear facilities.

TABLE 11

PENNSYLVANIA-NEW JERSEY-MARYLAND INTERCONNECTION

PROJECTED INCREASES IN GENERATING CAPACITY

Year	Nuclear (GW)E1	Additional # of Units	Coal (GW)E	Additional # of Units	Oil (GW)E1	Additional # of Units	Combustion Turbines (GW)E1	Additional # of Units	Annual Capacity In- crease (GW)E
1977	0.87	2	0.33	3	.95	12	0	0	2.15
1978	0.88	2	0	0	(-.18)*	0	0	0	0.88
1979	1.12	2	0.40	4	.01	NA	.20	-	1.73
1980	1.05	1	0	0	1.21	5	.09	14	2.35
1981	1.23	3	0	0	0	0	.10	-	1.33
1982	4.30	6	0.80	4	.61	2	0	-	5.71
1983	0.0	0	0	0	0	0	.30	-	0.30
1984	1.07	2	(-.03) 0.80	7	(-.12) .57	NA	0	0	2.44
1985	4.63	4	0	0	0	0	0	0	4.63
TOTAL	15.15	22	2.33	18	3.35	17	.69	14	21.52

¹ (GW)E = Gigawatts of Energy = Billionwatts

*(-#'s) indicate de- or re-rated facility capacity

Planned Facilities - Middlesex County

The impact of PJM planned facilities and additions will not be dramatically felt in Middlesex County. Public Service Electric & Gas plans to add two combustion turbines to its Sewaren generating plant by 1980. Jersey Central Power & Light has no facilities either planned or under construction at the present time and will not be increasing their physical plant capacity in Middlesex County before 1980. Jersey Central Power & Light does, however, own property in the Keyport area on Connesquont Point which is being held as a future generating plant site. JCP & L representatives have indicated that plans for nuclear power generation on its Keyport property was opposed by local government officials. JCP & L is not currently considering any alternative or substitute generation facility for that site.

NUCLEAR POWER

Since the early 1970's, nuclear power generation has grown substantially in the U.S. as a means of producing electricity. Nuclear power provides approximately 10 percent of the Nation's electrical supply. By 1985, this percentage is expected to increase three times, and by the year 2000 nuclear-fueled plants are projected to supply 50% of the Nation's electric power production.

New Jersey currently has two nuclear-powered reactors in operation in Salem and Oyster Creek. Salem I, in Lower Alloways Creek Township, Salem County is capable of producing 1,100 megawatts of electrical power. It is jointly owned by the Public Service and Philadelphia Electric Companies and is operated by Public Service Electric & Gas. An additional reactor, Salem II, to be located adjacent to Salem I, is expected to become operational in 1979 also with a 1,100 megawatt capacity. Hope Creek reactors I and II, located next to the Salem power stations, are scheduled to start operations by 1984 and 1986, respectively, and will each produce 1,067 megawatts of electrical power. Public Service Electric and Gas has 95 percent ownership of the station's production and will be responsible for the operation of each plant. The Atlantic Electric Company will own 5 percent of each plant's power output.

The Oyster Creek reactor in Lacey Township, Ocean County, has been operated by Jersey Central Power and Light since 1969 and is capable of producing 650 megawatts of nuclear-fueled electrical power. An additional

1,140 megawatts is scheduled to be produced by Jersey Central Power & Light's new reactor at Forked River, adjacent to the Oyster Creek plant, by the spring of 1983.

Two more nuclear power plants, Atlantic I and II, located 2.8 miles east of Little Egg Harbor Inlet and 12 miles northeast of Atlantic City, are projected to have 1,150 megawatt capacity each, and will be owned and operated by Public Service Electric and Gas Company. Since 1971, Public Service has been undertaking the necessary steps to obtain appropriate permits to place these two 1,150 megawatt nuclear reactors on huge floating barges to be anchored to the floor of the Atlantic Ocean and surrounded by an immense stone and concrete-breakwater.

The concept of floating nuclear power plants has received considerable opposition, despite the utility's claim that this type of project would be an appropriate method of supplying power to a state as densely populated as New Jersey. Those against this project include environmental groups, Atlantic County residents, the tourist and fishing industries, the office of the Public Advocate and the Byrne administration. The primary objection to floating reactors centers around the danger of accidental spills of radioactive material into the ocean.

In spite of this opposition, PSE&G, New Jersey's largest public utility, insists that floating nuclear power plants will have safeguards incorporated into the design to prevent potential accidents. The Federal Nuclear

Regulatory Commission is presently deciding whether Offshore Power Systems, Inc., of Jacksonville, Florida, should even be licensed to build floating nuclear reactors. Until such permits are granted, PSE&G has delayed purchase of the nuclear barges until 1983, at which time the multi-million project is expected to attract less opposition by incorporating all the necessary safeguards and by meeting all the required standards to attain the appropriate operating permits.

SUPPLY OF NATURAL GAS TO NEW JERSEY

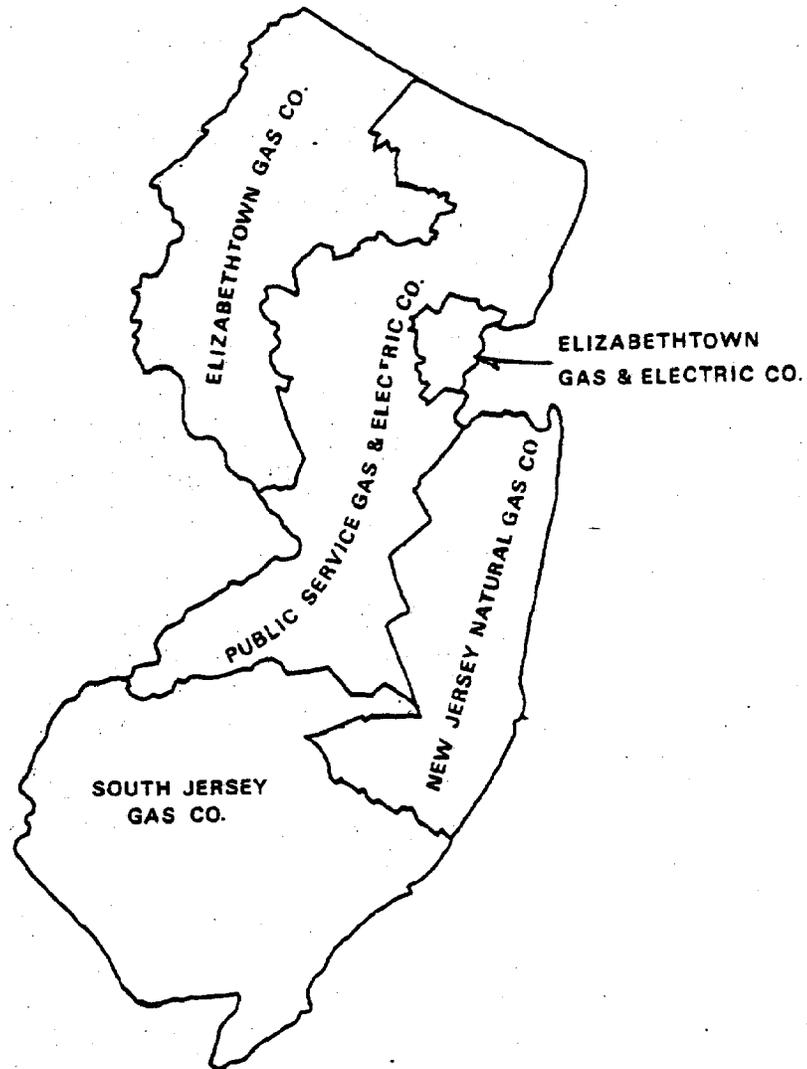
Principal Interstate Pipelines

Natural gas is transported to, and distributed within the State of New Jersey via interstate pipelines, predominantly from the Southwestern United States and Gulf Coast states. Nine major transporters of natural gas to New Jersey are listed in Table 12. Of the state's total supply, Transcontinental, Texas Eastern and Tennessee Gas provide the largest volume, accounting for 94.5 percent of the total supply transported to New Jersey.

Major Gas Distributor Franchise Areas

Four gas company utilities serve the residential, commercial and industrial sectors of New Jersey and include Elizabethtown Gas Company, Public Service Electric and Gas Company, New Jersey Natural Gas Company, and South Jersey Gas Company. Their respective franchise areas are illustrated on Figure 4 and appropriate interstate pipeline allocations are outlined in Table 13.

FIGURE-4



GAS UTILITIES

TABLE 12

(a)

NATURAL GAS SUPPLIED TO NEW JERSEY BY INTERSTATE PIPELINE
(1975-76 PUC REPORTING YEAR)
(million cubic feet)

Pipeline	Volume	Percent of Total
Transcontinental Gas Pipeline	143,345	56.5
Texas Eastern Transmission	84,024	33.1
Tennessee Gas Pipeline	12,408	4.9
Consolidated Gas Supply	1,923	0.8
Columbia Gas Transmission	1,646	0.6
Algonquin Gas Transmission	1,287	0.5
Houston Pipeline	924	0.4
Michigan Consolidated Gas	761	0.3
Distrigas	305	0.1
Other and Unspecified	<u>6,911</u>	<u>2.7</u>
Total	253,534	100.0

(a)

All figures are partially estimated.

Source: New Jersey Natural Gas Shortage: A Policy Analysis,
J.L. Cecil and D. Morrell, December 1976.

TABLE 13

NATURAL GAS SUPPLIED TO NEW JERSEY UTILITIES
 (1975-76 PUC REPORTING YEAR)
 (million cubic feet)

Supplier	Public Service Electric & Gas	South Jersey	New Jersey Natural	Elizabethtown
Transcontinental Gas Pipeline	102,038	24,954	--	16,353
Texas Eastern Transmission	53,048	--	26,971	4,005
Tennessee Gas Pipeline	12,197	--	--	211
Columbia Gas Transmission	--	--	--	1,646
Algonguin Gas Transmission	--	--	1,287	--
Consolidated Gas Supply	--	1,923	--	--
Houston Pipeline	--	924	--	--
Michigan Consolidated	--	761	--	--
Distrigas	--	305	--	--
Other and Unspecified	<u>3,293</u>	<u>3,018</u>	<u>600</u>	<u>--</u>
Total	175,576	31,885	28,858	22,215

Note: Table excludes inter-utility transfers, manufactured and liquified natural gas, and liquid petroleum gases. All figures are partially estimated.

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J.L. Cecil and D. Morrell, December, 1976.

New Jersey Gas

The four gas utilities of New Jersey supplied residents within the state with 276.2 Bcf of gas from November 1, 1975 through October 31, 1976. Of this sum, 92 percent or 253.5 Bcf can be attributed to gas sold on the wholesale market through interstate pipelines. Slightly over 1 percent (3.7 Bcf) of the total gas supply was obtained as "exploration" gas. This type of gas is developed by utility-owned exploration companies, which is then transmitted via the interstate pipeline network. A list of exploration companies can be found in Table 14.

Alternative Forms of Natural Gas

The remainder of New Jersey's gaseous fuel supply is derived primarily from non-methane gases. These gases, it is important to note, are not transported through the interstate pipeline network but are transferred in mobile gas tanks. Their contribution to the fuel supply is illustrated in Table 15.

Supplemental Supplies

Refinery gas is primarily a methane by-product of petroleum refinery operations and is sold to the utilities on a contractual basis. Other forms of gas that make up the state's overall gas supply include both synthetic natural gas (SNG) and liquified natural gas (LNG). Synthetic natural gas is derived from heavy hydrocarbons, primarily naphthas, and represent only about one percent of the state's total gas supply. At the

TABLE 14

NATURAL GAS SUPPLIES OBTAINED THROUGH EXPLORATION EFFORTS OF N.J. GAS UTILITIES
FOR THE 1975-76 PUC REPORTING YEAR
(million cubic feet)

Parent Utility	Exploration Division or Subsidiary	Volumes Supplied		Totals
		Nov. 1, 1975 to April 30, 1976	May 1, 1976 to Oct. 31, 1976	
Public Service Electric and Gas	Energy Development Corp.	1090	1706	2796
South Jersey Gas	South Jersey Exploration Co.	--	--	--
New Jersey Natural Gas	Exploration and Production Div.	--	--	--
Elizabethtown Gas	National Exploration	676	208	884
Total		1766	1914	3680

(a) Actual through March 21, 1976.

(b) Projected.

Source : New Jersey Natural Gas Shortage: A Policy Analysis, J.L. Cecil and D. Morrell, December, 1976.

TABLE 15
 (a)
 NEW JERSEY'S TOTAL GAS SUPPLY
 (1975-76 PUC REPORTING YEAR)

Type of Supply	Volume (MMcf)	Percent of Total
Natural Gas		
Interstate Pipelines (b)	253,534	92.4
Utilities' Exploration	3,680	1.3
Refinery Gas	10,321	3.8
Synthetic Gas	2,832	1.0
Liquified Natural Gas	549	0.2
(c)		
Natural Gas Liquids	<u>3,342</u>	<u>1.2</u>
Total	274,258	99.9

(a) All figures are partially estimated.

(b) This is natural gas developed by the utilities's own exploration companies and transmitted to New Jersey by interstate pipeline companies.

(c) NGL does not consist of natural gas (methane) but are compounds of heavier hydrocarbons including propane, butanes and natural gasolines. Propane and butane especially are used as gas substitutes.

Source : New Jersey Natural Gas Shortage: A Policy Analysis, J.L. Cecil and D. Morrell, December, 1976.

present time, PSE&G and Elizabethtown jointly own and operate SNG plants in Linden and Harrison, New Jersey.

Liquified natural gas is another supplemental gas composed of methane which has been cooled to - 265°F by a cryogenic process called liquifaction. Table 16 depicts the projected and actual liquified natural gas supplies available to gas utilities serving Middlesex County. This cooling technique allows a decrease in volume of 84% and, in so doing, affords greater flexibility and economy in transport and storage of LNG. PSE&G owns an LNG receiving terminal on Staten Island, New York, whose operation-ization has been stalled with the event of a major fire claiming 34 lives. The cause of the fire has still not been determined and until such time, the FPC will not permit operations at this facility to begin. Two other LNG receiving terminals are being planned by the Transco Terminal Company and Texas Eastern Gas Company for respective plant sites at Racoon Island, New Jersey and West Deptford, New Jersey. The potential hazards associated with transporting, storing, and regasifying LNG, which at the present time curtail operations at the Staten Island facility will, in all probability, thwart the permit process for these two new LNG facilities to locate in New Jersey.

The Situation in New Jersey

In the reporting year 1975-1976*, 19.0 billion cubic feet (Bcf) of non-methane-type gas entered or was produced and distributed in New Jersey (See Table 15). The largest source in this category is refinery gas, contributing

* Reporting year extends from November 1 through October 31.

TABLE 16

PROJECTED AND ACTUAL LIQUIFIED NATURAL GAS SUPPLIES
 AVAILABLE TO GAS UTILITIES(a) IN MIDDLESEX COUNTY (1975-76 PUC REPORTING YEAR)
 (million cubic feet equivalent)

Utility	Nov. 1, 1975 to April 31, 1976	May 1, 1976 to Oct. 31, 1976	Total for PUC Reporting year
Public Service Electric and Gas	--	--	--
Elizabethtown Gas	<u>150(b)</u>	--	<u>150</u>
Total	150(b)	--	150

(a) Does not include gas transported to New Jersey and liquified for storage purposes.

(b) Source of this LNG is Transco.

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J.L. Cecil and D. Morrett, December, 1976.

10.3 Bcf of the total volume distributed within the State. The second largest alternate form is natural gas liquids (NGL) which represent a 3.3 Bcf contribution to the total supply distributed. Synthetic natural gas enters the distribution system at 2.8 Bcf, and liquified natural gas contributed less than 1 Bcf to the supply.

Gas Companies Operating in Middlesex County

Two utilities supply gas to Middlesex County: Public Service Electric & Gas Company and Elizabethtown Gas Company. A major portion of the County is serviced by Public Service Electric & Gas Company with a service region covering all but the northeast corner of the County. This northeast area of Middlesex County is supplied gas by the Elizabethtown Gas Company. Elizabethtown's service region encompasses Carteret, Woodbridge, Perth Amboy, Metuchen and more than half of Edison Township.

Public Service Electric and Gas Company

Public Service Electric and Gas Company (PSE&G) not only is the largest gas distributing utility in New Jersey but is also the only gas utility in New Jersey to produce and distribute electrical power in conjunction with its gas distribution operations.

PSE&G markets its gas in an area occupying a corridor of the State from Trenton and Camden to the northeast corner of the State (See Figure 3). This region had a 1976 population of 4,940,855 and provided gas to approximately 72 percent of the State's high-volume industrial consumers.

In terms of statewide gas consumption, PSE&G supplies the following proportions:

- Residential66.8%
- Commercial74.3%
- Industrial58.9%

To meet the contractual obligations necessary to serve the customers above PSE&G secures its major gaseous fuel supplies primarily through three interstate pipelines (Transcontinental, Texas Eastern & Tennessee Gas Companies), which in 1976 supplied PSE&G with 88.7 percent of its total supplies. In order to fill the remaining demand requirements PSE&G receives gas from a number of smaller interstate pipelines and is the only gas utility that purchases refinery gas, its fourth largest gaseous fuel supply. Finally, PSE&G owns and operates 91.4 percent of New Jersey's SNG production which augments its total gas supply by slightly more than 1 percent.

TABLE 17

PUBLIC SERVICE ELECTRIC AND GAS CO.
TOTAL GAS SUPPLIES, 1975-76 PUC REPORTING YEAR
(million cubic feet)

Form of Supply	Nov. 1 to April 30	May 1 to Oct. 31	Source Total	Percent of Total Supply
Pipeline Natural Gas				
Transcontinental	52,767	49,271	102,038	54.1
Texas Eastern	29,913	23,135	53,048	28.1
Tennessee	6,244	5,953	12,197	6.5
Exploration Gas	1,090	1,706	2,786	1.5
Refinery Gas	5,391	4,930	10,321	5.5
Synthetic Natural Gas	---	1,907 ^(a)	1,907	1.0
Natural Gas Liquids	2,890	---	2,890	1.5
<u>Other and Unspecified</u>	<u>3,293</u>	<u>---</u>	<u>3,293</u>	<u>1.7</u>
Subtotal	101,588	86,902	188,490	100.0
(b)				
<u>Storage</u>	<u>38,918</u>	<u>---</u>	<u>---</u>	<u>---</u>
Total with Storage	140,506	86,902	188,490	100.0

(a) From an anticipated test run of Linden, N.J. SNG plant.

(b) Storage is not included in heating season total as it represents gas stored during the preceding summer, not additional supplies.

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil and D. Morrell, December, 1976.

Elizabethtown Gas Company

The Company, on the whole, distributed 23.8 Bcf of gas from November 1, 1975 to October 31, 1976. It has full ownership of a 150,000 Mcf (equivalent) LNG storage tank in Elizabeth and 10% ownership of supplemental gas supplies from the Linden SNG plant. In addition, Elizabethtown operates a propane-air gas manufacturing plant capable of providing 20,000 Mcf of this type of gas per day. Propane is a compound composed of heavy hydrocarbons and is especially used as a gas substitute. Also, Elizabethtown's privately-owned gas exploration company has been successful at augmenting their total gas volume by 3.7 percent.

TABLE 18

ELIZABETHTOWN GAS CO.
TOTAL GAS SUPPLIES, 1975-76 PUC REPORTING YEAR
(million cubic feet)

Form of Supply	Nov. 1 to April 30	May 1 to Oct. 31	Source Total	Percent of Total Supply
Pipeline Natural Gas				
Transcontinental	9,557	6,796	16,353	68.6
Texas Eastern	2,664	1,341	4,005	16.8
Columbia	884	762	1,646	6.9
Tennessee	152	59	211	0.9
Exploration Gas	679	208	884	3.7
Synthetic Natural Gas	154	191 ^(a)	345	1.4
Liquified Natural Gas	150	---	150	0.6
<u>Natural Gas Liquids</u>	<u>257</u>	<u>---</u>	<u>257</u>	<u>1.1</u>
Subtotal	14,494	9,357	23,851	100.0
(b)				
<u>Storage</u>	<u>4,886</u>	<u>---</u>	<u>---</u>	<u>---</u>
Total with Storage	19,380	9,357	23,851	100.0

(a) From planned test run of Linden SNG plant.

(b) Storage is not included in heating season total as it represents gas stored during the preceding summer and not additional supplies.

Source: New Jersey Natural Gas Shortage: A Policy Analysis: J. L. Cecil and D. Morrell, December, 1976.

TABLE 19

NEW JERSEY'S PROJECTED SUPPLY POSITION
 NOVEMBER 1976 - APRIL 1977*
 (million cubic feet)

	Volume
Pipeline Supply	115,172
Available from Storage	48,906
Total Without Supplemental Supplies	164,078
Normal Winter Firm Requirements	183,012
Supplemental Supplies Required for Normal Winter	18,934
Design Winter Firm Requirements	206,824
Supplemental Supplies Required for Design Winter	42,746
1975-76 Supplemental Supplies	19,408

Note: Normal and design winter firm requirements are assumed to be the same as in the 1975-76 period.

* The time frame of November, 1976 to April 1977 was chosen because of data availability and because it spans the winter. It is in the winter heating season that firm requirements reach maximum levels as gas demand peaks. Consequently, it is during this period that serious supply/demand imbalances can be expected to manifest themselves first.

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil and D. Morrell, December, 1976.

TABLE 20

NEW JERSEY SUPPLY POSITION
NOVEMBER 1975 - APRIL 1976

	Volume (MMcf)	Percent of Total Supply
Pipeline Supply	131,936	64.9
Supplemental Supply	19,408	9.6
Storage	51,858	25.5
Total Supply	203,202	100.0
Normal Winter Firm Requirements	183,012	90.1
Normal Winter Firm Reserves	20,210	9.9
Design Winter Firm Requirements	206,824	101.8
Additional Supply Required for Design Winter	3,622	1.8

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil and D. Morrell, December, 1976.

The major industrial consumers by SIC group in Middlesex County are illustrated in Table 21 below and include:

TABLE 21
MAJOR INDUSTRIAL GAS CONSUMERS

SIC*

20	Food & Kindred Products
28	Chemicals & Allied Products
32	Stone, Clay & Glass Products
33	Primary Metals

* Standard Industrial Classification Code.

TABLE 22

EMPLOYMENT AND LARGE-VOLUME INDUSTRIAL GAS CONSUMPTION
BY GAS COMPANY DISTRIBUTION AREAS IN MIDDLESEX COUNTY

Distributing Area	Companies(a)	Percent of Companies	Employment	Percent of Employment	Gas Used(b)	Percent of Gas Used	Gas/Employee (Mcf)(c)	Employees/MMcf of(d) Gas Used
Public Service	548	83.2	222,804	80.2	35,262.5	76.0	158.2	6.32
Elizabethtown	111	16.8	54,936	19.8	11,114.7	24.0	202.4	4.94
Total	659	100.0	277,740	100.0	46,377.2	100.0	360.6	11.26

(a) Industrial firms which consume more than 10 million cubic feet of gas each year.

(b) Million cubic feet.

(c) Mcf = Million cubic feet.

(d) MMcf = Million million cubic feet.

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil and D. Morrell, December, 1976.

TABLE 23

NEW JERSEY GAS SUPPLIES AND CURTAILMENTS
(1975-76 PUC REPORTING YEAR)
(million cubic feet)

Supplier	Contract Volume	Estimated Curtailment	Curtailment	Available Supply
Transcontinental	227,707	84,362	37.0	143,345
Texas Eastern	114,835	30,811	26.8	84,024
Tennessee	14,415	2,007	13.9	12,408
Consolidated Gas Supply	1,923	---	---	1,923
Columbia	2,787	1,141	40.9	1,646
Algonquin	1,698	410	24.1	1,287
Houston Pipeline	1,293	369	28.5	924
Michigan Consolidated Gas	761	---	---	761
Distrigas	305	---	---	305
Other and Unspecified	<u>6,911</u>	---	---	<u>6,911</u>
Total	372,634	119,100	32.0	253,534

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil and D. Morrell, December, 1976.

TABLE 24

PROJECTED NATIONAL FIRM REQUIREMENTS AND CURTAILMENTS
OF MAJOR INTERSTATE PIPELINES SERVING NEW JERSEY,
(1975-76 HEATING SEASON)

Supplier	Firm Requirements	Total Deficiency	Percent Deficient
Transcontinental Gas Pipeline Corp.	496,700	180,426	36.32
Texas Eastern Transmission Corp.	501,370	117,491	23.43
Tennessee Gas Pipeline Corp.	592,035	70,139	11.85
Consolidated Gas Supply Corp.	431,900	18,979	4.39
Columbia Gas Transmission Corp.	848,726	235,177	27.71
Algonquin Gas Transmission Corp.	<u>92,702</u>	<u>14,711</u>	<u>15.87</u>
Total	2,963,433	636,923	21.50

Source: New Jersey Natural Gas Shortage: A Policy Analysis
J. L. Cecil and D. Morell, December, 1976.

TABLE 25

HIGH PRIORITY GAS USE, CRITICAL CURTAILMENT
LEVELS, AND VULNERABILITY OF EMPLOYMENT
IN MANUFACTURING FIRMS FOR NEW JERSEY

SIC	Number of Employees	High-Priority Consumption (MMcf) (a)	Critical Curtailment Level(%) (b)	Employees/MMcf of High-Priority Consumption
20	27,010	1,814.5	60	14.9
21	125	---	--	----
22	11,374	1,116.6	58	10.2
23	2,265	191.1	29	11.9
24	40	38.2	47	1.0
25	800	---	--	----
26	6,522	621.9	75	10.5
27	2,232	236.0	55	9.5
28	67,456	2,948.7	71	22.9
29	3,418	28.1	96	121.6
30	3,050	495.5	64	18.3
32	28,110	7,129.8	55	3.9
33	22,941	2,912.4	60	7.9
34	26,263	1,244.1	69	21.1
35	21,668	1,151.2	44	18.8
36	53,672	548.8	73	97.8
37	17,280	680.7	25	25.4
38	5,668	82.2	81	69.0
39	3,773	320.0	68	11.8

(a) High priority consumption includes use for processing (alternate fuel infeasible), feedstocks and plant protection.

(b) The level of curtailment possible before high-priority gas uses are invaded; by definition, this equates to low-priority gas use in that industry.

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil and D. Morrell, December, 1976.

TABLE 26

THE LARGEST GAS CONSUMING INDUSTRIES:
GAS CONSUMPTION AND EMPLOYMENT
FOR NEW JERSEY

SIC Code	Description	Annual Gas Consumption (Bcf)	Employees (000)
32	Stone, Clay, Glass	15.94	28.11
28	Chemicals	14.20	67.46
33	Primary Metals	7.29	22.94
20	Food	4.58	27.01
34	Fabricated Metals	4.01	26.26
49	(a) Utilities	<u>(4.26)</u>	<u>(.15)</u>
	Total	46.02	171.78

(a) This category -- gas, electric and sanitary services -- is not included in the totals as it largely represents gas wasted or lost in supply of gas to retail customers.

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil and D. Morrell, December, 1976.

TABLE 27

NATURAL GAS USE AND EMPLOYMENT
IN MANUFACTURING INDUSTRIES
IN NEW JERSEY

SIC	Description	(1) Gas Used (MMcf)	(2) No. Employees	(3) Gas Used/ Employee (Mcf)	(4) Employee/Unit of gas used (MMcf)
36	Electric Equipment	2,003.9	53,672	37.3	26.8
25	Furniture & Fixtures	30.0	800	37.5	26.7
37	Transport. Equipment	911.5	17,280	52.7	19.0
38	Instruments	422.5	5,668	74.5	13.4
35	Nonelectric Machinery	2,042.8	21,668	94.3	10.6
23	Apparel	270.3	2,265	119.2	8.4
30	Rubber & Plastics	1,376.9	9,050	152.2	6.6
34	Fabricated Metals	4,013.5	26,263	152.9	6.5
21	Tobacco	19.6	125	156.8	6.4
20	Food	4,578.0	27,010	169.6	5.8
20	Petroleum Refining	708.1	3,418	208.3	4.8
28	Chemicals	14,195.9	67,456	210.3	4.8
27	Printing & Publish.	524.0	2,232	227.8	4.4
22	Textile Prod.	2,674.2	11,374	235.2	4.3
39	Miscellaneous	983.4	3,773	260.6	3.8
33	Primary Metals	7,290.6	22,941	318.4	3.1
26	Paper	2,540.7	6,522	389.5	2.6
32	Stone, Clay, Glass	15,939.6	28,110	567.0	1.8
24	Lumber & Wood	61.1	40	1,527.5	0.7

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil and D. Morrell, December, 1976.

TABLE 28

DATA ON LARGE-VOLUME INDUSTRIAL
GAS USERS IN NEW JERSEY

Standard Industrial Classification	Number of Companies	Number of Employees	Total Gas Consumption (million cubic feet)
32 Stone, clay & glass products	68	28,110	15,939.6
28 Chemicals & allied products	122	67,456	14,195.9
33 Primary metals	87	22,941	7,290.6
20 Food & kindred products	71	27,010	4,578.0
49 Electric, gas & sanitary services	4	150	4,259.7
34 Fabricated metal products	85	26,263	4,013.5
22 Textile mill products	68	11,374	2,674.2
26 Paper & allied products	29	6,522	2,540.7
35 Machinery, non-electrical	33	21,668	2,042.8
36 Electrical equipment & supplies	44	53,672	2,003.9
30 Rubber & plastics products	36	9,050	1,376.9
39 Miscellaneous manufacturing	16	3,773	983.4
37 Transportation equipment	8	17,280	911.5
29 Petroleum & coal products	11	3,418	708.1
27 Printing & publishing	13	2,232	524.0
38 Instruments & related products	8	5,668	422.5
70 Hotels & other lodging places	15	3,057	411.1
23 Apparel & other textile products	8	2,265	270.3
42 Trucking & warehousing	8	5,165	209.3
50 Wholesale trade	6	1,363	181.3
16 Construction: general contractors	6	540	178.9
14 Non-metallic minerals, except fuels	4	151	136.9
92 State government	1	1,100	135.4
65 Real Estate	2	620	124.1
80 Medical & other health services	3	1,745	104.6
24 Lumber & wood products	2	40	61.1
25 Furniture & fixtures	2	800	30.1
21 Tobacco manufactures	1	125	19.6
02 Agricultural production: livestock	1	200	14.9
57 Furniture & home furnishing stores	1	300	13.0
13 Crude petroleum & natural gas	1	535	12.4
54 Food stores	1	100	11.8
Unknown	1	--	60.3
Total	766	324,693	66,440.2

Source: New Jersey Natural Gas Shortage: A Policy Analysis, J. L. Cecil
and D. Morrell, December, 1976.

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