1.3 ELECTRIC GENERATING CAPACITY OF MARYLAND UTILITIES

Maryland utilities own and operate over 11,000 MW of generating capacity in Maryland. In addition, they own all or shares of generating units in other states. BGE and Delmarva Power own shares of the large Conemaugh and Keystone coal plants in Pennsylvania; PEPCO also owns a share of the Conemaugh plant. Delmarva Power owns shares of the Peach Bottom nuclear unit in Pennsylvania and the Salem nuclear unit in New Jersey, and operates coal plants in Delaware. PE owns shares of steam plants that are located in West Virginia and Pennsylvania. BGE has an entitlement to the Safe Harbor hydroelectric plant in Pennsylvania, and PEPCO is the sole owner of the Potomac River coal plant in Alexandria, Virginia, and several oil units in the District of Columbia. In total, this comes to almost 18,000 MW of capacity owned by Maryland utilities.

Table 1-3 lists the power plants owned by Maryland utilities, existing generating capacities at each plant, and planned capacity additions or reductions over the next several years. This table includes existing NUG plants whose total output is purchased by a utility, and proposed NUG facilities with long-term contracts that have been approved by the Maryland PSC.

The principal fuel burned at Maryland's power plants is coal, which in 1993 accounted for roughly 57% of the generation in Maryland. Table 1-4 and Figure 1-3 show the generation in Maryland in 1993, by fuel. Nuclear generation, represented by BGE's Calvert Cliffs plant, accounted for 28% of total generation in the state in 1993. Table 1-5 shows the generation, by fuel, for each power plant in the state within the four major utilities' systems.

Table 1-3 Current and Planned Generating Capacity in Maryland Utility Systems

Utility	Plant Name	Major Fuel Type	Capacity (MW) Current	Capacity (MW) Planned Increase (Decrease)
BGE	Brandon Shores	Coal	1,288	—
	Calvert Cliffs	Nuclear	1,660	—
	C.P. Crane	Coal	394	—
	Gould Street	Oil	104	—
	Notch Cliff	Natural Gas	128	—
	Perryman	Oil/Natural Gas	208	140
	Riverside	Oil/Natural Gas	391	(199)
	Wagner	Coal/Oil	1,005	—
	Westport	Oil/Natural Gas	248	(126)
	Philadelphia Road	Oil	64	—
	Bethlehem Steel[1]	Natural Gas	169	—
	BRESCO[1]	Waste	57	—
Out-of-State:	Conemaugh	Coal	181	—
	Keystone	Coal	358	—
	Safe Harbor	Hydroelectric	277	—
	Subtotal		**6,532**	**(185)**
PEPCO	Chalk Point	Coal/Natural Gas	2,339	—
	Dickerson	Coal/Natural Gas	837	269
	Morgantown	Coal	1,412	—
	SMECO[2]	Natural Gas	84	—
	Montgomery County[3]	Waste	—	40
	Panda-Brandywine[3]	Natural Gas	—	230
Out-of-State:	Benning Road	Oil	550	—
	Buzzard Point	Oil	256	—
	Conemaugh	Coal	166	—
	Potomac River	Coal	482	—
	Subtotal		**6,210**	**539**
PECO (Susquehanna)	Conowingo	Hydroelectric	512	—
Penelec	Deep Creek Lake	Hydroelectric	20	—
PE	R.P. Smith	Coal	114	—
	AES-Warrior Run[3]	Coal	—	180
Out-of-State:	Albright	Coal	76	—
	Harrison	Coal	629	—
	Hatfield's Ferry	Coal	332	—
	Pleasants	Coal	375	—
	Bath County	Pumped Storage	235	—
	VA & WV Hydro	Hydroelectric	11	—
	Subtotal		**1,772**	**180**

Table 1-3 Current and Planned Generating Capacity in Maryland (continued)

			Capacity (MW)	
Utility	**Plant Name**	**Major Fuel Type**	**Current**	**Planned Increase (Decrease)**
Delmarva Power	Vienna	Oil	168	—
	Dorchester	Coal	—	300
	Crisfield	Oil	10	—
Out-of-State:	Christiana	Oil	45	—
	Conemaugh	Coal	63	—
	Edge Moor	Coal/Oil	708	—
	Indian River	Coal	781	—
	Keystone	Coal	63	—
	Peach Bottom	Nuclear	157	—
	Salem	Nuclear	167	—
	Hay Road	Natural Gas	511	—
	Diesels	—	77	—
	Subtotal		**2,750**	**300**
Easton	Easton	Oil	47	46
Berlin	Berlin	Oil	4	5
TOTAL			**17,763**	**903**

1 NUG

2 The SMECO facility is located at the Chalk Point Station operated by PEPCO. PEPCO operates the unit and is entitled to the full output of the unit under a long-term contract.

3 Proposed NUG

Figure 1-3
Fuel Used to Generate Electricity in Maryland in 1993

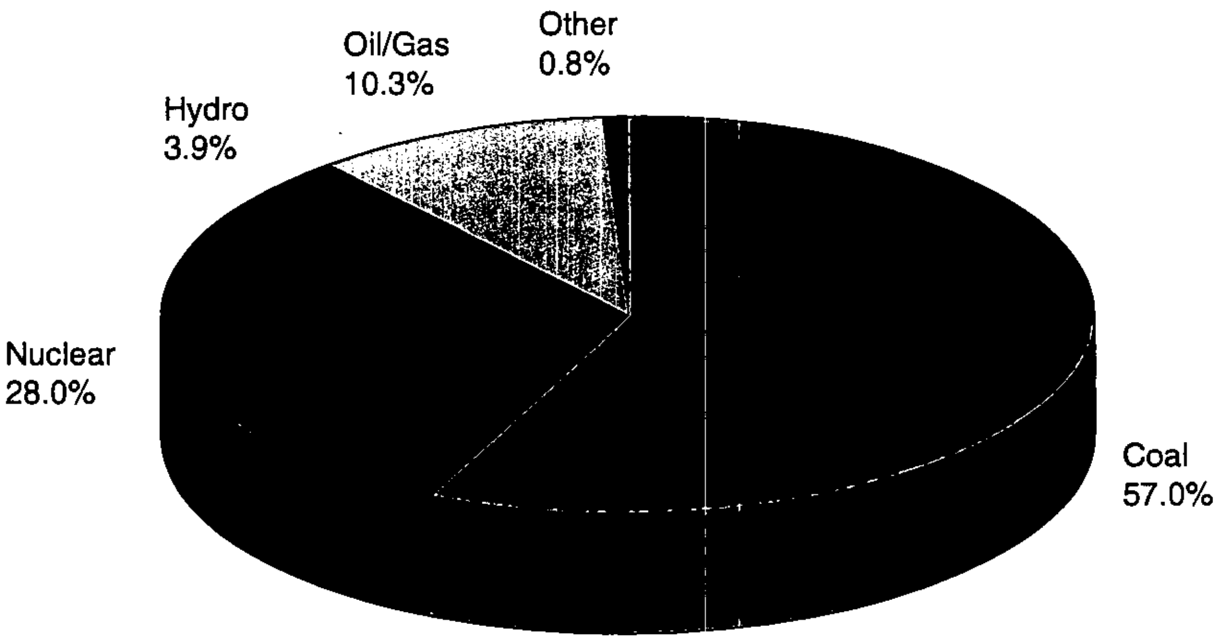


Table 1-4 Electric Generation in Maryland in 1993 in Gigawatt-Hours (GWH)

	BGE	Delmarva Power	PE	PEPCO	Susquehanna	Penelec	Berlin	Easton	Total
Coal	11,996	—	286	12,761	—	—	—	—	25,043
Nuclear	12,301	—	—	—	—	—	—	—	12,301
Oil/Natural Gas	965	460	—	3,050	—	—	4	27	4,506
Hydro-electric	—	—	—	—	1,627	65	—	—	1,692
Other	372*	—	—	—	—	—	—	—	372
Totals	25,634	460	286	15,811	1,627	65	4	27	43,914

*Other reflects waste and coke generation at BRESCO and Bethlehem Steel, respectively.

Table 1-5 *Generation at all Major Power Plants in Maryland, 1993 (GWH)*

	Fuel Type			
Plant	**Coal**	**Nuclear**	**Oil/Gas**	**Other**
BGE				
Westport			44	
Gould Street			162	
Riverside			89	
Wagner	2,565		388	
Crane	1,847		256	
Brandon Shores	7,584			
Calvert Cliffs		12,301		
Diesels			26	
BRESCO/Bethlehem Steel				372
Total	**11,996**	**12,301**	**965**	**372**
Delmarva Power				
Vienna 8			457	
Diesels			3	
Total			**460**	
PEPCO				
Dickerson	3,349		167	
Chalk Point	3,425		2,426	
Morgantown	5,987		457	
Total	**12,761**		**3,050**	
PE				
R.P. Smith	286			

1.4 *POWER POOLING*

To gain the efficiency and reliability benefits of interstate and intrastate power transactions, the Maryland utilities participate in multi-utility **power pools**. PE and its two utility affiliates form the APS Power Pool. PEPCO, BGE, and Delmarva Power are members of the Pennsylvania-New Jersey-Maryland Interconnection (PJM) Power Pool, which also includes most of the electric utilities in Pennsylvania, New Jersey, the District of Columbia, and Delaware.

The PJM pool employs an operating procedure known as **economic dispatch** to minimize fuel costs for all members. With economic dispatch, a utility system makes maximum use of its generating units with the lowest operating costs (coal, nuclear, and hydroelectric plants) and only uses units that are more expensive to operate (oil- or gas-fired units) when the lower cost units are already running at their maximum levels. PJM implements this process by collecting plant operating data on all member plants and continuously determining the pool-wide cost of generating an additional kilowatt-hour (the incremental cost). It operates all of the member utilities' units as a single system; at each hour, generation is added from the most economical source available, regardless of utility ownership, to meet the next increment of load. This results in continuous buying and selling of power among the members, referred to as **interchanges**. Through this system of economic dispatch, PJM as a whole realizes substantial fuel cost savings and distributes those savings among its members. In addition, power pooling enhances reliability of service and enables the member utilities to maintain smaller reserves.

In PJM, such reliability benefits are realized principally through long- and short-term planning for the adequacy of generation. PJM's capacity requirements are determined using the one-day-in-ten-years reliability criterion and include capacity that may be available in neighboring systems. These requirements are then allocated among member utilities. Currently, Delmarva Power and BGE use an 18% planning reserve margin to meet their PJM capacity obligation. PEPCO uses a 16% reserve margin. The determination of capacity requirements on a pool-wide basis permits members to share reserve capacity, thereby reducing the amount of capacity they would otherwise be forced to hold.

1.5 *ENERGY IMPORTS AND EXPORTS*

Because electricity sales to Maryland customers are greater than the amount of electricity generated in the state, a substantial quantity of energy is imported from neighboring states. Three utilities — BGE, Delmarva Power, and PEPCO — import energy from the Conemaugh and Keystone plants in western Pennsylvania (plants in which the three utilities hold partial ownership). Delmarva Power also imports electricity from both the Peach Bottom nuclear power plant in southern Pennsylvania and the Salem nuclear plant in southern New Jersey. PEPCO and BGE import substantial amounts of power from Ohio and Pennsylvania under long-term contracts. Maryland's status as a net importer of power is due principally to Delmarva Power and PE. Both companies have substantial customer bases in Maryland but at present generate very little energy in Maryland. Table 1-6 compares energy sales in the state, adjusted for losses, with the amount of energy generated in the state. The difference is the energy imported. The amount of electricity imported to and exported from Maryland in 1993 is shown in Figure 1-4.

Table 1-6 ***Exports and Imports of Energy into Maryland in 1993 (GWH)***

	BGE	COPCO	Delmarva Power	PE	PEPCO	Susque-hanna	Penelec	Somerset	Totals
Retail/ Wholesale Sales*	28,022	810	3,239	8,210	16,075	0	0	155	56,512
Generation	25,634	0	460	286	15,811	1,627	32	0	43,883
Imports (Exports)	2,388	810	2,779	7,924	264	(1,627)	(65)	155	12,629
Imports as Percent of Sales	8.5%	100.0%	85.8%	96.5%	1.6%	NA	NA	100.0%	22.3%

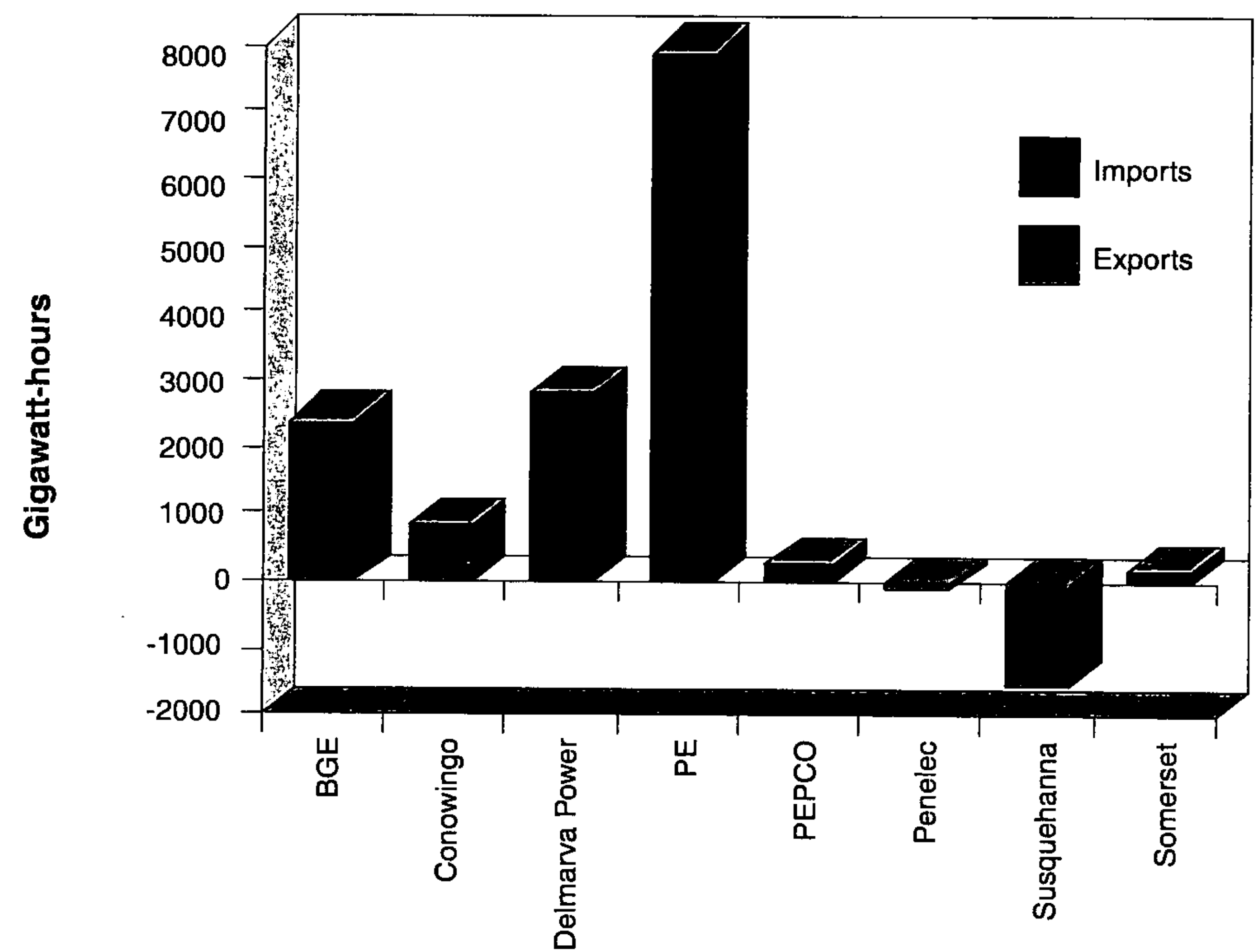
*Includes transmission and distribution losses

1.6 *THE ROLE OF TRANSMISSION*

Transmission facilities, consisting of high-voltage lines and transformers, play an integral role in providing electricity to the state's consumers. Transmission serves three principal functions. First, transmission lines connect generating facilities to load centers. This enables Maryland utilities to locate some of their large power stations in remote areas, or in other states, some distance from major load centers. Second, transmission systems enhance the reliability of the state's electric supplies by providing interconnections with neighboring utilities that may be able to provide assistance in times of emergency. Finally, in conjunction with membership in the PJM and APS power pools, transmission systems enable utilities in Maryland to reduce operating costs using the process of economic dispatch described in Section 1.4. Figure 1-5 shows the high voltage transmission grid in Maryland and neighboring states. The 500-kilovolt (kV) system is shared by Maryland utilities and PJM members in Pennsylvania, New Jersey, and Delaware. The system is also shared by PE, other members of the APS pool, and other utilities in western Pennsylvania.

Figure 1-5 illustrates the connections between generating stations and load centers in and around Maryland. BGE's Calvert Cliffs nuclear generating

Figure 1-4
Maryland Energy Imports and Exports, 1993



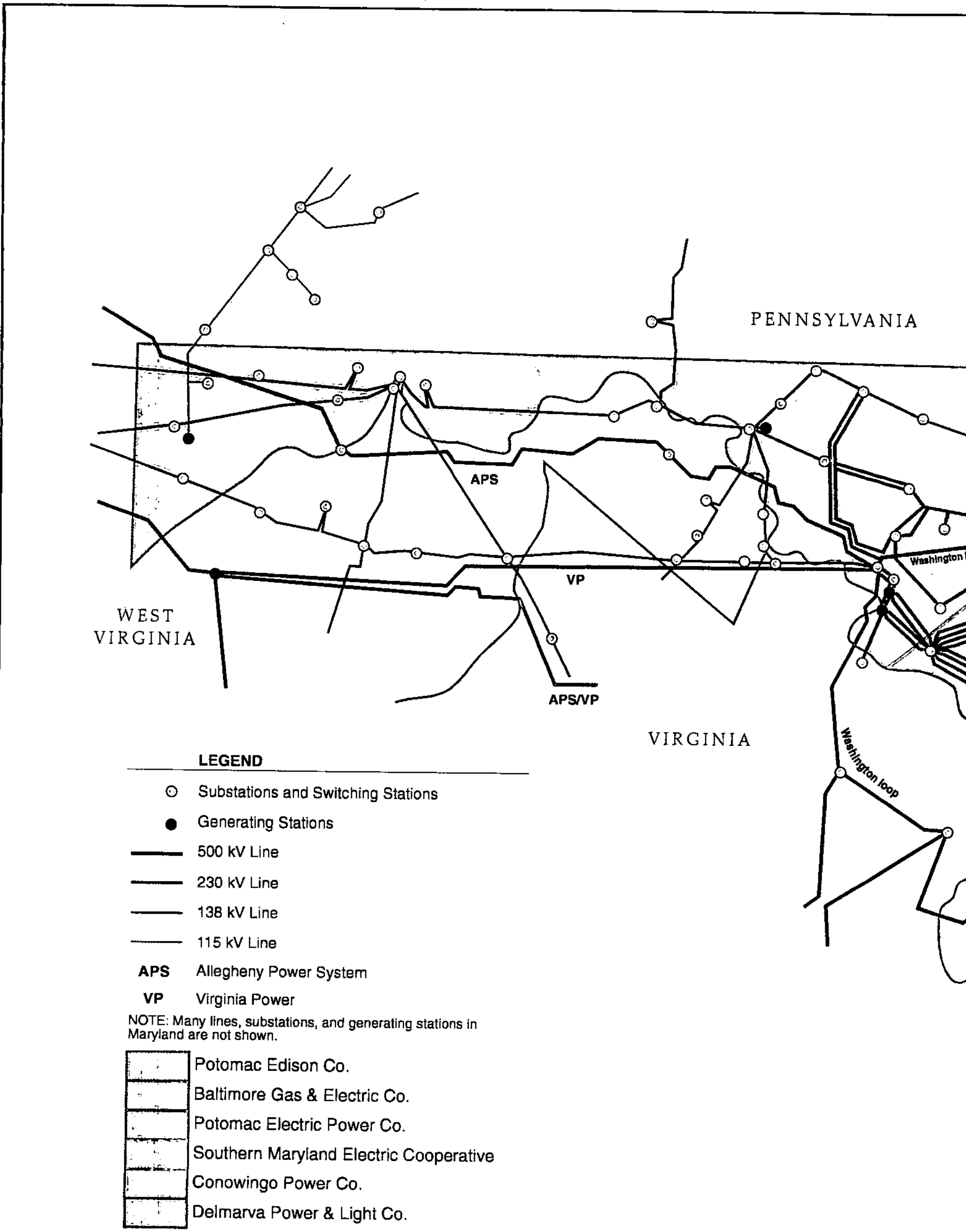
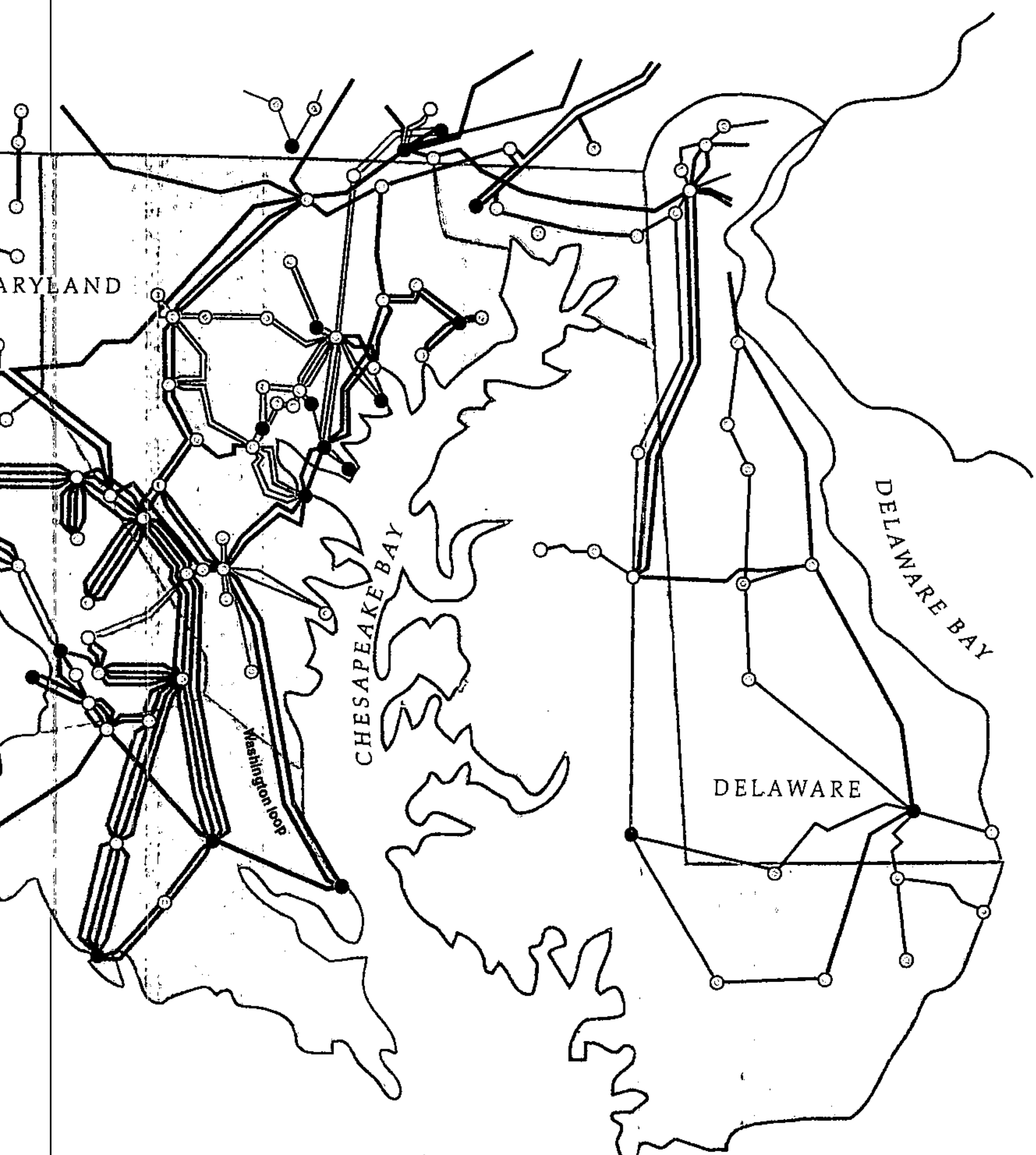

PENNSYLVANIA
WEST VIRGINIA
VIRGINIA
APS
VP
APS/VP
Washington loop
LEGEND
Substations and Switching Stations
Generating Stations
500 kV Line
230 kV Line
138 kV Line
115 kV Line
APS Allegheny Power System
VP Virginia Power
NOTE: Many lines, substations, and generating stations in Maryland are not shown.
Potomac Edison Co.
Baltimore Gas & Electric Co.
Potomac Electric Power Co.
Southern Maryland Electric Cooperative
Conowingo Power Co.
Delmarva Power & Light Co.

Figure 1-5
Major High Voltage Transmission Lines in Maryland and Nearby Areas - 1995



unit is connected by two 500-kV lines to the Baltimore-Washington metropolitan area. PEPCO's major generating facilities at Chalk Point, Dickerson, and Morgantown are connected to the Washington, D.C. metropolitan area through 230-kV lines. Delmarva Power's load on the Eastern Shore is connected to the company's generating facilities through 230- and 115-kV lines. Finally, PE's system is connected to company facilities located in other states through the 500-kV and lower voltage lines from the APS system in West Virginia and Pennsylvania.

One important addition to transmission facilities in the state was completed in May 1994 when two line segments were energized to complete the 500-kV loop around the Washington, D.C. area. One segment connects BGE's Calvert Cliffs plant with PEPCO's Chalk Point plant. A second segment connects BGE's Waugh Chapel substation with PEPCO's Brighton substation. The loop solidly ties the Calvert Cliffs and Chalk Point plants into the power grid and enhances access to power from the rest of PJM and neighboring power pools by BGE and PEPCO.

The 500-kV network in APS and PJM also delivers to Maryland utilities their share of the output of jointly owned generating stations in other states. These include the Conemaugh and Keystone coal plants in Pennsylvania and the nuclear units at Peach Bottom in Pennsylvania and at Salem in New Jersey. Beyond this, the high voltage grid makes possible PEPCO's 450-MW, 20-year capacity purchase from Ohio Edison Company. All Maryland utilities at various times have also used their share of the high voltage line system to purchase lower cost energy from APS and other utilities to the west of Pennsylvania. Because of the availability of such low cost energy in the west over the last several years, the high voltage lines connecting Maryland utilities to the APS system are heavily loaded most of the time.

1.7 MARYLAND'S ELECTRICITY USERS

Users of electricity in Maryland are generally classified as residential, commercial, industrial, or governmental. Tables 1-7, 1-8, and 1-9 present information on the sales of all Maryland utilities by customer class. Table 1-7 provides sales for IOUs, Table 1-8 for rural electric cooperatives, and Table 1-9 for municipal utilities. Table 1-10 combines these to show all retail electricity sales for the industry in Maryland. Overall, usage of electricity in Maryland is 60% non-residential and 40% residential, although each utility's customer base is different. Municipalities and rural cooperatives tend to sell a somewhat larger percentage of their total energy to households than do the larger IOUs. Figure 1-6 shows how the IOUs' total retail sales have changed over the past 11 years, and how they are projected to grow.

Table 1-7 ***IOU Electric Energy Sales in Maryland in 1993 (GWH)***

	BGE	COPCO	Delmarva Power	PE	PEPCO	Total
Residential	10,614	395	1,193	2,291	5,105	19,598
Commercial	2,659	151	965	1,228	7,699	12,702
Industrial	13,046	221	317	3,987		17,571
Other	453	1	12	13	189	668
Total Retail	26,772	768	2,478	7,519	12,993	50,539
Wholesale	—	—	641	397	2,321	3,359
Total	**26,772**	**768**	**3,128**	**7,916**	**15,314**	**53,898**
Loss Percentage	4.67%	5.49%	3.81%	3.71%	4.97%	—
Generation Required	28,022	810	3,239	8,210	16,075	56,365

Table 1-8 ***Rural Electric Cooperatives Electric Energy Sales in Maryland in 1993 (GWH)***

	Choptank	Somerset	SMECO	Total
Residential	393	88	1,326	1,807
Commercial	89	33	587	709
Industrial	54	27	156	237
Other	—	—	121	121
Total	**536**	**148**	**2,190**	**2,874**

Table 1-9 ***Municipal Utilities Electric Energy Sales in Maryland in 1993 (GWH)***

	Berlin	Easton	Hagerstown	Thurmont	Williamsport	Total
Residential	14	69	114	24	9	230
Commercial	10	124	57	26	2	219
Industrial	17	—	—	9	6	138
Other	1	7	9	1	1	19
Total	**42**	**200**	**295**	**51**	**18**	**606**

Table 1-10 Retail Electric Energy Sales in Maryland in 1993 (GWH)

	IOUs	Cooperatives	Municipals	Total
Residential	19,598	1,807	230	21,635
Commercial	12,702	709	219	13,630
Industrial	17,571	237	138	17,946
Other	668	—	19	808
Total	**50,539**	**2,874**	**606**	**54,019**

Most of Maryland's manufacturing industry is located in the service territories of BGE and PE, so a higher proportion of these two utilities' sales are to industrial customers. In fact, most of the total sales for these two utilities are to the primary metals industry in Maryland, because PE provides service to Eastalco Aluminum Company and BGE serves the Bethlehem Steel Company. Table 1-11 shows energy sales to the largest industries served by BGE and PE.

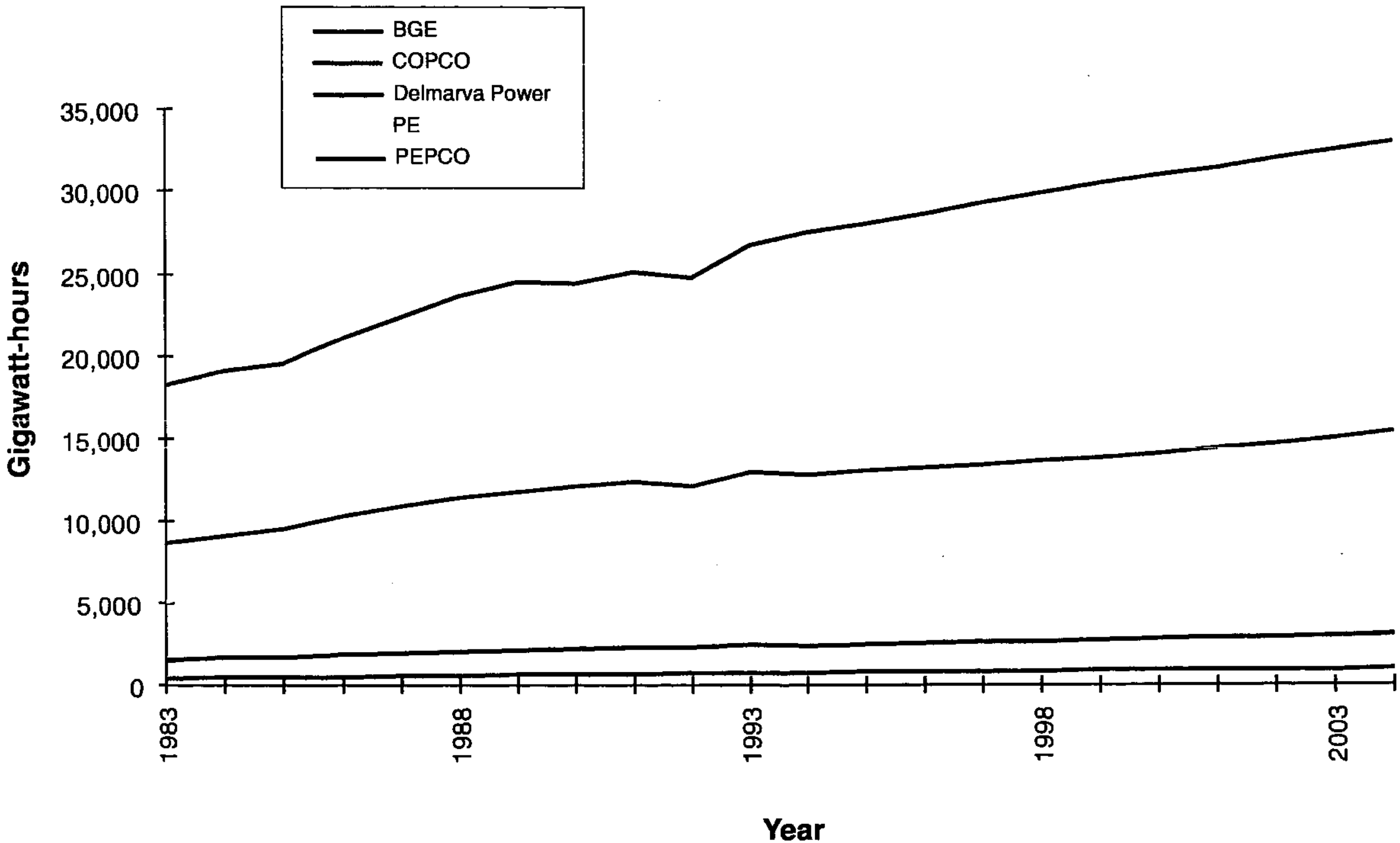
Energy sales in Maryland are expected to continue to grow, but at a slower rate than they have been recently. Table 1-12 shows gigawatt-hour sales by the five Maryland utilities during the period 1983 to 1993, and prospectively for the period 1994 to 2004. From 1983 to 1993, the annual rate of growth in energy sales in Maryland by Delmarva Power, BGE, COPCO, PE, and PEPCO (the five utilities accounting for more than 94% of all retail energy sales in the state) ranged from 3.9 to 5.3%, and averaged 4.0%. Over the ten years from 1994 to 2004, the annual rate of growth in energy sales is projected to range from 0.5 to 2.3%, for an average of 1.7%.

Table 1-11 Largest Industrial Sectors Served by Maryland Utilities (GWH)*

Industry	GWH
Primary metals	3,954
Chemicals	540
Stone and concrete	536
Paper	385
Electrical machinery	270
Total	**5,685**

*Based on 1992 data from BGE and 1993 PE data; other utilities serve primarily residential and commercial users.

Figure 1-6
Retail Sales of Major Maryland Utilities*



* Information projected for 1994 and beyond

Table 1-12 Retail Sales of Major Maryland Utilities, 1983-2004 (GWH)

	BGE	COPCO	Delmarva Power	PE	PEPCO	Total
1983	18,247	457	1,571	5,108	8,724	34,107
1984	19,123	477	1,695	5,769	9,116	36,180
1985	19,553	473	1,710	5,738	9,513	36,987
1986	21,129	538	1,861	5,657	10,305	39,490
1987	22,369	555	1,994	6,309	10,894	42,121
1988	23,680	619	2,100	6,663	11,425	44,487
1989	24,497	653	2,173	6,859	11,781	45,963
1990	24,401	687	2,228	6,960	12,130	46,406
1991	25,104	723	2,286	7,076	12,376	47,565
1992	24,823	729	2,355	7,164	12,158	47,229
1993	26,773	768	2,486	7,519	12,993	50,539
1994	27,562	799	2,442	7,578	12,839	51,220
1995	28,098	815	2,506	7,654	13,042	52,115
1996	28,689	831	2,565	7,754	13,246	53,085
1997	29,324	847	2,627	7,855	13,437	54,090
1998	29,983	878	2,693	7,881	13,639	55,074
1999	30,521	897	2,758	7,866	13,866	55,908
2000	31,062	916	2,825	7,682	14,145	56,630
2001	31,544	934	2,889	7,697	14,447	57,511
2002	32,080	953	2,955	7,761	14,757	58,506
2003	32,612	972	3,023	7,848	15,090	59,545
2004	33,139	991	3,090	7,934	15,453	60,607
Growth Rates						
1983 - 1993	3.9%	5.3%	4.7%	3.9%	4.1%	4.0%
1993 - 2004	2.0%	2.3%	2.0%	0.5%	1.6%	1.7%

Note: 1983-1993 data are actual; 1994 - 2004 data are forecast.

The factors most significantly affecting electricity demand in Maryland include growth in population, income, and employment; however, the large gains experienced in these areas in much of the state during the late 1980s is not expected to be repeated in the 1990s. Demand also depends upon the price of electricity, the energy efficiencies of electricity-using equipment, and the mix of business activities in the state. Maryland, along with the United States as a whole, is shifting to a more service-oriented economy, which tends to use less energy than heavy manufacturing on a per-worker basis. All of these factors are responsible for the slower rates of growth in electricity demand expected over the coming decade. A more complete discussion of the determinants of growth in electricity demand is included in Appendix A.

1.8 CONSERVATION AND DEMAND-SIDE MANAGEMENT IN MARYLAND

1.8.1 Background

Utilities traditionally have met growing customer power demands by constructing new generating capacity or purchasing wholesale bulk power from other suppliers. During the last 10 years, however, there has been a growing recognition that "managing" customer demands for electricity might be an economically more attractive and environmentally favorable method of serving part of the demand growth. Since the mid-1980s, Maryland electric utilities have focused considerable attention on **demand-side management** (DSM) programs as an alternative or supplement to expenditures on supply-side resources.

DSM programs typically fall into two basic categories: 1) load management, and 2) conservation.[1] **Load management** refers to utility programs designed to reduce customers' electric usage at peak demand hours or to shift such usage to the low demand hours. Such programs allow the utility to defer building or purchasing new capacity, because new capacity additions are driven by projected peak demand growth, which allows the utility to use its existing baseload units more efficiently. The savings from avoiding the capacity additions (and/or avoidance of expensive peak period fuels) flow back to utility customers. For example, a customer taking service under a curtailable rate, available under some DSM programs, normally will receive a rate discount reflecting the value of the interruptibility.

[1] Another type of DSM, strategic marketing, actually promotes the demand for electricity or new uses. The load enhancement is normally intended to increase use in the off-peak hours (e.g., night time security lighting) in order to improve the utility's system load factor while avoiding triggering the need for new capacity.

Load management programs are designed to save capacity and reduce peak period fuel use, but they are intended to have little or no impact on the total amount of electric energy (i.e., kWh) consumed. **Conservation** refers to utility-sponsored DSM programs that are designed to substantially reduce a customer's total energy use through increased energy efficiency. Most conservation programs also succeed in reducing peak demand significantly, but some conservation programs have little or no peak period impact and therefore are valued only for the energy savings.

In the mid-1980s, an acceleration in load growth prompted Maryland utilities to heavily emphasize load management, which was viewed as a cost-effective tool for reducing the large power plant construction burdens that utilities were facing at the time. The most important programs introduced or expanded at that time included interruptible or curtailable service to large business customers, time-of-day pricing for both residential and non-residential customer groups, and air conditioner/water heater cycling. Most of these programs could be introduced at relatively low cost, with participating customers receiving attractive rate discounts.

Utilities placed comparatively less emphasis at that time on conservation programs. Programs undertaken during the 1980s consisted mainly of home energy audits, conservation advertising, new home energy efficiency certifications, low income weatherization, and providing technical advice for customers. Approximately five years ago, utility sponsorship of conservation began to expand substantially, with the major change being the introduction of financial incentives in the form of customer rebates to encourage the purchase of high-efficiency equipment and appliances.

The expansion of conservation programs has required a large scale commitment of financial resources, with utilities spending tens of millions of dollars per year on program costs and rebates. In addition, to the extent successful, such programs imply a loss of retail sales revenue for the sponsoring utility. As a result, large scale conservation efforts on the part of utilities could not take place without changes to standard ratemaking practice. Under standard ratemaking, the increase in expenditures and loss of revenue from conservation programs would lead to an unacceptable deterioration in utility earnings between rate cases. To address this disincentive, the Maryland PSC has approved in recent years special surcharges for the recovery of utility conservation expenditures and losses in base revenue due to conservation programs. The surcharges also provide for incentive bonuses for the utility based upon a share of the net customer savings attributable to DSM. The surcharge method of cost recovery has effectively eliminated the disincentive to conservation program sponsorship that Maryland utilities previously faced.

It must be emphasized that substantial conservation efforts have been achieved, and will continue to take place, outside of utility-sponsored programs. Since the early 1980s, manufacturers have introduced and consumers and businesses have purchased electric equipment and appliances with increasing energy efficiencies, in response to market forces. In the late 1980s, federally mandated appliance efficiency standards were issued to be phased in during the 1990s. The 1992 Energy Policy Act mandated additional appliance efficiencies. The role of utility-sponsored conservation programs is to supplement and perhaps accelerate these existing market forces and federal standards, not replace them.

1.8.2 *DSM Trends in Maryland*

Maryland utilities are at various stages in the development and introduction of DSM programs. However, for all four major Maryland electric utilities, DSM is currently projected to meet a substantial percentage of the growth in power demands over the next 10 years. Table 1-13 provides a summary compilation of the projected savings from DSM programs over the next 10 years for Maryland's four major electric utilities.[2] Table 1-13 also demonstrates the amount of peak demand and energy usage growth which Maryland utilities expect to meet from conservation. This is shown in Figure 1-7. Although there is considerable variation among the four utilities, in each case DSM is expected to meet a substantial portion of the ten-year demand growth. For peak demand, DSM savings range from 26 to 53%, with the average for the four utilities at 46%. Utility conservation will meet a somewhat smaller percentage of the energy growth, ranging from 14 to 31% over the next ten years. The total for the four utilities is 22%. This pattern reflects the heavy utility commitment to load management (which saves virtually no energy) and the interest in exploiting opportunities to reduce peak demand.

[2] These four companies provide about 98% of total bulk power supply in Maryland. Since the DSM and power demand figures on Table 1-13 are total company figures, the projections are inclusive of the State of Delaware, the District of Columbia, and very small portions of Virginia and West Virginia. Maryland itself accounts for about three-fourths of the DSM savings shown on this table.

Figure 1-7
Percentage of Power Demand Growth Over the Next Ten Years to be Met by DSM Savings for Maryland Utilities

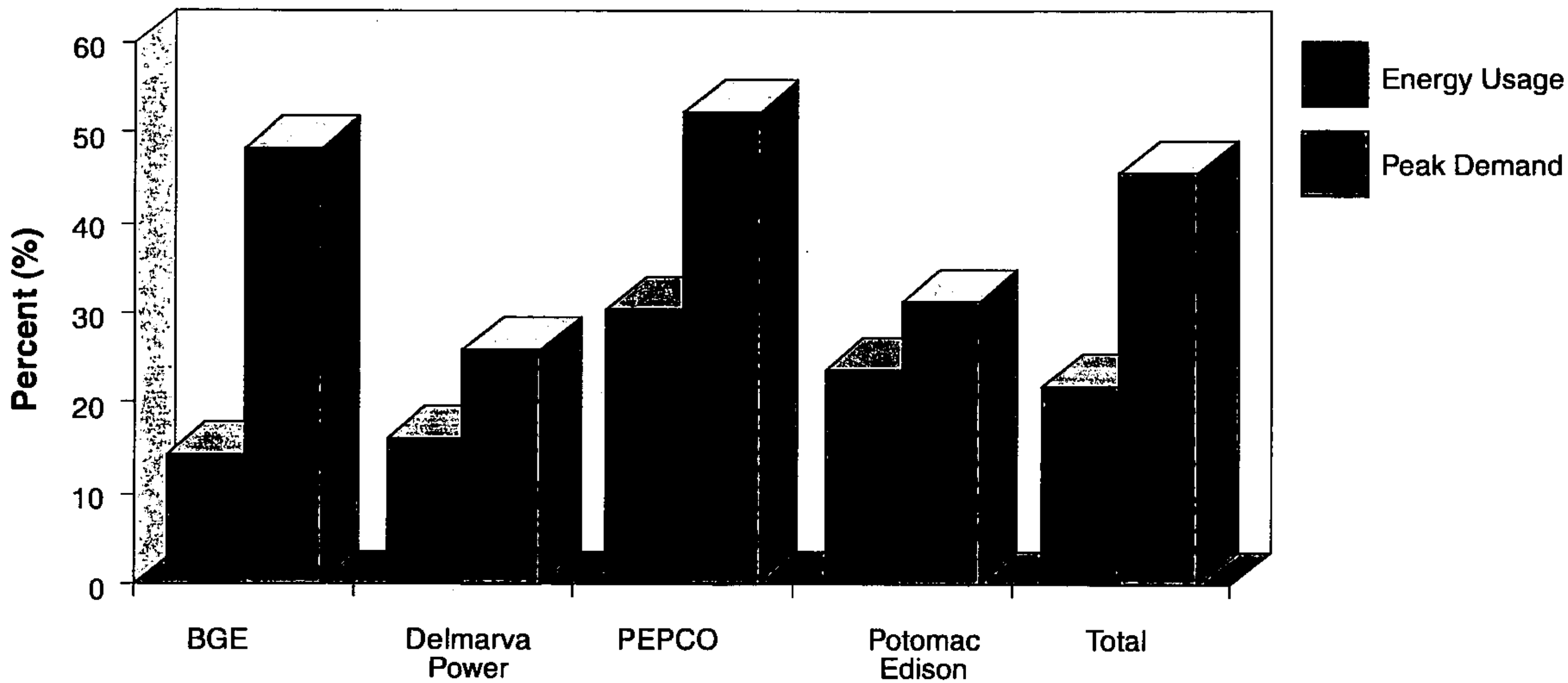


Table 1-13 The Role of DSM in Meeting the Growth in Power Demands for Maryland Electric Utilities (1994-2003)

	Projected Energy Use w/o DSM to be met			DSM Savings			
Utility	**1994**	**2003**	**Growth**	**1994**	**2003**	**Increase by DSM**	**% of Growth**
			Energy Usage (GWH)				
BGE	29,811	36,105	6,294	448	1,353	905	14.4%
Delmarva Power*	11,233	13,432	2,199	99	455	356	16.2
PEPCO	27,660	34,438	6,778	706	2,781	2,075	30.6
PE	12,372	13,982	1,610	325	704	379	23.5
Total	**81,076**	**97,957**	**16,881**	**1,578**	**5,293**	**3,715**	**22.0%**
			Peak Demand (MW)				
BGE	6,230	7,360	1,130	607	1,151	544	48.1%
Delmarva Power*	2,533	3,037	504	245	376	131	26.0
PEPCO	5,950	7,247	1,297	520	1,201	681	52.5
PE	2,507	2,963	456	172	314	142	31.1
Total	**17,220**	**20,607**	**3,387**	**1,540**	**3,042**	**1,548**	**45.7%**

*For Delmarva Power, 1995 was used as the base year due to the loss of ODEC load between 1994 and 1995.
Source: Utility 1994 long-range plans filed with the PSC in June/July 1994.

Table 1-14 demonstrates how much of total power demands in 1994 and 2003 will be met by utility DSM efforts based upon current projections. In 1994, DSM succeeded in meeting about 9% of the annual peak demand facing Maryland utilities and 2% of total electric energy usage. By 2003, this is expected to increase to 15% for peak demand and 5% for total energy. The reader is reminded that substantial energy conservation has been realized, and will continue to grow, outside of utility DSM programs and those savings are not shown on Table 1-14.

Table 1-14 DSM Savings in 1994 and 2003 for Maryland Electric Utilities (Percent of Total Demand for Power)

Utility	Peak Demand		Total Energy	
	1994	**2003**	**1994**	**2003**
BGE	9.7%	15.6%	1.5%	3.8%
Delmarva Power*	9.7	12.4	0.9	3.4
PEPCO	8.7	16.6	2.6	8.1
PE	6.9	10.6	2.6	5.0
Total	**8.9%**	**14.8%**	**2.0%**	**5.4%**

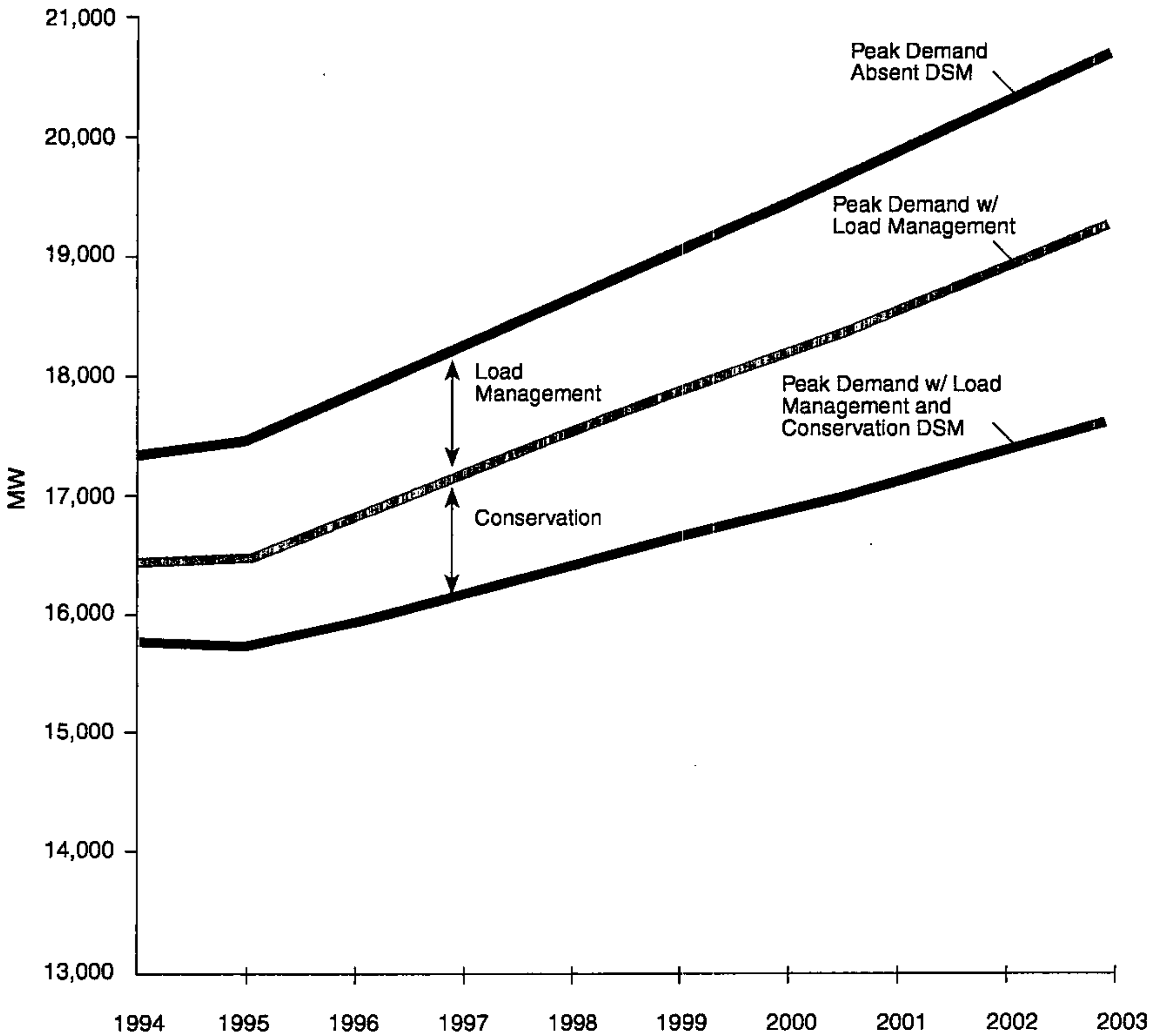
*Based on 1995 figures rather than 1994 due to the loss of the ODEC load between 1994 and 1995.
Source: Utility 1994 long-range plans filed with the Maryland PSC in June/July 1994.

Considerable caution must be exercised in making cross utility comparisons on Table 1-13. Differences in DSM growth projections on that table may be due to a number of utility-specific factors including the projected rate of growth in power demands (without DSM), inherent conservation or load savings opportunities, utility cost structures and other features. For example, since Potomac Edison is winter peaking, programs which primarily reduce summer peak demands might not have much value.

The projected savings from DSM for Maryland utilities is further shown on Figure 1-8. That figure shows the projected growth in peak demand over the next 10 years with and without DSM. The savings from DSM on Figure 1-8 is divided between load management and conservation programs. The middle growth path shows what projected peak demand would be if only load management programs were included in the projections, while the bottom growth path subtracts out all planned DSM. Hence, the vertical difference between the middle and bottom paths is the estimated peak demand savings from utility conservation programs.

Conservation programs differ somewhat among the four utilities, reflecting differences in customer types, utility needs, and perceptions concerning the most effective way of providing conservation services. Although the details differ, the programs expected to provide the most load savings and benefits would include the following:

Figure 1-8
Projected Peak Demand for Maryland Utilities With and Without DSM Savings*



*Based on the sum of projected peak demand and DSM peak demand savings of BGE, Delmarva Power, PEPCO, and PE.

Source: Utility 1994 long-range plans filed with the PSC in June/July 1994.

Residential

- Rebates for the purchase of higher efficiency heat pumps and air conditioners. The rebate is intended to cover all or a portion of the cost of "upgrading" from a standard model to a high-efficiency model.
- Rebates for the construction of high-efficiency new homes. The rebate may be provided to builders (or new homeowners) meeting certain prescribed standards of energy efficiency.
- To improve the energy efficiency of existing homes, the utility (or utility contractor) provides for the installation of a package of low-cost conservation measures and conducts an audit to determine whether additional energy saving investments are needed.

Commercial/Industrial

- Commercial and industrial facilities may be eligible for substantial rebates from investing in high-efficiency fluorescent lighting, as compared to "baseline" lighting efficiency.
- Commercial (and/or industrial) custom program involves rebates to property or facilities owners to cover the incremental costs of a range of energy efficient measures including lighting; high-efficiency heating, ventilation, and air conditioning; and building shell efficiency upgrades.
- In addition to the "customized" program, utilities provide industrial customers rebates for the purchase of high-efficiency motors.

These programs undergo periodic reassessments, and new programs are designed to target specific market niches. The reassessments are needed to determine whether the programs have been successful and what design modifications are needed.

The central feature of the conservation programs is to provide a financial incentive to the customer for selecting a high-efficiency measure relative to a "baseline" level of energy efficiency. The baseline is intended to represent the typical level of energy efficiency that would be selected by the customer in the absence of the incentive payment. The baseline for each measure must be periodically reevaluated and updated since market standards for customers will change over time.

The growth in DSM programs for Maryland utilities over the last five years parallels experience nationwide. The U.S. Department of Energy (DOE) reports that nationwide utility spending on DSM is expected to increase from an estimated $1.2 billion in 1990 to $4.0 billion by 1997. Savings in peak demand from DSM nationwide are expected to nearly double during the next 10 years.

Section 2

2.0 *POWER PLANT LICENSING IN MARYLAND*

2.1 *INTRODUCTION*

To build a power plant or transmission line in Maryland, a company must obtain a **Certificate of Public Convenience and Necessity (CPCN)** from the Maryland Public Service Commission (PSC). As part of this licensing process, applicants must address a full range of environmental, engineering, socioeconomic, planning, need, and cost issues. The Power Plant Siting Act of 1971 provides for a consolidated review of CPCN applications in Maryland. The Power Plant Research Program is responsible for managing that review and bringing to the PSC a consolidated set of licensing recommendations. This is the only process within the State regulatory framework that allows a comprehensive review of all electric power issues, with the goal of balancing the tradeoffs required to provide needed electrical power at reasonable cost while protecting the State's valuable natural resources.

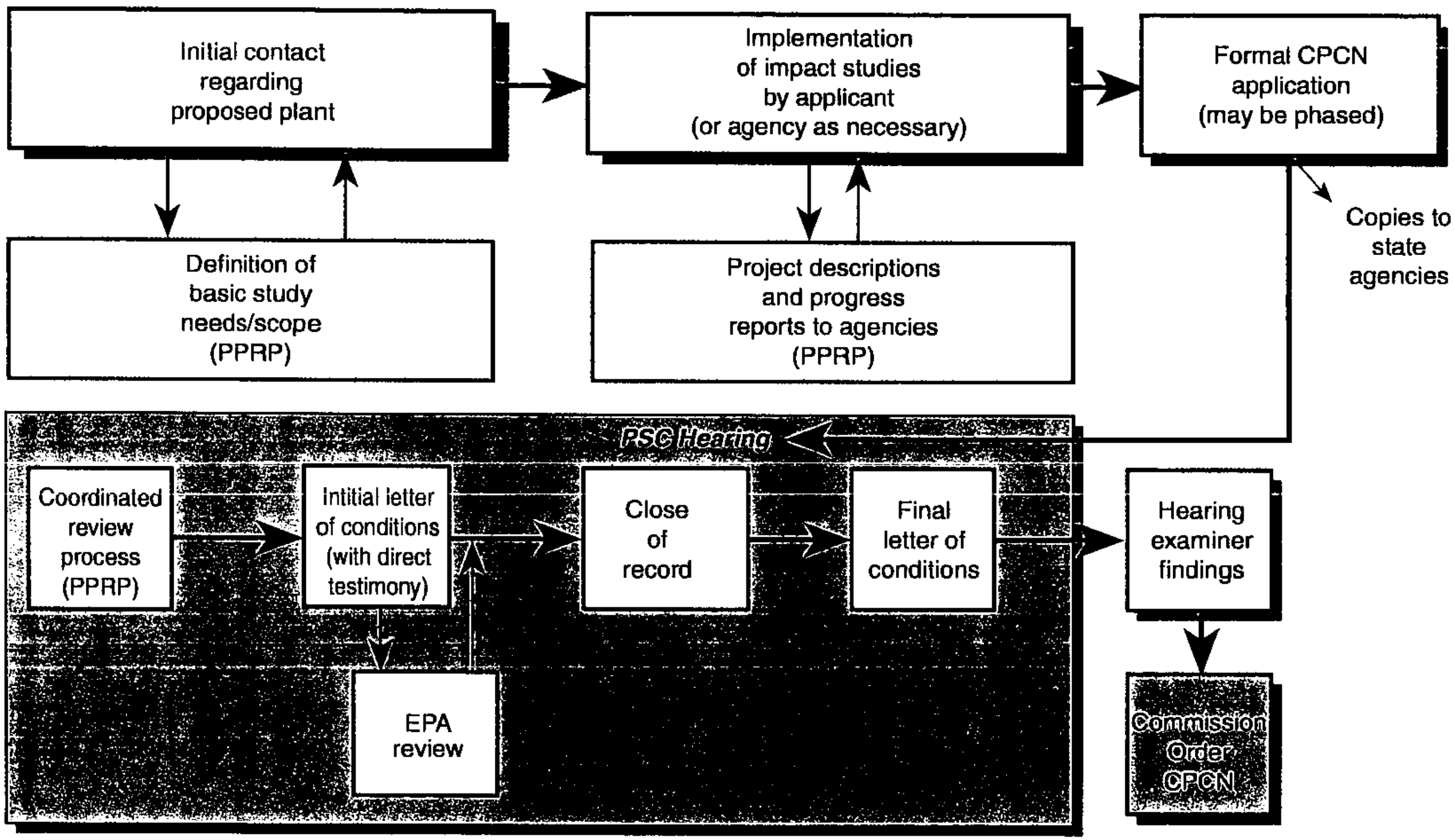
This section provides a description of the CPCN process, and discusses recent projects that PPRP has evaluated.

2.2 *THE CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY (CPCN) PROCESS*

PPRP is responsible for coordinating the State's **consolidated review** of proposed power generating and transmission facilities, and normally represents the State's position before the PSC in licensing cases. PPRP's coordination with an applicant for a new or modified power or transmission facility usually begins before the formal CPCN process is initiated (Figure 2-1). PPRP typically meets with the utility or non-utility developer to discuss an anticipated project. The meeting attempts to ensure that all issues are identified and any necessary studies are conducted prior to submittal of the CPCN application and the initiation of any adjudicatory process.

The CPCN application consists of direct testimony filed by the applicant in anticipation of an adjudicatory process before the PSC summarizing the proposed project and its impacts, as described in PSC regulations. The testimony is traditionally accompanied by an environmental review document that presents the applicant's environmental and socioeconomic studies conducted in support of the application. The CPCN, if issued,

Figure 2-1
CPCN Flow Diagram



constitutes permission to construct and operate the facility, and includes issuance of the required air quality and water appropriations permits.

Cases before the PSC are structured as administrative law proceedings, with lawyers representing the various parties involved. Parties to a case include the applicant, PPRP (acting on behalf of DNR and other state agencies), the PSC Staff, and the Office of People's Counsel (acting on behalf of the Maryland ratepayers). Other groups, such as federal agencies and private environmental organizations, as well as individuals, have a right to participate in the PSC hearing process. Any such parties can file testimony, participate in cross-examination of other parties, and file briefs with the PSC summarizing their position and any objections they may have regarding the proposed project. The process is flexible. Phasing, waivers, and specific scheduling requests can be addressed in a pre-hearing conference or at various points along the process.

Once the application is filed, PPRP reviews the testimony and the associated information on environmental, engineering, need, and socioeconomic impacts provided by the applicant. The PSC schedules a hearing at which all the parties to the proceeding actively participate and file their findings as formal testimony.

PPRP's direct testimony describes the analyses that the state performed to determine potential environmental and socioeconomic impacts from the proposed facility. PPRP's findings are subject to cross examination by any other parties to the case. PPRP also recommends to the PSC a number of special conditions to be included with the CPCN, if one is recommended to be issued. All interested state agencies have an opportunity to review the application, and to review and provide comments to PPRP before direct testimony is filed. Because air quality and water appropriations permits are part of the CPCN, the conditions presented to the PSC incorporate recommendations governing air emissions and the quantity of water that can be withdrawn from surface or ground water. Many state agencies have input to the recommended conditions, including the Departments of Agriculture, Business and Employment Development, Environment, Natural Resources, and Transportation, as well as the Maryland Office of Planning and the Maryland Energy Administration.

The PSC's Hearing Examiner for each case takes into consideration the license conditions recommended by the state, and the testimony and briefs filed by the applicant and all other parties, and issues a decision in the form of a proposed order on whether the CPCN should be granted and under what conditions. After an appeal period, a final order is released.

2.3 *STATUS OF RECENT LICENSING PROCEEDINGS*

Through most of the 1980s, utilities in Maryland had enough generating capacity to meet the needs of the state's electricity customers. By the end of the decade, however, growth in electricity demands had reduced the amount of excess capacity to the point where utilities and NUGs began to consider constructing new generating units and thus had to apply for CPCNs. The rest of this section highlights several recent CPCN cases before the Maryland PSC for power plants and transmission lines. Locations of the projects discussed in this section are indicated on Figure 2-2.

2.3.1 *Power Plant Cases*

2.3.1.1 *Perryman*

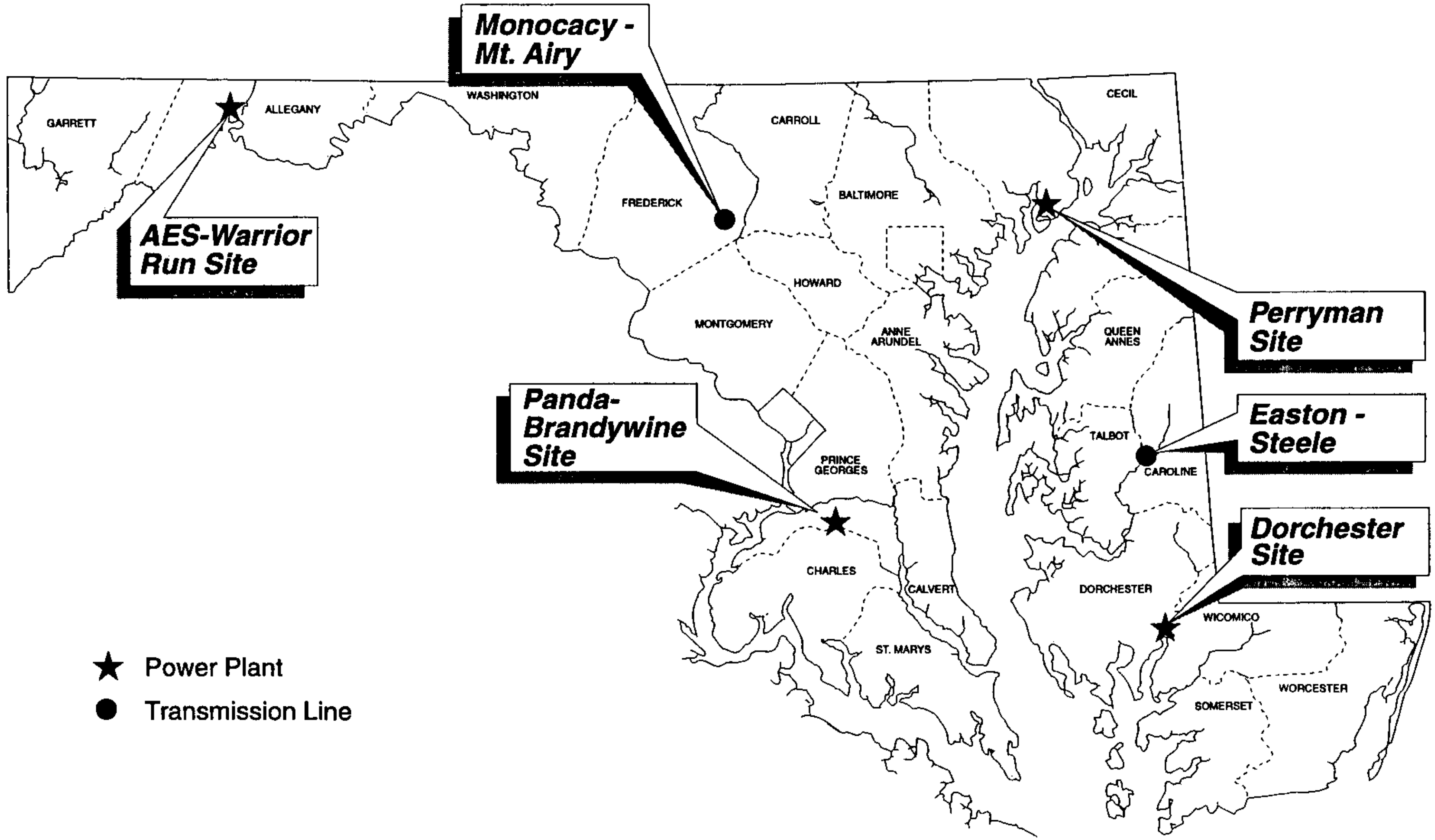
BGE operates an existing gas turbine facility at its Perryman site in Harford County (Figure 2-2). This plant went on line in 1971 and has a peaking capacity of 220 MW. In the early 1970s, BGE considered the site for construction of a nuclear generating facility. The company abandoned these plans and later identified the site for a future baseload coal-fired power plant. This was recently modified to a proposal for a gas-fired facility, which was the subject of a recent CPCN proceeding.

BGE applied for a CPCN in December 1989 to construct an 880-MW combined cycle facility at the Perryman site. BGE requested a phased approach to the Perryman licensing: Phase I addressed the environmental and technical issues associated with two 440-MW combined cycle units, and Phase II addressed the need, economics, and timing of the proposed units.

A significant regional issue examined during Phase I involved the source of water for the facility. Once the steam cycle is added — that is, when the simple cycle combustion turbines are converted to combined cycle operation — a large volume of water will be required to cool and condense the steam produced in the boiler. Two potential sources of water were evaluated: 1) Baltimore City's water system through the water pipeline (the so-called "Big Inch") connecting Baltimore to the Susquehanna River; and 2) treated effluent from the Sod Run wastewater treatment plant, which adjoins the Perryman site to the south.

Because the additional power generated by the steam cycle would not be needed immediately, BGE planned to put the simple cycle gas turbine on line prior to constructing the combined cycle component. This allowed the PSC to postpone the final determination of water source for the steam cycle until the proceeding is reopened to complete the combined cycle

Figure 2-2
Locations of Plants and Transmission Lines Involved in Recent PSC Proceedings



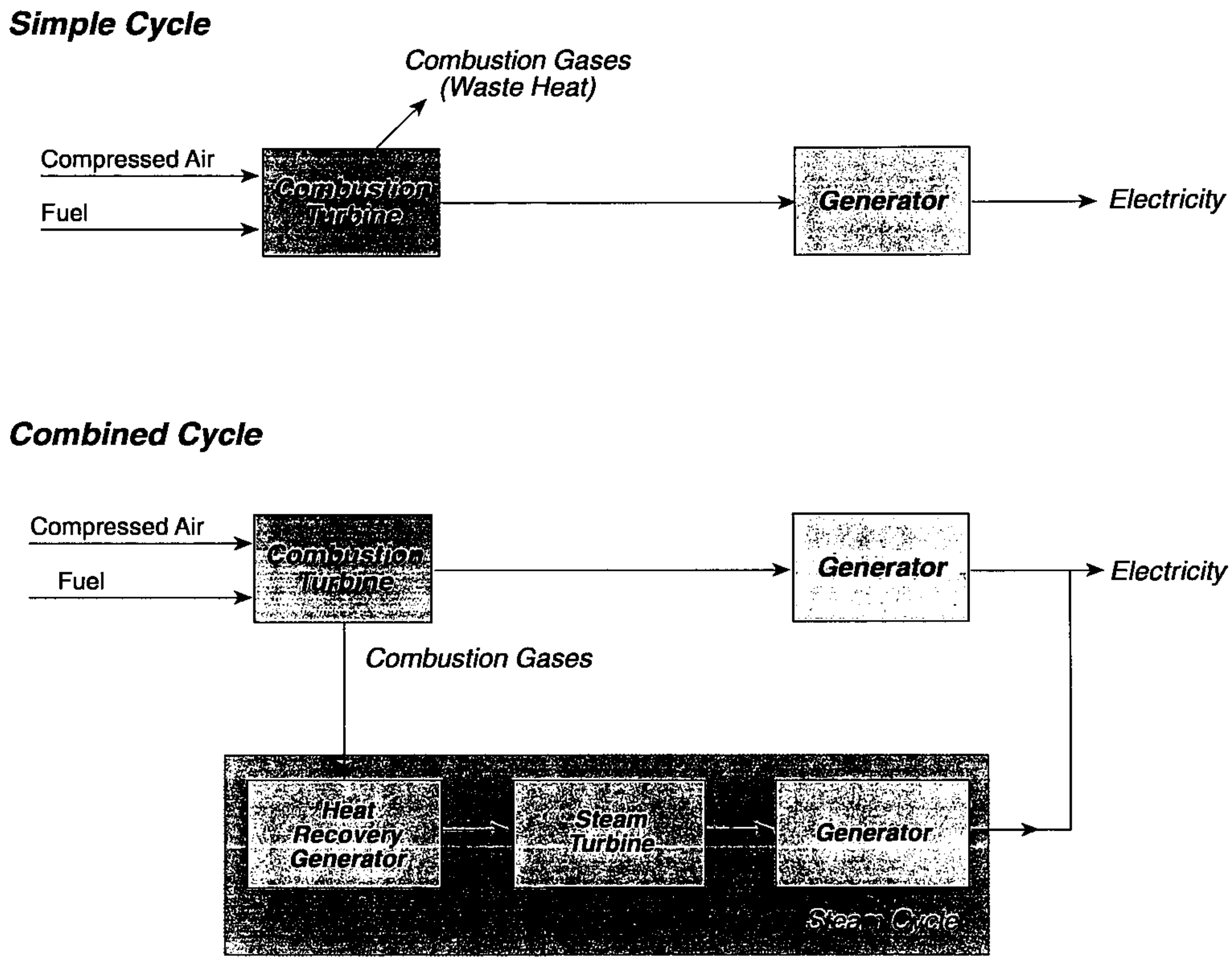
SIMPLE CYCLE VS. COMBINED CYCLE OPERATION

In simple cycle combustion turbines, hot gases from the burning of fuel (usually either natural gas or No. 2 fuel oil) are used to create mechanical energy, which is converted to electricity in a generator. The hot combustion gases are emitted directly from the turbine. Simple cycle turbines have relatively low efficiencies; only about 25% of the chemical energy in the fuel is actually converted to electrical energy. Because of the low efficiency of the process and the high cost of natural gas or oil, simple cycle turbines are more expensive to operate than coal-fired or nuclear units, and are only used during peak demand periods when all other available generating units are already running.

Combined cycle operation improves the efficiency of the power plant by using the thermal energy in the combustion gases that otherwise would be wasted. The hot combustion gases are sent to a type of boiler known as a heat recovery steam generator. Steam is produced to drive a steam turbine-generator unit and create additional electricity. The overall energy conversion efficiency of a combined cycle unit is typically about 40%, which is greater than most coal-fired or nuclear power plants.

Simple cycle and combined cycle operations are illustrated in the figure on the following page.

Simple Cycle vs. Combined Cycle Operation



phase, by which time more data on effluent quality and quantities from the Sod Run plant will be available. The water source must be determined prior to starting construction of the steam cycle portion of the facility.

Cogen Technologies, Inc., a non-utility generator, intervened in the need-for-power phase of the proceedings (Phase II) with the argument that they provided a more appropriate proposal to satisfy the need for power. The proposed alternative was a 513-MW cogeneration combined cycle power plant at an industrial site in Baltimore City, supplying electricity to BGE and steam to neighboring industrial facilities.

In May 1992, the PSC issued its final order, granting BGE a CPCN for one of the two proposed combined cycle units. The final CPCN conditions are included in Appendix B. The PSC also ruled that BGE must conduct a competitive bid after construction of the first simple cycle unit.

2.3.1.2 *Panda-Brandywine*

In conjunction with a PSC case evaluating PEPCO's options for purchased power, the PSC ruled in July 1992 that NUGs are required to obtain CPCNs. The combined cycle plant proposed by Panda Energy Corporation for a site near Brandywine in Prince George's County (Figure 2-2) was the first NUG project to go through the full CPCN licensing process. This proceeding was also noteworthy because of the extensive formal participation by area residents.

Panda proposed constructing a 248-MW combined cycle electricity generating plant that will operate as a cogeneration facility, supplying steam and water as feedstock to a distilled water manufacturing facility on site, which Panda will also build. Natural gas will be the primary fuel for the plant, with fuel oil as a backup. The electricity generated by the combined cycle plant will be sold to PEPCO.

The need for power and the viability of the Panda project had been established in a separate PSC proceeding involving PEPCO. In the first phase of the proceedings, Panda submitted one part of its CPCN application in September 1992 addressing air quality issues. A second phase, filed several months later, covered all remaining environmental and socioeconomic issues.

As with the Perryman project, water supply was a significant issue in the Panda-Brandywine licensing. Panda proposed using treated effluent from the Mattawoman wastewater treatment plant, to be conveyed to the site through a pipeline approximately 17 miles long. This conjunctive use of wastewater effluent, instead of the identified alternative, ground water, is an enlightened proposal that allows continued industrial development

PANDA-BRANDYWINE SAVING GROUND WATER

Panda-Brandywine, L.P., is constructing a nominal 248-MW generating station near Brandywine in Prince George's County, Maryland. In 1993, as part of its application for a Certificate of Public Convenience and Necessity (CPCN), Panda proposed using ground water to meet all the facility's water needs: approximately 300,000 gallons per day of process/potable water, and approximately 1.2 million gallons per day for cooling tower make-up. However, Panda was notified that DNR had an established policy stating that the use of potable ground water for industrial cooling does not meet the beneficial use requirements in COMAR since other water sources of lesser quality are available. PPRP recommended that Panda consider using treated effluent from a municipal wastewater treatment plant (WWTP) as an alternative cooling water source.

Panda followed up on PPRP's suggestion and evaluated the technical and cost feasibility of using treated effluent from the Mattawoman WWTP. The evaluation indicated that it represented a viable alternative, and Panda revised its CPCN application to reflect the change in water supply source. Both Panda and PPRP conducted analyses to confirm that the use of treated WWTP effluent would not harm the environment or human health. The CPCN issued in 1994 stipulated that WWTP effluent would be the primary source of water for the plant, and that ground water could only be used for cooling purposes during an emergency or during initial operations when the WWTP effluent might not be available. Panda's conjunctive use of water (two separate water uses from one withdrawal) will save about 400 million gallons of high quality ground water each year the facility is in operation.

without adding to the already high demands on ground water resources in southern Maryland. The CPCN was granted in 1994 (see conditions listed in Appendix C); groundbreaking for the plant occurred in May 1995, with a 1997 projected on-line date.

2.3.1.3 *AES-Warrior Run*

In 1988, the Maryland PSC approved a long-term contract between PE and Applied Energy Services (AES) Corporation. AES proposed building a 180-MW coal-fired cogeneration plant in Cumberland, Maryland. The plant was originally planned for operation in the mid-1990s; the on-line date has now been deferred until approximately 1999.

The proposed AES-Warrior Run site is in the Allegany County Industrial Park, approximately four miles south of Cumberland (Figure 2-2). The facility will utilize an atmospheric fluidized bed combustion boiler. AES has committed to using medium-sulfur Western Maryland coal, to the extent practicable, through a 20-year purchase agreement with Anker Energy, who will supply approximately 650,000 tons per year of Maryland coal to the Warrior Run plant.

As a cogenerator, AES plans to construct and operate an on-site facility producing 150 tons per day of food-grade carbon monoxide (CO_2). This plant, which will extract a portion of the CO_2 gases from the boiler exhaust, will be the primary steam host for the cogeneration plant. AES also may sell additional thermal energy to nearby customers.

After the PSC's July 1992 ruling in an unrelated PEPCO case that NUGs are subject to CPCN requirements, AES petitioned the PSC to waive the CPCN requirement for Warrior Run because of the timing of the ruling. The waiver was granted after AES assured the PSC that it would address ash disposal and transportation issues; PPRP coordinated resolution of these concerns. Groundbreaking for the facility occurred in October 1995.

2.3.1.4 *Dorchester Unit 1*

In September 1992, Delmarva Power applied for a CPCN to construct and operate a 300-MW pulverized coal generating unit, referred to as Dorchester Unit 1. The 1,130-acre site for the proposed plant is located in Dorchester County on Maryland's Eastern Shore, approximately two miles northwest of the Town of Vienna (Figure 2-2). At the time the CPCN application was filed, the proposed plant was scheduled for commercial operation in 2000, although the utility now expects to begin operation in 2004.

As in other major licensing cases, Delmarva Power requested a phased approach for the licensing of Dorchester Unit 1. The first phase of the application outlined the need for the proposed plant, the generating technology, alternative siting, and project financing. All these issues were resolved through stipulations agreed to by all the parties — PPRP (representing State agencies), Delmarva Power, PSC Staff, the Office of People's Counsel, and the Chesapeake Bay Foundation. Through this agreement, a technical working group was formed to provide input and review to Delmarva Power's integrated resource plan.

The second phase of the application addressed environmental and socioeconomic issues associated with the proposed plant. PPRP's impact assessment identified four key issues: 1) potential economic, safety, and environmental impacts associated with the delivery of coal to the plant by barge and rail; 2) aquatic impacts associated with the proposed intake structure on the Nanticoke River that would be used to supply cooling water to the proposed Dorchester Unit 1, a future Unit 2, and the existing Vienna Unit 8 power plant; 3) potential impacts to the federally and state-listed endangered Delmarva fox squirrel that has been observed on the Dorchester site; and 4) beneficial use of the plant's combustion by-products to reduce the amount of material placed in the proposed on-site landfill. All these concerns were resolved through a stipulation, again involving all parties in the case.

In March 1995, the PSC issued its order granting the CPCN, pending resolution of the on-line date and Delmarva Power's determination of need. The final license conditions are included in Appendix D.

2.3.2 *Transmission Line Cases*

As with construction of a power plant, construction of a transmission line in Maryland designed to carry 69 kV or greater also requires a CPCN. Two major transmission projects have recently received CPCNs: PE's Monocacy to Mount Airy line and Delmarva Power's Easton to Steele line. Brief descriptions of these recent transmission line cases are presented below; the project locations are shown on Figure 2-2.

2.3.2.1 *Monocacy to Mount Airy*

PE filed a CPCN application with the PSC for the proposed 230-kV Monocacy to Mount Airy transmission line in February 1991. The proposed 14.6-mile line would connect the Monocacy and Mount Airy Substations, and a proposed 0.9-mile loop would tie in the Eaglehead Substation. The project is located in Frederick County, adjacent to and in the Town of Frederick. The PSC issued a final order granting the CPCN in

STATION H

The Station H project is an expansion of PEPCO's Dickerson Generating Station in Montgomery County, Maryland. Station H was probably the most complex power plant licensing case that has been brought before the Maryland PSC, because of its many phases, and because it required preliminary evaluation of an advanced generating technology that had not been previously proposed in Maryland — coal gasification. The proceeding also involved a complex human health risk assessment, which PPRP sponsored, to examine potential combined risk from the proposed Station H, the existing Dickerson plant, and the proposed Montgomery County incinerator located nearby. PEPCO proposed constructing the plant in three stages, or elements:

- Element I - Four simple cycle combustion turbines, fueled with either natural gas or No. 2 fuel oil, with a total generating capacity of approximately 500 MW;
- Element II - Combined cycle stage, with the installation of two heat recovery and steam turbine generating systems, increasing total generating capacity to approximately 750 MW; and
- Element III - Coal gasification, in which the combustion turbines will begin using gas derived from coal as the primary fuel.

PEPCO requested and received a Certificate of Public Convenience and Necessity for Element I only, and has completed construction of two of the four simple cycle combustion turbines. The utility has not yet requested approval for the rest of the project. PPRP conducted a thorough environmental review of the simple cycle turbines, and also addressed the suitability of the Dickerson site for eventual addition of steam cycles and a coal gasifier. Key areas that will have to be examined closely as the project develops include air emissions, cultural resources, water supply, and management of coal gasification by-products.

1993. Clearing for the transmission line was initiated in the fall of 1993, and construction began in February 1994.

Issues that emerged during the evaluation included woodland impacts and forest fragmentation; clearing impacts, particularly with respect to wildlife and nesting birds; wetlands impacts and stream crossings; and impacts of electric and magnetic fields (EMF). Under the terms of the CPCN, PE was required to coordinate the timing of right-of-way clearing with DNR and the U.S. Fish and Wildlife Service to minimize impacts to migratory birds during the nesting season. PE was also required to develop a reforestation/afforestation plan, which will result in the planting of trees for shade and wind-blocks at schools and other sites as part of Frederick County's energy conservation program.

2.3.2.2 *Easton to Steele*

Delmarva Power applied to the PSC in February 1992 for a CPCN to build a 24-mile long, 138-kV transmission line extending from Delmarva Power's Steele Substation near Denton, Caroline County, to Easton in Talbot County, on Maryland's Eastern Shore, also traversing a small segment of Queen Anne's County. The PSC issued a proposed order granting the CPCN in December 1992. This order was appealed by adjacent property owners and a final order was issued in November 1993. Construction of the transmission line was initiated in the spring of 1994.

The majority of the proposed transmission line was located within an existing transmission line right-of-way. The dominant land use is agriculture, interspersed with limited areas of natural vegetation. Concerns that were raised during the evaluation included potential wetlands impacts, stream crossings, potential wildlife impacts, endangered species, woodland clearing, potential impacts to cultural resources, clearing and construction requirements for the portion of the line crossing through Tuckahoe State Park, proximity to the Easton Municipal Airport, and concerns with EMF at an elementary school in close proximity to the line.

Among other conditions, the CPCN requires that Delmarva Power calculate projected EMF levels for the transmission line at the centerline and edge of the right-of-way, as well as provide actual measurements of EMF levels once the line is energized, to ascertain the field limits associated with the transmission facility. This has become a condition that is recommended for all new transmission lines in Maryland.