

STRATEGIC PLANNING NEEDS AND CAPABILITIES:
A CASE STUDY OF A REGULATED COMPANY

by

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B.S., Tufts University
(1972)

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE
DEGREE OF
MASTER OF SCIENCE
at the
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
June 1977

Signature of Author.....
Alfred P. Sloan School of Management, June 1977

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Submitted to the Alfred P. Sloan School of Management
on May 12, 1977 in partial fulfillment of the
requirements for the Degree of Master of Science.

ABSTRACT

Any strategic planning system must be tailor-made to fit a particular company. A public utility will have some features common to any large industry, some features peculiar to a government regulated industry, and other features unique to the particular company.

This thesis is a study of the needs for a planning system at Public Service Electric and Gas Company (PSE&G) of New Jersey. I will attempt to determine the requirements for a system as determined by the situational setting in which I find PSE&G. Also required is a description of the planning system presently in use in the organization. By examining certain factors of the planning process I will arrive at a measure of the capabilities of this system. In addition a brief study of management perceptions and attitudes about the plan will be undertaken.

After accomplishing the above the major task will then be to determine the degree of match between the needs and capabilities of the planning system. This will be done by comparing the adaptive and integrative needs of the company with the capabilities in the system for both adaptation and integration. The result will be an analysis of PSE&G's planning system and some general thoughts and recommendations.

This study is part of a project studying the planning system of twenty-nine different companies. The research material used was common to all participants

in the study, and as a result there was much interpretation involved in order to adapt the materials to a particular company. Thus much of the data, although it may appear to be highly quantitative, must of necessity be highly judgmental. It is a combination of financial and numerical data, answers to questionnaires, and discussions with the management at PSE&G. The result is my determination of the suitability of PSE&G's planning system.

Thesis Supervisor: Peter Lorange
Assistant Professor

ACKNOWLEDGEMENTS

I would like to thank my thesis supervisor, Peter Lorange, for his help with this study. The comments of both Peter and Ben Ball during the Management Planning and Control Seminar are also appreciated. To those at Public Service Electric and Gas Company who took the time to help me I am particularly grateful, with special thanks to Everett Morris for his kind attention.

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CHAPTER I
INDUSTRY AND COMPANY BACKGROUND

When discussing the strategic planning system of any company one is trying to assess the way a company decides where it is going and how it plans to get there. In order to discuss this it is useful to have some sense of where the company, and the industry of which it is a part, have come from. To this end some discussion of background is appropriate.

The public utilities industry is often considered to be a natural monopoly.¹ This is due to the economics of scale of generating stations, transmission lines and distribution facilities. In addition it is argued that there are economies of scale to be gained in the administration and organization of a monopolistic public utility. As utilities showed a tendency to become more monopolistic government regulation increased. The result has been that the public utilities have become highly centralized organizations with decentralization occurring primarily in the form of geographic divisions for service-oriented activities.

There are several factors that are crucial to the operation of a utility. Construction is a significant variable, and much of the planning within a company revolves around this. Operations are also important.

Here it is the reliability of supply that must be monitored. On the finance side, having the cash flow necessary to support the heavy capital expenditures is another important variable. Finally, one must always be aware of the strong role that government regulatory agencies play in the running of the public utility.

The major federal pieces of legislation are the Federal Water Power Act of 1920, the Securities Act of 1933, the Securities and Exchange Act of 1934, the Public Utility Holding Company Act of 1935, and the Federal Power Act of 1935. Such laws are designed to insure the operation of the public utility "in the public interest." Rate regulation is a major function of regulatory agencies, and this is one of the main reasons that a public utility and its planning system must be regarded somewhat differently than most non-regulated industries in the private sector. In addition there are numerous state regulations with which the utility must comply.

PSE&G is located in the state of New Jersey. It serves a highly industrialized portion of the state that contains 77% of the state's population including its six largest cities. Exhibit 1 gives population and land area figures. The area has enjoyed a healthy growth trend through the years. It includes major

EXHIBIT 1

POPULATION AND LAND AREA

	Municipalities		
	Number	Land Area - Square Miles	Population
Served by:			
PSE&G			
Electric Only	33	200	736,255
Gas Only	74	1150	747,675
Both Electric and Gas	190	1200	4,219,715
Electric and/or Gas	297	2550	5,703,645
Other Utilities	270	4960	1,730,275
STATE TOTAL	567	7510	7,433,920

*(From Financial and Statistical Review 1965/1975 -
PSE&G; P. 2)

industrial facilities for 93 of the nation's top 100 firms. Residential development has shown a growth trend, and as a result there has been considerable increase in commercial facilities.

The company was established in 1924 as a result of a merger and consolidation agreement between Public Service Electric Company, Public Service Gas Company, and United Electric Company of New Jersey.² These three companies had been formed in the early part of the century. By 1910 Public Service Electric and United Electric of New Jersey operated as subsidiaries of Public Service Gas. Between 1924 and 1939 PSE&G merged with the remaining electric and gas companies whose properties had been operated by PSE&G under leasing arrangements. Energy Development Corporation (EDC) was formed in 1972 as a wholly-owned subsidiary. Its purpose was to develop natural gas reserves through participation in exploration and drilling programs. EDC joined several other utilities with an end to locating and investigating potential sources of uranium ore in the western United States in 1975. In 1972 Eascogas LNG was formed by PSE&G and Algonquin Gas Transmission Co. as a joint venture for importing liquified natural gas from Algeria. Thus a trend toward exploration and acquisition of new

sources can be seen.

Rates are set by the New Jersey State Public Utility Commission. They control intrastate sales of utility and gas. The Federal Power Commission (FPC) regulates the interstate sales and exchanges of electricity and the intrastate sales of electricity for resale.

To more fully understand the company I will now consider the situational factors which more completely describe PSE&G.

CHAPTER II
THE SITUATIONAL SETTING

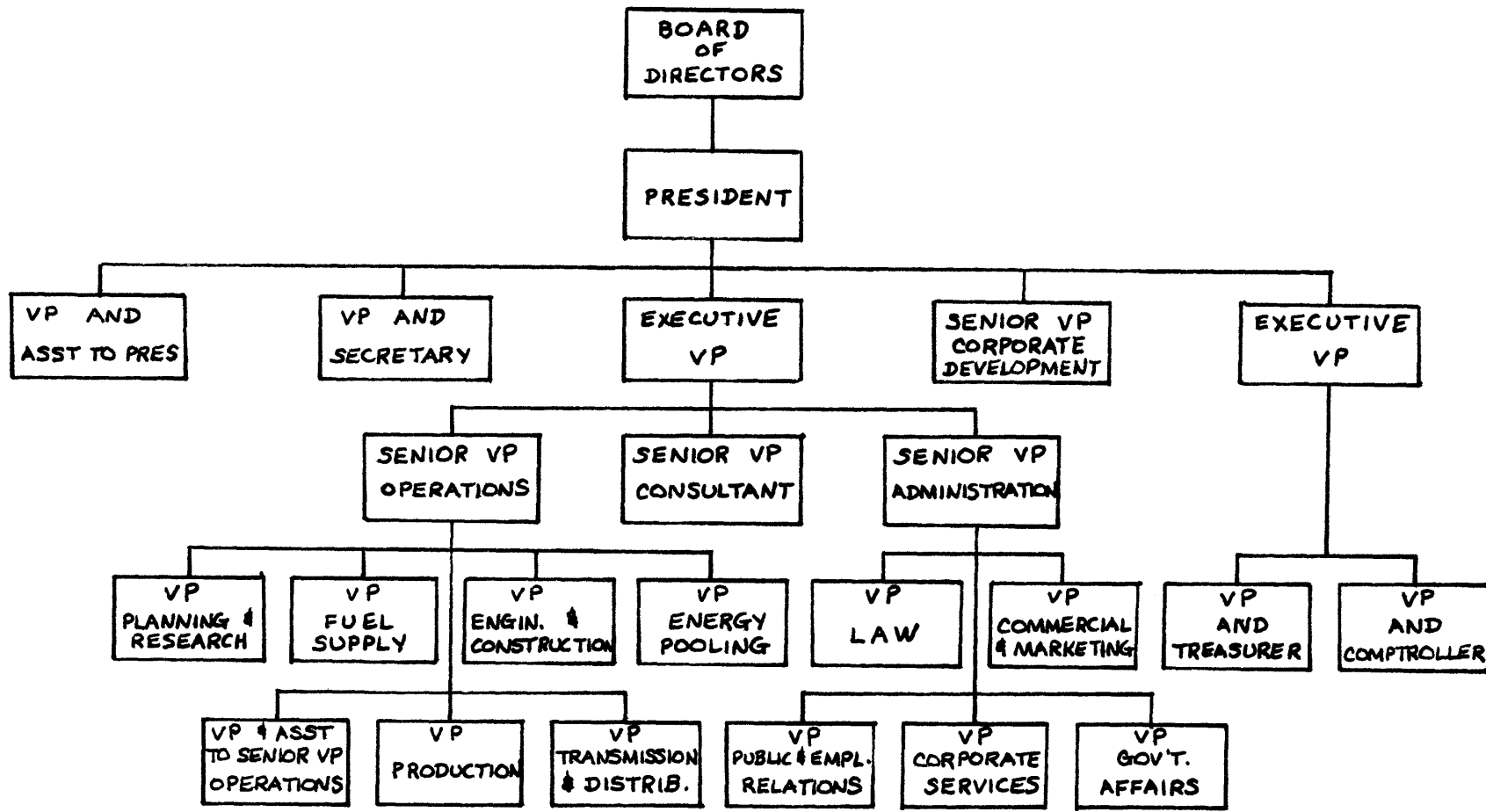
The situational setting of any company may be assessed along three dimensions. The first is a determination of the structure and the degree of diversity of the firm.¹ This involves an examination of the organization itself. The second dimension is the external environment. Here one is more concerned with influences outside the firm and over which it has little direct control. Finally the situational setting looks at the market and the competition. In each of these dimensions one must perform an analysis taking into account the goals and risk-taking willingness of senior management. An examination of the situational setting of PSE&G should lead one to a determination of the need for a planning system in their environment. If one concludes there is such a need one will then have an indication of what kinds of elements should be emphasized in the design of their strategic planning system. These elements are classified as either adaptive or integrative. The need for adaptation implies "a need to cope with discontinuities in the firm's environment and to seize new opportunities and avoid arising threats."² Integrative planning needs, on the other hand, imply the need "to coordinate the many processes of a corporation's diverse activity-centers to avoid duplications or bottlenecks, make available appropriate financing, and create an efficient planned pattern for the interaction between money, men, materials, and information."³ I will now consider each of

the above dimensions in turn.

PSE&G must be viewed as a functional, single business organization (see Exhibit 2). Although electricity and gas operations are treated somewhat independently they cannot be said to each have the responsibility and resources needed to engineer, produce and market their products. While separate accounting data is maintained this is more out of necessity to meet government regulations rather than a desire to operate separately. Gas and electric rates are set separately and therefore separate financial data is required. PSE&G has three subsidiaries that comprise a very small percentage of the total business. Indeed, one of them, Transport of New Jersey (TNJ), has operated at a net loss in the recent past. The others are Energy Development Corporation (EDC), a wholly-owned subsidiary formed in 1972 to develop natural gas reserves by participation in exploration and drilling programs. Eascogas LNG, Inc. is a joint venture with Algonquin Gas Transmission Company formed in 1972 to import liquified natural gas from Algeria. Since management considers itself to be essentially in the business of refining and supplying gas and electricity I shall settle on a functional description of PSE&G's structure.

One of the most important decisions one must make about the company is a definition of their strategic business units (SBUs). Such units should exhibit identifiable independence

EXHIBIT 2
 ORGANIZATION OF PSE&G



from each other and there should be some evidence that decisions are made separately in these units. I will divide PSE&G into two SBUs, electric and gas. There are several reasons for settling on this division rather than some other. First, senior management thinks of themselves this way. Although there is currently some effort to merge the planning functions so as to balance their different peaks (electricity peak load is in the summer, that of gas in winter), management feels that while rates must be set independently the electric and gas departments must remain distinct. This view is reinforced when one looks down the organizational chart (see Exhibits 3 and 4) and notices the breakdowns into gas and electric.

The production process for each of these strategic business units is a continuous process production. The service end of the business is considered by its managers to be complex and individualized. Service in this instance refers to the customer service of providing both quality and quantity. It includes such services as meter reading, collection activities, public relations, customer liason.

The product lifecycle is another feature of the situational setting that is critical to determining planning needs. Both electric and gas may be said to be in the mature stage, i.e.

the products or services are familiar to a vast majority of prospective users, and the technology and competitive structure

EXHIBIT 3
ORGANIZATION - PRODUCTION

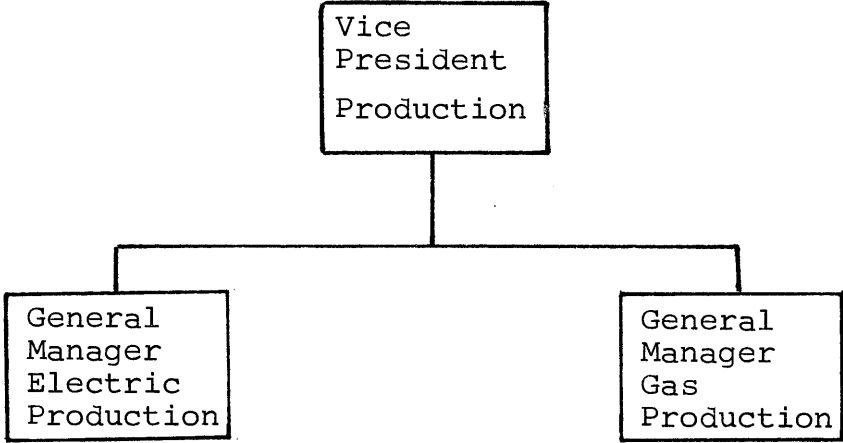
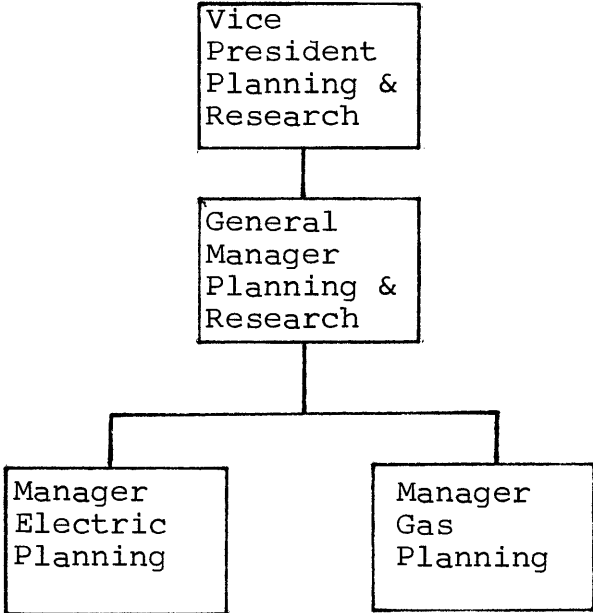


EXHIBIT 4
ORGANIZATION - PLANNING & RESEARCH



is reasonably stable. Solar energy is a product that would presently be considered to be in the introductory stage. Indeed, at the present time it is still in the research and development stage.

The risks faced by these two strategic business units are somewhat different. In both cases, in fact by the very nature of the industry, the customers are in a sense predetermined. By this I mean that a homeowner, for instance, does not arbitrarily decide he wants gas or electric heat. In the long run this is less obvious as a homeowner or industry may change locations and thereby change the form of power. Seasonality patterns are reversed, with the gas peak in winter while the electric peak occurs in the summer. Risk is also diversified with respect to raw materials. Electricity uses uranium (15% of the electric power is nuclear generated) and fossil fuels. Gas raw materials are natural gas, liquified natural gas (LNG), and synthetic natural gas (SNG).

In terms of adaptive and integrative needs most of the above indicates low needs for both adaptation and integration. (See Appendix A for details of adaptation/integration needs scoring). The exception is the definition of product life cycles as mature. Usually this shows medium needs for adaptation and high needs for integration. However, this is a perfect example of where one must be cognizant of the difference between an energy utility and most unregulated manufacturing

industries. In most cases a preponderance of SBUs in the mature stage indicates a need to look around for new opportunities. Yet, in the energy business, one is reasonably safe in assuming that the product will not go into a decline stage. It is important to keep abreast of new processes, but the product is likely to remain.

Looking at financial data (Appendix A - Part II) one sees a greater indication of high adaptive and high integrative needs.

From here I proceed to look at the competitive position of the SBUs (Appendix A - Part III). Here again one is in a unique position in an energy public utility. Market growth has been minimal. Before the "energy crisis" of 1973 it held at about 7%, while since then it has run around 4%. Market share, however, is really 100% since "competitors" do not exist for PSE&G's products. Market share can also be considered as percentage of the total energy market. Here market shares are considerably smaller (in 1974 they were 11.2% for electric, 20.3% for gas of the total N.J. energy market). Yet again the uniqueness of the situation cannot be ignored and the difficulty of changing from one "product" to another. When considering market share at 100%, I would conclude that the SBU has low adaptation needs but high needs for integration. The slow growth in the market also implies low adaptive needs, while the stability in market share shows low needs for integration.

Finally, one must look at managerial positioning as an element of the situational setting (Appendix A - Part IV). The managers in this case may be seen as critical administrators working within a framework of fixed policies and procedures. Compensation is essentially fixed and loyalty is more of a motivator than is entrepreneurship. Management sees competitors actions and strategies (e.g. oil) as having little impact on planned funds flow while factors such as the rate of technological change, changing customer requirements, changing demand patterns, material or supply shortage, or substitute products becoming available are viewed as having a somewhat greater impact. The environmental factors seen by management as having a critical impact on planned funds flow are the general level of the economy, changing material costs, and changing government regulations and tax policies. Each of these three factors are difficult for the company to respond to and therefore imply low adaptive needs. Low integrative needs are also indicated due to the difficulty in predicting these factors.

When summing across factors at the aggregate level I find the needs to be low for both adaptive and integrative planning. The bulk of the high adaptation needs result from the financial data. Much of this may be due to the qualitative judgments made here (what is a "considerable" increase in EPS?), and also to the fact that these are essentially adaptation or integration measures. I am in fact choosing between "high adaptation" or

"high integration

Under such circumstances it is reasonable to expect that one will come up with high measures. Qualitatively these trends were not extreme. Thus one must qualify the high adaptation needs. The aggregate output indicates the need for a planning system with low requirements for adaptation and integration.

One must, however, look beyond the aggregate level to fully understand the needs of this company. I believe comparing needs and capabilities is a useful way to look at all the companies in this study for terms of comparison, but one must be careful in how one determines exactly what the needs and capabilities are. Some kind of a weighting process would be ideal. As I have already mentioned, many of these scorings are highly judgmental and for that reason it would be meaningless to assign elaborate weighting techniques to the factors. Yet a look at how one would go about such a process and what it would mean in the case of PSE&G will prove enlightening.

The first question one must consider is "are these dimensions meaningful measures for this company given its peculiar situation?" In this way I will arrive at a determination of whether each dimension should be considered heavily, somewhat, or only a little when determining the final measure of the company's needs. This is as fine a weighting process as one can hope to achieve under present circumstances. A look at each dimension is now in order.

First one must consider the dimension I have labeled Diversity, Strategy, Structure. This seems to be an indicator that can be used universally across companies. There is nothing peculiar to a government regulated company that would make this a meaningless dimension. The fact of government regulation will affect what the ratings are. One must be careful to distinguish between having an affect on the ratings and rendering the ratings meaningless. Regulation is a fact of life for an energy company but this does not make the fact that the company is undiversified any less meaningful. Individual elements of this dimension, however, may be considered as having less impact on this study than others. For example, the element "products in mature stage" is less meaningful for this company than for most private companies. I believe this to be essentially a question of cause and effect. In most industries a majority of products in the mature stage indicates a need to do something about this unfavorable situation. It also indicates that one must carefully watch these products to observe when they enter the decline stage. This simply does not apply in this case. It is unlikely that the products will enter the decline stage, and the company is highly restricted in terms of the new businesses that it can acquire to balance out its portfolio. This is the most notable exception to the usefulness of the diversity, strategy, structure dimension. So the conclusion is that this dimension, which should be weighted heavily in

a determination of the company's needs, indicates low needs for adaptation while the measures for high and low integration are well balanced.

The next dimension (Appendix A - Part II) of the situational setting is Operating Results and Balance Sheet Information. Here the results show high needs for adaptation and high needs for integration. The argument used to indicate that this dimension has little relevance in determining the needs of PSE&G for a planning system is the same as that used above in reference to the maturity of the product lines. There is a trend for money to be coming into the business and this usually indicates the opportunity to diversify. But as the company cannot really diversify, and needs cash for heavy construction expenditures, one must look at these indicators from a different point of view. Indeed, the trends are necessary to maintain corporate goals which are dominated by the need to maintain a solid financial position and a steady return to shareholders. Thus while I would give the integrative scores high ratings for relevance to this study, the adaptive scorings must be relegated to the realm of "little importance

A look at Competitive Position leads one to the same argument as that used above. All of the ratings dealing with competitive products and product differentiation are of little value in the restricted environment in which this company operates. The notion of cash generators and cash consumers

and a balanced portfolio cannot be addressed in this situation. The conclusion must be that this portion of the ratings has little importance for PSE&G.

The final dimension of the situational setting is that of Managerial Positioning. Here again is a category that is universally applicable and as such should be weighted as having high relevance to this study. The policies and style of top management have some influence on any organization. The issue of cause and effect may still be a little muddy since it is difficult to determine if the managerial style affects the organization or if the regulated organization tends to attract managers with a particular style. This is a difficult hypothesis to test. This study does not address such a problem, and for my purposes I will assume the former and weight this section as having somewhat of an influence to account for the problem. I urge the reader, however, to remember the manner in which this judgment was arrived at, and consider this qualitatively when looking at the final results.

In addition to looking at the dimensions measured by the scoresheets there are two others which are not directly addressed but which deserve mention and are of particular importance in this industry. The first of these deals with adaptive needs. The issue of dealing with the political, economic, and physical environment is critical in this industry. Evidence of

this is seen in the existence of a Forecasting Department, and from discussions with different managers in the company. The managerial perception is that this is important, and when one observes the situation one must agree. Thus the conclusion is that there are high adaptive needs for environmental scanning.

The second additional element that must be considered is the issue of vertical integration. This is a vertically integrated industry, dealing with the production, transmission, and customer servicing of gas and electricity. As such there must be an emphasis on integrating the different levels of the business. The different classification of customers into residential, commercial, industrial, and street lighting also indicates high integrative needs, and this rating must be added to those above.

Now one must look at these new classifications and see if they yield different results from the aggregate results. While it is difficult to quantify these results a scan will indicate that the measures now call for a system with low adaptive capabilities except in the area of environmental scanning where the needs are for high adaptation. Integrative needs come out closer to being high. This is not clearcut, but when one looks at the additional factors not used in the scoresheets the requirements certainly lean toward those for a highly integrative system.

This kind of an elemental analysis has thus yielded a somewhat different picture of the needs for a planning system at PSE&G. The implication is, of course, that it is a more relevant picture than the simple aggregate one.

CHAPTER III
THE PLANNING SYSTEM

Having determined the requirements of a planning system for PSE&G I must now examine the current system and analyze its capabilities. This examination will take place in two parts. First there will be a description of planning systems within the company. After this I will attempt a discussion of the adaptive and integrative capabilities referring to specific features of the system.

Planning: A Description

Planning at PSE&G may be seen starting at two levels. The Corporate Model integrates these levels and results in a 5-year Financial Plan. It is composed of a Capital Budget, an Operating Budget, and a Financial Plan. All of these are driven by the energy forecast. For a more thorough description of forecasting see Appendix E. The formation of the capital budget is by itself a planning process and will be discussed separately (see Facilities Planning). The operating budget is generated in a bottom-up approach whereby each responsibility center submits a budget proposal to the next level up. This continues to the corporate level budgeting department. Exhibit 5 gives a summary of responsibility centers. These budgets are based on short-term requirements as set forth in the energy forecast.

EXHIBIT 5

There are 422 District Responsibility Centers. They are broadly classified as follows:

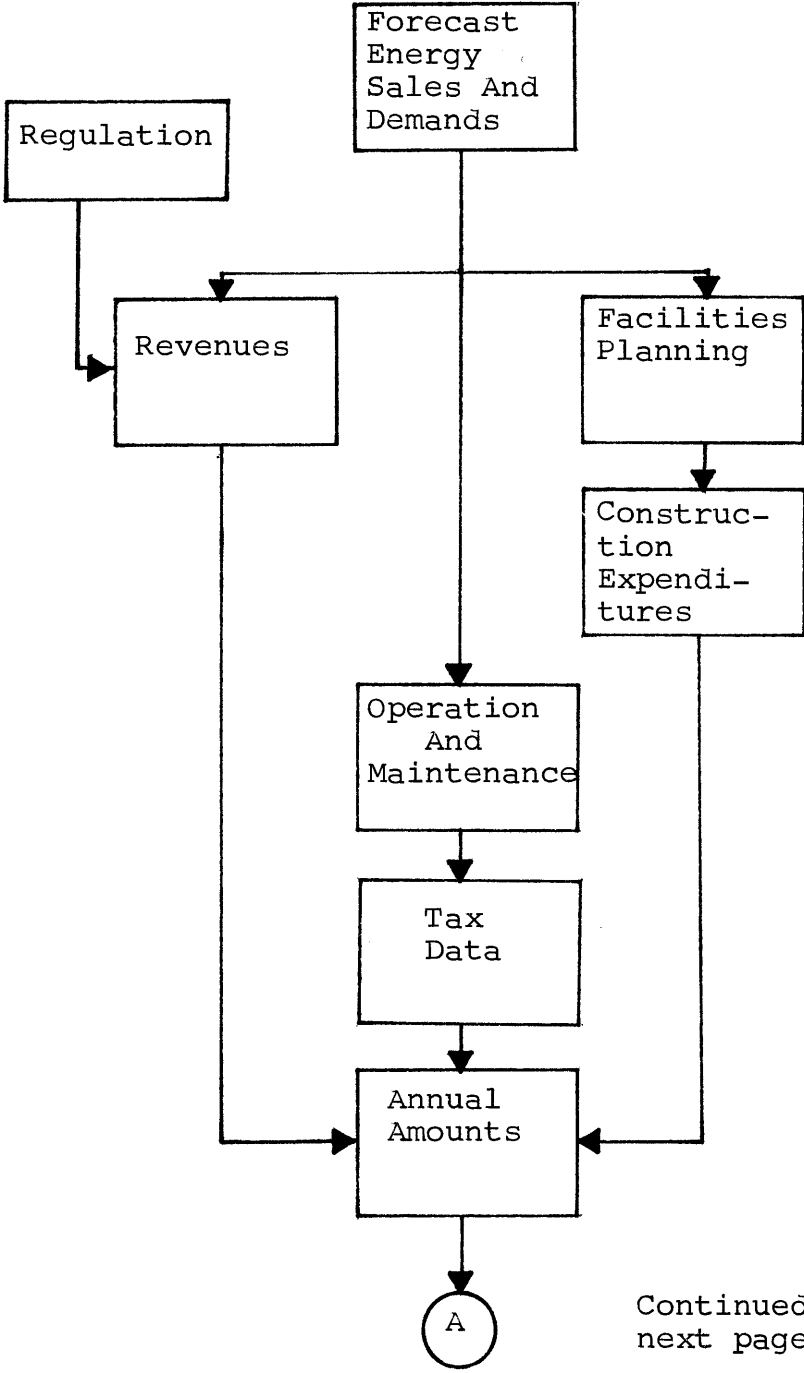
1. Each Electric Production facility has 5 centers
 - Station Manager
 - Operation Center
 - Performance Center
 - Maintenance Center
 - Storerroom
2. Each Electric Transmission and Distribution Division has 11 centers.
 - Line Department Headquarters - O/H
 - Line Department Headquarters - U/G
 - Substation Department
 - Service Department
 - Meter Department
 - Service Dispatching
 - Distribution Engineer
 - Transportation Department
 - Chief Clerk
 - Transmission Department
 - Storerroom
3. Each Gas Production facility has 2 centers
 - The Plant
 - Storerroom
4. Gas Transmission and Distribution is divided into 5 divisions which are supported by 4 responsibility centers at the district level
 - Transportation Department
 - Service Department
 - Distribution Department
 - Storerroom
5. Each Commercial Office is a center
6. Each major department in the General Office is a center

The capital budget process is an elaborate, iterative process based on the energy forecast for the next 20 years. The intent is to provide appropriate construction and development to maintain a certain specified level of service as determined through government regulations and corporate goals and objectives. This is one of the most critical planning functions in an energy utility. PSE&G has a special Planning and Research Department charged with the function of providing capital expenditure plans. (See Facilities Planning). Projects are set forth by this department. From here items are transferred to particular responsibility centers for further interpretation down the line. Capital expenditures for facilities are reviewed at the Vice Presidential level.

The operating and capital budgets are then combined with income projections based on forecasts and a financial plan is the result. Exhibit 6 gives a diagrammatic scheme for the process.

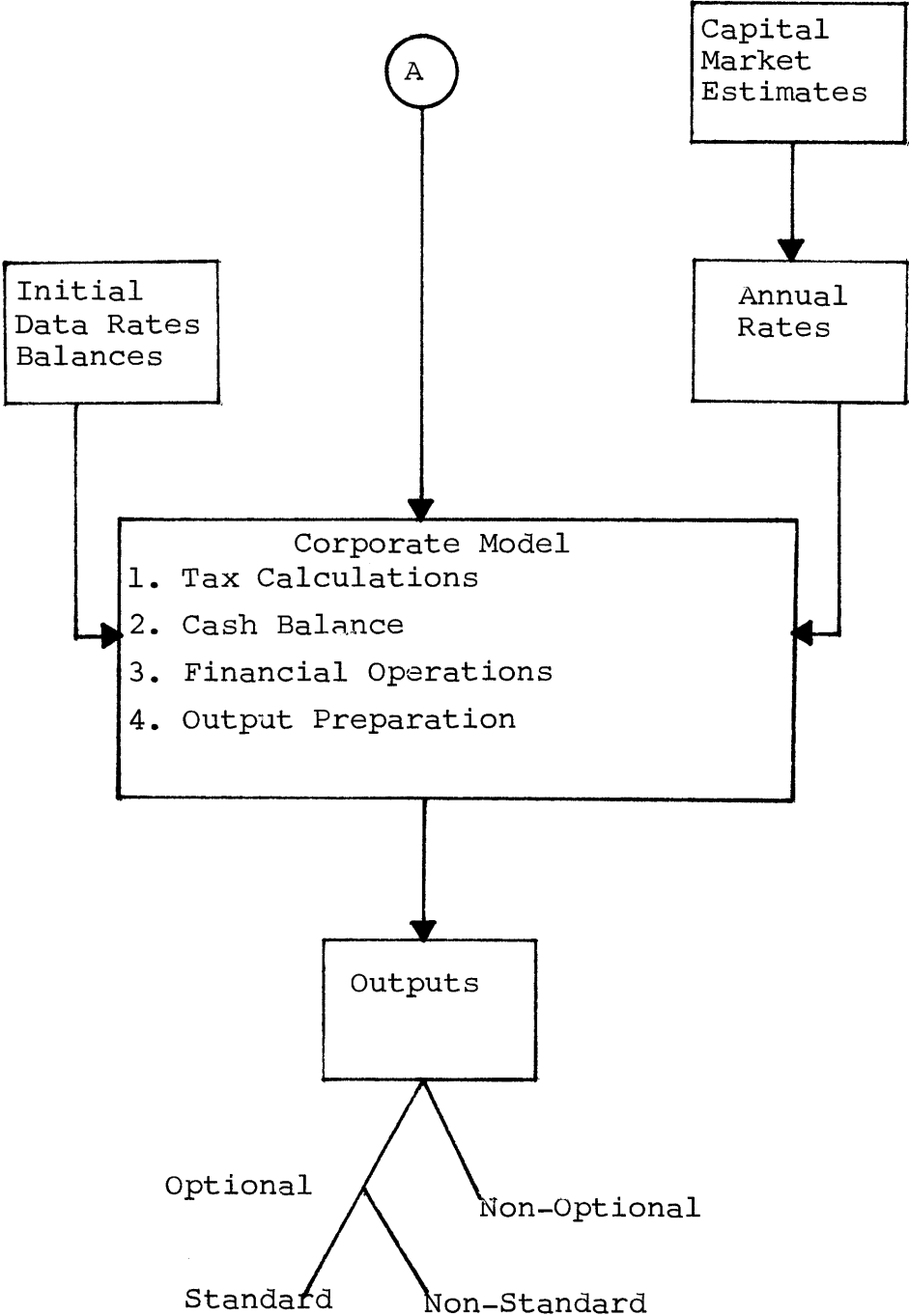
Here it can be seen that the energy forecast serves as input to the formation of construction expenditures and the operation and maintenance budget. Revenue projections rely on the energy forecast as well as the regulatory situation as input. The result from this is a projection of the annual amounts involved after tax data is assessed. From this point rates in the money market and initial data is combined with the amounts and run through the corporate model yielding tax

EXHIBIT 6
THE PLANNING PROCESS AT PSE&G



Continued on next page

EXHIBIT 6
(CONTINUED)



calculations, cash balance information, and data on financial operations.

The model is viewed by some members of management as "a tool to aid corporate executives and other members of top management in the decision-making process."¹ It has been computerized in the past, and has recently been redesigned in an even more heavily computerized form to speed up the process and thereby aid top management in using the model to answer strategic "what if" type questions. It is instructive to note however (see Appendix D) that the most senior management does not see the Corporate Model Planning System as being nearly as useful as those in lower levels. It seems that top management is still running the company in an intuitive manner for very unstructured macro-decisions, while the structured model takes over on tasks that are more easily programmed and analyzed quantitatively.

Senior management makes broad objective-setting, strategic decisions in the Management Council. This is a group of top management that meets at least weekly to decide on critical policy matters and to make major decisions. The council concerns itself with all phases of the company's operations. Members include the President and Chief Executive Officer, Executive Vice Presidents (2), Senior Vice-President - Administration, Senior Vice President - Consultant, Senior Vice President - Corporate Development, Senior Vice

President - Operations, and Senior Vice President - Governmental Affairs. While the council is a forum for discussion, it is difficult to determine if the decisions are truly made within the Management Council or if they are made more privately by the CEO who then uses the council as a form of legitimization. At any rate members do feel relatively free and unconstrained about airing their own views. It is in the Management Council that broad corporate objectives are formed. There are strategic general and long-range (solar energy or coal?) objectives as well as more specific financial objectives. The Financial Policies and Objectives stated in the PSE&G Financial and Statistical Review 1965/1975 are:

Assign highest priority to the task of achieving and maintaining the Company in a sound financial condition.

The Company's present financial policy reflects capital structure objectives of 50% debt, 13% preferred stock and 37% common equity. It is recognized that capitalization objectives may require adjustment from time to time in response to changing conditions, particularly changes in the risks of our basic businesses.

Aggressively seek rate relief on a timely basis to achieve levels of return which, in terms of both quality and quantity, will provide a base to support the market price of the Company's outstanding common shares at or above book value. This will permit additional shares to be sold without dilution of current shareholders' interests and will enhance the investment characteristics of the Company's fixed income securities.

It is within these broad guidelines that a financial plan is judged.

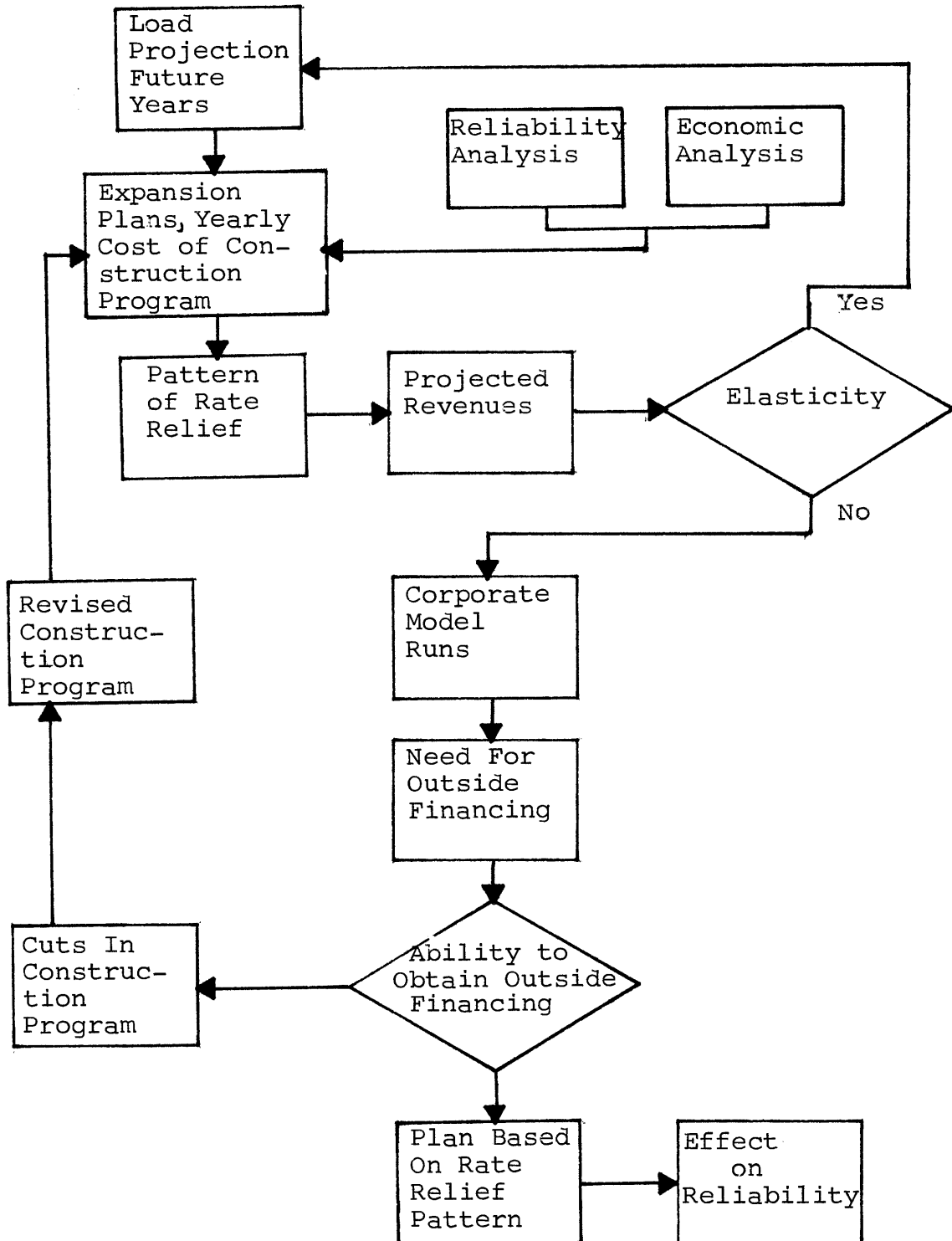
Much of the critical planning after the objective-setting stage is done in the facilities planning cycle.

Facilities Planning

Exhibit 7 depicts the process of planning for construction expenditures. The primary concern here is that of developing expansion plans within the limits of service and economic constraints. Using input such as forecasted loads and energy needs, service standards, anticipated research developments, and equipment availability plans are developed for operation, design, and construction relating to generation, fuel supply, interconnections, transmission, sub-transmission, and distribution. The objectives of this system planning are the determination of "what facilities should be provided when and where to assure adequate and reliable electric service at minimum cost to the community, consistent with maintaining a wholesome environment".² In past years this was done without worries as to financial constraints. Recently, as a result of inflation and increasing costs, environmental constraints, and the high costs of borrowing money the financial viability of the plan has taken on increasing importance.

In Exhibit 7 one sees that the first step in the facilities planning cycle involves the use of the forecasts of load projection as input. After an analysis of service reliability needs and the economic situation a set of plans for expansion

EXHIBIT 7
FACILITIES PLANNING PROCESS



and a year-by-year budget for the construction program is worked out. This is then combined with the expected rate relief from regulatory agencies to give a forecast of projected revenues. At this point the elasticity of demand is estimated, and if it is felt that the prices resulting from the rate relief will lead to a change in energy usage then this portion of the cycle is repeated. If not the information is run through the corporate model and the need for outside financing is determined. If this need cannot be satisfied then the construction program is revised and the process proceeds to the formulation of a new set of expansion plans and year-by-year construction budget. If the outside financing is obtainable then the plan is adopted and it is then analyzed to test its effects on service reliability.

When the Corporate Model is run, the 5-year plan is presented to the Board. Thus the plan and annual budgets are completed.

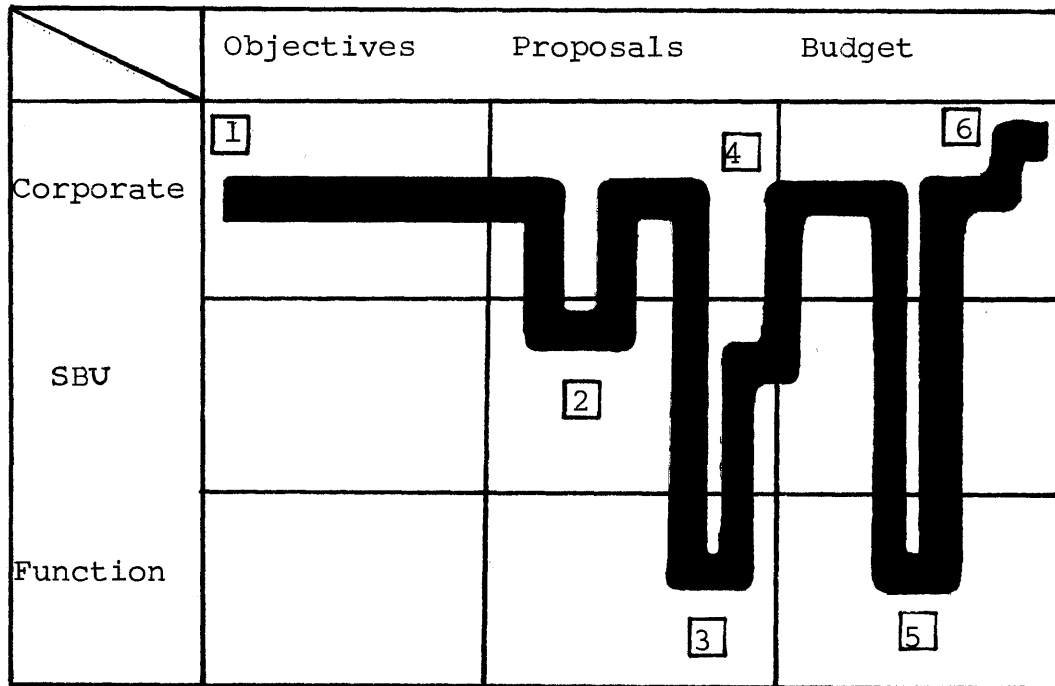
Having given the reader an idea of the system in use I will now proceed to a discussion of elements relevant to the adaptive/integrative capabilities of the system.

Planning: The Capabilities

Exhibit 8 is an attempt to schematically describe the flow of the planning system at PSE&G. Adaptive/integrative scorings can be found in tabular form in Appendix B - Part I. The results show high capabilities for adaptation built into the system's structure. The objective setting cycle is distinct from the strategic programming cycle because objectives are set by the Management Council while strategic programs are actually set by levels below the council. Planning outputs are easily recognizable since they are run through a computerized Corporate Model. Although the diagram does not show a heavy emphasis on the left-hand side and the individual scorings do not show a marked emphasis on high adaptation, a more qualitative judgment shows high capabilities for adaptation regarding the company's environmental scanning. This is seen in the elaborate forecasting procedures, the Forecast Committee meetings (see Appendix E), and the informal environmental scanning that appears to be taking place.

Integrative capabilities appear when considering the right-hand side of Exhibit 8. Much of the activity in the process occurs here, and there is both input and output from three levels in what has the potential to

EXHIBIT 8
PLANNING AT PSE&G



1. Management Council Meetings
2. Construction Plans
3. Five-Year Operating Plans
4. Corporate Model Run With Financial Constraints
5. Operating Budgeting
6. Final Review By Top Management

be an iterative process. The continuity is somewhat disjointed, between the construction budgets and plans and the operating budgets and plans. This is difficult to show in the diagram, but it is for this reason that I have rated the integrative capabilities of the system low as regards the "appropriate continuity for integration". The integrative capabilities were in place during the recent energy crisis of 1973. They were perhaps "used" more in the sense that "the crisis greatly intensified the need for short-term, day-to-day planning efforts in order to assure maximum available supply." Although one member of PSE&G's management states "the effects undoubtedly increased the knowledge and expertise of those involved which should eventually contribute to the continuing refinement of our planning system," the process has not changed significantly since then.

The design features of the system are considered next. The process is carried out throughout the entire year since it starts in April and runs through November. Prior to April the forecasting department prepares their data, so that one can see the process progressing through the year with the opportunities for change along the way. For a calendar of the 1978-1982 Corporate Model refer to Exhibit 9.

EXHIBIT 9

Schedule for 1978-1982 Corporate Model

<u>Date</u>	<u>Submit to</u>	<u>Item</u>	<u>Prepared by</u>
April 23	Manager - Budgeting	List of items proposed for Construction Budget	Each sponsoring Department
May 4	All Departments	Summary List of Proposed Budget Items	Manager - Budgeting
June 20	Budget Representatives	Distribute Capital Guidelines	Manager - Budgeting
July 18	Various Vice Presidents	Distribute 1978 Budget Roll-ups for review	Manager - Corp. Budgeting
July 22	Sponsoring Departments	Issuance of Electric & Gas Construction Budget	Manager - Budgeting
August 22	Various Vice Presidents	Distribute 1979-1982 Roll-ups for review Vice Presidential Reviews complete - all years	Manager - Corp. Budgeting
Sept. 16	Manager - Corp. Budgeting	Preliminary Financing Plan 1978-1982	Asst. to the Exec. Vice President

EXHIBIT 9
(CONTINUED)

<u>Date</u>	<u>Submit to</u>	<u>Item</u>	<u>Prepared by</u>
Sept. 19	Management Council	Review of Construction Budget & Prelim. Operating estimate	Manager - Budgeting
Sept. 26- Oct. 21	Vice President & Comptroller; Exec. V. P.s	Prepare, review, and revise Corporate Plan for 1978-1982	Manager - Corp. Budgeting
Oct. 31	Management Council	Review of Corporate Plan 1978-1982	Exec. Vice Presidents
Nov. 15	Board of Directors	Present Corporate Plan to Board of Directors	Exec. Vice Presidents

*Please note that this is an abbreviated calendar and does not contain all the steps in the process.

Reviews of the corporate model are carried out by the Management Council. It seems that once the process has been accomplished it is looked at for reasonableness, but there is not a great deal of time spent in review relative to the rest of the cycle. There are several other indicators of low adaptive capabilities. Among these are the informality and lack of documentation in the objective setting stage as well as the lack of formalized input on environmental scanning from functional levels. Apart from the forecasting and heavy environmental scanning the system is not really designed as an adaptive system. It is a passive adaptation in that once the forecast is made the efforts are to meet demand. Other than intuitive, informal planning the active adaptation indicative of an effort to change the situation to one more favorable to the company is not apparent.

Assessment of projects during the planning cycle is not strictly limited to new projects. One member of the budgeting department stated that the theory of zero-based budgeting was followed, but not the mechanics. The emphasis, however, is upon the evaluation of new projects, and as such the adaptive capabilities are only moderate.

The monitoring of the programs and budgets is formal in procedure but informal when used as a control mechanism. The budgeting department feels that it would like to do more towards holding responsibility centers accountable to their budgets (a responsibility center at PSE&G is actually a cost center), but presently this is looked at with little action ever resulting. Programs are monitored in a similar manner. In these cases the integrative capabilities are not readily apparent. While the potential is there in the reports that are produced, the actual use of variances is not widespread.

Finally a look at the use of strategic planning models and techniques is appropriate. The model used by PSE&G is a formalized, computer-based model. The latest version was developed by an outside consulting firm. It consists of seven models tied together at the end of the computer-run by a consolidation model. The hope is to speed up the time required to process a run-through of the model thus allowing greater use of the model as a strategic planning aid by making "what if" questions easier to ask of the model. The model is highly integrative since it puts the responsibility for data collecting and analysis of output to the

department involved, yet each department is aware of the interactions of the model and the fact that his efforts will feed into those of other departments. That this is acknowledged by the model users can be seen in the statements made by some of them when asked what they had learned through using the model. States one user, "the integrated modeling system has given me a greater awareness of the complexity of the studies carried out in models other than my own in arriving at coordinated long-range plans." Another says he "has gained an extensive overview of the total company operations and an insight into the functions of many other departments as a result of planning that required the assistance of others outside my own immediate area."

The seven models comprising the system are broken down as follows. The energy model uses forecasting as input data and its output provides the input to the gas operation and maintenance model, the electric operation and maintenance model, and the rate and revenue model. Both the gas and electric operation and maintenance models provide input to the rate and revenue model and the consolidation model. In the rate and revenue model fuel price increases or decreases are calculated. Revenue projections which result from this model are used

as input to the consolidation model. The construction model is not dependent upon any other models for input. Direct input data includes construction expenditure estimated by project. Output consists of utility plant balances, book depreciation, tax depreciation, deferred taxes, investment tax credits, and allowance for funds used during construction. The finance model is the next model in the system. This generates accrued interest and dividends, sinking fund provisions, amortization of debt discount, and expenses and premium on debt. Finally the consolidation model uses the output of the other six models to produce financial data - income statement, balance sheet, sources and disposition of funds, cash flow, required financing, etc. There is also a detailed and sophisticated income tax routine included in the consolidation model.

Thus PSE&G has a model which has high integrative capabilities. Those who championed the model strongly believe that the investment of \$500,000 will be recovered within one year. The managers who use the models seem to be aware of integrative capabilities as noted above. The main advantage of the new form of the model is in using it as a strategic planning tool rather than just an annual exercise in financial preparation. This

will take some time, as top management does not feel at this time that the model is useful for this purpose, although lower levels disagree. Thus the model has potential for being highly integrative and highly adaptive, but presently seems to be used as an integrative tool.

Currently the company is undergoing a management audit by a major management consulting firm. This, too, is seen as an integrative effort in running the company more effectively, efficiently, and smoothly. Econometric forecasting services are used by the Forecasting Department and these are quite obviously adaptive aids (see Appendix E for details).

The management control system is not highly developed in terms of actually controlling the actions of functional areas. It is computerized and produces reports of actual versus budgeted performance and variance reports, but these are not currently used as a form of control. I have rated the system as having medium integrative capabilities because of this. In keeping with this practice there is little use of responsibility centers as actual providers of strategic information. Adapting is done mostly at the highest levels of this company, so I would say that this is an example of a low adaptive capability in the cycle.

Both the capital budgeting and the management information systems are rather well developed and thus account for high integrative capabilities for the company. The exception to this statement is the facilities planning which is done as a separate function and is therefore less integrative, but probably more adaptive because it does heavy environmental scanning.

A concluding summary of the adaptive/integrative capabilities of PSE&G's planning system shows high adaptive capabilities in most areas. I think the company is strongest in adapting in the area of forecasting and environmental scanning, and weakest in the area of looking around for new opportunities and taking chances on them. Actively seeking to change the company's setting is also a weak area. One sees little efforts at trying to alter peak periods through any kind of a marketing program. This is done, but minimally, and it is therefore the largest contributor to the company's lower adaptive ratings. Integration in most areas is strong. The systems are formalized and computerized. Here again I would say that the lower integrative ratings result not from the form of the system, but because of the lack of use of the system for any real control purposes. The system is in place. It must now be recognized for the capabil-

ities that it already possesses.

Some effort must now be made to break the capabilities into their components and evaluate them in a manner similar to that in which the needs were evaluated. There are three dimensions dealt with when determining capabilities. The first is Structure of the Planning System. Here the bulk of the scorings indicate that the system has high capabilities for adaptation. This is largely a result of the formality of the Corporate Model, which leads to the distinction between cycles and the easily identifiable planning outputs. The logical extension that makes this a relevant portion of the scorings is that the model allows heavy environmental scanning and facilitates integration (which leads to the high integrative scores). So these measures will be considered highly relevant.

Next to be evaluated is the dimension of Design Features of the System. Here the measures are altogether relevant to this company. It is in this section that the high capabilities for adaptation due to environmental scanning are scored. As one goes down the list of factors in Appendix B - Part II one sees that each of these measures can be as easily applied to a regulated industry as to a non-regulated one. The

reason is that there is nothing in the restricted environment of the regulated company that would confine the scope of any of these measures. Thus the scorings here must be taken at face value, but one must recognize that the capabilities are highly adaptive in particular areas. In particular there are high environmental scanning capabilities and high capabilities to look at both quantitative and qualitative data. When considering these measures it is useful to remember that these measures are considerably more weighted on the qualitative/judgmental side than are those of the needs, and as such they must be analyzed in a more qualitative manner. This problem will become clearer when final conclusions are discussed.

The last dimension for measuring capabilities is Planning Models and Techniques. As a result of the computerized Corporate Model in use at PSE&G there is no doubt that this is a relevant dimension on which to evaluate their system's capabilities. The results here show both high adaptive capabilities and high integrative capabilities. These can be traced directly to the Corporate Model and the facilities planning process. This is a highly relevant section for this company.

In this case when looking at the "new" conclusions (or perhaps I may call them the weighted conclusions) one does not see a radically different picture. The relevance here is to be aware of why the system has these high adaptive and integrative capabilities. When examining this I find high adaptive capabilities for environmental scanning and in the capital budgeting process, and high integrative capabilities as a result of the computerized model and thorough budgetary procedure. This shall be related to the weighted needs scorings in Chapter V.

CHAPTER IV
MANAGEMENT PERCEPTIONS

The data appearing in Appendix C indicates that top management's attitudes give the planning system a highly integrative flavor. This results primarily from a conservative attitude of a technically oriented CEO who has arrived at his position by coming up through the organization. This is a hint that one might expect to find a system with integrative capabilities because the CEO has a natural tendency to operate this way.

The second aspect of management perception that I would like to discuss relates to the data found in Appendix D. A questionnaire was circulated among various members of the organization, particularly those who are users of the Corporate Model. They were asked to rate their perceptions of how the model is used, whether it is helpful to top management for strategic planning, whether it is helpful to lower levels of management to get them to look at broad problems, etc. It is interesting to compare the results of the most senior management's attitudes (this was obtained only as an aggregate measure with a scoresheet filled out based on general attitudes). Briefly, these men do not see the planning system as being particularly useful to them in the decisions that they have to make,

while the actual users of the model see it as being useful for decision-making purposes and useful to them in the way they look at the business. When asked what they learned from the planning system that they did not know before the users mentioned an awareness of sensitivity of profit to changes in growth, an awareness of the sensitivity of growth to changes in the prices of products, the effects of variations in the sales forecasts, amount and timing of required rate relief, and the "absolute necessity for all departments to participate in sound corporate planning." There seems to be some trend in this direction, but it has not filtered all the way up to the levels of management that are involved in the first cycle of the planning process. Individual differences are informative to consider when looking at the different scoresheets, but the general trends are even more instructive. Most managers below the top level felt that the planning system was useful for long-range objectives. Yet those who are most involved in setting long-range objectives felt that the system was somewhat less useful. Another interesting result was that while most users of the models felt that the system provides a reliable basis for operations, the members of top management did not agree with this statement at all. In short there seems to be a

vast difference in the usefulness of the system as perceived by those involved in the second two cycles as distinct from the top management who is involved in the objectives-setting cycle. The objectives-setting cycle is crucial to a system if it is to truly be a strategic planning system in the sense of directing the company into specific areas. It is possible that the new Corporate Model will alleviate some of these discrepancies if top management can be made to see it as useful in developing alternative solutions. For now it cannot be denied that there is a communication gap regarding the usefulness of the system.

CHAPTER V
CONCLUSIONS AND ANALYSIS

In conclusion one must consider whether or not the measures that have been developed show any degree of match between the needs of the company for a planning system and the capabilities that have been found in the existing system. I have shown the aggregate situational setting as indicating a relatively low need for adaptation as well as integration. Much of the low needs for adaptation result from the fact that PSE&G is a publicly regulated company and is therefore prohibited from entering any form of business as one might see in a conglomerate. Thus the need to search around for new products to balance out the portfolio in terms of cash-generating versus cash-consuming products is not present. Adaptation to a competitive environment is not required as much as adaptation to a regulated, changing physical environment. The company must be able to anticipate and adapt to government changes in regulation. There must be the capability to adapt to the environment and adjust raw material requirements to fit scarcities as they arise. The energy crisis of 1973 was an example of what can go awry in an industry such as power supply. As supply is restricted the prices climbed. This is a basic fact of economics and can

happen in any industry. The difference here is that there were no substitutable products readily available. In addition this is not a product that consumers could simply do without. Indeed it was at this point that marketing efforts went into convincing consumers to use less energy. This can be done to a limited extent however. Americans have developed a propensity to consume large amounts of energy over a long period of time. It will take an equally long time and possibly an ever present crisis to change this pattern. The crisis is ever present, but it is unfortunately not perceived by most people. It should be the job of the marketing department of a power company to make this threat visible and educate the consumer to use less energy. Therefore the high adaptive needs for PSE&G are needs to adapt to a changing environment within a very narrow range of alternatives. These special considerations account for the weighted needs' scorings discussed in Chapter II.

Some of these alternatives are being explored. Nuclear generated electricity accounts for about 15% of the electricity provided by the company to its customers. Solar energy is now being explored as a possible alternative to other fuels. While the government is part of the adaptive problem it is also part of the

solution. Much of the research on solar energy is financed through government grants. This is more than an industrial problem. It is a national problem. Appendix F gives an indication of the kinds of research being carried out and the aid that the federal government gives in financing this research.

Integrative needs are less clearcut. Although there are scorings under both high and low integrative needs the differences are not very pronounced. Any large company has certain basic integrative needs and as such those scores that indicate high integrative needs cannot be ignored. Once again, a look at the weighted scorings at the end of Chapter II discusses this in some detail.

The adaptation/integration capabilities are even less clearcut than the above. Chapter III weights these appropriately. One sees that there is a relatively high adaptive capability. As mentioned earlier, this is largely a result of the elaborate environmental scanning done by the company. The capability to use the planning system as a way of trying out alternative solutions to adaptive problems is less highly developed. More work needs to be done in this area. It is possible that the new Corporate Model will help. But management must perceive the model to have

this capability. This is a task that has yet to be accomplished.

Integrative capabilities are high according to the scorings. As previously mentioned I think this is a fair indication of the planning system in use at PSE&G. It brings departments into contact with each other, forces them to work with each other in developing five-year plans, and is capable of supplying standardized information across functional and geographical boundaries. The only exception here is the management control system which is in place but has yet to be really used as a form of control.

Now we come to the critical point of the study. Do the needs of the system match its capabilities? A simple yes or no is inappropriate. Exhibit 10 shows the aggregate scorings indicating a mismatch along the adaptive dimension and a less significant mismatch for integration measures. But this is not the entire story. When one pulls apart the components and examines the weighted scorings one finds a greater degree of match. For example there are high adaptive needs for environmental scanning at PSE&G. Significantly there are also high capabilities for environmental scanning. The mismatch occurs in areas where the company should be

EXHIBIT 10
 SYSTEM MATCH
 (UNWEIGHTED AGGREGATE)

NEEDS					
Adaptation			Integration		
H	M	L	H	M	L
10	3	29	9	2	15

MGT. PERCEPTION					
Adaptation			Integration		
H	M	L	H	M	L
0	1	0	4	2	0

Mismatch

CAPABILITIES					
Adaptation			Integration		
H	M	L	H	M	L
20	15	13	12	8	3

Mismatch
(Less)

using the model to test out strategic alternatives and fails to do so. Yet because of the limited choices available to a company in this particular position this is a less critical problem than might be expected in most companies in the private sector. One finds PSE&G highly sensitive to financial factors such as the maintenance of a strong cash flow position and maintenance of the debt/equity ratio. Yet to a company that has significant financial objectives and to whom security is important this is a reasonable situation. The needs to adapt to the financial environment are critical, and the Corporate Model fills these needs. Thus one must conclude that the aggregate mismatch, while significant, is not great.

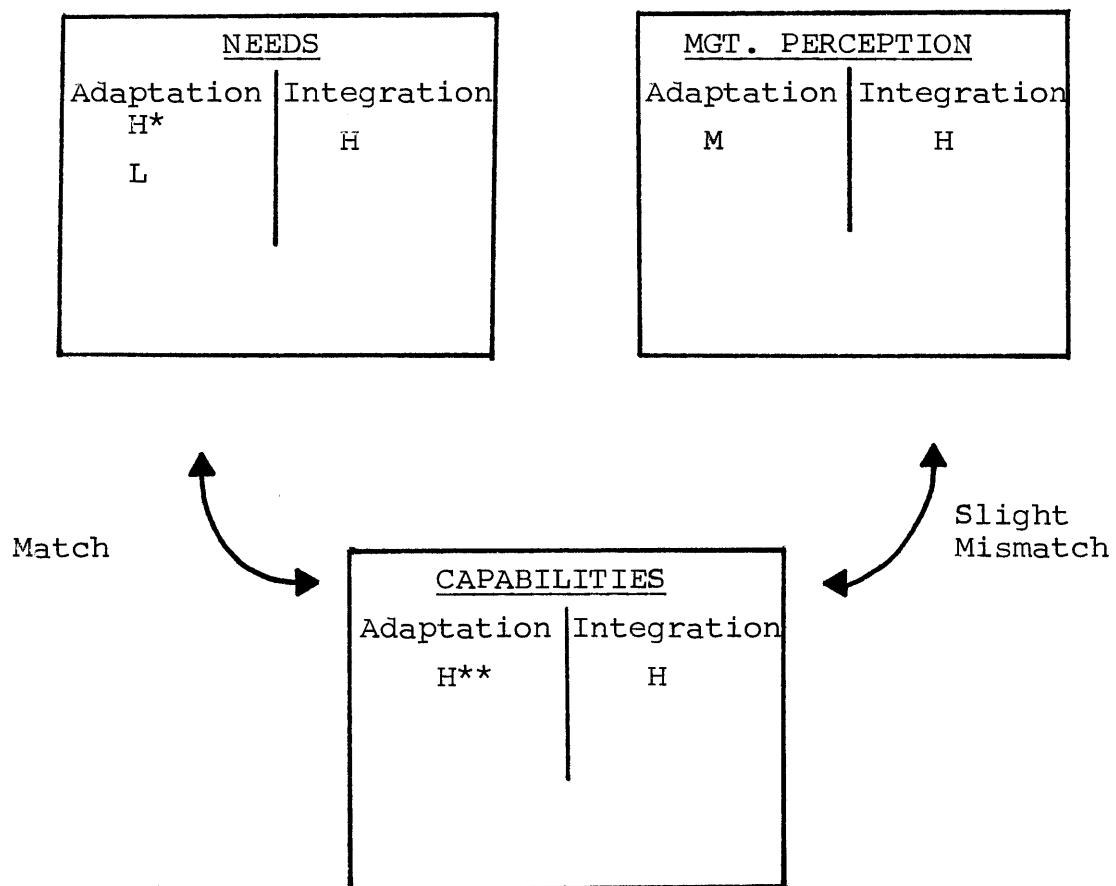
The aggregate numbers themselves do not show as high a degree of mismatch when considering integration. The company has a need to coordinate its activities and it is making an effort to do so. Although the low integrative needs outweigh the high ones there are enough high indicators to lead one to assume that a system with high integrative capabilities is called for. Most of the capability for high integration comes from the formality of the budgeting system, the Corporate Model, and the computerized data storage and standardized

reporting procedures. As discussed in Chapter III this is consistent with the high needs for integration as indicated in the financial data and the diversity, strategy, and structure of the company. In a slowly growing market, even without a great deal of competition, financial data must be carefully monitored. Here again the problem in the match is basically that of a system that is in place but not in proper use.

Thus in both cases one finds the system in place to be capable of meeting the needs of the company. Part of the problem in the aggregate scores is that the systems are not used to their fullest potential. It is significant that the research materials that have been used are not designed to divide the needs and capabilities along particular lines. Thus there is the danger that if the results are not carefully broken apart that area of match may be overlooked because the scores show a mismatch. More refinement in the research is called for. This has become particularly apparent in my study due to the peculiar situational setting of a highly regulated company. Because there are heavy adaptive needs along some lines, but much less significant needs along others the aggregate figures must be broken apart to have any real meaning. I believe this

is one of the more significant findings of this study. An attempt at this has been made at the ends of Chapters II and III. If one now looks at Exhibit 11 one will see a greater degree of match. This diagram considers the weightings as well as the elemental nature of the research questionnaires. The significance here is two-fold. First one sees that the system at PSE&G is in fact a better match than first suspected. The second critical finding has to do with this study itself. It indicates that the refinement in research materials can be done, but it will place an even greater degree of qualitiveness in the findings. This can be seen from the reasoning that was necessary to analyze needs and capabilities along elemental lines in earlier chapters. Yet I feel that it is important to look at the results in this manner for they must be more meaningful. Future effort in revising the research materials must elaborate along the lines of balancing out the number of measures of a particular type of need against the capability of the system to fill that need. For example, if there are 10 questions dealing with needs for environmental scanning then there must be 10 questions dealing with the capabilities for environmental scanning. Further the questions in both must correspond to each other.

EXHIBIT 11
SYSTEM MATCH
(WEIGHTED)



* High adaptive needs for environmental scanning

** High adaptive capabilities for environmental scanning,
for facilities planning, capital budgeting

In this way the quantitative analysis can be more meaningful and balance out some of the increased "fuzziness" that must come with a further compartmentalization of the research questionnaires. It is also important to "tailor-make" the research questionnaires to the company in a similar manner as that of tailor-making the system itself to the situational setting. Thus the use of a section of questions that is totally irrelevant to the situational setting of a company can be avoided. In this way the misleading measures that might be obtained (as in the Competitive Situation section in this study) can be avoided. Although this may cause problems in cross-company comparisons the benefits gained in obtaining truer measures of a match must outweigh this problem.

The external effectiveness of the system is another judgment that I have used in attempting to arrive at a conclusion as to the suitability of the planning system in place at PSE&G. This was discussed in Chapter IV (Management Perceptions) and will be elaborated on here only to point out that it is consistent with the match/mismatch conclusions for integrative and adaptive factors. Upper management does not perceive the system as being useful to them. Yet the system does have this potential as it is described to me. The new Cor-

porate Model is highly integrative and is perceived as such by its users. This is in keeping with the integrative aspects as described. Users do not see the system as heavily controlling lower levels. Nor do I. This is the management control problem discussed above. Perceptions and the results of this study are thus fairly consistent.

There are some areas that would allow the opportunity for better utilization of the current system, and thus increase the degree of match and the suitability of the system. Most of these areas have already been touched upon, but I will reiterate them here for the sake of completeness. First there is an opportunity for greater management use of the Corporate Model for making strategic decisions. This is likely to be increased with the introduction of the new Corporate Model making "what if" questions much more easily and quickly asked. If management awareness of this possibility can be increased there is much potential for more accurate data on which to base decision-making. Second there is the area of company control over consumer preferences. While the environmental scanning process leads to precise forecasts there is potential for a stronger marketing function to adjust load peaks and general customer awareness of the energy problem. More integrative cooperation between the fore-

casting and the marketing areas could give the company more adaptive control over their long-run direction. One is also led to the conclusion that a management control system against which operating units are measured and held accountable to might improve the integrative capabilities of the system. The potential, again, is there. It has yet to be used to compare and control the relationships between the various areas of the company. More attention to this matter might result in an increase in the efficient interaction between money, men, materials, and information. The opportunity also exists for this company to analyze the components of its needs and capabilities along the elemental lines outlined above. Such an analysis offers the potential to better understand the problem such a company faces in a changing environment and to examine ways to design a planning system to fit the problems.

The ultimate judgment of a planning system must rest not only with the results, but with its acceptance and use by all levels of the organization. PSE&G has a system that is logical for the type of organization. With some modifications in both the system and its use and perceptions there is the possibility of an excellent match in the near future.

CHAPTER VI

RELEVANCE TO THE AGGREGATE STUDY OF TWENTY-NINE COMPANIES

One final task remains in this study. The peculiarities of a regulated company and how this affects the relevance of this study must be considered. Some of these issues have been pointed out along the way in previous chapters, but for clarity I would like to discuss them here again and elaborate.

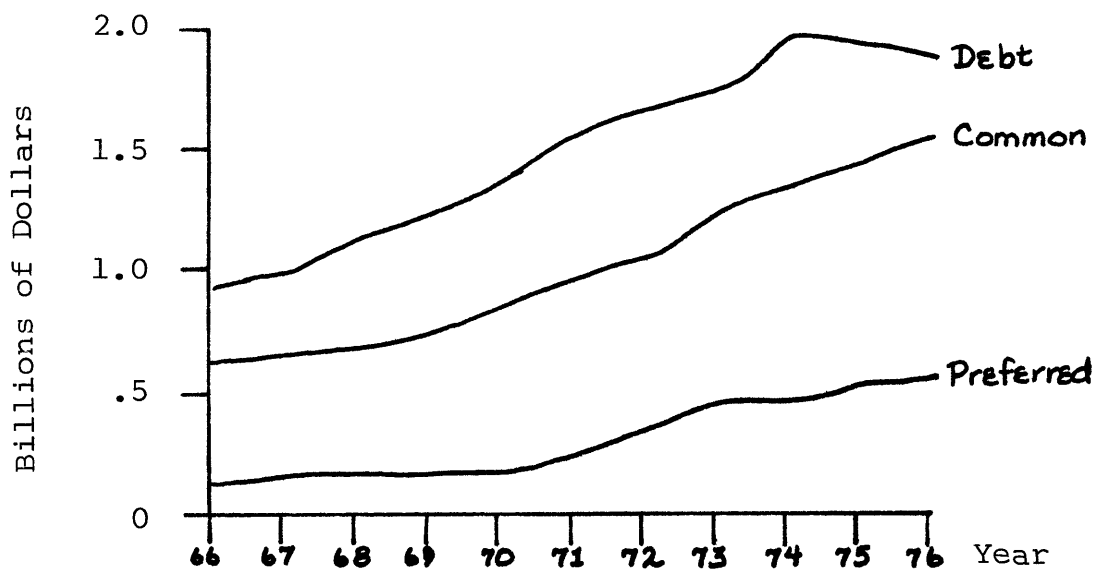
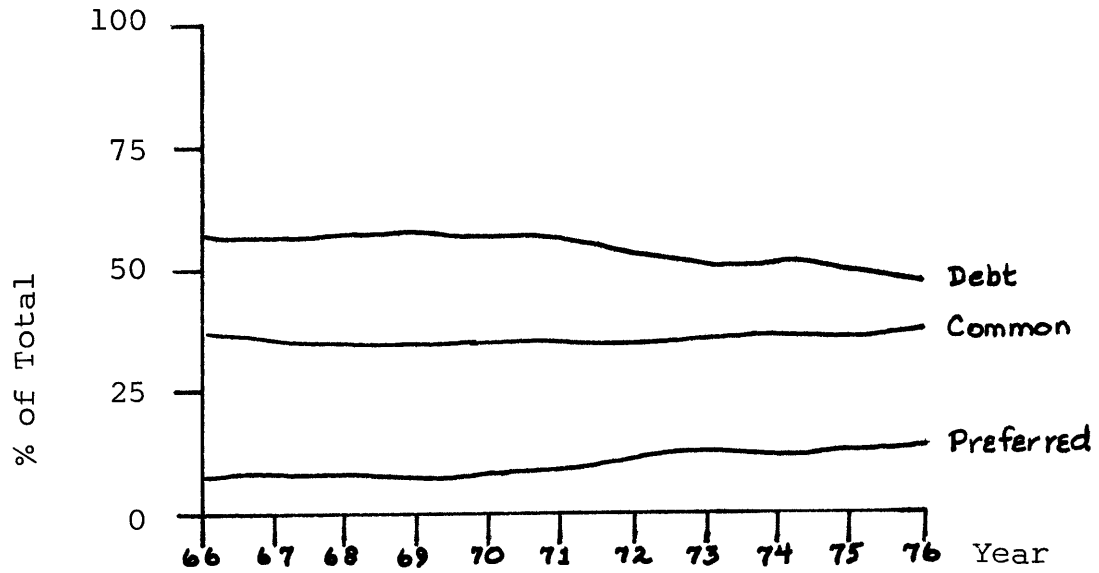
Certainly one of the most obvious differences is that of the unique competitive position in which one finds PSE&G. There is no undifferentiated product waiting in the wings to steal the company's market share. The quadrant by quadrant Boston Consulting Group competitive analysis does not prove to be very informative when looking at this type of company. There is no balanced portfolio and no opportunities to acquire one in the sense that such a competitive analysis would indicate. Thus an analysis of each of the products as to whether they are in the introductory, growth, mature or decline stages provides us with some interesting information but there is really nowhere to go with it.

Pricing is another area where there is a large difference between this company and the rest of those in this study. PSE&G does not need to use pricing as a competitive market tool. It cannot make the conscious

choice of having price follow quality or costs. This choice is already made. Any changes in rates must be defended before a rate commission and the costs must be justified to allow an increase in rates. What this means for this study is that pricing cannot be used as an adaptive tool for a regulated company. This is just a constraint within which the company must operate. Yet if pricing cannot be a tool it cannot be a useful measure for the purposes of this study. To be a key variable it must be a variable over which the company has some control. In this case one cannot use pricing policies as a measure of the needs of the company. This will not apply to the other twenty-eight companies investigated and as such must make comparisons more difficult.

The extreme importance of bond ratings and shareholder satisfaction and confidence also set this company apart. The rigidity with which the company maintains the 50% debt, 13% preferred stock, and 37% common equity goal may be seen in Exhibit 12. The first graph indicates how the percentages have remained steady over the past 10 years, while the second shows the actual amounts and how they have changed relative to each other. Such rigidity is not common in the other com-

EXHIBIT 12
CAPITALIZATION



panies studied. But it is a strong indication of the importance of the financial end of the business, and the financial goals and objectives are not treated lightly. One may conjecture that these goals are more critical in this company than in others.

The high degree of vertical integration, while not unique to a regulated industry, is not common to a number of the companies in this study. Here is an example of the tailor-making that is required in designing the planning system and how the vertical integration will require high integrative capacities of a planning system at PSE&G. This is one of the primary reasons for the high integrative needs and capabilities of this company yet it may not play such a critical role in assessing the needs of other companies.

The supply restriction and resulting marketing policy of urging consumers not to use their product are also unique to an energy company. Certainly this is not the situation one expects to find in most companies. This is a function of the supply problems (particularly with gas), but also a social and environmental concern. To preserve power for all it may be necessary to restrict use to everyone a little. This is not the same kind of situation as in a pure market where those who are willing

to pay the price for a product bid out those who are not. The need to adapt to these kinds of concerns is an element of the situational setting of PSE&G while it is not applicable to the other companies under consideration. This dimension must be accounted for when describing the situational setting of a power company and its adaptive needs.

In summarizing the above one concludes that while some of the issues dealt with across all the companies are not relevant here, there are others that have added relevance in this situation. This was the purpose behind a discussion of the elemental nature of the ratings. The components are useful to look at in all cases. Yet because they are particularly useful in this case they have perhaps been easier to untangle.

With this caveat in mind one can then proceed to compare this company to other companies. It is possible to compare needs and capabilities, and this will be done with future studies on these research findings. As long as one remembers the limitations of such comparisons they can prove valuable.

FOOTNOTES

Chapter 1

1. Summary of industry background taken from Strategic Planning in the Utility Industry, Larry Leonard Schedin, unpublished Masters Thesis, Sloan School of Management, M.I.T., June 1976
2. Financial and Statistical Review 1965/1975, Public Service Electric and Gas Company, Newark, New Jersey, p. 4

Chapter 2

1. Lorange, Peter, Diagnosis and Design of Strategic Planning Systems in Diversified Corporations, Sloan School Working Paper, December 1976, p. 8
2. Ibid, p. 1
3. Ibid, p. 1

Chapter 3

1. Blewitt, Bert J., Public Service Electric and Gas Company's Corporate Economic Model, presented to EEI System Planning Committee, Milwaukee, Wisconsin, October 1968, p. 1
2. Mallard, S.A., System Planning with Financial Constraints, presented to EEI Rate Research Committee, Hunt Valley, Maryland, April 1975, p. 2

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A NOTE ON APPENDICES A THROUGH D

The material in these appendices is a condensation of the research materials used for this study. Basic issues are summarized in one line. If the reader desires more detail on the questions and format used I refer him to the Sloan School Working Paper by Peter Lorange, An Analytical Scheme for Assessment of a Company's Planning Needs, Planning Capabilities, and Planning Effectiveness. This contains the original research material and the scoring sheets used to compile and summarize it. My earlier warning of the qualitative and highly judgmental nature in some areas should be kept in mind at this point.

APPENDIX A
PLANNING NEEDS

I. Diversity, Strategy, and Structure

	<u>Adaptation</u>	<u>Integration</u>
Functional Organization	L	M
Two SBUs	L	L
Single Business	L	L
74% of sales from largest SBU	L	L
87% of profits from largest SBU	L	L
Production in only 1 country	L	L
Continuous production processes	L	H
Complex service process	H	H
Products in mature stage	M	H
Different seasonality pattern	L	
Different customers	L	
Different raw materials	L	
<u>Totals</u>		
	<u>Adaptation</u>	<u>Integration</u>
<u>H</u>	<u>M</u>	<u>L</u>
1	1	10
		<u>H</u>
		<u>M</u>
		<u>L</u>
		3
		1
		5

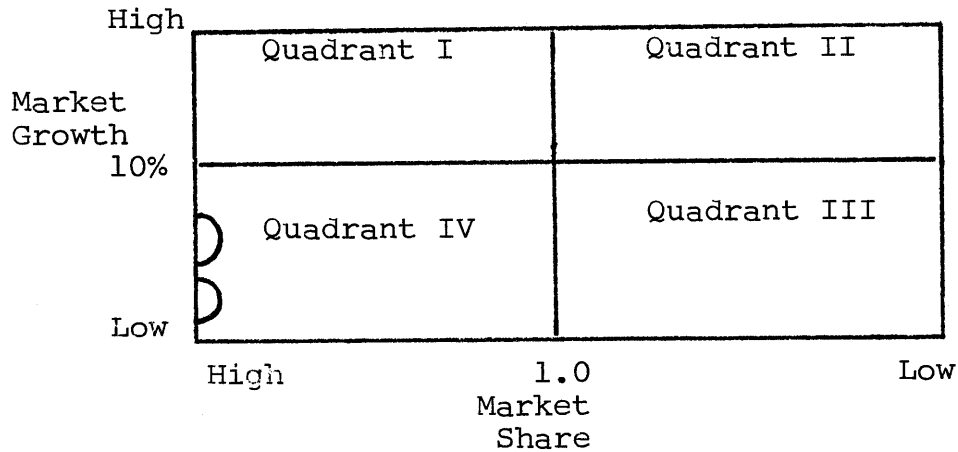
II. Operating Results and Balance Sheet Information*

	<u>Adaptation</u>	<u>Integration</u>
Favorable trend in D/E ratio	H	
Favorable trend in EPS	H	
Unfavorable trend in P:E ratio		H
Favorable trend in sales	H	
Favorable trend in net profits	H	
Low product orientation	L	H
Increase in accounts receivable, liquid reserves, rates	H	
Increase in dividends	H	
D/E not a constraint	H	

Totals

<u>Adaptation</u>			<u>Integration</u>		
$\frac{H}{7}$	$\frac{M}{0}$	$\frac{L}{1}$	$\frac{H}{2}$	$\frac{M}{0}$	$\frac{L}{0}$

*See Exhibit A1

III. Competitive Position

	<u>Adaptation</u>	<u>Integration</u>
Electric SBU in Quadrant IV	L	H
Gas SBU in Quadrant IV	L	H
Downward vertical movement - electric	L	
Downward vertical movement - gas	L	
Large positive cash flow	L	H
Labor efficiency plays minor role in elec. SBU		L
Labor efficiency plays minor role in gas SBU		L
New process developments play minor role in electric SBU's success		L
New process developments play minor role in gas SBU's success		L
Product redesign plays no role in electric SBU		L
Product redesign plays no role in gas SBU		L
Substitution plays minor role in electric SBU		L
Substitution plays minor role in gas SBU		L
Product pricing closely related to production costs		H
Product differentiation not factor in electric SBU	L	
Product differentiation not factor in gas SBU	L	
Building with shared experience not factor in elec. SBU	L	
Building with shared experience not factor in gas SBU	L	

Adaptation Integration

External influences key factor in elec. SBU	H
External influences key factor in gas SBU	H
New products small factor in elec. SBU	L
New products small factor in gas SBU	L
Price and quality unrelated in elec. SBU	L
Price and quality unrelated in gas SBU	L

Totals

	<u>Adaptation</u>			<u>Integration</u>	
$\frac{H}{2}$	$\frac{M}{0}$	$\frac{L}{13}$	$\frac{H}{4}$	$\frac{M}{0}$	$\frac{L}{8}$

IV. Managerial Positioning

	<u>Adaptation</u>	<u>Integration</u>
Critical Administrator	M	
Fixed/Guidance/Loyalty	M	
Many policies and procedures	L	
Fixed compensation	L	
Flexibility/Predictability of economy	L	M
Flexibility/Predictability of gov't. regulations	L	L
Flexibility/Predictability of changing costs	L	L

Totals

<u>Adaptation</u>			<u>Integration</u>		
$\frac{H}{0}$	$\frac{M}{2}$	$\frac{L}{5}$	$\frac{H}{0}$	$\frac{M}{1}$	$\frac{L}{2}$

V. Summary of Adaptation - Integration Needs

	<u>Adaptation</u>			<u>Integration</u>		
	<u>H</u>	<u>M</u>	<u>L</u>	<u>H</u>	<u>M</u>	<u>L</u>
Diversity, Strategy, Structure	1	1	10	3	1	5
Financial Information	7	0	1	2	0	0
Competitive Position	2	0	13	4	0	8
Managerial Positioning	0	2	5	0	1	2
TOTALS	10	3	29	9	2	15

Exhibit A1
Financial Data

	<u>1976</u>	<u>1974</u>	<u>1972</u>
Debt: Equity Ratio	.91	1.11	1.14
P:E Ratio	8	5	10
<u>Dollars:</u>			
Earnings per share	2.79	2.35	2.29
Dividends	1.70	1.72	1.70
<u>Thousands of Dollars:</u>			
Sales	1,869,535	1,455,873	970,903
Electric	1,316,077	1,100,965	674,833
Gas	553,458	354,908	296,070
Total Operating Income	288,438	230,459	178,392
Electric	236,359	187,593	141,181
Gas	52,079	42,866	37,211
Depreciation Expense	133,087	106,683	91,037
New Fixed Investments	218,175	218,389	356,195
Accounts Receivable	266,702	210,982	94,773
Current Assets	458,675	408,443	201,974
Current Liabilities	562,984	509,181	181,967
Long-term Debt	1,894,210	1,965,765	1,670,459

APPENDIX B
PLANNING CAPABILITIES:

I. Structure of the Planning System

	<u>Adaption</u>	<u>Integration</u>
Objective and strategic cycles are distinct	H	
Easy to identify planning outputs:		
Corporate	H	
SBU	H	
Function	H	
Area	H	
Emphasis on left-hand side	M	
Appropriate levels for adaptation	M	
Appropriate shape for adaptation	H	
Appropriate continuity for adaptation	M	
Adaptive in recent past	H	
Adaptive in distant past	H	
Emphasis on right-hand side		H
Appropriate levels for integration		M
Appropriate shape for integration		M
Appropriate continuity for integration		L
Integrative in recent past		H
Integrative in distant past		H

Totals

<u>Adaptation</u>			<u>Integration</u>		
$\frac{H}{8}$	$\frac{M}{3}$	$\frac{L}{0}$	$\frac{H}{3}$	$\frac{M}{2}$	$\frac{L}{1}$

II. Design Features of the Planning System

	<u>Adaptation</u>	<u>Integration</u>
Separation between planner, controller in objectives setting	H	
Process continues throughout year	L	
Time spent on reviews	M	
Constrained guidelines	L	
Objectives not ambitious	L	
Corporate guidelines are constraints	L	
CEO informally thinks through consequences	L	
SBU's informally think through consequences	L	
Functional level not involved in setting guidelines	L	
CEO doesn't write down strategy	M	
Strategic projects are summed yearly	H	
Each program not reassessed yearly	L	
Some analysis of programs con- sistency with objectives	M	
Customers needs a major driving force	H	
Little conflict	L	
Scanning activities identifiable	H	
Scanning activities specific	H	
Scanning techniques different for predictable vs. unpredictable	M	
Performance monitored informally	M	
Programs monitored less formally	M	
Budgets monitored	H	
Objective-setting: variables qualitative	H	
Programming: variables quanti- tative/qualitative		H
Budgeting: variables quantita- tive/qualitative		H
Objective-setting: reviews frequent	H	
Programming: reviews annual	M	M
Budgeting: reviews annual	M	M
Objective-setting: monitoring semi-continuous	M	M

II. Design Features of the Planning System

	<u>Adaptation</u>	<u>Integration</u>
Programming: monitoring semi-continuous	M	M
Budgeting: monitoring semi-continuous	M	M
Individual salary mostly fixed	L	L

Totals

	<u>Adaptation</u>			<u>Integration</u>		
$\frac{H}{8}$	$\frac{M}{11}$	$\frac{L}{10}$		$\frac{H}{2}$	$\frac{M}{5}$	$\frac{L}{1}$

III. Use of Strategic Planning Models and Techniques

	<u>Adaptation</u>	<u>Integration</u>
Model use - old	M	H
Model use - new	H	H
Outside consultants		H
Forecasting studies	H	
Little use of responsibility centers	L	
Capital budgeting adaptive	H	
Control system undeveloped		L
Capital budgeting integrative		M
Internal data consistent		H
Historical comparisons possible		H
Data available on disc files		H
Non-financial data available	H	
Competitors information not available	L	
Budget information available through MIS		H
Strategic information unavailable through MIS	L	

Totals

<u>Adaptation</u>			<u>Integration</u>		
$\frac{H}{4}$	$\frac{M}{1}$	$\frac{L}{3}$	$\frac{H}{7}$	$\frac{M}{1}$	$\frac{L}{1}$

IV. Summary of Adaptation - Integration Capabilities

	<u>Adaptation</u>			<u>Integration</u>		
	<u>H</u>	<u>M</u>	<u>L</u>	<u>H</u>	<u>M</u>	<u>L</u>
Structure	8	3	0	3	2	1
Design Features	8	11	10	2	5	1
Models and Techniques	4	1	3	7	1	1
TOTALS	20	15	13	12	8	3

APPENDIX C
MANAGEMENT PERCEPTIONS

	<u>Adaptation</u>	<u>Integration</u>
CEO for 2 yrs. - 36 yrs. with company		
Few years to retirement		
Group decisions - Management Council		
CEO Engineering background		H
Promoted from within		H
Conservative risk attitude		H
Consistent risk attitude		H
Balance between short/long term	M	M
Performance desires		M

Totals

<u>Adaptive</u>			<u>Integrative</u>		
$\frac{H}{0}$	$\frac{M}{1}$	$\frac{L}{0}$	$\frac{H}{4}$	$\frac{M}{2}$	$\frac{L}{0}$

APPENDIX D
VALIDATION OF USEFULNESS

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	X		
2. System provides adequate competitor analysis			X
3. Useful in generating new alternatives	X		
4. Strategic options follow from plans			X
5. System useful in communication	X		
6. System provides planning "language"			X
7. Vehicle for evaluating managers' performance			X
8. CEO thinks planning system useful	X		
9. Line managers think planning system useful			X
10. System provides reliable basis for operations			X
11. System accepted by line managers			X
12. Performance better than others not planning	X		
13. Top management actively involved in planning	X		
14. Top management does not delegate major part in plans	X		
15. Company goals operation, basis for planning			X
16. Line personnel integrally involved in planning			X
17. Managerial performance measured against plan			X
18. Company climate supportive of planning	X		
19. Comprehensive planning seen as part of management process	X		
20. Simple, flexible system promotes creativity			X
21. Top management communicates plans to group heads	X		
22. Top management uses plans for decision-making			X
23. System focuses heavily on budget matters	X		
24. System focuses heavily on strategic planning	X		
25. System consistent with nature of business	X		
26. Dynamic system ensures effort and creativity	X		
27. Managers "broughton board" in terms of system			X

*Top Management Aggregate View

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	7	1	
2. System provides adequate competitor analysis	2	5	1
3. Useful in generating new alternatives	5	3	
4. Strategic options follow from plans	4	2	2
5. System useful in communication	6	2	
6. System provides planning "language"	5	1	2
7. Vehicle for evaluating managers' performance		6	2
8. CEO thinks planning system useful	4	3	1
9. Line managers think planning system useful	2	4	2
10. System provides reliable basis for operations	6	2	
11. System accepted by line managers	5	1	2
12. Performance better than others not planning	5	2	1
13. Top management actively involved in planning	4	2	2
14. Top management does not delegate major part in plans	3	5	
15. Company goals, operation, basis for planning	4	2	2
16. Line personnel integrally involved in planning	3	3	2
17. Managerial performance measured against plan		6	2
18. Company climate supportive of planning	4	1	3
19. Comprehensive planning seen as part of management process	5	1	2
20. Simple, flexible system promotes creativity	3	5	
21. Top management communicates plans to group heads	1	7	
22. Top management uses plans for decision-making	1	6	1
23. System focuses heavily on budget matters	4	2	2
24. System focuses heavily on strategic planning	1	6	1
25. System consistent with nature of business	5	3	
26. Dynamic system ensures effort and creativity	4	4	
27. Managers "brought on board" in terms of system	2	3	3

*Totals

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	X		
2. System provides adequate competitor analysis	X		
3. Useful in generating new alternatives	X		
4. Strategic options follow from plans			X
5. System useful in communication		X	
6. System provides planning "language"			X
7. Vehicle for evaluating managers' performance			X
8. CEO thinks planning system useful			X
9. Line managers think planning system useful			X
10. System provides reliable basis for operations	X		
11. System accepted by line managers			X
12. Performance better than others not planning			X
13. Top management actively involved in planning			X
14. Top management does not delegate major part in plans		X	
15. Company goals operation, basis for planning			X
16. Line personnel integrally involved in planning			X
17. Managerial performance measured against plan			X
18. Company climate supportive of planning			X
19. Comprehensive planning seen as part of management process			X
20. Simple, flexible system promotes creativity		X	
21. Top management communicates plans to group heads		X	
22. Top management uses plans for decision-making			X
23. System focuses heavily on budget matters		X	
24. System focuses heavily on strategic planning		X	
25. System consistent with nature of business		X	
26. Dynamic system ensures effort and creativity	X		
27. Managers "brought on board" in terms of system			X

*Manager-Planning

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	X		
2. System provides adequate competitor analysis		X	
3. Useful in generating new alternatives		X	
4. Strategic options follow from plans	X		
5. System useful in communication	X		
6. System provides planning "language"	X		
7. Vehicle for evaluating managers' performance			X
8. CEO thinks planning system useful		X	
9. Line managers think planning system useful		X	
10. System provides reliable basis for operations		X	
11. System accepted by line managers		X	
12. Performance better than others not planning	X		
13. Top management actively involved in planning		X	
14. Top management does not delegate major part in plans	X		
15. Company goals operation, basis for planning		X	
16. Line personnel integrally involved in planning		X	
17. Managerial performance measured against plan		X	
18. Company climate supportive of planning			X
19. Comprehensive planning seen as part of management process		X	
20. Simple, flexible system promotes creativity		X	
21. Top management communicates plans to group heads		X	
22. Top management uses plans for decision-making		X	
23. System focuses heavily on budget matters			X
24. System focuses heavily on strategic planning		X	
25. System consistent with nature of business		X	
26. Dynamic system ensures effort and creativity		X	
27. Managers "brought on board" in terms of system			X

*General Manager - Planning & Research

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives		X	
2. System provides adequate competitor analysis	X		
3. Useful in generating new alternatives	X		
4. Strategic options follow from plans			X
5. System useful in communications		X	
6. System provides planning "language"			X
7. Vehicle for evaluating managers' performance			X
8. CEO thinks planning system useful			
9. Line managers think planning system useful			X
10. System provides reliable basis for operations	X		
11. System accepted by line managers			X
12. Performance better than others not planning		X	
13. Top management actively involved in planning			X
14. Top management does not delegate major part in plans	X		
15. Company goals operation, basis for planning			X
16. Line personnel integrally involved in planning			X
17. Managerial performance measured against plan			X
18. Company climate supportive of planning			X
19. Comprehensive planning seen as part of management process			X
20. Simple, flexible system promotes creativity	X		
21. Top management communicates plans to group heads		X	
22. Top management uses plans for decision-making		X	
23. System focuses heavily on budget matters		X	
24. System focuses heavily on strategic planning			X
25. System consistent with nature of business		X	
26. Dynamic system ensures effort and creativity		X	
27. Managers "brought on board" in terms of system			X

*Manager - Electric Planning

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	X		
2. System provides adequate competitor analysis		X	
3. Useful in generating new alternatives	X		
4. Strategic options follow from plans	X		
5. System useful in communication	X		
6. System provides planning "language"	X		
7. Vehicle for evaluating managers' performance			X
8. CEO thinks planning system useful			X
9. Line managers think planning system useful	X		
10. System provides reliable basis for operations	X		
11. System accepted by line managers	X		
12. Performance better than others not planning			X
13. Top management actively involved in planning			X
14. Top management does not delegate major part in plans			X
15. Company goals operation, basis for planning	X		
16. Line personnel integrally involved in planning	X		
17. Managerial performance measured against plan			X
18. Company climate supportive of planning	X		
19. Comprehensive planning seen as part of management process	X		
20. Simple, flexible system promotes creativity	X		
21. Top management communicates plans to group heads			X
22. Top management uses plans for decision-making			X
23. System focuses heavily on budget matters		X	
24. System focuses heavily on strategic planning			X
25. System consistent with nature of business	X		
26. Dynamic system ensures effort and creativity	X		
27. Managers "brought on board" in terms of system	X		

*Manager - Rates

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	X		
2. System provides adequate competitor analysis		X	
3. Useful in generating new alternatives		X	
4. Strategic options follow from plans		X	
5. System useful in communication	X		
6. System provides planning "language"		X	
7. Vehicle for evaluating managers' performance		X	
8. CEO thinks planning system useful	X		
9. Line managers think planning system useful	X		
10. System provides reliable basis for operations		X	
11. System accepted by line managers	X		
12. Performance better than others not planning	X		
13. Top management actively involved in planning	X		
14. Top management does not delegate major part in plans		X	
15. Company goals operation, basis for planning	X		
16. Line personnel integrally involved in planning	X		
17. Managerial performance measured against plan		X	
18. Company climate supportive of planning	X		
19. Comprehensive planning seen as part of management process	X		
20. Simple, flexible system promotes creativity		X	
21. Top management communicates plans to group heads		X	
22. Top management uses plans for decision-making		X	
23. System focuses heavily on budget matters	X		
24. System focuses heavily on strategic planning		X	
25. System consistent with nature of business	X		
26. Dynamic system ensures effort and creativity		X	
27. Managers "brought on board" in terms of system		X	

*Manager - System Operations

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	X		
2. System provides adequate competitor analysis		X	
3. Useful in generating new alternatives	X		
4. Strategic options follow from plans		X	
5. System useful in communication	X		
6. System provides planning "language"	X		
7. Vehicle for evaluating managers' performance		X	
8. CEO thinks planning system useful	X		
9. Line managers think planning system useful		X	
10. System provides reliable basis for operations	X		
11. System accepted by line managers	X		
12. Performance better than others not planning	X		
13. Top management actively involved in planning	X		
14. Top management does not delegate major part in plans	X		
15. Company goals operation, basis for planning	X		
16. Line personnel integrally involved in planning	X		
17. Managerial performance measured against plan		X	
18. Company climate supportive of planning	X		
19. Comprehensive planning seen as part of management process	X		
20. Simple, flexible system promotes creativity	X		
21. Top management communicates plans to group heads		X	
22. Top management uses plans for decision-making		X	
23. System focuses heavily on budget matters	X		
24. System focuses heavily on strategic planning	X		
25. System consistent with nature of business	X		
26. Dynamic system ensures effort and creativity	X		
27. Managers "brought on board" in terms of system	X		

*Ass't to General Manager - Gas Production

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	X		
2. System provides adequate competitor analysis		X	
3. Useful in generating new alternatives	X		
4. Strategic options follow from plans	X		
5. System useful in communication	X		
6. System provides planning "language"	X		
7. Vehicle for evaluating managers' performance			X
8. CEO thinks planning system useful	X		
9. Line managers think planning system useful		X	
10. System provides reliable basis for operations	X		
11. System accepted by line managers	X		
12. Performance better than others not planning	X		
13. Top management actively involved in planning	X		
14. Top management does not delegate major part in plans			X
15. Company goals operation, basis for planning	X		
16. Line personnel integrally involved in planning		X	
17. Managerial performance measured against plan		X	
18. Company climate supportive of planning		X	
19. Comprehensive planning seen as part of management process	X		
20. Simple, flexible system promotes creativity		X	
21. Top management communicates plans to group heads		X	
22. Top management uses plans for decision-making	X		
23. System focuses heavily on budget matters			X
24. System focuses heavily on strategic planning		X	
25. System consistent with nature of business	X		
26. Dynamic system ensures effort and creativity	X		
27. Managers "brought on board" in terms of system			X

*Corporate Economist

	Strongly Agree	Somewhat Agree	Do Not Agree
1. Planning system useful for long-range objectives	X		
2. System provides adequate competitor analysis			X
3. Useful in generating new alternatives		X	
4. Strategic options follow from plans	X		
5. System useful in communication	X		
6. System provides planning "language"	X		
7. Vehicle for evaluating managers' performance		X	
8. CEO thinks planning system useful	X		
9. Line managers think planning system useful		X	
10. System provides reliable basis for operations	X		
11. System accepted by line managers	X		
12. Performance better than others not planning	X		
13. Top management actively involved in planning	X		
14. Top management does not delegate major part in plans		X	
15. Company goals operation, basis for planning		X	
16. Line personnel integrally involved in planning		X	
17. Managerial performance measured against plan		X	
18. Company climate supportive of planning	X		
19. Comprehensive planning seen as part of management process	X		
20. Simple, flexible system promotes creativity		X	
21. Top management communicates plans to group heads	X		
22. Top management uses plans for decision-making		X	
23. System focuses heavily on budget matters	X		
24. System focuses heavily on strategic planning		X	
25. System consistent with nature of business	X		
26. Dynamic system ensures effort and creativity		X	
27. Managers "brought on board" in terms of system		X	

*Manager - Budgetary

APPENDIX E
FORECASTING

Environmental scanning at PSE&G is formalized via the Forecasting Department and the Forecasting Committee. The purpose is to provide both long and short-range projections of load factors and gas and electric peaks. This is important for the company for facilities planning to meet future peak projections. As such it is critical to the successful operation of an energy company. The specialized forecasting functional areas testify to this.

A multi-method approach is used by the Forecasting Department. By major forecast sector, the methods used are as follows:

Residential Sales

Econometric Analysis
Appliance Saturation Analysis
Geographic Forecast

Commercial Sales

Econometric Analysis
Geographic Forecast

Industrial Sales

Econometric Analysis
Standard Industrial Classification Method

System Peak Demand

Base and Weather Component Analysis
Rate Class Contribution to Peak Loads

In addition there are studies that cross sectors such as:

Solar Energy Market Penetration
 Heat Pump/Lennox Unit Market Analysis
 Conservation and Load Management Impact Study
 Demographic Projection Model
 Total Energy Analysis

The forecasting procedure starts with a series of assumptions regarding the economy (national and state), the employment picture in the state, restrictions on materials supply, introduction of new processes, environmental conditions, population projections, the electric and gas markets, impact of electric vehicles, impact of total energy systems and self generation, etc. Based on these assumptions and historical data the methods mentioned above are used and forecasts are designed.

A summary of the philosophy behind the approach is found in the Corporate Energy Forecast Manual:

Forecasts must account for all relevant factors, both quantitative and qualitative. The basic approach is to build the forecast from its smallest components.

Forecasts should be reproducible and adjustable. That is to say, if any one assumption changes, the forecaster has a structure by which he can logically and consistently adjust the forecast.

Forecasts should be responsive to management decision-making needs.

"Box-In" - Forecasts should be determined by using several models. Reliance on a single model is dangerous because of possible inherent errors

in that method. This multi-faceted approach allows the forecaster to evaluate the requirements of several different methods. For example, forecasting residential energy consumption by income vs kWh relationships, by appliance saturations and by geographic regions will each provide a range of forecasts. The forecaster can then select the forecast which reasonably meets the assumptions made for each approach.

The Forecasts Department is responsible to senior management and must insure that assumptions are consistent with corporate policy. Part of this process is the routing of the forecasts through the Forecasting Committee before they are finally accepted. The committee goes through each of the assumptions made one by one and discusses their accuracy and relevance. Much of this is done in an informal discussion type of atmosphere where members are free to bring up anything they feel might be at all relevant. Indeed one can hear discussed at such a meeting items such as the "American Ethic" (will an American always but something bigger and better?), human nature, life-styles, etc. Suggestions are made to see what other utility companies are doing, to see what New Jersey industrial companies are thinking of (are they considering moving out of the state?), to take another look at housing starts. Further general discussion revolves around capital equipment productivity, taxes, society, electric heating being a luxury item, oil as an

increasing proportion of home heating. Thus one gets the view that the committee is free to look at anything that they feel will affect forecasts. It is at these meetings that the forecasts are accepted. The members do not truly feel that they know the "philosophy" of the senior management. It is, rather, a situation where they set the policy and the senior management will then either complain or legitimize it. Yet the bulk of the questioning of alternatives seems to be done within the committee.

Members of the committee include the following officers of the company:

- Manager - Electric Planning (Chairman)
- Manager - Gas Planning
- Forecasts Engineer - Electric Planning (Secretary)
- Corporate Economist - Finance
- Assistant Comptroller
- Manager, Systems Operations - Electric Production
- General Manager Rates
- General Manager Marketing
- General Manager Urban Affairs and Area Development
- Assistant General Manager Gas Production

Thus one can see that the Forecasting Committee can be viewed as a powerful integrative tool.

(Reference for the above summary: PSE&G Corporate Energy Forecast - Summary Report, Fall 1976).

APPENDIX F
RESEARCH AND DEVELOPMENT

Research and development efforts at PSE&G have seven primary objectives:

Conversion of nuclear energy to forms suitable for meeting consumer needs, emphasizing development of advanced reactor concepts and power plant applications for both fission and fusion.

Improvement of load factor in production, transmission, and distribution facilities through the development of technologies for energy storage and load management.

Use of rejected heat from power plants; in the near term for aquaculture and agriculture, and in the long term to provide useful energy.

Development of means for using refuse as a source of fuel in producing both electricity and gas.

Development of means for ensuring that emissions from PSE&G facilities continue to meet environmental standards.

Economic use of new technologies; such as solar energy, cogeneration, wind power, etc.; to conserve energy and complement the traditional energy sources.

The company participates both in internal projects and projects in conjunction with industry research organizations such as the Electric Power Research Institute and the American Gas Association. In addition PSE&G works on federally funded research projects. The major portion of the R&D budget is, in fact, provided through federal reimbursements. In particular, the R&D budget

for 1977 contains two areas, energy conversion and sources and environment where reimbursements account for 99% of the funds and 47% respectively. The total reimbursed expenditures account for 80% of the budget. For 1976 PSE&G was awarded 11 research contracts. These provided \$9 million in outside funding, while the company provided \$12 million of its own funds.

A brief sample of current R&D projects follows.

The Battery Energy Storage Test Facility (BEST) is jointly funded by the Federal Energy Research and Development Administration (ERDA) and the Electric Power Research Institute (EPRI). The purpose is to develop efficient and economic batteries for energy storage. In this way lower cost energy could be stored for use during peak load periods. PSE&G will contribute \$1.5 million of the approximately \$13 million needed.

A \$188,000 research contract with ERDA funds a 15-month study to determine the feasibility of blending hydrogen into natural gas distribution systems.

An aquaculture project to study the economic feasibility of utilizing warm water discharged from power plants to raise commercial-size freshwater shrimp, trout, striped bass and eels is funded by the National Science Foundation.

Eco-Fuel II is derived from solid waste. PSE&G is participating in a one-year program to test the use of this powdered fuel.

Finally PSE&G has a solar energy research program. This is "a \$447,000 demonstration project to install and operate solar energy facilities in 14 customers' homes to determine the practicality of solar energy as a substitute or supplement to conventional heating systems."

Thus one sees a trend toward using all available energy sources, and reducing the dependence on fossil fuels and petroleum.

(The above summary was taken from the 1976 Annual Report of PSE&G).