27
1-30-81
JW
24 DNTIS

(1)

MASTER

R-1584

Technical Memo

ARGONNE NATIONAL LABORATORY

ANL
EES

ARGONNE NATIONAL LABORATORY
Energy and Environmental Systems Division

prepared for
U. S. DEPARTMENT OF ENERGY
under Contract W-31-109-Eng-38

DISCLAIMER

Printed in the United States of America. Available from National Technical Information Service, U. S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161

ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue
Argonne, Illinois 60439

ANL/CNSV-TM-47

CASE STUDY OF TOTAL ENERGY SYSTEM, SHER-DEN MALL, SHERMAN, TEXAS

prepared by

George B. Myrtetus and Merton D. Levey

Total Energy Leasing Corporation
90 Park Avenue
New York, New York 10016

for

Energy and Environmental Systems Division
Argonne National Laboratory
under Argonne Contract 31-109-38-4002

Completed December 1977
Published December 1980

Work sponsored by

U.S. DEPARTMENT OF ENERGY
Assistant Secretary for Conservation and Solar Energy
Office of Buildings and Community Systems

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

PREFACE

The Total Energy Leasing Corporation, contractor for the Sher-Den Mall business venture and for the preparation of this report, neither owns nor operates a Total Energy System. Its normal operation procedures call for the formation of two wholly-owned subsidiaries with respect to each project: a lessor-subsidiary formed in agreement with the owner/developer to install the system and thereafter to lease it to the owner/developer for a substantial term of years; a managing-agent subsidiary formed for that exclusive purpose in agreement with the owner/developer to serve as the agent for the limited purpose of operating and maintaining, on behalf of the owner/developer, the Total Energy System that has been installed and that the owner/developer is contractually obligated to operate and maintain.

In this case study, the principal participants are:

Total Energy Leasing Corporation (Telco), the Company.

Telco Energy Corporation of Texas (Telco-Texas), the lessor-subsidiary.

Sherman Energy Management Services (SEMSI), the managing-agent subsidiary.

Meyer Steinberg, d/b/a Sher-Den mall, the Owner, the Landlord, the Owner/Developer, the Lessee, and as part of Sherman Sher-Den Ltd. Partnership (the Owners).

And the Mall itself, as:

Sher-Den Mall and Sher-Den Mall Shopping Center.

Tables, figures, exhibits, and equipment specification lists are presented for the most part in the form submitted to Argonne by the Total Energy Leasing Corp.

THIS PAGE

WAS INTENTIONALLY

LEFT BLANK

CONTENTS

CONTENTS (Cont'd)

CONTENTS (Cont'd)

TABLES

TABLES (Cont'd)

TABLES (Cont'd)

FIGURES

EXHIBITS

1 INITIAL CORPORATE PLANNING, INVESTIGATION AND FEASIBILITY STUDIES

1.1 TOTAL ENERGY CONCEPT

Energy Systems

By 1960 the trend to the concept of independent power generation was beginning under a term coined by the natural gas industry. The promotional label was "Total Energy" (TE). The total energy plant in operation represents one of the most efficient forms of power plant engineering. Throughout the development of electrical power, no great concern for the waste heat given off by the power plant had been exhibited -- only a concern for the minimization of costs incurred in wasting fuel.

The plant is designed around two prime factors: recoverable waste heat, and the use of absorption cooling. The waste heat from the prime mover is put to work to provide air conditioning and heating for the occupants of the building. In many cases, the useful application of this so-called waste results in doubling of the central-station, power-plant efficiency. Engineers speak of TE plant efficiencies in the range of 75%, meaning that 75% of the energy value of the fuel burned in the plant's engine is converted into electricity or heating and cooling medium.

A TE system is generally characterized by the following services and components:

1. The plant produces electricity for the building or development at the site of use; fuel for the generating plant is usually natural gas and distillate fuel oil.

2. The electrical generating units are always equipped with heat recovery equipment to collect heat that may be used for the operation of air conditioning or refrigeration equipment, for a variety of industrial functions, and for space heating.

3. The plant serves a single site and as the power and heat it produces does not cross public thoroughfares, its operation does not infringe on the public electric utility legal franchises.

4. The advantage of the plant lies in the matter of scale -- it can be built carefully according to both present and future needs of a specific enterprise. The economics are largely a function of this scale.

5. Selection of engines and related equipment for a TE plant must be closely related to the electrical load profile of the building or building complex. The load profile is calculated by ascertaining the total electricity demands of the building over a 24-hr period and over the entire year. All energy needs -- are calculated so that the exact size and type of engine can be chosen for the job.

The system should be designed so that the engines and electrical generators meet the energy needs of average use most effectively.

6. The most efficiently designed plant would be one that utilizes generating sets sized so that combinations of the sets are always operating in their more efficient range.

7. In installations that require less heat and more electricity, the more efficient diesel engine is more appropriate than the gas turbine. Determining the relationship between heat and electricity is the key to this selection.

Therefore, a TE system is usually feasible only for an installation having a daily electric load that is constantly high for the full year and one that coincides with a need for a large amount of building or process heating or cooling, as well as high electric utility rates and competitive gas or oil rates.

One of the stumbling blocks to the development of total energy is the fact that each plant is unique -- a custom engineered installation in which pre-engineered package designs and equipment cannot be used.

Another drawback to the development of the independent power plant is that it requires an initial investment of additional money by the building owner. Even though these installations result in decreased overall costs, the savings are experienced only over the lifetime of the building. In our economy, this concept of life cycle costing is in opposition to the accepted method of lowest possible first costs.

The electric utilities, through their trade association -- the Edison Electric Institute -- set up the Program to Combat Isolated Generation. The major weapon in the electric utility arsenal was the practice of setting low electric rates. In cooperation with state and municipal utility rate commissions, the rate schedules traditionally favor bulk users of power. The utilities set up special promotional rates for projects and buildings that might find it advantageous to plan for a TE plant. The World Trade Center in New York City, which consumes more electricity (80,000 kW) than cities like Stamford or Schenectady was originally designed by the architect-engineers with a TE plant power supply. Consolidated Edison -- the New York franchised electric utility -- offered the builders of the World Trade Center a special "promotional" package of electrical rates, at a cost far below what other New York consumers pay for electricity. This offer successfully prevented the installation of the more logical TE plant in the building.

During the 1960s, the utility (Consolidated Edison Co.) applied to the Public Service Commission for a special low rate called Special Classification B - Bulk Power - Housing Developments -- which it could use to obtain the electric load demand for Co-Op City -- a 15,000-cooperative-apartment development in the Bronx. The project was planned to have its own generating plant at much lower costs for power than the open-existing rate of Con Ed. Again, this special rate schedule served the purpose of preventing installation of a total energy plant at Co-Op City.

1.2 MARKETING CONSIDERATIONS

1.2.1 The Shopping Center Market

The energy requirements of a shopping center have other characteristics that make them highly attractive, aside from their sheer size. Because shopping centers require huge amounts of electricity, they are desirable prospects for onsite electrical generation. A substantial part of the load is related to air conditioning. The undesirable aspects of the shopping center load are reflected in the energy requirements for heating systems, which are quite low because of the large inputs of heating from incandescent lighting and from the body heat of customers and store personnel. Also, most shopping centers operate only eight to twelve hours, so expensive equipment for onsite generation is often not as highly utilized as may be necessary to justify it economically.

In the design of energy systems for shopping centers, nearly all systems fall into one of three basic categories:

Roof top systems. Each store is supplied with heating, cooling, and ventilation through individual units typically located on the roofs of the building. Electricity for lighting and other uses is supplied to each store either through its own meter or through a master meter for the whole center.

Central Plant Systems. In a typical central plant system, heating, cooling, ventilation, and hot water are supplied to all stores from a single location in the shopping center. The central plant may use electricity, gas, oil, or a combination of these, as an energy source. Electricity for lighting is supplied to individual stores directly.

Total Energy Systems. The distinguishing feature of total energy systems is onsite electrical generation. Electricity is generated by gas-fired diesel engines or gas turbines, and heat that is exhausted as a by-product of electrical generation is used to the maximum extent possible for space heating, water heating, and for operating air conditioning equipment. A TE plant becomes an economic possibility when an installation is large enough to justify full-time manning by technically qualified personnel during operating hours. Its overall size is reasoned to be a center of about 500,000 sq ft.

The tendency today in developing shopping center sites is to incorporate from three to as many as six or seven anchor tenants and from 40 to as many as 80 medium and small sized stores. As a result, shopping centers larger than 1,000,000 sq ft are no longer uncommon. There has been an almost universal adoption of the enclosed pedestrian mall design, and these malls represent large volumes to heat and cool.

While shopping centers are getting larger, they also are beginning to offer longer and longer shopping hours.

One of the special problems of applying TE systems to shopping centers is that the energy demands of shopping centers are limited largely to an 8-12 hr day.

1.2.2 Decision Makers in the Energy System Selection Process

Some owner/developers build centers with the intention of owning and operating them indefinitely, while others are in fact speculative builders who intend to sell the center to another owner after the first year or two of operation. The difference is significant from an energy standpoint because the former tend to be willing to invest more in quality energy installations than the latter. Few owner/developers are impressed with sophisticated engineering analyses or economic projections, particularly if the projections use such investment techniques as discounted cash flow. Furthermore, they tend to be far more concerned with first cost than with operating cost, particularly during periods of tight money and high interest rates. For all these reasons, owner/developers seldom provide the initiative for innovation with respect to energy systems.

The influence of architect/engineer firms normally is somewhat less than that of the consulting mechanical engineers unless they are serving in that capacity themselves.

For most large shopping centers, the detailed design of the heating, ventilating, and air conditioning (HVAC) systems is done by consulting engineers. Thus, these engineers are in a strong position to influence the selection of energy sources. Despite their exceptional technical capabilities, a majority of them show a marked reluctance to accept new energy system approaches. In the case of TE systems, many engineers are skeptical of the claimed operating and economic advantages of such systems and are reluctant to risk their professional reputations until they have seen more convincing proof.

The anchor tenants include such well known companies as Sears, Roebuck & Co., Montgomery Ward & Co., J.C. Penney Co., Inc., S.S. Kresge Co., F.W. Woolworth Co., and Food Fair Stores, Inc.

Most of these companies have highly qualified engineering staffs at their central headquarters, including some of the most knowledgeable people anywhere with respect to sophisticated energy systems. In planning for energy services in new stores, the first concern of anchor tenants is performance. If central-plant or TE systems are proposed, the anchor tenants require that these systems provide energy equal to or better than the services they would receive directly from the utilities in a conventional system design. When these basic performance standards have been met, the entire attention of the anchor tenants centers on minimizing operating costs. In the negotiations for the proposed energy services, the anchor tenants usually have powerful bargaining leverage.

The institutional investors, the chief mortgagors of shopping centers, have not seen convincing evidence of the technical and economic merits of total energy. They want to see reliable objective data on the operating and economic performance of existing plants, not computer generated projections. Their attitude is influenced by the relationship of the plant to the rest of the center in the event of foreclosure of either component. In a few instances when the plant is owned and operated by a third party leasing company, this problem has been overcome by a gas company warranty that the plant will continue to perform satisfactorily under all conditions, with the gas company assuming direct responsibility for operation and maintenance, if necessary.

Third party leasing companies were formed in the early days of central plant and TE system introduction because of the difficulty of the owner/developer in securing enough mortgage money.

1.2.3 Decision Factors in Energy Source Selection Performance and Reliability Requirements

Performance and Reliability Expectations. The general public expects a high level of technical performance and reliability in public utility services. This demand extends not only to freedom from service interruptions but also to energy content of fuels and voltage and frequency stability of electric service. Therefore, the first stated requirement of a TE plant is that the technical performance and reliability must equal or exceed that of conventional public utility services. Thus, a need exists for credible data to establish conclusively its comparative performance characteristics.

Legal Obstacles. The first problem is the matter of zoning. Concern exists as to whether a TE plant is permissible under zoning ordinances for office and commercial properties. A more difficult problem usually centers on the extent to which a plant selling services to tenants is subject to the regulations governing public utility companies. The question is considerably aggravated where submetering of these services is proposed. A third problem centers on the question of whether the operator of the plant incurs a liability with respect to his tenants in the event of service interruption.

Ecological Issue. The ecological issue, particularly with respect to air pollution, has been of more importance recently, and the general agreement is that air pollution and noise pollution will become items receiving much greater attention in the future.

Economic Considerations. Owner/developers are more concerned about first cost than about operating cost, especially during periods of tight money. They use crude measures for purposes of analysis, i.e., pay-out periods rather than discounted cash flow.

Architects and consulting engineers are prone to cater to a client's desire to minimize first cost, which makes them rather resistant to total energy concepts.

Investment groups usually are concerned primarily with assuring a return on their investment in energy systems. Most investment groups are thoroughly conversant with advanced methods of economic analysis.

Anchor tenants are clearly concerned about operating costs almost exclusively and are indifferent to the mechanics of energy systems beyond assuring themselves of reliability and adequate capacity.

1.2.4 Incentives of Shopping Center Developers for Promoting a Total Energy Plant and Utilization of Third Party Assistance

Energy Management Systems and Services provided by Telco:

1. Total Energy Leasing Corporation displaced the Landlord's capital cost for central station air conditioning and heating equipment for the main buildings and the common mall area of the key tenants. This displaced cost, supplied by Telco, reduced the developer's original investment and the annual mortgage costs and thereby increased the operating profit by a substantial amount.

2. As the TE plant housing and shell structure is provided by the developer, Telco contributes a yearly rental payment for this space.

3. The developer benefits from a professional energy management service in the design, construction, operation, and maintenance of the energy plant and places a single responsibility for the generation, distribution and application of electricity, air conditioning, heating, refrigeration, domestic hot water and compressed air in the total energy company.

4. The long economic life and low controlled operating costs of the plant fulfills the demands of the anchor tenants and improves the shopping center's mortgage rating.

5. The reliability factor of the TE plant is substantiated by its excess equipment capacity, the dual fuel engine generators, and the onsite qualified operating engineers.

6. The four-pipe distribution system offers maximum flexibility to the tenants as simultaneous heating and cooling requirements of different tenants is satisified without any time lag.

7. The Tenant Displaced Cost Analysis prepared by Telco and the agreement -- Subscriber Service Agreement -- consummated with each tenant demonstrates the tenant's savings on energy and services received from the TE plant.

8. The developer benefits from the reduction cost of roof steel layout as no heavy machinery is placed on the roof.

9. The developer benefits from the savings on penthouse construction required by majors for their HVAC equipment.

10. Displacements of developer responsibility for maintenance, repair, and replacement of all HVAC equipment.

1.3 LEGAL AND REGULATORY CONSIDERATIONS

1.3.1 The Public Utility Status of Total Energy Facilities

Today, in all probability, no public utility status would be acquired by a total energy installation where the installation would serve only a limited number of tenants, without using public streets, without applying for a franchise, or without exercising powers of condemnation. Generally speaking, it may be said that whether or not a particular gas, water, or electricity installation, or service, constitutes a public utility operation under a typical public utility statute still depends on whether there is a holding out, or dedication, of such service to or for the public.

The following utility services have been declared by court rulings not to constitute a public utility operation:

1. The owners and operator of a total energy installation that supplies electricity only to its tenants does not constitute a public utility operation.

In the Drexelbrook Case, the Pennsylvania Supreme Court held a similar gas, water, and electricity service not to constitute a public utility operation. That case involved applications to the Pennsylvania Public Utility Commission (PUC) filed by the Philadelphia Electric Co. and by the Philadelphia Suburban Water Co. They sought PUC approval of the transfer of their distribution service supply and metering equipment to Drexelbrook Associates, a partnership that owned and managed Drexelbrook -- a garden-type apartment village. The applications were dismissed by the Pennsylvania PUC. On appeal, the Pennsylvania Supreme Court held that the proposed service by Drexelbrook would not constitute it as a public utility within the meaning of Section 2 of the Public Utility Law because such service would not be furnished "to or for the public." The Court stated that

> in the present case the only persons who would be entitled to and who would receive service are those who have entered into or will enter into a landlord tenant relationship and those to be serviced consist only of a special class of persons -- those to be selected as tenants -- and not a class open to the indefinite public. Such persons clearly constitute a defined, privileged and limited group and the proposed service to them would be private in nature. Therefore, where gas, water and electricity service is proposed only to a limited number of shopping center tenants, the furnishing of such services does not constitute a public utility operation.

2. Furnishing gas, water or electricity to tenants on a rent-inclusion basis does not constitute a public utility operation.

In the leading Drexelbrook case, the Commission that sought to hold Drexelbrook's operations to be a public utility operation conceded that a landlord would not be a public utility if its charges for utility service were included unitemized in a flat overall rental charge. In its decision overruling the Pennsylvania Commission, the Pennsylvania Supreme Court rejected the distinction between rent inclusion and submetering and stated:

> It is apparent that whether or not the utility charge is included in a flat rental or determined through submetering, it still constitutes compensation to the landlord. We fail to see how the method of computing the charge for the utility service is in any sense determinative of or relevant to the issue of whether the service is to or for the public.

Accordingly, it appears that while the most recent authoritative decision may reject the distinction, the distribution of gas, water, or electric service on a rent inclusion basis is in some minor respects more likely to be held a nonpublic-utility operation than distribution on a submetering basis.

3. Furnishing gas, water or electricity to shopping center tenants by a separate corporation does not constitute a public utility operation. Even if a separate total energy corporation is established and the shopping center's total energy plant is owned or operated by a third party owner/operator, the operation would not constitute a public utility operation subject to public utility commission jurisdication. This nonpublic utility status would exist if (1) ownership and operation were carried on by a separate corporation for each shopping center; (2) the corporation were incorporated under general business corporation (rather than public utility corporation) statutes; and (3) the corporation's powers were limited to supplying gas, water, and electricity to the tenants of the named shopping center.

In summary, no public utility status is acquired by a total energy installation in a shopping center distributing gas, water, or electricity where the installation serves only a limited number of tenants, without using public streets, without applying for a franchise, and without exercising powers of condemnation. While the case is perhaps even stronger for a nonpublic utility status where the electricity is distributed on a rent-inclusion basis, no public utility status would be acquired even if the electricity were submetered.

1.3.2 Preliminary Talks with the Securities and Exchange Commission as to Telco's Exemption from Public Utility Holding Co. Act

On May 2, 1969, Mr. John Q. Stilwell, at that time President of Total Energy Leasing Corporation, and Harry F. Loeser of the firm of Foley Hoag & Eliot, met with Aaron D. Levey, Associate Director of the Division of Corporate Regulation, Securities and Exchange Commission, to discuss the potential application of the Public Utility Holding Company Act to Total Energy Leasing Corp.

The legal arguments advanced at this meeting to support Telco's exemption status were as follows:

1. The provisions of Section 2(a)(3) of the Holding Company Act should not apply to Telco's subsidiaries because they are primarily engaged in a business other than the generation and distribution of electrical energy and the amount of electrical energy is so small as not to involve the public interest.
2. Section 2(a)(3) should not apply to Telco because it neither owns, for the purposes of the Act, nor operates facilities for the generation of electric energy.
3. In addition, since the System Lease (to be reviewed in more detail below) places all legal obligation for the operation and maintenance of such facilities upon the Project Owner, Telco's management subsidiaries were involved therewith only as such Project Owner's Agents and, therefore, should not for the purposes of the Holding Company Act be deemed to be companies supplying such facilities.

While the Associate Director disagreed with some of the legal arguments presented above, he did indicate that at this time the Commission does not want to be involved with the regulations of TE systems under the Holding Company Act and the Associate Director suggested the following procedure.

Telco should file an application for a declaration by the Commission that the Act does not apply. In the alternative, the application should be for an exemption from the provisions of the Act pursuant to Rule 7. He indicated that the reaction of the staff would be to delay any action by the Commission on such an application as long as possible. He gave his firm assurance that the staff and the Commission would regard such a filing as a "good faith application" under the Act, which would have the legal effect of exempting Telco from all provisions of the Act until the Commission determines otherwise.

Therefore, an application was filed on behalf of the Company and the subsidiaries with the Securities and Exchange Commission on June 13, 1969, and assigned File No. 31-697 in the Commission's files. The argument was once again developed in this application that neither Telco nor any of its subsidiaries constitute an electric utility company as that term is defined in Section 2(2)(3) of the Public Utility Holding Company Act of 1935.

In support of this application, Telco submitted the following information as to its operating procedure.

Telco itself neither owns nor operates a total energy system. Its normal operating procedures call for the formation of two wholly-owned subsidiaries with respect to each project. A lessor-subsidiary formed for that exclusive purpose normally agrees with the owner/developer of a project to design a total energy system suitable for the total energy requirements of the project, to install the system therein and thereafter to lease it to the owner/developer for a substantial term of years. The financial benefits of this arrangement to the owner/developer are substantial. The construction of such a system by such a Telco lessor-subsidiary displaces a not significant portion of the capital cost of the project, and since the Telco lessor-subsidiary agrees to subordinate its security interest in the system to the first lien of the owner/developer's permanent mortgage lender, it also, in effect, provides the owner/developer with a form of subordinated financing in an amount equal to a substantial portion of the cost of the TE system installed. Another category of Telco's subsidiary, a managing-agent subsidiary, formed for that exclusive purpose will ordinarily agree to serve as the agent of the owner/developer for the limited purpose of operating and maintaining, on behalf of the owner/developer, the TE system that has been installed and that the owner/developer is contractually obligated to operate and maintain.

Telco's Lessor Subsidiaries. Telco has organized the following wholly-owned, lessor-subsidiaries to design, install and lease a Total Energy System in Sher-Den Mall, Sherman, Texas.

Telco Energy Corporation of Texas ("Telco-Texas"). Telco-Texas is a wholly-owned subsidiary of Telco, organized as a Texas corporation in order to design a Total Energy System for Sherman Sher-Den Limited Partnership (Sher-Den), the developer and owner of the Sher-Den Mall, a 500,000 sq-ft shopping center in Sherman, Texas, to install the system therein and to enter into a long-term lease of the system to Sher-Den. In pursuance thereof, Telco-Texas has entered into an Installation Agreement with Sher-Den whereby the former has agreed to design and install a suitable TE system for the project, in accordance with plans prepared by Telco-Texas and approved by Sher-Den. The Installation Agreement contains provisions that are customary in standard construction agreements, relating to the protection of the various security interests, insurance, scheduling of the work, performance bonds and other matters. Contemporaneously with the execution of the Installation Agreement, Telco-Texas and Sher-Den have executed a System Lease with respect to the total energy system for an initial term of 35 years. Such rental payments will constitute Telco-Texas' only income.

The System Lease is a "net lease," so-called, in that Telco-Texas retains little more than bare legal title. Sher-Den, as lessee, is required to operate and maintain the system and pay all charges with respect thereto. The System Lease provides that Sher-Den is solely responsible for the generation and distribution of total energy services produced by the system and that Sher-Den alone is obligated to provide complete management of the system, including all engineering services, labor, supervision, maintenance, supplies, water, fuel, and electric power necessary for the operation thereof. The System Lease further specifies that Sher-Den cannot sell total energy services produced by the system to anyone other than a tenant who is physically located within the project.

Sher-Den has entered into Subscribers' Service Agreements with certain of its prospective tenants for the provision by Sher-Den of total energy services thereto, and it is anticipated that similar agreements will be entered into with other prospective tenants. The execution of such agreements is a condition precedent to Telco-Texas' obligation to construct the system pursuant to the Installation Agreement. Each Subscriber's Service Agreement is for a term that is coterminous with the tenant's lease. Pursuant to each such agreement, heating, ventilating, and air conditioning (HVAC) services are provided to the tenant in return for a fixed annual sum per square foot of space leased in the project by the tenant, which sum is negotiated by Sher-Den on a tenant-by-tenant basis and is subject to certain standard adjustments representing, in effect, a cost of living escalation or deescalation, as the case may be. Pursuant to each such agreement, electric service is to be provided to the tenant at a charge equal to the per kWh rate that would apply were the tenant to satisfy his electric requirements from the local electric utility. In each such Subscriber's Service Agreement, Sher-Den guarantees that its charge for electricity service will not exceed the relevant electric utility charge. Each such Subscriber's Service Agreement restricts the tenant to the use of such services and prohibits the reselling of any of these services to others.

Telco has organized the following wholly-owned subsidiary to serve respectively as the managing agent for Sher-Den, the lessee of the total energy system:

Sherman Energy Management Services, Inc. (SEMSI). SEMSI is a wholly-owned subsidiary of Telco, organized as a Texas corporation, that has entered into a Management Agreement with Sher-Den in which SEMSI has agreed to operate and maintain the total energy system that Sher-Den has leased from Telco-Texas as Sher-Den's agent for this purpose. In part, the Management Agreement between SEMSI and Sher-Den provides that:

SEMSI agrees, as agent for Sher-Den, to provide all necessary engineering services, labor, supervision, maintenance, and operating supplies necessary fully to discharge Sher-Den's obligations pursuant to the System Lease and the various Subscriber's Service Agreements between Sher-Den and its tenants. Pursuant to Article III of the Management Agreement, SEMSI guarantees Sher-Den that the system will be maintained and operated in an efficient manner; and that the annual expenses and costs of said maintenance and operation, including the annual rent payable to Telco-Texas pursuant to the System Lease and the annual management fee payable to SEMSI, will never exceed the annual gross revenue received by Sher-Den from the provision of total energy services to its tenants, less a certain stipulated sum that represents profit to Sher-Den from the operation of the system. To the extent that the actual expenses and costs of operation and maintenance in any year exceed the projections of SEMSI, its annual management fee will, in effect, be correspondingly reduced. Conversely, especially efficient performance by SEMSI of its agency obligations will permit it to earn additional compensation, pursuant to Article III. Such fees as SEMSI will receive from Sher-Den pursuant to the Management Agreement are the only revenues that SEMSI will receive.

The System Lease and the various Subscriber's Service Agreements make Sher-Den ultimately responsible for the proper operation and management of the total energy system. Consequently, the Management Agreement permits Sher-Den to designate a financially responsible and qualified company, other than SEMSI, to perform SEMSI's duties, in the event of the failure of satisfactory performance by SEMSI.

The Management Agreement also provides for access to various parts of the system, inspection, and maintenance of the system, arbitration of disputes and other nonsubstantive matters.

Therefore, Total Energy Leasing Corporation and each of its wholly-owned subsidiaries requested that the Commission issue an order:

1. Declaring Telco and each of its subsidiaries hereinbefore named to be not an "electric utility company," as that term is defined by Section 2(a)(3) of the Holding Company Act, on the ground that the owner/developer of the project identified and described and not Telco or any of its subsidiaries related thereto, constitutes company operating facilities used for the generation, transmission, or distribution of electric energy for sale for purposes of the phrase " ... other than sale to tenants or employees of the company operating such facilities for their own use and not for resale" in the first sentence of Section 2(a)(3) of the Holding Company Acts; or

2. Declaring Telco and each of the said subsidiaries to be not an "electric utility company" as that term is defined by Section 2(a)(3) of the Holding Company Act, on the ground that Telco and each of the said subsidiaries is entitled to such an order because in each case the standards of clause (a) of said Section 2(a)(3) are met.

1.3.3 Opinion of Foley Hoag & Eliot as to Whether Total Energy Corp. and/or any of Its Subsidiaries are Subject to the Public Utility Holding Co. Act of 1935

Foley Hoag & Eliot stated that for purposes of this opinion, they would rely on the facts set forth in the Exemption Application filed on behalf of the Company and the Subsidiaries with the Securities and Exchange Commission.

After reviewing pertinent sections of this Act -- Section 2(a)(7), 2(a)(4), 2(a)(5), and 2(a)(3) -- they concluded the following: The question whether companies engaged in the business of designing, installing, and leasing "Total Energy Systems," so-called, such as certain of the Subsidiaries are, or rendering managing-agent services in connection with such systems, as certain others of the Subsidiaries do, are "electric utility companies" within the meaning of the first sentence of Section 2(a)(3) presents novel questions of interpretation that have not heretofore been raised in any reported proceeding under the Act. In our opinion valid arguments can be made based on the language of the Act, its legislative history and the interpretation of analogous State statutes by State Courts and regulatory commissions, to the effect that none of the Subsidiaries should be held to be an "electric utility company" within the meaning of said first sentence of Section 2(a)(3).

Even if a company falls within the definition of an "electric utility company" in the first sentence of Section 2(a)(3), it is entitled to be declared by the Commission not to be an "electric utility company" for purposes of the Act, if the Commission finds that such a company meets the standards established by clause (a) of Section 2(a)(3). The Company on behalf of itself and the Subsidiaries has filed with the Commission an application for such a declaration, which is a part of the Exemption Application hereinbefore referred to. Although due to the paucity of precedent in this area the matter is not free from doubt, we are of the opinion that the Company and the Subsidiaries should be held by the Commission to qualify for a declaration under Section 2(a)(3)(A) to the effect that none of them is an "electric utility company" under the Act.

Section 2(a)(3) further provides that the filing in good faith of an application such as the Exemption Application exempts the filing companies (and the Owner of the facilities operated by any such company) from being an "electric utility company" under the Act "until the Commission has acted upon such application." On the assumption hereinbefore stated that the facts set forth in the Exemption Application are accurate, and in light of our opinion stated in the preceding paragraph, we are of the further opinion that the Exemption Application is a filing in good faith within the meaning of the third sentence of Section 2(a)(3) of the Act.

It follows from the preceding paragraph, and it is our opinion, that, unless and until the Commission adversely acts upon said application under Section 2(a)(3), which is a part of the Exemption Application, none of the Subsidiaries is an "electric utility company" for the purposes of the Act; and that so long as none of them is an "electric utility company" (and, of course, so long as the Commission has not taken affirmative action to declare the Company or any of the Subsidiaries to be a "holding company" under Section 2(a) (7), neither the company nor any of the subsidiaries is a "holding company," or a "subsidiary company" or a "registered holding company," or an "affiliate" of a "registered holding company" or of a "subsidiary company" of a "registered holding company" within the meaning of the Act.

1.4 SUMMARY AND EXPLANATION OF MATERIAL PROVISIONS OF CONTRACTS BETWEEN SHER-DEN AND TOTAL ENERGY LEASING CORP.

1.4.1 Installation Agreement

The Installation Agreement* made between Meyer Steinberg d/b/a Sher-Den Mall and Telco Energy Corporation of Texas contains the following significant provisions:

1. The agreement provides for the construction of the Complex by Owner in accordance with plans to be agreed upon mutually by Telco (a subsidiary of Total Energy Leasing Corporation) and Owner (Sec. 3.1) and provides for the mechanical matters in connection with the division of

*This AGREEMENT was made this 11th day of February, 1969, by and between MEYER STEINBERG, d/b/a SHER-DEN MALL, with offices at 1305 Oak Cliff Bank Tower, Dallas, Texas 75208, and TELCO ENERGY CORPORATION OF TEXAS, a Texas Corporation with offices c/o Suite 2004, 330 Madison Avenue, New York, New York 10017.

labor and responsibility for erection of the Complex and basic facilities adequate for installation of the System (Article 3, generally). Owner is obligated to provide for Telco's machine and transformer rooms, to perform certain work in connection with the installation of the HVAC system and other work to enable Telco to install the Total Energy System (Sec. 3.8).

2. Telco is obligated to install the System in accordance with plans and specifications to be approved by the Owner, and the standby company (Sec. 4.1) will probably supply the standby service, provided for in the Management Agreement. Owner and Telco agree to coordinate their several construction responsibilities to achieve scheduling efficiency (Sec. 4.2). The Agreement expressly provides that the System is personal property and remains the property of Telco (Sec. 4.4) but subject to the first lien of the Fee Mortgagee.

3. The agreement requires Telco and Owner to provide fire, liability, and boiler insurance in amounts of at least 80% of the full insurable value of the insured property and to include the interests of the Fee Mortgagee under such policies (Article 5).

4. Article 7.2 of the Installation Agreement contemplates that the Owner may convey its interest in the Complex provided that the obligations of Owner under its agreement with Telco shall have covenants running with the land.

5. Provisions are included for notice of completion by Telco and acceptance of the system by Owner (Sec. 8.2) and for automatic acceptance of a portion of the system upon completion of a portion of the system serving a prescribed minimum number of square feet (Sec. 8.3).

1.4.2 System Lease

The System Lease* between Telco Energy Corporation of Texas (the "Lessor") and Meyer Steinberg d/b/a Sher-Den Mall (the "Lessee") contains the following substantive clauses:

*This AGREEMENT was made as of the 11th day of February, 1969, by and between TELCO ENERGY CORPORATION OF TEXAS, a Texas corporation with offices c/o 330 Madison Avenue, New York, New York, 10017 (the "Lessor"), and MEYER STEINBERG, d/b/a SHER-DEN MALL (the "Lessee"), with offices at 1305 Oak Cliff Bank Tower, Dallas, Texas 75208.

1. The lease provides that Telco will lease to Owner and Owner will hire from Telco the System (Sec. 1.1) for an initial term of 35 years, which is to be coterminous with the permanent fee mortgage (Sec. 2.18) and for optional renewal terms of three successive periods of ten years each (Sec. 9.1). After the initial term and at any time during any renewal term, Owner may purchase the System from Telco at its then independently determined fair market value (Sec. 9.2).

2. Owner will pay Telco a fixed annual amount, payable monthly, as the Basic Rent for the System (Sec. 3.1A) during a part of the initial term and a somewhat lower rental during the balance of the initial term and any renewal term (Sec. 3.1B). (IMPORTANT NOTE: This fixed rental is, by virtue of the guaranteed cost provisions of Article 3 of the Management Agreement described below in effect paid only out of revenues received from tenants for electricity and HVAC Services.)

3. The lease provides that the System remains personal property and the property of Telco, subject to the rights of the Fee Mortgagee holding the first lien on the Complex (Article 5).

4. Owner, at its expense, is required to maintain fire, liability, boiler, and machinery insurance on the System (Article 6). Such insurance is to include the interest of the Fee Mortgagee (Sec. 6.8) and if such a clause is obtainable, is to waive the insurer's right of subrogation against Telco, the Managing Agent, and any of Owner's tenants, for negligent acts.

5. Owner, as lessee, is required to maintain and operate the System and to provide the electricity, heating, and air conditioning services to the tenants of the Complex (Article 7). The Owner's responsibility therefore is contemplated to be performed by an agent, which will be an affiliate of Telco, under the Management Agreement described below.

6. Provision is made in the event of damage or destruction of the System and/or the Complex and for the application of the insurance proceeds to restoration of the Complex and Systems, subject to the rights of the Fee Mortgagee (Article 8). If under such provision, restoration of the Complex is not made by Owner under circumstances where Owner is obligated by the lease to do so or where he elects but fails to do so, Telco is entitled to recover its then discounted cost less the proceeds of insurance (Sec. 8.2).

7. The lease also provides for possible expansion of the Complex and provides for Telco's option to provide total energy services for the expanded premises on similar terms and conditions and at rates determined under the replacement provisions of Section 9.4.

8. Telco, as lessor, is obligated to pay all personal property taxes on the System (Article 10) and Owner is required to pay all other taxes such as real property taxes, sale and use taxes, and the like. Provision is made for apportionment of taxes if the system and the Complex are together deemed to be real property and are assessed as such.

9. If, after commencement of the lease term, the activities of the lessor, lessee, or any managing agent in connection with the total energy

system and the provision of services therefrom, should become subject to any form of public utility regulation resulting in regulation or restriction of the rentals, fees and charges of lessor or any managing agent, the lease provides that lessee may take such action as may be required to eliminate such regulation, or in the alternative, purchase the system from lessor at its then discounted cost to lessor (Article 11).

IMPORTANT NOTE: If Owner should be required to purchase the system under this provision, Telco would be paid only out of revenues received from tenants for electricity and HVAC Services (Sec. 11.3). In addition, the lease makes appropriate provision for partial or total condemnation of the Complex and for the determination of the amount of awards to be made to lessee and lessor and for their respective rights to prove value in condemnation proceedings (Sec. 12).

10. Assignment and subletting are generally prohibited without lessor's consent except that lessee may assign the lease to a purchaser of the fee title to the Complex provided the assignee assumes all of lessee's obligations under the lease and under the Management Agreement (Secs. 13.1 and 13.2). Lessee may mortgage the lease only as direct or collateral security given to a Fee Mortgagee (Sec. 13.3).

11. Lessor agrees to join with lessee in any fee mortgage on the Complex for the purpose of subjecting the System to the first lien of the Fee Mortgagee, but only if certain conditions are agreed to by the Fee Mortgagee in order to preserve the economic benefits of the lease for the lessor and of the Management Agreement for the managing agent. For example, if the mortgagee acquires title to the system, the mortgagee must agree to perform all covenants of the lessee and to lease back to the lessor the system for a nominal rental. In addition, the mortgagee is required to assume the obligations of the lessee under the Management Agreement (Sec. 15). Also, the lease provides for subordination of the System Lease to the rights of the Fee Mortgagee (Sec. 16).

12. Lessor is deemed in default under the lease in the event of bankruptcy, voluntary or involuntary, or if lessor defaults under the Management Agreement. In the event of default, unless cured after notice, the lease terminates and lessor is deemed to have abandoned the System (Article 17). Lessor may transfer its interest in the system or mortgage the system provided adequate arrangements are made to substitute performance by the transferee of Lessor's obligations (Sec. 18).

13. The usual provisions for default by lessee (bankruptcy, failure to pay rent, failure to perform covenants, and the like) are contained in the lease, and it is also provided that if lessee shall be in default under the Management Agreement, such event shall be deemed a default under the lease (Sec. 19).

14. The agreement of lease is subject to the approval of any Fee Mortgagee (Sec. 23).

15. Lessor is granted access to the leased premises at all times for the purpose of inspection, maintenance and changes, if required, to the system (Sec. 24).

16. Lessee covenants not to sell electricity or any other services from the total energy plant to any person other than occupants or tenants of the Complex and not to dedicate any public way which will run through the system or take any other action which might subject the system to public utility regulations (Sec. 25).

17. Lessee grants to lessor a recordable security interest under the Uniform Commercial Code in all sums received under Subscriber Service Agreements with tenants of the Complex under which such tenants receive services from the total energy system (Sec. 30).

1.4.3 Management Agreement

The Management Agreement* between Meyer Steinberg, d/b/a Sher-Den Mall ("Owner") and Sherman Energy Management Services, Inc. ("Agent") contains the following substantive sections:

1. An affiliate of Telco ("Agent"), a corporation, will enter into a Management Agreement with Owner under which all services required to be performed by Owner for tenants under the Subscriber's Service Agreements will be performed by Agent. Agent will furnish all system insurance coverage required to be furnished by Owner under the System Lease and Agent will maintain personnel to operate and maintain the System (Articles 1.1, 1.2 and 1.3). All costs of operation, other than payment of the Basic Rent under the System Lease and certain other payments to be made directly by Owner shall be made by Agent on behalf of Owner (Article 1.4).

2. The Management Agreement runs for a term of years and renewals coterminous with the term of the System Lease (Article 1.7).

3. The guaranteed cost provisions of the Management Agreement (Article 3) insure that if the assumed size of the Complex is reached, and a certain minimum schedule of HVAC fees is obtained from Space Tenants, Owner will receive a minimum franchise fee for the first portion of the initial term and a higher fee for the balance of the term, and the Agent will receive from Owner all revenues in excess of the franchise fee derived from the supply by Owner to tenants of electricity, heating and cooling. The guaranteed cost provisions also provide that the amounts received by Agent as a management fee and by Telco as lessor under the lease agreement are to be deducted from the amount paid by Owner to Agent under the Management Agreement. In addition, the guaranteed cost arrangements may be adjusted for variations in the total number of square feet to be served by the System. (IMPORTANT NOTICE: Assuming Owner has entered into Subscriber Service Agreements for a certain minimum number of square feet in the Complex at a certain minimum average HVAC rate within a reasonable period of time after the commencement of the initial term of the System Lease, the guaranteed cost provision is intended

*This AGREEMENT made as of the 11th day of February, 1969, between MEYER STEINBERG, d/b/a SHER-DEN MALL, with offices at 1305 Oak Cliff Bank Tower, Dallas, Texas, 75208 ("Owner") and SHERMAN ENERGY MANAGEMENT SERVICES, INC., a Texas Corporation, with offices c/o 330 Madison Avenue, New York, New York, 10017, ("Agent").

to insure that all costs of operation of the total energy system, including the Basic Rent under the System Lease and the Management Fees under the Management Agreement, will never exceed the revenues received from Space Tenants for electricity and HVAC Services.)

4. The Management Agreement provides for Agent to enter into a standby agreement either with the gas company which supplies the primary fuel or with the engine manufacturer under which one of the above agrees to perform or cause to be performed all of Agent's duties under the Management Agreement if Agent defaults (Article 7). Provisions are also included to allow Agent to resume its duties and be compensated therefore when it is certified by the gas company to be able to resume such duties.

Owner grants to the Agent a recordable security interest under the Uniform Commercial Code in all sums received under Subscriber Service Agreements with tenants of the Complex under which such tenants receive services from the total energy system (Article 15).

Article 16 of the System Lease provides for the subordination of the lien of the System Mortgagee upon the System to the lien upon the System created by the Fee Mortgagee. Therefore, in order to maintain the economic benefits of the lease to the lessor and the Management Agreement to the Agent, the recordable security interest in all revenues (HVAC and electric) received under Subscriber Service Agreements was granted to the lessor (Telco-Texas) by Sher-Den Mall and to the Agent (Sherman Energy Management Services, Inc.) by Owner, Sher-Den Mall. This secured interest in the revenue flow was to be paramount to the rights of any Fee Mortgagee. This secured interest in a revenue flow was the only prime collateral which Telco could then offer its System Mortgagee as the lien on the physical assets had been subordinated to the Fee Mortgagee.

1.5 STANDBY SERVICE AGREEMENT, FAIRBANKS MORCE, INC.

Under the Standby Service Agreement negotiated with Fairbanks Morse, Inc., Fairbanks agreed to provide standby service in the event of failure of Sherman Energy Management Services, Inc. ("Energy") to perform its obligations to operate and maintain the system as provided for in the Management Agreement. For the purpose of this agreement, the term "event of default" or "default" shall mean the occurrence of any of the following events:

1. Abandonment by Energy of its duties to operate and maintain the system.

2. Filing by Energy or any petition under the Bankruptcy Act.

3. Total failure of the system for three consecutive full business days.

4. Periodic total failure of the system aggregating more than 5% of normal business hours during more than one period of three consecutive months in any period of 60 consecutive months.

5. Failure to meet at least 85% of the minimum output standards for more than 5% of normal business hours.

Upon receipt of written notice of default, Fairbanks shall assume the following obligations:

a. Furnishing of all engineering services, labor, supervision, maintenance and operating supplies, water, and fuel necessary for the operation of the system and to enable Owner to properly service the tenants under the Subscriber's Service Agreements.

b. Make all repairs and replacements and perform all maintenance work and provide labor, materials, services, parts and other supplies required..

c. Supply adequate number of qualified personnel.

d. In addition to work performed on the diesel engine generating plant, Fairbanks shall perform such maintenance and repair work with respect to the electrical distribution, heating, ventilating and air conditioning facilities which are not part of the components originally supplied by them.

e. Fairbanks may render advisory and consulting services to Energy so as to permit Energy to cure the event of default.

However, under this agreement, Fairbanks shall have no obligation to make collections or receive payments from the tenants nor shall Fairbanks have any liability for liquidated damages or loss of profits for actual losses.

Fairbanks shall be reimbursed for all costs of natural gas, labor, equipment and parts, and all its other operating costs, including an amount to cover overhead equivalent to 50% of the aggregate amount of such costs plus a management fee of 12% of the sum of such aggregate costs.

Fairbanks shall be paid monthly upon submission of evidence of its costs. The obligation of Fairbanks to assume the operation of the system is conditioned upon its approving the plans and specifications for the complex and system.

If Fairbanks operates and maintains the system, Energy shall have the right to assume operation and maintenance of the system immediately upon the curing of the default.

If either Owner, Telco, or Operations shall assign or transfer its respective interest in the system, Fairbanks shall have the right to terminate this agreement.

Telco and Energy agree to furnish Fairbanks monthly all such financial statements relating to the operation and maintenance of the system as Fairbanks shall require to perform its obligations.

This agreement shall remain in effect for a term of twenty-five years from the date the Owner informs Fairbanks that the system is in operation and providing satisfactory service to tenants under Subscriber Service Agreements.

Although detailed discussions pertaining to a Standby Service Agreement were entered into with the gas utility serving Sher-Den Mall, we consummated the Standby Service Agreement with Fairbanks Morse and, thereby, satisfied our obligations under Article 7 of the Management Agreement.

1.6 INITIAL FEASIBILITY STUDIES

1.6.1 Telco Management

Our original feasibility studies for the Sher-Den Mall Shopping Center represent the work of our technical staff with the assistance of engineering inputs developed by our consulting engineers.

We prepared several feasibility studies and as the engineering design work progressed to the point that more detailed information was available on the major pieces of equipment proposed for this plant, we revised our study to reflect the current state of design. We will review below the revised feasibility projection of October 1968.

1. Design Parameters for Determining HVAC Rates and Estimated Electrical Revenues and Concept of Meter Readings for Electrical Rate Determination and "Displaced Cost Analysis" for HVAC Rates Determination.

a. Lighting, miscellaneous power, and air handlers demand and usage were determined by comparison with same tenants or similar type of tenants on existing shopping centers in the southwest area.

b. For the two major tenants, operating hours were calculated to be 14 hours per day, six days per week, or a total of 4368 hours per year. For the other key tenants, the operating hours per year were calculated to be 4056 and for the remainder of the Mall tenants the operating hours were calculated to be 3900 per year.

c. Tenant load and usage for lighting, miscellaneous power, and air handlers have been computed for each tenant or tenant space, and the charges for electric usage were based on the appropriate rate schedules of the franchised electric utility, Texas Power & Light Co.

d. Electricity was to be furnished on a meter basis at rates identical to those charged by Texas Power & Light Co. Therefore, electrical services were to be provided to all users at the same rate as the established rate schedules approved by the Public Utility Commission. The tenants could check and verify billing by comparing the demand, kilowatt hours used, escalation, and tax charges to a Texas Power & Light rate schedule appropriate for their classification and usage.

e. Table 1.1* presents a major tenant and store analysis of electrical loads and projected revenue.

---

*Tables and Exhibits appear consecutively at the end of the section.

f. HVAC rates were established at the feasibility stage on the basis of a "displaced cost analysis" (DCA) study. The rates for each type of user -- majors, backbone, satellites and Mall -- (this terminology referred to the square footage used by each tenant) were computed independently. This study was based primarily on the determination of rates for the Lancaster, Pennsylvania, shopping center adjusted or modified by six-factor analysis. At the Lancaster shopping center, the individual tenant's HVAC rates were derived by compiling the costs that would have been realized by each user had he/she been required to purchase, install, operate and maintain his own HVAC system over the life of his/her lease. This cost was then reduced to a dollar per square foot, per year charge and this computation became the basis for the heating and cooling service charge.

Essentially, the six-factor analysis presented a ratio between Sher-Den Mall and Lancaster, Pa., of the difference in dry bulb hours above 80°, wet bulb hours above 67°, effective full load hours of refrigeration, operating hours for the air conditioning system, degree days, average cents per kWh for three stores representing different parameters, average cents per therm for these three stores and average dollars/kW for air conditioning for these stores.

g. The preliminary six-factor analysis (see Table 1.2) indicated that the energy and service functions performed and charged for under the HVAC rates for a comparable store would equal approximately 94% of the rate charged in Lancaster, Pa., shopping center. Table 1.2 also indicates the marketing revenue structure determinants and a revenue analysis by component items.

h. The revenue analysis chart (Table 1.3) indicated for each tenant the makeup of the HVAC rate. As it separated not only capital costs and energy and service costs but also those capital costs associated with the central plant and those associated with the in-store work, the individual rate structure and the overall HVAC revenue for the center could be analyzed and compiled by the Total Energy Leasing Corporation, based on the capital cost contribution agreed upon with the owner/developer of the center.

i. The refrigeration compressors were calculated to operate 2320 hours of equivalent full load operation and air conditioning auxiliaries were calculated to operate 2741 hours per year.

j. Maintenance, repairs, and filters. These rates were derived from study of these costs for several national chain accounts, using this type of equipment (roof mounted heating and cooling units and central plant chilled and hot water systems with chilled and hot water coils in the air handlers).

k. Replacement cost was derived from industry experience for replacement of compressors, evaporator coils, noncleanable condenser coils, air handlers, water and refrigeration piping, electrical wiring, valves, etc.

l. Insurance and taxes were based on studies made by Honeywell and the Office Building Experience Exchange Report and procedure recommended by Carrier Corporation.

m. Installed equipment cost expressed in dollars per square foot calculated by using contractor estimates of installing roof mounted equipment on the basis of 300 square feet per ton and amortizing the cost of equipment and installation over a 10-year period. The central plant equipment costs based on cost estimates of construction departments of large department stores and amortized over a 20-year period.

n. HVAC charges set at approximately 15% below computed cost for tenant owning and operating equivalent heating and cooling equipment. Table 1.4 presents the summary of tenant HVAC rates by square footage occupied by cents per square foot per year and total estimated revenue.

2. Operating Concept. An operating staff consisting of a Chief Operating Engineer, two operators and a mechanic would be provided so that the central plant would be attended for two shifts per day, six days per week. The Chief Operating Engineer would be responsible for the efficient operation of the central plant, initiation of necessary maintenance and repairs in the central plant as well as assignment and supervision of maintenance activities for in-store air conditioning equipment with the tenant and owner spaces. Operators to assume the responsibilities of the Chief Operating Engineer during his/her absence and be available to unscheduled maintenance activities which may occur during off hours. The mechanic to perform routine preventive maintenance on the central plant equipment as well as such things as filter changes, lubrication, etc., on HVAC equipment located in the tenant space. Though the plant is designed and instrumented to be essentially unattended, the staff and scheduling of the operating crew would be such that qualified personnel would be on the site 16 hours per day and on call for the remainder of the period.

In addition to preventive maintenance performed by the onsite operating crew, service contracts would be executed with the major equipment suppliers to provide the necessary major maintenance and overhaul of their respective units.

Table 1.5 presents the parameters computing the components of direct operating costs and a projection of the operating cost categories and the method for determining the component cost of this section of the feasibility study.

3. Design Concept. To satisfy the projected electrical heating and cooling loads of the Sher-Den Mall, the feasibility study indicated a maximum requirement of 3123 kW in electrical generation. To satisfy this demand and provide an adequate amount of standby capacity, it was proposed that the electrical generation section of the total energy plant have a maximum capacity of 5000 kW in the form of five (5) 1000 kW units. In this manner, three of the above units would be able to satisfy the normal high demands of the center: (3123 kW, normal high demand; 90% diversity factor, 2800 kW), at all times, allowing one engine to be maintained in a stand-by status as well as one engine available for routine or emergency activities. As additional standby, each engine would be capable of providing 110% of its rated capacity for two hours in any given 24-hour period.

The feasibility study also indicates that approximately 1433 tons of refrigeration (maximum tonnage demand) would be required to air condition the center during the anticipated operating hours. The design scheme provided for a combination of absorption and direct driven electric centrifugal machines and would make maximum use of the waste heat available from the engine generators as well as the excess electrical capacity of the generators during off-peak conditions. In this manner, a portion of the refrigeration load could be shed under periods of severe electrical demand. Waste heat from the waste heat boilers would be utilized during the colder periods of the year to provide hot water for space heating. Additional boiler capacity would be provided to generate steam during those periods that heating or cooling was required and waste heat from the waste heat boilers was at a minimum.

The electrical switchgear would provide automatic startup and shutdown of generator sets as required to meet the demands of the center. Switchgear would incorporate automatic sequencing of engines, automatic load sharing and automatic frequency control. A programmer would be incorporated in the switchgear to initiate engine startup and shutdown in accordance with anticipated load increases or decreases. Substations for the distribution of electrical energy to the tenants will be sized 150% of anticipated capacity. A double-ended feature will allow switching of generator feeders in the event of line failures.

Table 1.6 presents the basis for the capital investment projection and the investment projection by indivudual components within each of three classifications.

Table 1.7 is a summary of the original feasibility projections as presented in the tables referred to above and projects an estimated return on investment of 12.96%.

1.6.2 A.T. Kearney Report

A.T. Kearney completed a study of the business and financial prospects of Total Energy Leasing Corporation for the investment brokerage house, Bear, Stearns & Co.

Bear, Stearns & Co. had retained A.T. Kearney & Co., Inc. to conduct a study of the business and financial prospects of Total Energy Leasing Corp. in order that a financial institution might reasonably estimate the profitability of the subject company.

A.T. Kearney reported that based on their analysis the revenue and profit projections of Total Energy Leasing Corp. were reasonable. There was sufficient market opportunity to support the projected number of installations and ample monies were projected for field operating and administrative expenses.

Revenues. The Telco revenue projects involved three to four operating systems in 1970 increasing to about 25 systems in 1973. The revenue projections are realizable within the confines of the shopping center market growth.

The Company's estimated revenues per square foot compare favorably with shopping center tenants and developer's experience. The revenue risks were outlined as follows: (1) The possibility for errors in feasibility projection of new centers. Adequate care was taken by Telco to minimize chances for error in this area; (2) Unoccupied tenant areas; (3) Lowered electricity billings. Should the local utility electricity rates charged to all customers for a given demand and consumption level decline, Telco's rate structure would be adversely affected. However, A.T. Kearney concluded that they felt this scenario unlikely.

Field operating costs. Fuel accounts for half of the operating costs and was accurately reflected in the projections. Ample operating personnel were planned for each system and budgeted at realistic levels. Maintenance costs were somewhat less than competitive estimates. However, the maintenance costs were checked with equipment manufacturers and consulting engineers and appeared to be conservatively stated.

General and administrative. The G&A projection included the addition of persons to the headquarters operation. A.T. Kearney's analysis involving an independent estimate of possible future administrative expenses indicated an adequate budget for 1970 and more than adequate coverage of needs for 1971 and 1972.

Conclusion. In summary, the revenue and profit projections are reasonable. There was sufficient market opportunity to support the projected number of installations. Telco's revenue estimates were realistic and ample monies were projected for field operating and administrative expenses.

1.6.3 A.D. Little & Co. Report on Estimated Operating Margins for Three Total Energy Installations

The Arthur D. Little (ADL) Inc. memorandum report provided estimates of income before financial charges, depreciation and income tax that might reasonably be expected from three total energy installations owned and operated by Telco or its affiliates. The ADL work was done between December 15, 1970, and January 15, 1971.

ADL used the term operating margin to describe for each site the difference between revenue and all site-related costs exclusive of financial charges, depreciation, income taxes, and directly attributable services, such as billing, done in New York. ADL estimated the operating margins for Sher-Den as follows:

1971 -	$176,100
1972 -	195,200
1973 -	195,200
1974 -	195,200
1975 - 1981 -	195,200
1982 and beyond -	185,200

The change in 1982 is due to the contractually obligated increase in the "franchise fee" at Sher-Den ($10,000 per year increase).

Revenue - HVAC Contracts. Telco sets HVAC rates for smaller tenants of Sher-Den by approximating the tenant's cost as if he were to buy and operate an air conditioning system of his own. In estimating alternative costs, the heat load due to lighting and other electrical devices is considered. Because the HVAC contract, typically for a period of 10-20 years, is usually signed in advance of detailed store design, the actual lighting load may differ from the typical or average figures that were used in setting the HVAC revenue at twice the normal hourly rate if the hours of operation are longer than those specified in the contract.

Escalation of HVAC Contracts. Most of Telco's HVAC contracts make provision for increased HVAC charges if the cost of fuel, labor or taxes rise. The standard Telco contract does not specify how fuel escalation (typically $.005/sq ft/yr increase for each 1¢ per million Btu) will be computed in the case of a dual fueled installation; nor does it set a wage base or number of men from which labor escalation (typically $.002/sq ft/yr increase for "each 10¢ per hour in the average wage scale") is to be computed. More significantly, it is not clear from Telco's agreements with the shopping center operators whether increased HVAC revenue due to escalation would come within provisions of HVAC revenue sharing. Based on tabulations made in June 1970 and assuming that Telco can avoid sharing additional HVAC revenue due to escalation with operators of Sher-Den, ADL believed that the provisions in force at Sher-Den are about compensatory.

Electric Rates. Telco's electrical revenues are based directly on the prices charged for electricity by the local utilities. Any price increases by the utilities would be translated directly into additional gross margin for Telco.

Projected Operating Margins. Two sets of operating margin projections were made -- one set includes ADL's preferred assumptions and one set reflects Telco management's expectations that reduction of labor force and achieving a higher ratio of gas to oil consumption can be implemented and margins thereby improved. (See Table 1.9 for a comparison of values assumed for Sher-Den Mall variables.)

Revenue. Electrical rate Sher-Den - 1.575¢/kWh (November 1970 realization).

Franchise Fee. Sher-Den 50% of all revenue above the amount provided by a storewide average of 44¢/sq ft/yr.

Fuel Costs, Gas. Sher-Den's gas rate is quite complex. The rate ADL used is their best estimate of the combined effects of a standard rate Telco pays for four months of the year and the special "air conditioning rider" which materially reduces this rate in the months of April through November.

Fuel Oil. The cost of fuel oil was obtained from invoices.

Wages & Fringes. Estimated by extending the work force by level of skill and by annual salary as estimated by Telco.

Lube Oil. These were based on typical consumptions and fuel oil cost.

Insurance. Insurance costs were obtained from Telco's brokers.

Other Expenses. Include supplies, telephone charges and the like. Used estimates of Telco's operations personnel.

Maintenance Accrual, Electrical. The per kilowatt hour maintenance cost ADL assigned to engine and electrical maintenance was closely related to a detailed analysis made by Telco's operations personnel, but was actually based on 50% of the charge a major engine manufacturer would make for an all inclusive contract.

The Assumption Set 2 and Assumption Set 3 models used respectively by A.D. Little and Telco's management differ only in percent of plant gas fired vs oil fired and the concomitant variance in fuel costs.

The two assumption sets are included below by functions and for the years 1971 through 1975. (See Tables 1.10 and 1.11.)

Findings

A.D. Little stated that of the three locations (Park City, Sher-Den Mall and Laclede) studies, Sher-Den was then and should continue to be the best able to attract tenants -- it was at the time of the study about 95% leased. The Sher-Den Mall has little competition within a large and prosperous trading area. Its management can afford to be selective in leasing the remaining space and it should build up a stable roster of tenants.

1.7 LONE STAR CO. CONTRACT FOR INDUSTRIAL SERVICE

The contract for Industrial Gas Service, Rate 3-H, executed August 5, 1970, was the result of discussions between Mr. Donald Sengstaken, Project Director for the Telco Total Energy Plant installation at Sher-Den Mall, and R. Richard Riggins, the regional manager of Lone Star Gas Company, and was to cover the contract year commencing August 15, 1970.

Sherman Energy Management Services, Inc., was to purchase gas from Lone Star Gas Co. under the most favorable Industrial Rate classification, Rate 3-H, and was to be billed under air conditioning Rider H for the months of April through November. Air conditioning Rider-H is applicable to 1775 tons of air conditioning installed at the shopping center. The natural gas billing procedure was as follows:

Rate 3 of the Schedule of Industrial Rates-H contains a summer and winter rate. The winter rate applies during the months of December through March and the summer rates apply during the remainder of the year. The Schedule of Industrial Rates is a step rate. The unit cost per MCF within each step remains constant regardless of the total consumption. The amount which is added to each step on the enclosed formula sheet is to adjust for the difference in unit cost for each step. The GCA or Gas Cost Adjustment entered on the bill is the amount by which the weighted average cost of gas in the field exceeds 16 cents, which is the base cost. To this base cost and GCA are added two taxes: street and alley tax, which is 2% of the base cost plus GCA, and the state occupation tax, which is 1.997% of the base cost plus GCA.

The first complete calendar year of operation would be 1971 and an analysis of the gas usage, total billing per month under the winter rate and the summer rate with the air conditioning rider and the cents/MCF, is presented in Table 1.12.

Analysis of Gas Costs

1. The winter four months, while representing 28% of the MCF used, accounted for 33% of the total dollar invoices by Lone Star Gas Co.

2. While the eight summer months represented 72% of the MCF utilization, the dollars invoiced were only 67% of the yearly cost of natural gas.

3. The average summer cost per MCF of 25.90 cents is only 78.7% of the average winter rate. The summer rate is composed of the Rate 3-H Summer, which averaged approximately 29.54 cents, and the air conditioning Rider-H, which averaged 24.07 cents.

4. Both the summer and winter rates have a gas cost adjustment factor that varies from 1.16-1.41¢/MCF and a street alley and state occupation tax which varies from 1.25-0.96¢/MCF.

5. Therefore, the first year of operation would reflect a gas cost distributed approximately as follows:

	¢/MCF
Average of winter and summer rates and air conditioning rider	25.57
Gas cost escalation - average	1.30
Street and alley and state occupational tax	1.00
Total average cost	27.87

6. Exhibits 1.1-1.4 present the calculated bills for January 1971 and April 1971, and formula sheets for winter and summer rate billings, the air conditioning rider and the Schedule of Industrial Rates-H and Air Conditioning Rider-H.

Table 1.1 Original Feasibility Projection, 10/30/68, Sher-Den Mall, Summary of Tenant Electrical Loads and Charges

	Unit Sq. Ft.	Total Sq. Ft.	KWH Sq.Ft./Yr.	KW Demand	$/Year
Penney's	119,853		31.60	779.0	37,893
Montgomery Ward	90,000		27.50	522.5	30,827
Woolworth	34,200		25.40	161.0	12,335
Dept. Store	26,650		25.40	128.2	11,075
Grocery	17,550		24.90	96.5	5,768
Cafeteria	7,900		62.44	134.3	7,991
Theater	8,800		12.17	44.0	2,613
		304,953			
Typical Stores:					
2	8,170	16,350	18.75	39.1	7,099
4	5,250	21,000	18.75	29.3	10,676
6	3,900	23,325	17.00	14.4	10,290
6	2,980	17,900	17.00	12.6	9,270
4	2,220	8,875	17.00	9.0	4,760
1	1,600	1,600	85.20	4.0	2,820
4	1,510	6,040	13.87	5.2	2,660
7	1,200	8,400	13.87	4.2	3,843
5	830	4,150	13.87	3.5	2,200
Mall & Common Area		54,950	13.40	164.8	11,044
Parking Lot Lighting				300.0	9,000
	Total Area -	467,500	Total Est. Elec. Rev.	$	182,164

Table 1.2 Sher-Den Mall, Preliminary Six-Factor Analysis

	Lancaster	New Location	Fraction	Weight =		Rating
Dry Bulb above 80°	654	See Below		-	=	
Wet Bulb above 67°	1,437			-	=	
Efl.Hrs.-Refrigeration	1,715	2,320	2,320 / 1,715 = 135	X 5	=	676
Oper.Hrs.A/C System	2,026	2,741	2,741 / 2,026 = 135	X 2	=	270
Degree Days	5,482	2,272	2,272 / 5,482 = 41	X 2	=	82
Av. ¢/KWHR-Light	1.76¢	1.54	1.54 / 1.76 = 88	X 4	=	352
Av. ¢/Therm	14.5 ¢	6.84	6.84 / 14.5 = 47	X 2	=	94
Av. $/KW-AC	$2.23	1.74	1.74 / 2.23 = 78	X 5	=	390
				20 93.2	=	1,864 / 20

	Lancaster	Sher-Den (Location)	Location/ Lancaster			
80° Dry Bulb	654	2,304	2,304/654	X 8	=	28.1
67° Wet Bulb	1,437	3,001	3,001/1,437	X 14	=	29.2
			Room Total			78.00
			Adj. DB/WB Rating			135.3 %

2. New Location

Efl. Hrs. - 1,715 x 135.3% = 2,320
Oper. Hrs. -2,206 x 135.3% = 2,741

3.

Square Footage	KWHR Sq.Ft./Yr.	Watts/Sq.Ft.	Tons	KW/Ton	BTU/Sq.Ft.
21,800	24	5.5	280sqft/ton 78	1.4	35
3,000	24	6	280sqft/ton 11	1.75	35
100,000	24	5.5	280sqft/ton 357	1.4	23

Energy 66% X .932 = 61.5
Service 34% X .95 = 32.3
Energy plus services as % of base rate 93.8

Table 1.2 (Cont'd)

MARKETING REVENUE STRUCTURE DETERMINANTS

1. Dry Bulb Hours Above - 80°
   Wet Bulb Hours Above - 67°

   6 Factors Weighted

   Efl. Hrs. - 5
   Oper. Hrs.- 2
   Degree Days - 2
   Av. ¢/KWH Light - 4
   Av. ¢/Therm - 2
   Av. $/KWAC - 5

2. Revenue Analysis Form

   (a) Store - Sq. Ftge. Type
   (b) Amortized Capital Cost - A.B.C.
   (c) HVAC Rate Energy and Services
   (d) Rate Determination
   (see attached form)

3. Total HVAC and Electrical Revenue for Shopping Center by Tenants:

Tenant M-(4) B-(9) S-(37) Landlord-(1)
Square Footage - 467,493
HVAC Rate - 44.6¢/sqft - no subtraction for non a/c area
HVAC Revenue - $208,510
Demand - Watts/Sq.Ft. (Elec.Sale)
Demand - KW 3,123
KWH/Sq.Ft./Yr. (Elec.Sale) 25.06
KWH/Yr. (Elec.Sale) - 11,716,000
Cents/KWH (Elec.Sale) 1.55
Electric Revenue - $182,164
Total Revenue - $390,674
Air Conditioning Tonnage - 1,600

		Sq.Ft.	%
Majors	(4)	270,703	57.9
Backbone	(9)	50,600	10.8
Satellites	(37)	91,240	19.5
Landlord-Mall	(1)	54,950	11.8
Office Bldg.		-	-
		467,493	100.0

Table 1.3 Revenue Analysis Chart

SHOPPING CENTER- Sher-Den Mall
DEVELOPER- Enterprise Development
ENGINEER- Herman Blum
SQUARE FOOTAGE-
MAJOR - 270,703
BACKBONE - 50,600
SATELLITES - 91,240
Landlord - 54,950
467,493

AIR CONDITIONING DATA

USE
DESIGN % DB- 100
WB- 78
WET BULB ABOVE 67°- 3,001
DRY BULB ABOVE 80°- 2,304
EFL HRS.-COMPRESSOR- 2,320
OPER.HRS-AUXILIARIES-2,741
OPER.HRS-BLOWERS - 3,744/4,056/4,368
Electric - Texas Power & Light Co.
Gas - Lone Star Gas Co. (K-No Amortized Cap)

HEATING DATA

USE
AVERAGE WINTER TEMP.-51.0
DAYS PER SEASON- 162
K-HEAT REQ.PER BTU- 465.0
D.D. - 2,272
Design - 18° (99%)
Based on - 21,800 sq.ft.
Av.¢/KW - 1.64
Av.¢/Therm - 6.84
Av.$/KW A/C - 1.55

NOTES:

CAP.K-no amortized capital costs. Replacement cost only. S&A Amortized hi-side cost only.

ENERGY-93.2% of La. Base

SERVICE				
E.97-1.00	x	1	<	34
E.95- .97	x	.97	<	33
E.92- .95	x	(.95)	<	32
E.88- .92	x	.92	<	31

				REVENUE ANALYSIS AMORTIZED CAPITAL COST ¢/sqft/yr.					HVAC RATE ENERGY & SERVICES ¢/Sq.Ft/Yr.				RATE DET.	
						Central Plant Only								
NAME	LEVELS	SQ.FT.	BUILD KEY SHELL S&A	C.P.C.W. .10185 RTH&C .149	$/SQ.FT./YR.	A FEAS. -V	B GOING IN V/Adj.	C +0-	HVAC NOTES	A' FEAS. -V	B' GOING IN V/Adj.	C' +0	A+A' FEAS.	B+B' GOING IN
J.C. Penney	2	119,853	K	C.P.C.W.	2.68/27.3/33	(8.55)	(9.45)	(9.00)	Key	23.0	25.3	24.2	23.0	25.3
M. Ward	1	90,000	K	C.P.C.W.	2.68/27.3/33	(8.55)	(9.45)	(9.00)	No	25.0	27.5	26.4	25.0	27.5
Kress/ Woolworth	1	34,200	K	C.P.C.W.	2.14/21.8/33	(6.84)	(7.50)	(7.20)	Amort. Cap	50.0	55.0	52.5	50.0	55.0
Dept.Store	1	26,650	K	C.P.C.W.	2.14/21.8/33	(6.84)	(7.50)	(7.20)	Cost Replace.	55.0	60.5	57.75	55.0	60.5
Grocery/ Kroger	1	17,550	K	RTH&C	1.82/27.1/33	(8.45)	(9.38)	(8.90)	In-store only	55.0	60.5	57.75	55.0	60.5
Cafeteria	1	7,900	K	RTH&C	3.22/48.11/33	(15.07)	(16.67)	(15.87)	"	75.0	82.5	78.75	75.0	82.5
Theater	1	8,800	K	RTH&C	1.91/28.5/33	(8.93)	(9.87)	(9.40)	"	65.0	71.5	68.25	65.0	71.5
Store	1	8,170	S&A	RTH&C	2.00/29.9/33	9.37	10.86	9.87	Amort.	55.0	60.5	57.75	64.4	69.8
Store	1	8,170	S&A	RTH&C	2.00/29.9/33	9.37	10.86	9.87	Hi Side Cap	55.0	60.5	57.75	64.4	69.8
Store (4)	1	5,250	S&A	RTH&C	2.00/29.9/33	9.37	10.86	9.87	Costs Only	60.0	66.0	63.0	69.4	75.4
Store (6)	1	3,900	S&A	RTH&C	2.14/31.9/33	9.99	11.05	10.52	"	70.0	88.0	84.0	90.6	98.6
Store (6)	1	2,980	S&A	RTH&C	2.28/33.9/33	10.62	11.74	11.18	"	80.0	88.0	84.0	90.6	98.6
Store (4)	1	2,220	S&A	RTH&C	2.28/33.9/33	10.62	11.74	11.18	"	85.0	93.5	89.3	95.6	104.1

Table 1.3 (Cont'd)

SHOPPING CENTER- DEVELOPER- ENGINEER- SQUARE FOOTAGE- MAJOR BACKBONE SATELLITES	**AIR CONDITIONING DATA** USE DESIGN % DB- WB- WET BULB ABOVE 67° DRY BULB ABOVE 80° EFL HRS.-COMPRESSOR- OPER.HRS-AUXILIARIES- OPER.HRS-BLOWERS-	**HEATING DATA** USE AVERAGE WINTER TEMP. DAYS PER SEASON- K-HEAT REQ. PER BTU- D.D.-

NOTES:

CAP.

ENERGY

SERVICE		
E.97-1.00	x 1	<34
E.95- .97	x .97	<33
E.92- .95	x .95	<32
E.88- .92	x .92	<31

				REVENUE ANALYSIS AMORTIZED CAPITAL COST					HVAC RATE ENERGY & SERVICES					RATE DET.	
NAME	LEVELS	SQ.FT.	BUILD KEY SHELL S&A	C.P.C.W. .10185 RTH&C .149	$/SQ.FT./YR.	A FEAS. -V	B GOING IN V/Adj.	C +0-	HVAC NOTES	A' FEAS. -V	B' GOING IN V/Adj.	C' +0	A+A' FEAS.	B+B' GOING IN
Store (5)	1	1,510	S&A	RTH&C	7.42/36.05/33	11.30	12.49	11.90	"	90.0	99.0	94.5	101.3	110.3
Store (7)	1	1,200	S&A	RTH&C	2.42/36.05/33	11.30	12.49	11.90	"	95.0	104.5	99.75	106.3	115.8
Store (5)	1	830	S&A	RTH&C	2.60/38.74/33	12.14	13.42	12.78	"	100.0	110.0	105.0	112.1	122.1
Mall	1	54,950	K	RTH&C	1.40/20.86/33	6.54	7.23	6.88	No Amort Cap Cost	40.0	44.0	42.0	40.0	42.0

Table 1.4 Original Feasibility Projection, 10/30/68, Sher-Den Mall, Summary of Tenant HVAC Rates

	Unit Sq. Ft.	Total Sq. Ft.	$/Sq.Ft. Per Year	$/Yr.
Penney's	119,853		.23	32,241
Montgomery Ward	90,000		.25	22,500
Woolworth	34,200		.50	17,100
Department Store	26,650		.55	14,657
Grocery	17,550		.55	9,652
Cafeteria	7,900		.75	5,925
Theater	8,800		.65	5,720
		304,953		
Typical Stores:				
2	8,170	16,350	.55	8,992
4	5,250	21,000	.60	12,600
6	3,900	23,325	.70	16,327
6	2,980	17,900	.80	14,320
4	2,220	8,875	.85	7,543
5	1,510	7,590	.90	6,831
7	1,200	8,400	.95	7,980
5	830	4,150	1.00	4,150
Mall and Common Area		54,950	.40	21,980
Total Area		467,500		
Total Estimated HVAC Revenue...........				$208,510

Note - Rates for other than normal retain operations, e.g. beauty parlor, restaurant, etc., to be developed on specific requirements.

Table 1.5 Original Feasibility Projection Sher-Den Mall, Annual Direct Operating Costs

Basis:

Fuel for power generation by dual fuel engines.

Fuel consumption based on actual tests by Fairbanks Morse, Inc. Fuel rates for the proposed installation are:

Full Load	-	8,413	BTU Gas
	-	537	BTU Oil
		8,950	BTU/KWH
3/4 Load	-	8,740	BTU Gas
	-	635	BTU Oil
		9,375	BTU/KWH

Associated heat recovery equipment provides recovery of 15 psi steam equivalent to 30% fuel input.

Electricity for tenants	- 11,700,000	KWH/Yr.
Central Plant HVAC Auxiliaries:		
1,433 tons x 2,741 hours of operation -	960,000	KWH/Yr.
Electric Centrifugal Chiller		
500 tons x 2,320 hours of operation -	1,040,000	KWH/Yr.
	13,700,000	KWH/Yr.

Installed Capacity:

Absorption Machines - 2 at 550 ton ea.	- 1,100	tons
Electrical centrifugal - 1 at 500 tons	- 500	tons
	1,600	tons
Peak requirements - Majors	956	tons
Mall and Satellites	477	tons
	1,433	tons

Cooling load - Majors - 2,537 effective full load hours of operation

- Mall and Satellites - 2,320 effective full load hours of operation

- Central Plant Aux. - 2,741 effective full load hours of operation

Table 1.5 (Cont'd)

Fuel Consumption

	MCF
A. For generation - 13,700,000 KWH/Yr.	123,300
B. Heat recovery - 27% of 123 x 10^9 BTU = 33.2 x 10^9 BTU	
C. Absorption cooling with direct steam recovery - 3,420 KW x 9,000 BTU/KW x 27% x $\frac{\text{lb. steam}}{\text{BTU}}$ x $\frac{\text{ton}}{\text{18.5 LBm}}$ = 475 tons	
475 x 2,741 air conditioning hours x 18,500 BTU/Ton = 24.1 x 10^9 BTU	
Cooling by absorption with supplemental heat 1,433 - (475 + 500) 458 x 2,320 x 23,000 BTU/Ton	24,400
D. Heating and Hot Water Production above waste heat recovery 7.4 x 10^9 BTU =	7,400
Total MCF	155,100

E. Components of Operating Cost:

Cost of gas and fuel oil expressed in equivalent MCF - 155,100 x \$.27/MCF	\$ 41,877
Labor: Chief Operating Engineer Two (2) Operators One (1) Mechanic Fringe Benefits plus Payroll Taxes	46,000
Water and Water Treatment Water - .715¢/sq.ft. - 3,339 Water Treatment - .658¢/sq.ft. - 3,072	6,401
Lube Oil - .1866 Mills/KWH x 13,700,000	2,550

Table 1.5 (Cont'd)

Maintenance	
HVAC - Central Plant In-Store - $5.00/ton x 1600	8,000
Engine and Electrical Maintenance - 1.5 mills/KWH x 13,700,000	20,550
Taxes - .5% of gross plant cost .005 x 1,777,000	8,885
Insurance - .004 x 1,777,000	7,108
Franchise Fee - $1,250/Month per Lease Agreement	15,000
Other Expenses	4,000
Total Operating Cost	$ 160,371

Table 1.6 Original Feasibility Projection, Sher-Den Mall, Capital Investment

Basis:

Maximum electrical demand - 3,120 KW
Normal high demand 90% diversity - 2800 KW
Annual energy requirements - 13,700,000 KW
Peak refrigeration load - 1,433 tons
Peak heating demand - BTUH

Central Plant Equipment:	
5 engine generator sets at 1,000/KW ea.	$ 600,000
Waste heat recovery boilers	57,000
Switchgear	65,000
Cooling towers	92,000
Pumps, primary	30,000
Heat exchangers	12,000
Boilers	21,000
Motor control center	24,000
Electric centrifugal chiller - 500 Ton	30,000
Absorption chillers - 2 at 550 Tons	65,000
Mechanical and Electrical Installation:	
C.P. mechanical control (includes lube oil and fuel oil)	110,000
C.P. electrical control	65,000
Electrical distribution	75,000
Hot and chilled water distribution	25,000
HVAC distribution in stores	460,000
Engineering Fees	66,000
Total Capital Investment	$1,797,000

Table 1.7 Original Feasibility Projection, Sher-Den Mall, Summary

Revenue:		
Electrical Service (Table I-I)	-	$ 182,164
HVAC Service (Table I-IV)	-	208,510
Total Revenue		$ 390,674
Operating Costs: (Table I-V)		
Fuel		$ 41,877
Other		118,494
Total Operating Costs		$ 160,371
Gross Profit		$ 230,303
Investment (Table I-VI)		$1,797,000
Return on Investment before overhead, interest, depreciation and provision for federal income taxes		12.96%

Table 1.8 Total Energy Leasing Corp.
Financial Projections

	1969	1970	1971	1972
Revenues	$ -	$ 3,052	$ 8,138	$14,495
Cost and Expenses				
Field Operating	-	1,228	3,274	5,831
Depreciation	-	430	1,146	2,042
G & A	250*	325	450	600
Amortization of Organization Expense	-	98	98	98
Total Cost & Expenses	-	2,081	4,968	8,571
Income before Interest and Taxes	-	971	3,170	5,924
Net Interest Expense	-	587	1,727	3,269
Income before F.I.T.	-	384	1,443	2,655
Provision for F.I.T.(deferred)	-	96	361	664
Net Income after Taxes	-	288	1,082	1,991
Capitalization (At the beginning of year)				
Total Net Plant Investment	-	12,642	33,282	58,474
Common Stock	5,300	5,300	11,407	16,237
Retained Earnings	-	-	288	1,370
TotalEquity	5,300	5,300	11,695	17,607
Debt	-	7,342	21,587	40,867
Ratio Analysis:				
Net Income / Revenue =		9.4%	13.3%	13.7%
Net Income / Equity (at the beginning of the year) =		5.4%	20.4%	17.0%

*Deferred and amortized

Table 1.9 Comparison of Values Assumed for Key Variables at Sher-Den Mall

Key Variables	Assumption Set 2 A. D. Little	Assumption Set 3 Telco Management
Heat rate BTU/KWH (including supplementary firing)	13,500	13,500
Percent gas fired	90	95
Cost of gas (¢/MMBTU)	24.73	24.73
Cost of oil (¢/MMBTU)	87.90	87.90
Lube oil cost (mills/KWH)	.1866	.1866
Engine and electrical maintenance (parts)(mills/KWH)	1.04	1.04
HVAC maintenance (parts and outside services)($/ton)	4.00	4.00
Property tax (% of gross plant cost)	.5	.5
Labor force (full time men)	5 (1971) 4 (later)	5 (1971) 4 (later)

NOTE: Also see Tables 1.10 and 1.11.

Table 1.10 A.D. Little, Inc. Projected Operating Margin
($ and sq ft in 1,000s-kWh in 1,000,000s)

ISSUE: 1, ASSUMPTION SET 2

	SHER DEN MALL				
	71	72	73	74	75
LEASED SQUARE FEET					
USING ELECTRICITY	460.1	467.3	467.3	467.3	467.3
USING HVAC	460.1	467.3	467.3	467.3	467.3
KILOWATT HOURS					
SOLD-TENNANTS	10.2	10.5	10.5	10.5	10.5
SOLD-LANDLORD	1.3	1.3	1.3	1.3	1.3
USED-TELCO	3.7	3.7	3.7	3.7	3.7
GENERATED	15.2	15.5	15.5	15.5	15.5
REVENUE					
ELECTRIC	181.6	185.0	185.0	185.0	185.0
HVAC	190.7	196.5	196.5	196.5	196.5
TOTAL	372.3	381.5	381.5	381.5	381.5
COSTS					
FRANCHISE FEE	15.0	15.0	15.0	15.0	15.0
HVAC REV SHARING	0.0	0.0	0.0	0.0	0.0
FUEL - GAS	45.8	46.4	46.4	46.4	46.4
- OIL	18.1	18.3	18.3	18.3	18.3
WAGES + FRINGES	55.4	44.4	44.4	44.4	44.4
LUBE OIL	2.8	2.9	2.9	2.9	2.9
WATER + TREATMENT	6.4	6.4	6.4	6.4	6.4
PROPERTY TAXES	14.3	14.3	14.3	14.3	14.3
INSURANCE	11.5	11.5	11.5	11.5	11.5
OTHER EXPENSES	4.0	4.0	4.0	4.0	4.0
ACCRUALS-					
ENG+ELEC MAINT	15.8	16.1	16.1	16.1	16.1
HVAC MAINT	7.0	7.0	7.0	7.0	7.0
TOTAL COST	196.2	186.3	186.3	186.3	186.3
OPERATING MARGIN	176.1	195.2	195.2	195.2	195.2

Table 1.11 Telco Management Projected Operating Margin
($ and sq ft in 1,000s-kWh in 1,000,000s)

ISSUE: 1, ASSUMPTION SET 3

	SHER-DEN MALL				
	71	72	73	74	75
LEASED SQUARE FEET					
USING ELECTRICITY	460.1	467.3	467.3	467.3	467.3
USING HVAC	460.1	467.3	467.3	467.3	467.3
KILOWATT HOURS					
SOLD-TENNANTS	10.2	10.5	10.5	10.5	10.5
SOLD-LANDLORD	1.3	1.3	1.3	1.3	1.3
USED-TELCO	3.7	3.7	3.7	3.7	3.7
GENERATED	15.2	15.5	15.5	15.5	15.5
REVENUE					
ELECTRIC	181.6	185.0	185.0	185.0	185.0
HVAC	190.7	196.5	196.5	196.5	196.5
TOTAL	372.3	381.5	381.5	381.5	381.5
COSTS					
FRANCHISE FEE	15.0	15.0	15.0	15.0	15.0
HVAC REV SHARING	0.0	0.0	0.0	0.0	0.0
FUEL - GAS	48.3	49.0	49.0	49.0	49.0
- OIL	9.0	9.2	9.2	9.2	9.2
WAGES + FRINGES	55.4	44.4	44.4	44.4	44.4
LUBE OIL	2.8	2.9	2.9	2.9	2.9
WATER + TREATMENT	6.4	6.4	6.4	6.4	6.4
PROPERTY TAXES	14.3	14.3	14.3	14.3	14.3
INSURANCE	11.5	11.5	11.5	11.5	11.5
OTHER EXPENSES	4.0	4.0	4.0	4.0	4.0
ACCRUALS-					
ENG+ELEC MAINT	15.8	16.1	16.1	16.1	16.1
HVAC MAINT	7.0	7.0	7.0	7.0	7.0
TOTAL COST	189.7	179.7	179.7	179.7	179.7
OPERATING MARGIN	182.6	201.8	201.8	201.8	201.8

Table 1.12 1971 Natural Cost Utilization and Billings at Sher-Den Mall

Month	MCF	Total Lone Star Gas Co. Invoice	Winter Rate ¢/MCF	Summer Rate ¢/MCF
Winter Rates				
January	17,759	$ 5,798.98	32.65	
February	15,378	5,056.98	32.88	
March	14,292	4,720.46	33.03	
December	14,812	4,913.26	33.17	
	62,241	$ 20,489.68	32.92	
Summer Rates & A/C Rider-H				
April	18,330	5,004.37		27.30
May	17,177	4,495.56		26.17
June	21,378	5,391.69		25.22
July	22,089	5,501.37		24.91
August	20,895	5,171.67		24.75
September	22,094	5,615.81		25.42
October	18,868	5,000.80		26.50
November	18,867	5,185.15		27.48
	159,698	$ 41,366.42		25.90
Total	221,939	$ 61,856.10		27.87

EXHIBIT 1.1 Bill Calculating Procedure 1

Lone Star Gas Company

JOE E. ALLEN
Utilization Consultant

700 North Crockett St., P.O. Box 878
Sherman, Texas 75090

In calculating bills for the months of December through March the following procedure should be followed:

1. Locate proper consumption level on enclosed formula sheet for winter Rate 3-H.

2. Multiply consumption times proper rate plus GCA.

3. Add proper amount to adjust for step rate.

4. Add taxes. Street and Alley Rental- 2%. State Occupation- 1.997%

EXAMPLE: January 1971

Consumption- 17759 MCF
GCA - 1.16 ¢

17759 x (.290 + .0116) + 220.00 or;

$5576.11 plus taxes

Street and Alley Rental tax- $111.52
State Occupation tax $111.35

TOTAL BILL- $5576.11 + $111.52 + $111.35 or;

$5798.98

In calculating bills for the months of April through November the following procedure should be followed:

1. Subtract amount to be billed on air conditioning rider from total consumption.

2. Bill air conditioning gas as indicated on enclosed formula sheet for air conditioning rider.

3. Bill remainder of consumption in accordance with enclosed formula sheet for summer Rate 3-H.

EXHIBIT 1.2 Bill Calculating Procedure 2

Lone Star Gas Company

JOE E. ALLEN
Utilization Consultant

700 North Crockett St., P.O. Box 878
Sherman, Texas 75090

EXAMPLE: April 1971

OCA - 1.25 ¢
Total consumption- 18330 MCF
Amount to be billed on Air-conditioning Rider H- 3 MCF/TON x 1775 Tons or;
5325 MCF
Amount to be billed on summer Rate 3-H - 18330 less 5325 or;
13005 MCF.

1. Air conditioning gas.

   5325 x (.205 + .0125) + 40.00 or;

   $1198.19

2. Remainder billed on summer rate

   13005 x (.255 + .0125) + 135.00 or;

   $3613.84

3. Total bill before taxes is 1198.19 + 3613.84 or;

   $4812.03

4. Add taxes

   Street and Alley Rental- $96.24
   State Occupation - $96.10

5. Total bill is $4812.03 + $96.24 + $96.10 or;

   $5004.37

If you have any questions regarding this matter please call me.

Yours very truly
LONE STAR GAS COMPANY

Joe E. Allen

Joe E. Allen
Utilization Consultant

EXHIBIT 1.3 FORMULA SHEET

RATE 3-H WINTER: (December through March Billing Months)

BILLING MCF **		
1 - 1,000	MCF x (.360 + GCA)	MIN. $400.00/month
1,001 - 5,000	MCF x (.315 + GCA) +	$ 45.00
5,001 - 10,000	MCF x (.300 + GCA) +	120.00
10,001 - 20,000	MCF x (.290 + GCA) +	220.00
20,001 - 35,000	MCF x (.280 + GCA) +	420.00
35,001 - 50,000	MCF x (.275 + GCA) +	595.00
ALL OVER 50,000	MCF x (.270 + GCA) +	845.00

SUMMER: (April through November Billing Months)

1 - 1,000	MCF x (.305 + GCA)	MIN. $400.00/month
1,001 - 5,000	MCF x (.270 + GCA) +	$ 35.00
5,001 - 10,000	MCF x (.260 + GCA) +	85.00
10,001 - 20,000	MCF x (.255 + GCA) +	135.00
20,001 - 35,000	MCF x (.250 + GCA) +	235.00
35,001 - 50,000	MCF x (.245 + GCA) +	410.00
ALL OVER 50,000	MCF x (.240 + GCA) +	660.00

RATE ACR-H

1 - 100	MCF x (.405 + GCA)	
101 - 300	MCF x (.305 + GCA) +	$10.00
ALL OVER 301	MCF x (.205 + GCA) +	40.00

APR	3 MCF/ton
MAY	5 MCF/ton
JUN	8 MCF/ton
JUL	9 MCF/ton
AUG	9 MCF/ton
SEP	8 MCF/ton
OCT	5 MCF/ton
NOV	3 MCF/ton

** Measured MCF to be multiplied by the Btu factor before applying rate.

EXHIBIT 1.4

Form 1459 (9-69)

LONE STAR GAS COMPANY
SCHEDULE OF INDUSTRIAL RATES-H
STATE OF TEXAS

The rates hereinafter quoted are available to any gas customer who can be served by Company's existing system upon the terms and conditions recited herein and in the contract of which this Schedule of Industrial Rates forms a part. The rates shall not be available for stand-by use, but shall be available only to customers purchasing from Company their entire natural gas requirements at the premises or location set out in the contract. The gas delivered hereunder is for the individual use of customer and shall not be resold.

This Schedule of Industrial Rates is based on the Customer's use of gas service for twelve full months during a contract year. However, this Schedule of Industrial Rates may be made applicable to temporary service (less than twelve full months during a contract year) by the payment by Customer to Company of a non-refundable sum of $125.00 upon execution of such a temporary contract.

The gas shall be measured at a single meter location. Bills will be rendered at both gross and net rates. The net rates shall apply to bills paid within ten (10) days from monthly billing date; thereafter, the gross rates shall apply.

The minimum bill provisions shall be waived when the service period for which bill is rendered is for 19 days or less. Whenever the initial service period is for 10 days or less, no bill will be rendered and the customer's consumption shall be carried forward and added to customer's consumption during the next succeeding monthly service period for billing purposes.

Gas Service under this Schedule of Industrial Rates shall be subject to curtailment, interruption or discontinuance in any particular service area when necessary in the judgment of the Company for it to maintain residential and commercial service, and industrial service in accordance with the following order of priority:

(1) Residential and commercial service.
(2) Rate 1 service under this schedule.
(3) Public School Rate service.
(4) Rate 2 service under this schedule.
(5) Agricultural Irrigation service.
(6) Rate 3 service under this schedule.
(7) Oil Field Rate service.

For the purpose of priority of service, Rates 1 and 2 of Company's Schedules of Industrial Rates F and/or G shall be equivalent to Rate 1 service under this Schedule, Rate 3 of said Schedules of Industrial Rates shall be equivalent to Rate 2 service under this Schedule, and Rate 4 of said Schedules of Industrial Rates shall be equivalent to Rate 3 under this Schedule.

These rates shall not be available to residential customers where fewer than five dwelling units are served through one meter. Rates 2 and 3 under this Schedule shall not be available to rooming or boarding houses, orphanages, old people's homes, dormitories, hospitals, tourist camps, hotels, apartment buildings or other buildings used primarily as living quarters unless Customer provides stand-by equipment, for the use of other fuel, of at least equal capacity to that normally required by the Customer and fuel in storage in an amount adequate to fulfill Customer's fuel requirements during periods of interruption of gas service in accordance with the above curtailment provision.

Customer shall receive service under its choice of one of the following rates in accordance with the rate selected by Customer as provided in the contract. Winter rates shown below are for the December, January, February, and March billing months. Summer rates are for all other billing months.

EXHIBIT 1.4 (Cont'd)

RATE 1

			Summer Gross	Summer Net	Winter Gross	Winter Net	
First	100 Mcf	@	$.778	$.70	$.956	$.86	per Mcf
Next	100 Mcf	@	.456	.41	.567	.51	per Mcf
Next	300 Mcf	@	.411	.37	.500	.45	per Mcf
Next	500 Mcf	@	.378	.34	.444	.40	per Mcf
Next	1 500 Mcf	@	.356	.32	.422	.38	per Mcf
All Over	2 500 Mcf	@	.344	.31	.411	.37	per Mcf
Minimum Monthly Bill			$40.00		$40.00		

RATE 2

			Summer Gross	Summer Net	Winter Gross	Winter Net	
First	750 Mcf	@	$.411	$.37	$.489	$.44	per Mcf
Next	2 250 Mcf	@	.344	.31	.411	.37	per Mcf
Next	7 000 Mcf	@	.333	.30	.389	.35	per Mcf
Next	15 000 Mcf	@	.322	.29	.367	.33	per Mcf
All Over	25 000 Mcf	@	.311	.28	.356	.32	per Mcf
Minimum Monthly Bill			$275.00		$275.00		

RATE 3

			Apr–Nov Summer Gross	Apr–Nov Summer Net ↓	Dec–Mar Winter Gross	Dec–Mar Winter Net ↓	
First	1 000 Mcf	@	$.3389	$.305	$.4000	$.360	per Mcf
Next	4 000 Mcf	@	.3000	.270	.3500	.315	per Mcf
Next	5 000 Mcf	@	.2889	.260	.3333	.300	per Mcf
Next	10 000 Mcf	@	.2833	.255	.3222	.290	per Mcf
Next	15 000 Mcf	@	.2778	.250	.3111	.280	per Mcf
Next	15 000 Mcf	@	.2722	.245	.3056	.275	per Mcf
All Over	50 000 Mcf	@	.2667	.240	.3000	.270	per Mcf
Minimum Monthly Bill			$400.00		$400.00		

EXHIBIT 1.4 (Cont'd)

ADJUSTMENT FOR HEAT CONTENT

This Schedule of Industrial Rates is based upon the delivery of gas having an average total heat value of 1000 British thermal units (BTU) per cubic foot. Should the average total heating value of gas delivered in any monthly period be more or less than 1000 BTU per cubic foot, the measured volume for such period shall be increased or decreased, respectively, in the percentage by which the average heating value of such gas is greater or less than 1000 BTU per cubic foot. The monthly average total heating value of the gas at a pressure of four ounces plus 14.4 pounds per square inch and at a temperature of 60 degrees Fahrenheit shall be determined at Company's expense by the use of standard methods and procedures.

ADJUSTMENT FOR GAS COST

The foregoing rates are based upon a weighted average cost of gas purchased by Lone Star Gas Company of 16 cents per MCF based on a pressure of four ounces per square inch above an assumed atmospheric pressure of 14.4 pounds per square inch. The term, "weighted average cost of gas purchased", as used herein, shall be the weighted average price per MCF, adjusted to a four ounce base, paid or accrued by Company to producers, processors, transporters or other sellers for gas purchased by the Company during the latest available fiscal twelve months and shall include any production, severance, dedication or gathering tax paid or accrued by Company directly or by way of reimbursement to its gas suppliers with respect to gas purchased by Company.

Whenever the weighted average cost of gas purchased is more or less than 16 cents per MCF, the net rates shall be increased or decreased by the amount of such difference and the gross rates shall be adjusted proportionately. In applying the gas cost adjustment clause, the adjustment shall be computed to the nearest one-hundredth of one cent.

ADJUSTMENT FOR TAXES, LICENSES, FEES, CHARGES, AND RENTALS

Customer shall pay Company an amount equivalent to a proportionate part of all taxes or rentals which now are or which may be levied, charged or imposed by any governmental body under authority of any law, ordinance or contract for the use of the public streets, alleys and thoroughfares in the conduct of Company's business, or because of Company's occupation; and Customer shall pay Company an amount equivalent to a proportionate part of any new tax or increased tax or any other governmental imposition, rental, fee or charge levied or charged after July 1, 1969 (except State, county, city, and special district ad valorem taxes, taxes on net income and any production or similar tax included in the weighted average cost of gas as provided in the gas cost adjustment clause).

EXHIBIT 1.4 (Cont'd)

Form 1461 (9-69)

LONE STAR GAS COMPANY
AIR CONDITIONING RIDER-H
STATE OF TEXAS

APPLICATION:

Applicable to all customers other than general service customers when the customer uses such services for process and/or comfort cooling purposes during the months shown below.

The provisions of the rates specified above are modified by the attachment thereto of this rider only as shown herein.

MONTHLY RATE:

First 100 Mcf	@	$.4500 gross;	$.405	net per Mcf
Next 200 Mcf	@	.3389 gross;	.305	net per Mcf
Over 300 Mcf	@	.2278 gross;	.205	net per Mcf

The above rate shall be subject to the terms and conditions, including adjustments, set forth in the Rate Schedule to which this rider is attached.

VOLUME DETERMINATION:

The portion of the monthly gas consumption subject to this air conditioning rider shall be computed on the following basis:

April	3 Mcf per nominal ton installed capacity;
May	5 Mcf per nominal ton installed capacity;
June	8 Mcf per nominal ton installed capacity;
July	9 Mcf per nominal ton installed capacity;
August	9 Mcf per nominal ton installed capacity;
September	8 Mcf per nominal ton installed capacity;
October	5 Mcf per nominal ton installed capacity;
November	3 Mcf per nominal ton installed capacity.

Installed capacity shall mean name-plate capacity of the plant normally and regularly used for maximum conditions and does not include stand-by or unused facilities. The Mcf so computed shall not exceed 95% of the total monthly consumption. All gas consumption in excess of the volumes subject to this air conditioning rider shall be billed in accordance with the terms of the Rate Schedule to which this rider is attached.

Customer Name Sherman Energy Management, Inc.

Number of tons applicable under this rider 1775

2 DESCRIPTION OF TOTAL ENERGY SYSTEM

2.1 FACILITY SERVED BY SYSTEM

The Sher-Den Mall Shopping Center is located in Grayson County, Texas, approximately 75 miles northeast of Dallas. The site is situated approximately two miles north of the City of Sherman, Texas, and 10 miles south of the City of Denison. (Figure 2.1* indicates the geographical location of Sherman and the surrounding major metropolitan area.) The property adjoins U.S. Highway #75 to the west and is bordered by Interstate Highway 82 to the south. (Figure 2.2 indicates the shopping center site in relation to the communities of Sherman and Denison.)

The Mall is classified as a Regional Shopping Center in that it contains in excess of 400,000 sq ft of retail space, and includes two major department stores and approximately 50 national chain stores and local specialty shops. The complex is totally enclosed and served by a common mall. This project was conceived in early 1968 based on extensive market research, which indicated strong growth patterns in the general area of north central Texas and significant increases in general buying power for the periods 1960 through 1970. The following is excerpted from the market survey report of that time.

> Sherman and its neighboring city Dension, located in Grayson County in north central Texas, have recently been declared a standard metropolitan statistical area (SMSA), which means that they are in effect in a select group of cities that offer present and future growth potential.
>
> Sherman is ideally situated 70 miles from Dallas and, as a result, has a more captive local shopping market, yet it is close enough to allow convenient access to the large metropolitan city area and the new regional airport. Adding further impetus to the area is its proximity to Lake Texoma, which has a 1250-mile shoreline and was visited by 9,000,000 people in 1967.
>
> From the latest 'Survey of Buying Power,' a survey of the adjoining 12-county trade area was made, taking into consideration a reasonable distance of 40 to 50 minutes driving time a shopper would normally travel. From this survey, the growth that was and is presently taking place is apparent. The state population growth rate from 1960 to 1967 was 13.2% or an average of 1.88% per year. Grayson County grew 14.8% for the same period or an average of 2.1% per year. Sherman's rate was the most outstanding, growing 22.0% from 1960-1967 or 3.15% on a yearly average. Because of the stability of the working market, which is based on a solid manufacturing foundation, the number of households in Sherman making from $5,000 to $8,000 is 7.5% more than the U.S. average and

---

*Figures appear consecutively at end of section.

is 12.5% higher than the state average. In addition, per capita income for Sherman is 9.2% higher than the state average.

The apparent strength of this area is affirmed by such quality firms as Johnson and Johnson, I.B.M., Texas Instruments, and Kaiser Aluminum Company.

Undoubtedly, the Sherman area enjoys a unique position with respect to location and economic stability. The development of Sher-Den Mall will adequately meet the needs created by this rapidly growing market.

The shopping center site consists of 42.26 acres of ground and was planned for a gross building area of 498,691 sq ft (415,722 leasable) and parking facility for 2767 cars, with major tenants being the J.C. Penney Co. and Montgomery Ward.

As eventually developed, the gross building area comprised 484,804 sq ft (exclusive of the total energy plant building) consisting of a Mall of 59,850 sq ft and the following leasable areas:

	sq ft
Montgomery Ward	94,954
J.C. Penney Co.	119,018
Mall Stores	201,384
Theater	8,800

and parking for 3014 cars. The Mall now contains a third department store -- Beall Bros. -- occupying 21,740 sq ft.

As shown in Fig. 2.3, an additional 59 retail stores, ranging in size from 600-21,000 sq ft, have frontage space on the enclosed Mall connecting the Penney and Montgomery Ward facilities and kiosks, ranging in size from 150-280 sq ft, operate in the Mall itself.

The Mall is open for business six days per week from 10:00 a.m. to 9:00 p.m. and has a fully climate-controlled atmosphere for all stores and the common area.

Also located on the site are automotive service facilities providing TBA services operated by both the Penney and Montgomery Ward companies.

2.2 TOTAL ENERGY PLANT

2.2.1 The Sher-Den Mall Shopping Center

The Sher-Den Mall Shopping Center receives all of its electricity and heating and cooling energy from a total energy plant located within the shopping center proper. The plant is in a self-contained building on the easterly perimeter of the project. (See Fig. 2.3.) The plant is 110 feet long and 93 feet wide, and has an overall head room of 25 feet. Construction is of structural steel with masonry perimeter walls on a concrete slab floor. As indicated in the figure, the plant is separated from the Mall occupied space by several corridors to minimize noise or vibrations transmitted from the plant to the shopping center proper. All items of equipment are located within the building with the exception of a roof mounted cooling tower and underground storage tanks for fuel oil, lubricating oil, and waste oil.

In addition to fuel oil, the plant is served with natural gas from the lines of Lone Star Gas Co., who maintain a gas regulating and metering station on the southern corner of the plant building. Raw water is supplied by the City of Sherman, as are the necessary sewage facilities.

Electricity generated within the plant is distributed throughout the complex via multiple underground feeder circuits at 4160 volts. Feeders terminate at eight transformers wherein voltage is reduced to 480/120 volts. Secondary feeders, also underground, terminate in various meter rooms wherein individual tenant electric usage is measured for demand and kilowatt hour consumption. In a similar manner, power for the Mall and common areas maintained by the owner of the shopping center, as well as for parking lot lights, is distributed and metered.

Heating and air conditioning for the individual stores and the common areas is accomplished with hot and chilled water generated within the plant. The water is circulated throughout the complex by two independent loops of piping providing hot and chilled water to be circulated continuously to all areas. From the main loops secondary piping is connected to individual air handling units in each store. The air handling units with their separate thermostats control the temperature of the air across the unit coils, thereby maintaining space temperature at the desired level. Each of the plant's subsystems are described below.

2.2.2 Description of Mechanical Systems

The primary power source of this total energy plant is four Fairbanks Morse engine-generators, Model 38 TDD8-1/8. These dual fuel, turbocharged, after-cooled, six-cylinder engines are rated 1800 hp at 900 rpm. They directly drive matching generators rated at 1250 kW each and generate power at 2400/4160 volts. The facility is designed to accommodate a fifth engine-generator should expansion of the complex increase demand beyond the desired reserve capacity of the initial installation.

The following list presents specifications and manufacturing information on this equipment:

ENGINE - GENERATORS AND ACCESSORIES

Engines (4)

Manufacturer	Fairbanks Morse
Model	38TDD8-1/8
No. of Cylinders	6
HP at RPM	1800 at 900
BMEP	127.3 psi
Total Piston Displacement	6221 cu in.
Piston Speed at RPM	1500 fpm at 900

Blower (Turbo-Compressor)

Air Delivery at RPM	5500 cfm at 700
Scavenging Pressures at RPM	15 psi at 900

Generators (4)

Manufacturer	Fairbanks Morse
Model	TGZJ 956-18
kW at RPM	1250 at 900
Volts	2400/4160
Cycle	60
Phase	3

Exciters (4)

Manufacturer	Fairbanks Morse
Model	286 AZ
kW at RPM	9 at 1750
Volts	125

Air Filters (4)

Manufacturer	Burgess-Manning Company
Model	2065-1141-0
Width	60"
Height	68"
Weight	945 lb
Outlet	16" dia.

Air Intake Silencers (4)

Manufacturer	Burgess-Manning Company
Model	4400-242
Width	64"
Height	28 23/32"
Weight	590 lb

The engine-generator units are fueled primarily by natural gas, which is fed at 60 psig through a Peco dry gas filter to a supply manifold feeding each of the four units. Liquid fuel oil is provided for pilot fuel and for periods when natural gas supply is limited or curtailed. The fuel oil supply system as well as the natural gas system also supplies the steam boiler -- more fully described later.

The fuel oil for the engine-generators is stored in a 20,000-gal underground storage tank exterior of the plant building and is pumped into two 275-gal day tanks equipped with high- and low-level alarms and an automatic start/stop pumping system that maintains an adequate fuel level in the day tanks. From here the fuel is gravity fed to the engines. Unused fuel is returned from the engine to the storage tank and dirty fuel that has been filtered out is sent to a 750-gal waste fuel tank, also enclosed underground exterior to the plant.

Lubricating oil required by the engine-generating units is supplied from a 1000-gal underground storage tank and is pumped into one 275-gal day tank. From there it is gravity fed into each engine sump by lubricating sump level controls. Lubricating oil extracted by the filtering system is returned to the waste-oil storage tank.

The primary by-product of the engine operation is heat rejected to the exhaust gas and jacket cooling water. To recoup this otherwise wasted source of energy, each Fairbanks Morse engine is equipped with a Maxim thermoflash unit Model TPP 50-18(20). These units, incorporating the exhaust muffler with an exhaust heat boiler, circulate jacket cooling water from the engine at 200°F through tubes surrounded by engine exhaust gas at 770°F. A portion of the water flashes into steam. Each unit is capable of producing a maximum of 5000 pounds of steam per hour at 15 psi.

The manufacturer and specifications are listed below:

WASTE HEAT BOILER (4)

Manufacturer	Maxim
Model	TRP 50-18 (20)
Exhaust Outlet Temperature	770°F
Exhaust Heat Recovery	2.6 MMBtu/hr
Jacket Water Heat Recovery	865,000 Btu/hr
Total Heat Recovery	3.465 MMBtu/hr
Steam Capacity	Approximately 3400 lb/hr
Steam Pressure	15 psig max.

Steam is fed into a header that is controlled by a steam demand valve. The steam is then available to perform two functions:

1. It feeds a Bell & Gossett heat exchanger that has a capacity to produce 600 gpm of water heated from 106°F to 200°F. Condensate from the exchanger is sent to a Maxim condensate receiver and eventually used as boiler feed water. Specifications regarding the heat exchanger and Maxim condensate receiver are listed below:

HOT WATER HEAT EXCHANGER (1)

Manufacturer	Bell & Gossett
Model	SU-209-2
Shell, fluid	Steam
Tubes, fluid	Water

Capacity, MBH	12,000
Entering/Leaving Water Temp.	160/200°F
Steam Pressure, psig:	15 psig max.
at control valve inlet	10
at shell	0
Max. Water P.D. (ft)	5
Fouling Factor	.0005
Passes	2

Steam Condenser (1)

Manufacturer	Bell & Gossett
Model	SU-205-2
Shell, fluid	Steam
Tubes, fluid	Water
Capacity	16,800 lb/hr
Steam Pressure	15 psig
GPM	798
Entering/Leaving Water Temp.	85/125°F
Max. Water P.D., ft	5
Fouling Factor	.0005
Passes	2

Condensate Sub-cooler (1)

Manufacturer	Bell & Gossett
Model	WU-64-43
Shell, fluid	Condensate
Tubes, fluid	Water
Entering/Leaving Shell	250/200°F
Entering/Leaving Tubes	85/125°F
GPM, Tubes	42

CONDENSATE EQUIPMENT

Condensate Receiver (1)

Manufacturer	Maxim
Model	MCR 1000
Capacity (Storage)	500 gal

Condensate Return Pump (2)

Manufacturer	Chicago
Model	Sure Return Type D9200
Arrangement	Duplex
Type	Vertical shaft, centrifugal
GPM, each pump	112
Discharge Pressure	25 psig
Motor HP, each	3
RPM	1750
Receiver Size	87.5 gal

2. The low pressure steam can go alternately to a Trane absorption cold generator that requires 19,000 lb/hr to produce 1025 tons of refrigeration. This unit can produce 2050 gpm of chilled water at 42.5°F.

Since electric power demand is directly proportional to the amount of steam produced by the waste-heat system, heating and cooling demands and steam production will not necessarily match at all times. In the event steam production exceeds the requirements of the heating and cooling equipment, excess steam is fed to a Bell & Gossett steam condenser, a subcooler, and then goes as condensate into the condensate receiver. The water in the condensate receiver is returned to the system via waste-heat boilers.

To supplement the hot and chilled water production from waste heat and to insure the plant's capability to meet the peak heating and cooling demands of the complex, the system is equipped with an electrically-driven centrifugal water chiller and a dual-fuel-fired steam boiler.

A Trane Model CV-7 centravac, driven by a 650-hp motor, is rated to produce 725 tons of refrigeration with 1450 gpm of chilled water at 40°F.

The dual-fuel Kewanee steam boiler is capable of producing 13,800 pounds of steam per hour to be used in either the heating or chilled water systems.

Specifications regarding the Trane absorption unit, the Trane centravac and the Kewanee steam boiler are listed below:

<u>ABSORPTION REFRIGERATION MACHINE</u> (1)

Manufacturer	Trane
Model	B10C
Capacity, tons refrigeration	1025
Steam Flow	Approx. 19,400 lb/hr
Evaporator:	
Entering/Leaving Water Temp.	54.5/42.5°F
GPM	2050
Max. P.D. (ft)	11.8
Passes	2
Fouling Factor	.0005
Absorber-Condenser:	
Entering/Leaving Water Temp.	85/101°F
GPM	3860
Max. P.D. (ft)	46.5
Passes - Absorber	2
Condenser	1
Fouling Factor	.0005
Concentrator:	
Steam	19,400 lb/hr
Psig - to valve	15
to machine	12
Purge Motor	
HP	1/2
Volts/Amps/Cycle	115/60/1

Pump Motor	
HP	15
Volts/Cycle/Phase	480/60/3
F.L.A.	20.6
L.R.A.	124.5

Condensate Cooler

Manufacturer	Bell & Gossett
Model	WU-63-23
Capacity to cool	25,000 lb/hr from 212°F to 200°F
Cooling Water	25 gpm
Cooling Water Temp., Ent./Lvg.	85°/109°F
Max. P.D., condensate	1 ft
Max. P.D., cooling water	5 ft
Fouling Factor	.0005

CENTRIFUGAL REFRIGERATING MACHINE (1)

Manufacturer	Trane
Model	CV-7G-GG-H6
Capacity, tons refrigeration	725
kW	602
Evaporator:	
Entering/Leaving Water Temp.	52/40°F
Max. P.D. (ft)	18
GPM	1450
Fouling Factor	.0005
Passes	2 R.H.
Condenser:	
Entering/Leaving Water Temp.	85/95°F
Max. P.D. (ft)	15.5
GPM	2175
Fouling Factor	.0005
Passes	2 R.H.
Compressor:	
Volts/Amps/Cycle at RPM	480/60/3 at 3600
F.L.A.	800/840
L.R.A.	5150
Oil Pump:	
HP	1/4
Volts/Amps/Cycle at RPM	480/60/3 at 1800
Purge Unit:	
HP	1/4
Volts/Amps/Cycle at RPM	115/60/1 at 1800
Chilled Water Requirement	4 GPM

STEAM BOILER (1)

Manufacturer	Kewanee
Model	LS-400 G02
Design Pressure	15 psig

Operating Pressure	12 to 14 psig
Relief Valve Pressure	15 psig
Output	400 BHP
Fuel	Gas/Oil
Firing	Full Modulation
Htg. Surface, Fireside	2000 sq ft
Blower HP	15
Steam Nozzle	12 in.
Regulator inlet pressure	4-5 psig
Altitude	600 ft
Fuel Rate:	
Gas	16,740 CFH
Oil	119.6 GPH
Motors:	
Oil Pump	1/2 hp
Air Compressor	5 hp
Volts/Cycle/Amps	460/60/3

The condenser cooling water system serves several functions throughout the plant. It circulates treated water through two Baltimore Aircoil cooling towers, each with a capacity of 3895 gpm where the water, cooled by eight fans, enters at 98°F and leaves at 85°F with an ambient wet bulb temperature of 78°F. There are four electric heaters rated 6.6 kW each, per tower to prevent freezing. This water is pumped to the absorption refrigeration machine, the centrifugal refrigeration machine, the steam condenser and sub-cooler, and the jacket water system of the engine. This water serves to dissipate the heat in the machines or heat exchangers it comes in contact with. Specifications for the cooling tower are given below:

<u>COOLING TOWER</u> (2)

Manufacturer	Baltimore Air Coil
Model	VLT-1500
Maximum Overall Height	12'-0"
GPM, each tower	3895
EWT	98°F
LWT	85°F
Ambient Wet Bulb	78°F
Max. Pumping Head	23 ft
Electric Heater kW, per tower (for freeze protection, 40° basin temp., down to -10°F)	4 at 6.6 kW each
Motor HP, each tower	8 at 20 hp each

Compressed air, necessary for starting the engines and operation of all pneumatic control devices, is provided by a Quincy two-stage, motor-driven air compressor (main compressor) and a Quincy dual-drive, two-stage compressor. The dual-drive compressor runs on either an electric motor or it can be switched to a Wisconsin heavy duty gasoline engine. The compressed air goes into seven 20" diameter x 60" high air reservoirs connected to a common pipe so that one, all, or any combination of reservoirs can be in use. The pressure maintained in the reservoir is between 200-250 psi. The compressors are equipped with start/stop pressure switches in order not to exceed or go below that level. Relief valves, in case of overload, are on the compressors and reservoirs and are set at 265 psi and 255 psi, respectively. A pressure reducing station regulates a second compressor air circuit to a maximum of 80 psi for operation of the pneumatic motor valves and associated controls. Specifications are listed below:

COMPRESSED AIR

Pumps

Manufacturer	Quincy	Quincy
Type	Two-Stage Motor-Drive	Two-Stage Dual-Drive
Pressure Switch	225-250 psi	200-250 psi/250 electric gas

Air Reservoirs

Dimensions	20" diam. x 60" high

Relief Valves

Compressor	265
Reservoir	225

There are eight major pumps (see following list of specifications) in the plant operating in three capacities. Two pumps of 1750 gpm each supply the chilled water system, four pumps of 2960 gpm each supply the condenser water system and the remaining two of 300 gpm each work for the hot water system.

PUMPS

Quantity	2	4	2
Manufacturer		Ingersoll-Rand	
Model	6x14 SD	8x14 SD	3x14 SD
Duty	Chill water	Cond. water	Heat water
Type		Double Suction	
GPM, each	1750	2960	300
T.D.H. (ft H_2O)	160	100	200
Water Temp.	45-55°F	85°F	160-200°F
Motor HP, each	100	100	30
RPM	1750	1750	1750

2.2.3 Description of Electrical Systems

The prime movers generate electricity by driving four Fairbanks Morse generators rated at 1250 kW each, producing power at 4160 volts, 60 Hz. Each generator is equipped with a Fairbanks Morse direct current exciter rated at 9 kW with a power output of 125 volts.

All power generated within the plant is distributed to a common bus, which is contained in switchgear equipment manufactured by Euclid Equipment Co. of Farmingdale, New York. The switchgear consists of 16 side-by-side steel cabinets having front-mounted instrumentation and rear access to equipment. Each engine generator unit has one cabinet for incoming circuit breakers connecting that generator to the bus, and a second cabinet contains the volt, amp, watt-hour meters, the various engine controls, and safety alarm indicators. Two additional cabinets, with similar equipment, were provided in the event a fifth engine generator was required to be installed. One common panel provides automatic controls for regulating sharing of line load evenly among the operating engines as well as load-shedding equipment and automatic start-up and shut-down circuitry, and one additional panel is provided for manual or automatic syncronization of operating equipment. The remaining four panels are provided for outgoing feeder, circuit-breaker equipment.

Two of the four outgoing feeders are connected to a double-ended substation and load center located in the switchgear room. As shown in Fig. 2.4, this substation consists of two 1000-kV transformers reducing the generated voltage to 277/480 volts. The load center can be fed from either transformer with the opening or closing of the bus tie breakers contained therein. The tie breakers are interlocked to prevent accidental short circuit of incoming power. The low voltage power from the load-center, feeder circuit is used primarily to operate the electrically driven equipment located within the plant, such as a centrifugal refrigeration machine, pumps, cooling tower fans, miscellaneous electrical devices and plant lighting. A portion of the power from the plant's substation is distributed outside the plant to certain shopping center spaces located nearby.

The two remaining outgoing feeders located on the opposite end of the main switchgear equipment are fed underground for further distribution to the tenants of the shopping center. All power generated and distributed to the main switchgear is metered by individual engines and collectively reported for use in determining plant production and efficiency.

2.3 DISTRIBUTION SYSTEMS

2.3.1 Mechanical

As previously described, the hot and chilled water produced by the plant is conveyed by manifolds and multiple pumps to a four-pipe, closed-circuit, distribution system (supply and return circuit for both the hot and chilled water system). These pipes encircle the shopping center in the space between the roof and the finished ceiling near the exterior perimeter wall. This space is usually the rear of the individual store and is normally used for storage or other support facilities to the retail space.

Secondary piping connects to the main circuit, both supply and return, and carries the water to dual-coil, air handling units. There are 10 air handling units used to serve the 60,000-sq-ft mall space. Each air handling unit has appropriate ductwork, ceiling diffusers, and thermostats controlling three-way automatic valves in order to enable it to maintain space conditions compatible with all other units.

For approximately 30 of the smaller and contiguous stores in the Mall, there are six air handling units with individual ductwork to several stores. Air temperature leaving these common units is controlled by a duct thermostat to provide air temperature low enough to satisfy the store having the highest heat load. Reheat coils located downstream of the air handling unit and before the air is discharged into the individual space adjusts air temperature for those tenants who have lesser heat loads. The remaining Mall stores are large enough to necessitate either one or more of their own units within their space. Temperature control is accomplished in a similar manner to that described above. The department stores, because of their size, have completely separate systems. Montgomery Ward's system comprises two McQuay air handling units plus three Continental air handling units with reheat coils. J.C. Penney Co. utilizes seven McQuay air handling units, all with reheat coils. All of these units are specifically selected for the department of the store they are to serve, each of which has varying heating-cooling demands. All air handling systems are operated by Robertshaw Controls.

2.3.2 Electrical

As mentioned above, two feeders from the main switchboard are distributed through a system of underground manholes around the perimeter of the building to eight pad-mounted transformer locations. The feeders are routed in a parallel manner so that each transformer can be connected to either feeder in order to balance load and facilitate servicing. Two of the eight transformers reduce voltage to 277/480 volts for use by the two major department stores. The remaining six step-down to 120/208 volts for the remaining Mall stores. From the low side of these transformers, underground feeders connect to meter rooms. From these locations, power is divided in separate circuits and through metering equipment is fed overhead to the individual stores for operation of their air handling unit, lighting and other electrical needs.

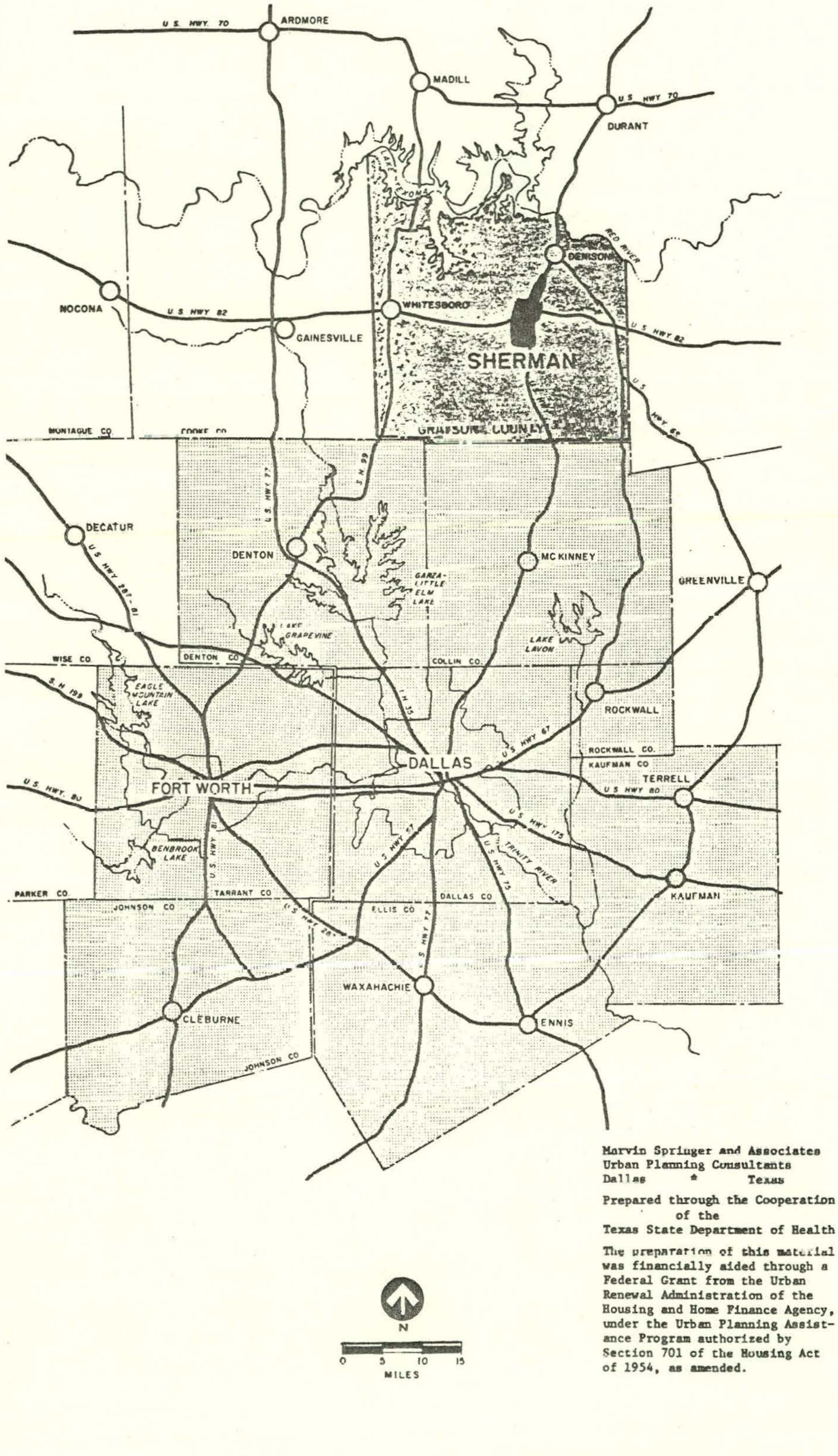


Fig. 2.1 Grayson County, The Northern Anchor of a Vast Urban Region

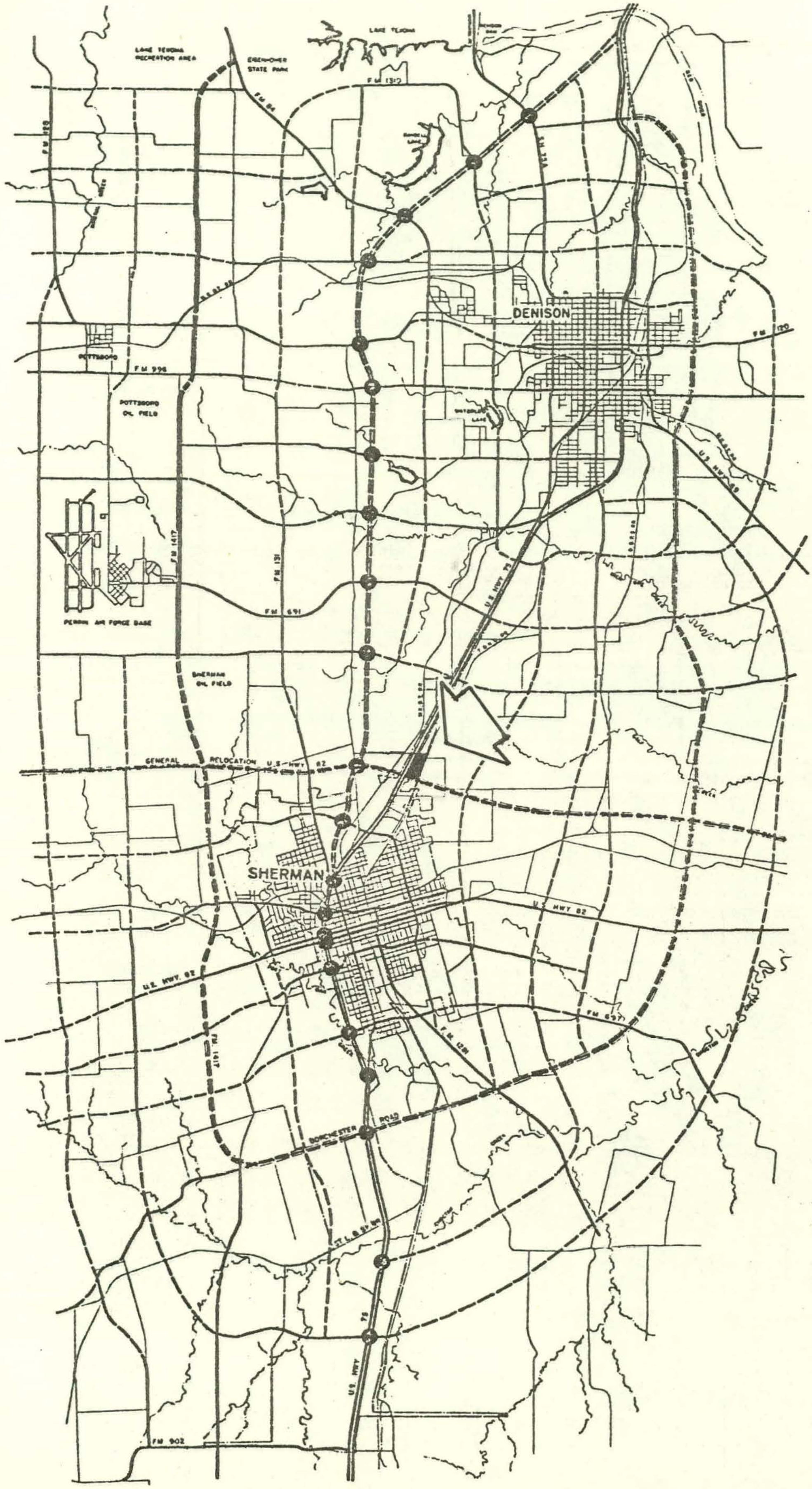


Fig. 2.2

Sherman-Denison Thoroughfare Relationship

Marvin Springer and Associates
Urban Planning Consultants
Dallas * Texas

Prepared through the Cooperation of the Texas State Department of Health

The preparation of this material was financially aided through a Federal Grant from the Urban Renewal Administration of the Housing and Home Finance Agency, under the Urban Planning Assistance Program authorized by Section 701 of the Housing Act of 1954, as amended.

B-1			
NO.	LESSEE	DIM.*	SQ.FT.
1	CAMERA CENTER	20x30	600
2		20x50	1,000
3	Tobacco House	20x50	1,000
4	SUPER X DRUGS	70x150	10,500
5	Bob's Old Fash.	15x50	750
6	KARMEL KORN	15x50	750
7	GENERAL NUTRITION	20x50	1,000
8	Plants & Pots	20x50	1,000
9	Hunter Piano	20x50	1,000
10	THE PLUM TREE	30x50	1,500
11	ORANGE BOWL	30x50	1,500
12	MOTHERHOOD MATERNITY	15x55	330
13		15x55	325
14	FATHER & SON SHOES	30x55	1,550
15	SINGER	30x35	1,050
16	ZALES	30x75	2,250
17	WYATTS CAFETERIA	90x122	9,825
18	KROGER GROCERY	110x147	16,200

B-2			
NO.	LESSEE	DIM.*	SQ.FT.
1	P. WALKER FIG. SALON	30x40	1,200
2	COMMERCIAL CREDIT	20x40	800
3	SHERMAN SAVINGS	28x31	868
4	RUBAIYAT IMPORT	IRREG.	840
5	SWEENEY JEWELRY	30x80	2,400
6	Century Books	30x100	2,425
7	BELL SHOES	30x120	3,600
8	EMBASSY FABRICS	30x140	4,200
9	MERLE NORMAN	15x50	750
10	MARGO'S LA MODE	60x140	6,450
11	PANTS AMERICA	30x72	2,160
12	EXTENSION ONE	30x72	2,160
13	LILLEY'S DEPT. STORE	150x180	21,080
14	REGIS BEAUTY SALON	20x60	1,200
	THEATER		8,300

B-3			
NO.	LESSEE	DIM.*	SQ.FT.
1		20x40	800
2	ORANGE JULIUS	20x50	1,000
3	TOPPERS	40x90	3,600
4	AMERICAN HANDICRAFT	16x83	1,330
5	Trend Jewelers	14x40	560
6	SMARTTS	44x90	3,510
7	DOCKTOR'S PETS	30x90	2,700
8	STEWMAN'S	30x60	1,800
9	CONTINENTAL BARBERS	IRREG.	905
10	STORAGE	IRREG.	2,480
	Baker Bldg.		
			2,400
	Animal Med. Clinc		1,454
			8,854

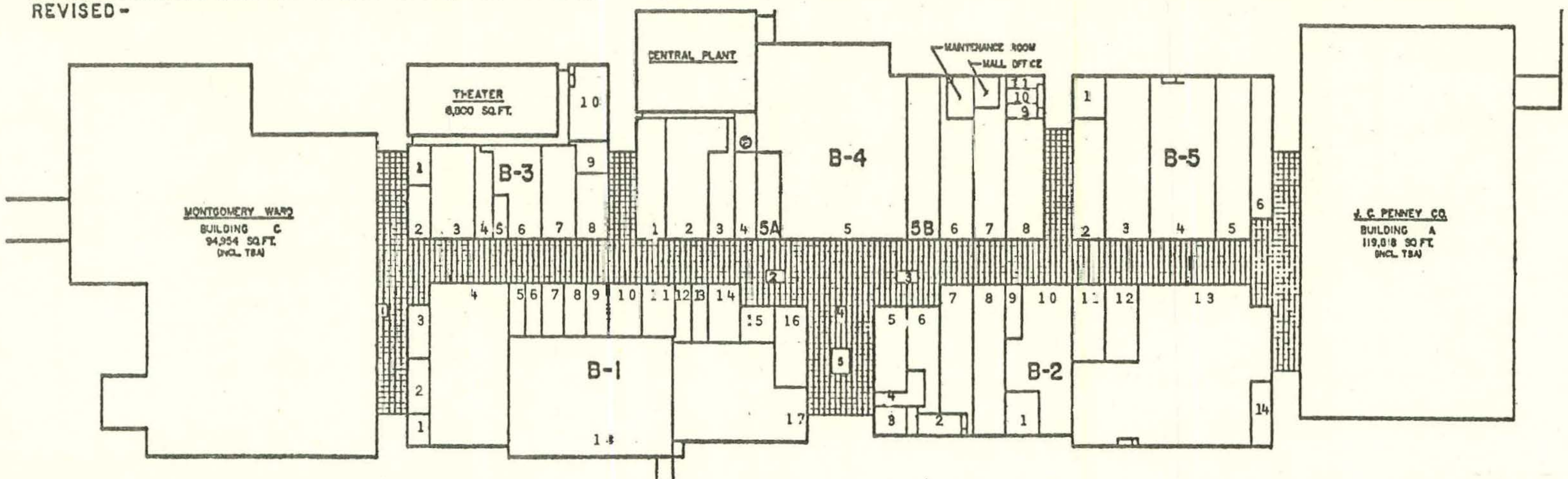
B-4			
NO.	LESSEE	DIM.*	SQ.FT.
1	ROYCE SHOES	27x110	2,970
2	TOYS BY ROY	IRREG.	6,550
3	MODE O'DAY	25x80	2,000
4	BED AND BATH	20x80	1,600
5	BEALL BROS.	RREG.	21,740
6	Plymouth House	RREG.	5437
7	MUSICLAND	30x120	3,600
8	KINNEY SHOES	35x110	3,850
9	S.WEST RESEARCH	10x30	300
10		14x30	490
11	Psy Counseling	12x35	420
5A	GOLDMINE	20x80	1,618
5B	The Gentry		4,000
6C			981

B-5			
NO.	LESSEE	DIM.	SQ.FT.
1	STORAGE	30x40	1,200
2	COPELAND SHOES	30x110	3,300
3	Jay Vee Stores	40x150	6,000
4	MARGIE'S	60x150	8,984
5	JACO'S MEN'S SHOP	30x150	4,530
6	DOLEN'S CARDS	20x130	2,600
7	Radio Shack		1840
	TOTAL STORAGE	3,680	
	TOTAL MALL STORES	210,184	

KIOSKS			
NO.	LESSEE	DIM.	SQ.FT.
1	Fantazia	,	144
2	SWISS PRETZEL	12x16	192
3	PARK LANE HOSIERY	14x20	280
4	CAN-DO	10x15	150
5	Enchanted Sun	16x24	192
	TOTAL KIOSKS		958

*MAXIMUM LENGTH AND WIDTH FOR IRREGULAR AREAS, WITH ACTUAL SQUARE FOOTAGE SHOWN.

REVISED-



THIS PLAN IS SUBJECT TO CHANGE AND THE APPROVAL OF ALL AGENCIES HAVING JURISDICTION.

EXACT DIMENSIONS AND STORE LOCATIONS ARE BINDING ONLY TO THE EXTENT PROVIDED FOR IN EXECUTED LEASES.

LEASE SCHEDULE REFLECTS SQUARE FOOTAGE OF LEASE TO THE NEAREST WHOLE FOOT FOR ACTUAL SQUARE FOOTAGES, REFER TO EXECUTED LEASES.

DIMENSIONS SHOWN IN LEASE SCHEDULE ARE TO THE NEAREST FOOT.

LEASE PLAN

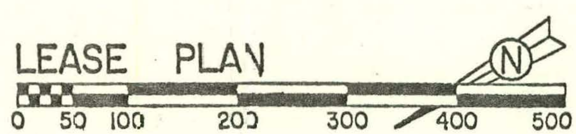


Fig. 2.3 Lease Schedule "A"

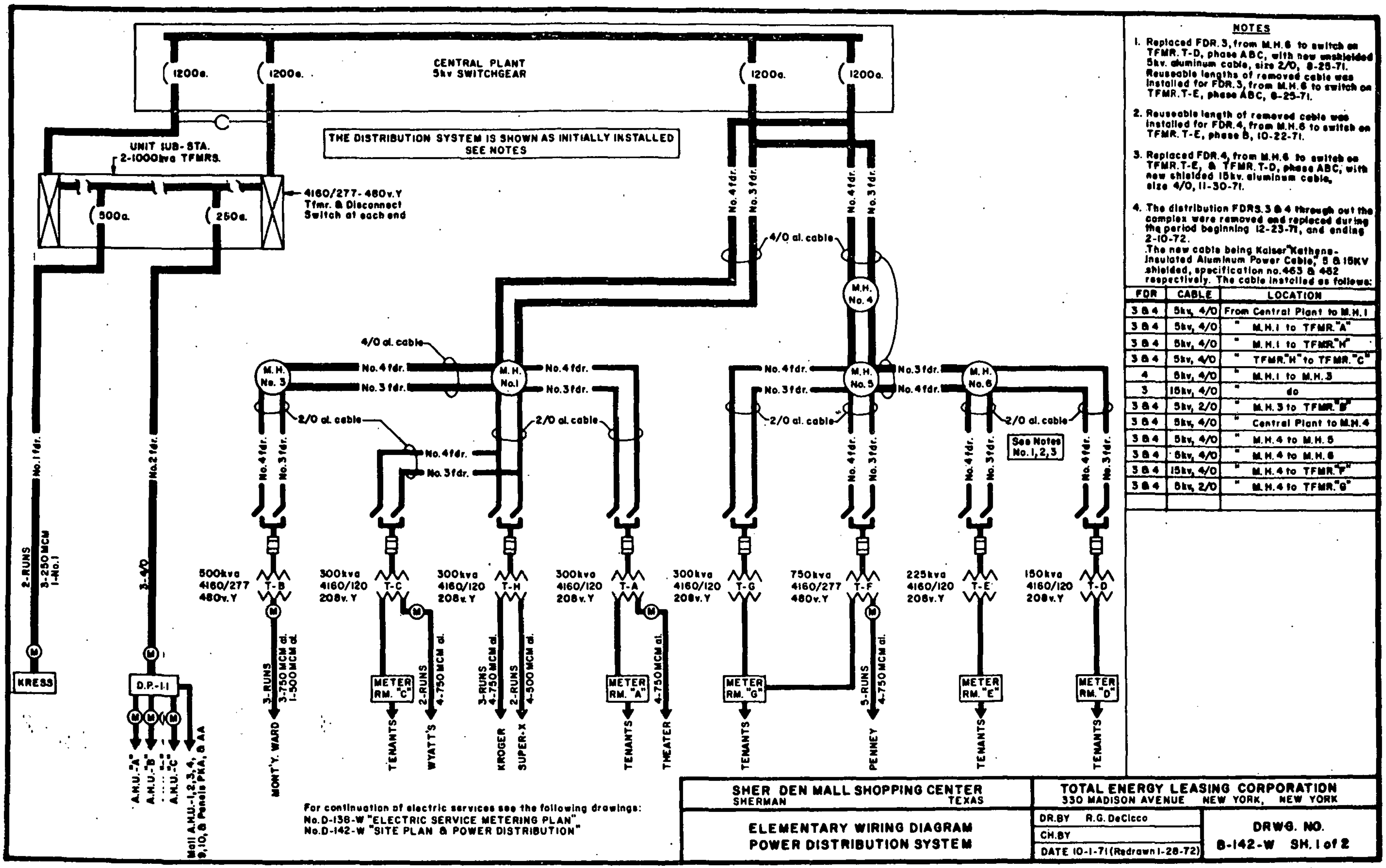


Fig. 2.4 Elementary Wiring Diagram of Power Distribution System

3 CAPITAL COSTS

3.1 GENERAL POLICY

In keeping with its contracts with the owner/developer to install, lease, and manage (operate) the system, it was the policy of the Company (Telco) to design and construct the energy plant in a space provided by the Owner of the project that the system was to serve. Therefore, the building or room containing the primary generating equipment as well as access space for the system's distribution components or structural and space provisions within the Mall and tenant spaces, did not represent a capital cost for the Company. Under the terms of the Management Agreement, the Company compensated the Owner of the project for the facilities provided for the system with a nominal annual rental termed the "franchise fee." For information, the cost of the building housing the system, to the extent possible, has been extracted from the overall construction costs of the project (shown as a Note in Table 3.6)*.

3.2 CONSTRUCTION BUDGETS

The initial feasibility study previously discussed was based on the project Owner's initial plans for developing the site and the intended occupancy thereof. The feasibility study also included preliminary selection of major equipment components as to number and size based on the anticipated demands of the complex. Construction budgets were then constructed by obtaining unit quotations for most of the major equipment within the plant proper. Since detailed design of the complex had not been completed at this time, an allowance was provided for the electrical and HVAC distribution systems as well as HVAC work in tenant spaces. These were influenced to a large extent based on the experience of consulting engineers associated with similar types of shopping centers.

3.3 SITE PLANNING

As part of the feasibility study and the Company's prior engineering experience with similar types of plants, the general configuration and overall space requirements had been approximately determined. However, a continuing coordination with the Owner's architects and engineers was necessary until the site plan became firm. The major tenants of the shopping center, because of their marketing strength, exercised considerable influence on the finalized site plan in order to afford their premises the most advantageous orientation in the overall development. The location of the total energy plant from the Company's standpoint was most preferably a central location in order to minimize the length of its distribution systems. From the Owner's viewpoint, of course, a remote location was preferable in order to minimize the loss of prime rental space and to avoid any nonesthetic effects created by the plant's higher roof line, exhaust stacks, and roof-mounted cooling towers. The possibility of noise and vibration transmission from the plant to the occupied spaces of the shopping center was also a consideration.

---

*Tables appear consecutively at end of section.

3.4 DESIGN CONTRACT

Having completed the general site development plan and general location of the total energy plant, an engineer/design contract was entered into with Herman Blum Consulting Engineers of Dallas, Texas. It was the policy of the Company to engage local professional engineering firms experienced in large central system heating and air conditioning plants, locally licensed and familiar with building codes, permit requirements and construction practices prevailing in the area. The contract, negotiated on a lump sum basis, was executed in March 1969 in the amount of $25,000, covering a scope of work that included:

1. development of mechanical and electrical construction drawings, specifications and other information necessary to solicit competitive bids from contractors;
2. analysis of construction bids for thoroughness and compliance with plans and specifications and recommendations for award;
3. receipt, review, and approval of working drawings and equipment submittals furnished by the contractor's suppliers subsequent to award and during the construction period; and
4. periodic inspection of the work in progress with certification as to its completion and full compliance with the plans and specifications.

Detailed engineering of the distribution systems, especially the HVAC, could proceed only as tenant leasing and store plans became known. In particular, the design of air handlers and ductwork in the J.C. Penney Co. and Montgomergy Ward's space required detailed coordination with the construction personnel of these companies. Likewise, many of the national chain stores occupying space in the Mall required approval of interior HVAC work in order to assure compatibility with their interior design. For this reason, a lump sum engineering contract was not practical and in October 1969, the Company entered into a contract with Herman Blum Consulting Engineers providing for the plans and specifications for the distribution systems on the basis of 6¢/sq ft of building. At the time, this rate was estimated to involve an expenditure of approximately $27,000. Subsequent to the awarding of these contracts, it was necessary to engage specialized engineering consultants for additional minor costs. Cerami & Associates, specializing in sound and vibration isolation, performed an analysis to assure that the proposed plant's location and design would not create any objectionable impact on the adjacent shopping center. Their work resulted in the provision for access hallways separating the total energy plant from the perimeter walls of the nearby tenant spaces.

In accordance with the construction financing discussed elsewhere herein, the lending institution required certification of construction work completed and compliance with plans and specifications in order to fund progress payments. Therefore, Casper & Sotnikow, a firm frequently used by the financial institutions, was engaged to perform field inspections during the course of the construction period to verify the accuracy of invoices furnished by the various contractors.

Capitalized engineering fees applicable to the project are shown in Table 3.1, which includes the original engineering contracts as well as the addenda required as the result of changes in the scope of work and modifications to the project during the course of construction.

Because of the elaborate coordination requirements among the tenants, Owner, and the Company's engineers and contractors, and because the Company prepurchased directly several major items of plant equipment, a member of the Company's engineering group was assigned full time during a major portion of the construction period to establish construction schedules, monitor contractors' performances, and approve the disbursement of capital funds in progress payment for work completed. The salaries and expenses incurred by the Company's in-house engineering personnel were not included in the following schedules in that they were considered part of the general and administrative expenses of the Company.

3.5 PREPURCHASED EQUIPMENT

Due to the long lead time for the manufacture of major equipment items and in particular the prime movers, it was the Company's policy to prepurchase certain large items of equipment for installation by the contractors and subcontractors. This arrangement had several advantages in that the Company was planning several similar installations at the time the Sher-Den project was begun and economic benefits were anticipated as the result of bulk purchases directly from the major manufacturers. It also enabled freezing the cost for a significant portion ($944,569, 35.8%) of the system's components. As will be shown later in the capital costs variance table, this procedure was effective in limiting cost overruns for this portion of the system.

In the Sher-Den project, the engine generator units with all accessory systems, including the waste heat boilers and the primary switchgear, were purchased through the Fairbanks Morse Division of Colt Industries. This arrangement, in addition to assuring the best possible price, placed sole responsibility for the design and selection of these interrelated components with a substantial manufacturer. A lengthy delay in the shopping center construction schedules required using similar units originally intended for another location. The major chilling equipment, the absorber, and the centravac were purchased directly from the Trane Company. The plant's 480-V substation and the eight padmounted transformers for the electrical distribution system were committed by the Company. These items were in turn included in the specifications of the mechanical and electrical contractors. The Company then assigned its commitment to the successful contractor. Other items of prepurchased equipment were assigned to the mechanical contractor for installation after arrival at the site. Table 3.2 summarizes these purchase commitments, which required significant modifications.

3.6 CONSTRUCTION CONTRACTS

From the plans and specifications developed by the design engineer, competitive bids were solicited from established contractors in the Dallas metropolitan area having experience in large mechanical-electrical systems.

It was the Company's desire to attain a lump sum arrangement for all of the work involved, including the tenant work. However, due to the unknown aspects of many of the smaller tenants' requirements, this portion of the mechanical contract required a negotiated allowance. Continental Mechanical Corp. of Dallas, Texas, was awarded a contract in the amount of $1,422,000, which included all mechanical and electrical work in the total energy plant and the mechanical distribution throughout the Mall as well as the in-store HVAC systems for major department stores, the Mall itself and an allowance for future leased spaces in the center. This contract proved to require a multitude of additions and some changes in design, especially as relates to the J.C. Penney Co. space and the Mall tenants. The project delay previously mentioned also resulted in substantial overtime charges. Table 3.3 clearly reflects the nature and extent of these modifications.

The plans and specifications for the electrical distribution system were separable from the documents prepared by the consulting engineer. Separate bids were solicited for this work, and a contract was awarded to Fischbach and Moore, Inc. of Dallas, Texas, in the amount of $212,489. The scope of this work involved the installation of the 5 kV feeder cables from the plant's switchgear to the various transformers and a low voltage feeder to distribution panels in the major stores and to several meter rooms serving the smaller tenants. Table 3.4 indicates the breakdown of this contract.

Subsequent to the award of these major contracts and the purchase agreements executed by the Company directly, it was necessary to enter into several miscellaneous contracts for equipment and services not covered by the original plans and specifications. These, in total, amounted to less than 1% of the total project cost. Table 3.5 summarizes the value of all the original contracts and purchase agreements, final sums paid after all addenda and revisions to the original scope of work, the percentage increase in each commitment, and the percentage each contract represents of the total final project cost.

3.7 CAPITAL COST ALLOCATION AND ANALYSIS

In the following outline (see page 74), the total capital cost of the project has been allocated to the various components of the system, namely: engineering, electrical generation plant, heating and cooling plant, distribution systems and tenant work. Table 3.6 summarizes these component costs. In Table 3.7 the total capital cost has been regrouped to indicate those allocable to the electric vs the heating and cooling elements of the system as well as an allocation showing the plant vs the distribution system. This table indicates the cost per kW and cost per ton of installed capacity as well as the cost per sq ft for the areas served. In these analyses, the engineering cost has been distributed to the mechanical-electrical portions of the system on a pro-rata basis. To a large extent, these allocations are fairly accurate in that the prepurchased items are known as elements of the total cost. Likewise, the electrical distribution cost is clearly definable in that this work was the subject of a separate contract with Fischbach and Moore, Inc. In the case of the Continental Mechanical contract, their billing breakdowns indicated cost allocations. To the extent that the dollars expended in any one category varied from that of their original projection, it would constitute an error in the allocation. However, such variations would probably have a negligible effect on the allocation within the overall project cost.

3.8 CAPITAL COST ANALYSIS AND VARIATION

In Sec. 3.7 we have seen (Table 3.7) that allocable capital costs to the electrical system vs the heating and cooling system are about an even split -- 49% vs 51% -- while the cost of the plant proper vs the distribution of the electric and HVAC service divide roughly 60%/40%, with the tenant and Mall in-store work accounting for the majority of the latter -- 26% of the total project cost. These actual cost percentages were not too divergent from the feasibility study or the original contract amounts, with the exception of the tenant HVAC work that increased from 21% to 26% whereas the cost of the plant decreased from 61% to 58%.

Table 3.8 indicates the shift in percent allocation to the various components of the overall system as well as the increases in cost from the project budget to final cost. As shown in this table and in Table 3.9, significant cost increases were incurred in most divisions of the project amounting to 23.4% over the original feasibility. Tenant HVAC work alone increased about 45%. Absolute cost increased $300,725 by the time contracts were awarded and another $236,624 by the time construction was completed. Both of these increases seriously affected the economic feasibility of the project.

The reasons for these costs in excess of project budget and especially those incurred after the award of contracts can be attributable to three general areas: (1) the passage of time, (2) the intent, which did not materialize, that all spaces would be served by hot and chilled water, and (3) the unknown details of the work outside the confines of the total energy plant. The conclusion section of this report discusses the impact of these events more fully, but the following should be brought out at this time when the figures are close at hand.

The feasibility studies were developed in early 1968, at the same time agreements were reached with the developer/owner of the shopping center providing for the Company to install the "System." Design work began in early 1969, but development of the shopping center lagged, and it was not possible to proceed with serious general construction until March 1970. By this time there had been numerous changes in the project affecting our scope of work. Although the prepurchased equipment cost was relatively firm, general inflation increased the cost of the primary mechanical and electrical contracts and required additional allowance to accelerate the work to make up for lost time. As a result, final contract costs exceeded original estimates by $300,725 or 13.1%.

In the course of the work, numerous change orders were required, some of which are unavoidable in a project of this size. The bulk of these occurred in the distribution and tenant work divisions, and can be attributed to our lack of initial clarification of requirements. As an example, our plan was to provide a single electric service point for each user (similar to public utility policy). We were in fact required to provide additional trenching, duct bank, and secondary feeders to the outlying TBA facilities even though a single service meter was provided. Furthermore, it became apparent that the TBA facilities, because of remoteness, would not be served by the plant's heating and cooling system. Even so, the Company was required to provide and install self-contained equipment. A similar arrangement occurred with Kroger and Super X' tenant spaces.

The changes in the HVAC work in the J.C. Penney Co. store proved most significant. Large national department stores have extensive in-house engineering and construction staffs. Their economic leverage in a project such as Sher-Den is sufficient to demand and receive elaborate facilities to the letter of their specifications at no cost to them. The engineer and the contractor underestimated these conditions. A review of the mechanical contract (Table 3.3) clearly shows an increase of almost 22% over the contract value due to the numerous changes and modifications required. Engineering changes required to implement the above store modifications increased costs in that division approximately 20%. Finally, it should be noted that the "weight" of the prepurchased equipment, which cost remained relatively unchanged, was responsible for limiting increases in the total energy plant proper to under 4%. In summary, increases in project cost beyond the contract stage amounted to $236,624 or 9.1% (Table 3.9).

The Company's analysis of these extras reveals that had the project proceeded on schedule, its requirements been more precisely defined, and its work been limited to the precise area its system directly served, the final investment would have been reduced by more than $350,000.

CAPITAL COSTS

DESCRIPTION & ALLOCATION

I. Engineering Fees - Table III-1 $ 62,634

II. Electrical Generation

A. Engines - Four (4) Fairbanks Morse Model 2800 TDD 8-1/8 Engine Generators, 4160 V, 3 Phase, 60 Hz., 1,250 KW, 6 Cylinder, 900 RPM, 127.3 BMEP, Turbocharged, Dual Fuel

Accessories:
4 ea. FM Generator 9 KW 125 V Exciter
4 ea. Intake Air Filters
4 ea. Intake Air Silencer
2 ea. Fuel Oil Day Tank & Controls 275 Gal.
1 ea. Start-Up Air Receiver Elec. Motor Driven
1 ea. Start-Up Air Receiver Gas Engine Driven
2 ea. Fuel Oil Transfer Pumps
1 ea. Waste Oil Tank 750 Gal.
5 ea. Lube Oil Controls
4 ea. Sets L.O. Filters, Strainers, Coolers & Controls
4 ea. Jacket Water Pumps
4 ea. Pre-Lube Pumps
4 ea. Combination Waste Heat & Silencer Boilers
4 ea. Engine Gauge Boards
1 ea. Condensate Feed Water Unit
4 ea. Back Pressure Valve
4 ea. Engine Crankcase Blowers
4 ea. Expansion Tanks

Lot.......... 683,549

B. Switchgear:
1 Lot Euclid 4160 V. Switchgear Consisting of:
5 Generator ACB Compartments
5 Generator Auxiliary Compartments
4 Feeder ACB Compartments
2 Bus Tie Compartments
1 Load Shedding Compartment
1 Auto Synch. & Freq. Control Compartment
4 Grounding Resistors
3 Lighting Arrestors
1 Capacitor
1 Synch. Panel

1 Set Woodward Controls Consisting of:
- 1 Automatic Speed Match Synch.
- 5 M.O. Potent Meters
- 5 E.G.A. Control Box
- 5 Resistor Box
- 1 Master Frequency Trimmer

Lot............	118,842

C. Plant Substation

1 Each General Electric double-ended 750 KVA, 4,160/480 volt substation. Fused interrupter switches, 1600 amp capacity, on outgoing section to each bus. Tie interrupter switch normally open between each bus. — 28,892

D. Installation charge allocated from Continental Mechanical Corp. — 285,741

III. Chilling & Heating Plant

A. Chillers:

1 Rig of 1,750 tons refrigeration consisting of:
- 1 ea. Model B10C Trane Absorption Unit 208/3/60
- 1 ea. Model CV-7G Trane Centrifugal Chiller - 4,160/3/60

Lot............	102,665

B. Boiler:

1 ea. Kewanee Low Pressure Steam Boiler rated 13.39 x 10^6 BTU/Hr. Dual Fuel — 20,000

C. Cooling Towers:

2 ea. Baltimore Air Coil, Model VLT 1500 rated 3,895 gpm each, 8-20 H.P. Motors — 68,000

D. Piping:

Insulated steam, hot water and chilled water piping located with Total Energy Plant. Condenser cooling water and return piping for engines and 1,750 ton chilling plant. Also any necessary additional piping — 127,000

E. Auxiliaries:

1. Pumps -
   - 2 Ingersoll Rand Model 6 x 14 SD rated 1,750 gpm each - Chilled water
   - 4 Ingersoll Rand Model 8 x 14 SD rated 2,960 gpm each - Condenser water
   - 2 Ingersoll Rand Model 3 x 14 SD rated 300 gpm each - Heating water

2. Expansion Tanks -
   - 1 Hot expansion tank 572 gallons
   - 1 Chilled water expansion tank 457 gallons

3. Heat Exchangers -
   - 1 ea. Steam Condenser - Bell & Gossett Model SU-205-2 rated 15.82×10^6 BTU/Hr.
   - 1 ea. Sub-Cooler - Bell & Gossett Model WU-64-43 rated 8.32×10^5 BTU/Hr.
   - 1 ea. Hot Water Convertor Bell & Gossett Model SU-209-2 rated 12.0×10^6 BTU/Hr.
   - 1 ea. Condensate Cooler Bell & Gossett Model WU-63-23 rated 2.98×10^5 BTU/Hr.

4. Gauges and Thermometers

5. Insulation Work

6. Temperature Controls

7. Installation charge allocated from Continental Mechanical Corp.

Lot............	224,762

IV. Electrical Distribution

A. Pad mounted transformers	22,479
B. 4 - 4,160 volt distribution feeders to pad mounted transformers. Secondary distribution at 277/480 volt to major department stores and at 120/208 volts to other stores	222,247

V. HVAC Distribution Hot and chilled water is carried to all parts of the shopping center by a four pipe distribution system. The system branches off to supply all the air handling units in the Mall and stores.	142,000
VI. Tenant Work Montgomery Ward (82,588 sq.ft. served) - Five air handling units supply the single floor. There are also additional heating units in the ductwork.	93,655
J. C. Penney Co. (141,906 sq.ft. served) - Seven air handling units supply air to the two floors. Six unit heaters and eleven booster heating coils are also in use in the system. Ductwork and positioning of the units is all done to Penney's design specifications.	266,619
Mall Area - Ten air handling units supply air for the entire area.	84,704
Strip Stores - air handling units are provided for groups of small stores, individual units for larger stores and for a few special cases multiple units for a particular store. Ductwork both supplies and returns air.	282,557

Table 3.1 Engineering Fees

A. Mechanical and Electrical Design - Herman Blum Consulting Engineers		
1. Total Energy Plant -(Original Contract)	$ 25,000	
A. Revisions	3,171	$ 28,171
2. Distribution System -(Original Contract 449,000 sq.ft. at 6¢/sq.ft.	26,963	
A. Revision to J. C. Penney Co. area	2,633	
B. Revision to Montgomery Ward area	485	
C. Revision to Mall area	2,821	32,902
B. Vibration Analysis - Cerami & Associates		750
C. Field Verification - Casper & Sotnikow		811
Total Engineering Fees......		$ 62,634

Table 3.2 Prepurchased Equipment

	Amount	% of Original Project Cost
Fairbanks Morse	$ 790,599	30.0
Trane Company	102,599	3.9
General Electric Co.	51,371	1.9
	$ 944,569	35.8

Table 3.3 Continental Mechanical Corp. Mechanical Contract

Original Contract - $212,498

Division of Work	Original Amount	Addenda	Final Amount
Manholes & Trenching	$ 29,934	$ 5,289	$ 35,223
Equipment	68,386	1,497	69,883
Duct Bank & 5KV Cable	18,775	15,501	34,276
Conduit & Wire	95,403	9,941	105,344
Totals	$ 212,498	$ 32,228	$ 244,726

Table 3.4 Fischbach and Moore, Inc. Electrical Contract

Original Contract - $1,442,000
Revisions - 17,500

Total $1,459,500

Division of Work	Original Amount	Addenda	Final Amount
Start-Up and Fees	$ 83,000	$ -	$ 83,000
Total Energy Plant	637,544	21,926	659,470
Distribution Piping	142,000	-	142,000
Montgomery Ward	88,700	4,955	93,655
J. C. Penney Co.	154,500	112,119	266,619
Mall Area	80,000	4,704	84,704
Tenant Spaces	273,756	8,801	282,557
Totals	$1,459,500	$152,505	$1,612,005

Table 3.5 Capital Costs, Summary and Variance, by Contractor

Category / Contractor / Reference	Original Contract	Variance	Final Cost	Percent of Total Cost
I. Engineering - Herman Blum Consulting Engineers - Table III-1	$ 51,963	$ 10,671/ 20%	$ 62,634	2.2
II. Purchased Equipment: - Table III-2				
a) Engine-Generator Package-Fairbanks Morse	790,599	11,792/1.5%	802,391	28.3
b) Chillers - Trane Co.	102,665	-	102,665	3.6
c) Substation and Transformers-General Electric Company - $51,371 - See Note 1	-	-	-	-
III. Construction Contracts:				
a) Mechanical - Total Energy Plant and HVAC Distribution System - Continental Mechanical Corp.- Table III-3	1,442,000	170,005/11.8%	1,612,005	56.8
b) Electrical Distribution System-Fischbach & Moore - Table III-4	212,498	32,227/15.2%	244,725	8.6
IV. Miscellaneous:				
a) Fire Extinguishers	-	2,416/100%	2,416	.08
b) Governor Field Service	-	3,438/100%	3,438	.1
c) Switchgear Field Service	-	3,675/100%	3,675	.1
d) North Texas Air Conditioning	-	2,400/100%	2,400	.08
TOTALS	$2,599,725	$236,624/9.1%	$2,836,349	100.00

Note 1 - The cost of the unit substation ($28,892) and the pad mounted transformers ($22,479) was determined by firm quotes received from the General Electric Co. These quotes were assigned to the mechanical and electrical constractors, respectively, and are included in their original contract amount.

Table 3.6 Summary of Capital Costs by Components

I.	Engineering Fees		$ 62,634
II.	Electrical Generation:		
	Fairbanks Morse Equip.	$683,549	
	Switchgear	118,842	
	General Electric Substation	28,892	
	Mechanical & Electrical Install.	285,741	
			1,117,024
III.	Chilling & Heating Plant:		
	Chillers	102,665	
	Boiler	20,000	
	Cooling Tower	68,000	
	Piping	127,000	
	Mechanical & Electrical Install.	224,762	
			542,427
IV.	Electrical Distribution:		
	Transformers	22,479	
	Duct and Cable Installed	222,247	
			244,726
V.	Hot and Chilled Water Distribution		142,000
VI.	Tenant Work:		
	Montgomery Ward	93,655	
	J. C. Penney Co.	266,619	
	Mall Area	84,704	
	Strip Stores	282,557	
			727,535
		Grand Total	$2,836,346

Note: The building or equipment room housing the Total Energy System was built and paid for by the shopping center owner. Cost for this division of the general contractor's work was approximately $145,000.

Table 3.7 Summary of Capital Costs by System

		$	$/Unit	% of Total
By Major System:				
Electrical System:				
Generation	$1,149,620		229/KW	40.5
Distribution	252,844		51/KW	8.9
		$1,402,462	280/KW	49.4
Heating and Cooling System:				
Plant	$ 550,764		315/T	19.4
Distribution	144,467		83/T	5.1
Tenants and Mall	738,651		421/T	26.1
		1,433,882	819/T	50.6
Total		$2,836,346		100.0

PLANT VS. DISTRIBUTION

Plant:				
Electrical	$1,149,620		2.37/sqft	40.5
Heating and Cooling	550,764		1.13/sqft	19.4
		1,700,384	3.50/sqft	59.9
Distribution:				
Electrical	252,844		.52/sqft	8.9
Heating and Cooling	144,467		.29/sqft	5.1
Tenants and Mall	738,651		1.53/sqft	26.1
		1,135,962	2.34/sqft	40.1
Total		$2,836,346	5.84/sqft	100.0

BASIS: 5,000,000 KW
1,750 TONS
485,180 SQ. FT.

Table 3.8 Shift in Percent Allocation to System Components and Increase from Project Budget to Final Costs

	Original Project Budget Percent Total Cost	Final Percent Total Cost	% Increase in Cost: Project Budget to Original Contract	% Increase in Cost: Original Contract to Final Cost	% Increase in Cost: Project Budget to Final Cost
Engineering	2.2	2.2	1.9	20.5	22.8
Total Energy Plant	61.5	58.5	13.1	3.9	17.6
Distribution	14.5	13.6	5.8	9.1	15.4
Tenant HVAC Work	21.8	25.7	18.9	21.8	44.9
Totals	100.0	100.0	13.1	9.1	23.4

Table 3.9 Capital Costs, Summary and Variance, by Function

	Project Budget	Variance	Original Contract	Variance	Final Cost	% Total Cost
Engineering	$ 51,000	$ 963	$ 51,963	$ 10,671	$ 62,634	2.2
T.E.P.						
Electrical	926,000	154,985	1,080,985	36,042	1,117,027	39.4
HVAC	485,000	30,323	515,323	27,103	542,426	19.1
Total	1,411,000	185,308	1,596,308	63,145	1,659,453	58.5
Distribution						
Electrical	187,000	25,498	212,498	32,227	244,725	8.6
HVAC	148,000	(6,000)	142,000	-	142,000	5.0
Total	335,000	19,498	354,498	32,227	386,725	13.6
Tenant Work	502,000	94,956	596,956	130,581	727,537	25.7
Grand Total	$2,299,000	$300,725	$2,599,725	$236,624	$2,836,349	100.0

4 PLANT OPERATIONS

4.1 STANDARD OPERATING PROCEDURES

4.1.1 Energy Demands

As in the case of any electrical generating facility, increases in power demands must be met instantaneously with available operating generating equipment. As there is no practical way to generate and store large amounts of electricity for later use, the operation of the engine generators in a total energy plant must match precisely the electrical demands of the shopping center tenants and Mall, plus the electrical requirements of the plant itself.

Heating and cooling energy media must be provided to meet the thermal loads in the interior spaces of the Mall and individual stores. These demands, however, are not instantaneous requirements on the heating and cooling plant and can be provided in anticipation of later thermal demands as well as decreased in anticipation of diminishing thermal demands.

Accordingly, the operation of the prime movers and other pieces of equipment within the total energy plant are scheduled to closely conform to the operating hours that the shopping center is opened for business.

Sher-Den Mall is open for business between 9:00 a.m. and 9:00 p.m., six (6) days per week. Only the theater is opened beyond 9:00 p.m. The theater and one other tenant have some operating hours on Sunday. Most tenants (except the theater) are also closed on major holidays. Although this normal daily cycle would indicate a 12-hour off condition, the electrical demands of the stores precede the public opening time and extend beyond closing to permit employee activities in preparation for and subsequent to the normal business day. Hence, the electrical high demands of the center are more correctly stated as 8:00 a.m. to 10:00 p.m.

As mentioned in the preceding paragraph, the electrical demands on the plant are in large part due to the electrical requirements of the plant itself. Auxiliary equipment, i.e., pumps, chillers, cooling tower fans, etc., amount to approximately 40% of the normal high electrical demand. To properly prepare the space conditions in the shopping center, it is necessary to operate the heating or cooling components of the system in a manner that overlaps the public hours of the shopping center. This necessity further extends the time cycle of high electrical demand on the plant and increases in loading are realized as early as 6:00 a.m. and last until after 11:00 p.m.

Seasonal variations in outdoor conditions have a significant effect on the electrical demands of the total energy plant. Although the shopping center tenants have a fairly constant electrical load for lighting and miscellaneous power, those users with self-contained air conditioning units do contribute to increased tenant demands in the summer months. To a larger extent, the plant's electric chiller (580 kW) and associated electric auxiliaries require higher and longer usage during the summer months. Conversely, the heating demands on the plant are minimal during the normal business hours of the center in that more than adequate heat is generated by the lighting and people. In off hours during the coldest winter months, some supplementary heat must be provided in early morning hours so that space conditions are not uncomfortably cold when employees arrive for work.

Figure 4.1* shows hourly load curves for a typical summer and winter day and indicates the relative amount of electrical demand while the center is opened vs the nonoperating hours of the shopping center.

4.1.2 Equipment Selection

Engine-Generators. The standard operating procedures require that the four engine-generating units be operated as follows:

1. Each unit to be cycled in use to permit operating hours to be accumulated on each machine in accordance with a predetermined maintenance schedule.
2. Operating engines to run as close to 75% of rated capacity as practical, thereby providing a minimum of 25% spinning reserve on each operating engine.
3. All operating engines to carry an equal percent of the total plant load (automatic load sharing).
4. One engine to be available for standby to replace a failed operating engine or to be available when emergency repairs are required.

In Fig. 4.2, typical plant loads have been analyzed for several consecutive days selected at random. As can be seen, one unit is used to carry the minimal night load and act as the baseload unit for several consecutive days. A second unit is brought into service several hours before the shopping center opens to meet the demands of the plant's auxiliary equipment and increasing lighting demands from the center. A third engine is utilized to meet the peak demands that are registered on the plant between the hours of 9:00 a.m. and 9:00 p.m. The engines are removed from service in reverse order unless there is to be a change in the baseload engine designation, in which case the previous baseload engine is removed from service and the engine used in the second position becomes the baseload engine for the following night and next day.

For the sample days selected in Fig. 4.2, the summertime demands in the off hours varied between 700 and 800 kW, well within the capacity of one engine and in conformance with the preceding criteria for having spinning reserve. During these days, at approximately 4:00 p.m., the peak demand on the plant approached 2450 kW. Although this demand is barely within the capacity of two units, spinning reserve is insufficient in the event of instantaneous surges on the system. Also, in the event of an unscheduled shutdown, i.e., if an operating unit trips off the line, the remaining unit

---

*Figures and tables appear consecutively at end of section.

would be incapable of carrying the load even with automatic load shedding initiated. Therefore, three units are operated during the normal business day. Although the operation on these days results in an average engine load of only 55% and does not meet the desired level of 75% mentioned above, the requirement for spinning reserve takes precedence, provides a factor for assured reliability, and warrants the operation of the third engine. Further analyses of weekly and monthly loads also will show that the capacity of two units is frequently exceeded on Saturdays, special sale days, and in extremely warm weather. During off hours and especially between the hours of 11:00 p.m. and 7:00 a.m., the loading on the one operating engine approaches 65%. Operating problems with this one unit during these hours would have no adverse effect on the shopping center tenants or customers. During these periods, at least one additional unit is maintained in a standby condition and can be automatically or manually started to assume the load should it become necessary to shut down the baseload unit.

Heating and Cooling Components. As described in Sec. 2, the major components of the heating and cooling system consist of waste heat boilers, coupled to the exhaust and cooling water systems of each engine generator unit, an 1100-ton absorption chiller, a 725-ton centrifugal chiller and a 13.5-MMBtu steam boiler. Accessories include multiple hot and chilled water pumps, condenser water system, and heat exchangers. The system, by design, utilizes a four-pipe distribution system providing hot and chilled water to the shopping center complex. This feature enables the system to supply both heating and cooling energy media independently and simultaneously.

Standard operating procedures provide that the initial heating and/or cooling demands of the complex be satisfied first with waste heat available from the operating engine generators. The second increment of the cooling load is satisfied with the operation of the electric centrifugal chilling machine. The operation of this unit in itself, at various degrees of capacity, increases successively the total electrical demand on the plant, the amount of waste heat available, and the output of the absorption chiller. On a peak cooling day in the summer, the combined waste heat and centrifugal operation may fall short of the cooling demands of the complex. At these times, the boiler is operated intermittently to provide additional absorption output to meet peak cooling demands. After the peak demands of the day, the boiler is secured and the centrifugal chiller is reduced in capacity. When demands are met with waste heat alone, the chiller is also secured. As the monthly tabulation of operating hours will show (Fig. 4.4), the cooling demands of the project are met for a majority of the operating hours by waste heat and the centrifugal machine only. Boiler operating hours for peak cooling demands average approximately 30 hr per month during the cooling season.

As is common with totally enclosed regional shopping centers, the majority of the thermal requirements are for cooling. Internal heat loads generated by high wattage lighting and a high density population are primarily responsible for high cooling requirements. Therefore, heating demand is almost nil during the normal business hours of the shopping center on a year-round basis although a small amount of heat energy is provided to the hot water system even in the summer months for reheat purposes. During

During nonoperating hours in the winter months, some heat energy is required to maintain the complex at reasonable temperature levels. Unfortunately, these periods of time coincide with the minimum electrical demands when the amount of waste heat available from generation is also at its lowest point of the daily cycle. Therefore, additional boiler operations are required during the night hours when outside ambient conditions are severe. The monthly tabulation of equipment hours shows boiler hours approximating 300 during severe winter months.

Figure 4.3 graphically depicts the manner in which the cooling equipment is scheduled into a daily operating cycle to meet the typical summertime cooling demand of the project. In this example, between the hours of 11:00 p.m. and 6:00 a.m., the minimum amount of waste heat is available due to the low demand for electric power. Essentially all of the steam generated from this waste heat is utilized in the absorption chiller, which produces about 150 tons of refrigeration. As the figure indicates, this is not sufficient to maintain interior space temperatures. However, since the center is unoccupied the chilled water temperature is allowed to rise approximately 10° to 15° while the air temperature within the space rises about 8°. Between 6:00 a.m. and 8:00 a.m. (depending on the high temperature forecast for the day), the electric centrifugal is put in service at 40% of its rated capacity. The total tonnage on line at this time is in excess of the cooling demands of the project, but is necessary to pull down the space temperatures that were allowed to drift upwards during the night. At 8:00 a.m. and again at 10:00 a.m., the capacity of the chiller is increased in order to condition the space in anticipation of the heat load generated by electric lighting and people as the retail spaces become more occupied. In the example, the cooling demands of the project exceeded the combined capacity of waste heat and the centrifugal machine at about 4:00 p.m. In this case, the boiler is fired for a period of two or three hours to provide supplementary steam and additional tonnage from the absorption machine. At 6:00 p.m., boiler operations are discontinued and beginning at 9:00 p.m. the centrifugal capacity is gradually reduced until 11:00 p.m. when it, too is taken out of service. The minimum waste heat again provides the basic cooling energy throughout the night.

A similar chart prepared for a winter day would indicate that all of the waste heat available during the night would be used to meet the heating demands of the complex. On extremely cold nights, this waste heat would not be adequate and the heating hot water temperature as well as space conditions would be allowed to drift down approximately 10°, to a minimum of 55°F. At approximately 2:00 a.m., the boiler would be fired to provide additional steam and heating hot water to reestablish the desired space comfort conditions in advance of the shopping center opening.

Auxiliary Equipment. At least one hot, chilled and condenser water pump is run continuously 24 hr/day to preclude any radical change in space conditions during severe off-hour weather. Operation of additional pumps, condenser and cooling tower fans are staged to parallel the operation of the main heating and cooling demands.

4.1.3 Emergency Procedures

The automatic switchgear described in Sec. 2 is sufficiently sophisticated to permit automatic startup and shutdown of operating engines. In view of the fact that the electrical demands of the shopping center during normal business hours are the most critical requirement of the total energy plant, the switchgear incorporates load shedding circuits that, in the event of an emergency, will automatically drop the load of the plant's heating and cooling components or auxiliary equipment. Even though there may be sufficient standby generating equipment, the automatic load shed feature is necessary to compensate for the instantaneous losses of on-line generating power. The most critical condition would be a severe summer day when the combined on-line demands of the plant were approximately 2800 kW and three engines were operating. Should a problem then develop within one engine that would activate one of the many safety devices and automatically disconnect this engine from the line, the remaining two engines would be exposed to 1400 kW each and would sense an overload. Under these conditions, the operating staff cannot react quickly enough to start up and put on line the standby engine so load dump or shed circuits are activated.

In the above described situation, the total demand of the total energy plant itself is in the neighborhood of 1000 kW, 50% of which can be attributed to the electric chiller. Therefore, by instantaneously disconnecting the chiller and certain other auxiliary equipment, the total demand of the plant is brought well within the capacity of the two remaining engines. The engine generators can function effectively for almost two hours without most of the auxiliary equipment operation, since boiler feed water pumps and air compressors have gasoline engine drive backup to provide an essential service to the plant, and the two-hour period is more than adequate to bring the standby unit into service and is usually sufficient to analyze and correct the fault that caused the original shutdown.

4.2 OPERATION STAFF

4.2.1 Qualifications

Due to the critical requirements for continuity of operation and the responsibility of a significant investment, qualified operating/maintenance personnel are a necessity. The staff of a total energy plant requires the capabilities normally associated with the classification of operating engineers, licensed boiler engineers, and refrigeration mechanics. The Company's recruiting program to obtain initial operating personnel investigated three sources that had basic experience in a total energy plant:

1. Public utility power plant operators
2. Maritime engine room operators
3. Service organizations of major engine manufacturers

In 1972, when the Sher-Den plant was completed, the Chief Engineer was recruited from the Service Department of Fairbanks Morse. This choice was appropriate in that the Sher-Den plant was equipped with Fairbanks Morse engine generator units. Other operating and mechanical personnel were recruited from natural gas exploration and operating companies and the mechanical departments of several large industrial plants in the Dallas metropolitan area. As is the case in many start-up operations, considerable turnover in operating personnel is experienced in the first year or two. At Sher-Den, a relatively long employment record has been experienced since 1973. Now there are several employees who have almost five years of continued service. The present Chief Engineer, assigned in March 1976, was transferred from another one of the Company's locations where he received his initial training.

4.2.2 Staff

The total energy plant's staff at the Sher-Den Mall consists of a Chief Engineer, operators to provide coverage on three shifts per day, seven days per week, and mechanics to perform the routine and emergency maintenance requirements of the equipment. Each employee works eight hours per day, 40 hours per week. Shift schedules are designated as No. 1 (12:00 midnight to 8:00 a.m.); No. 2 (8:00 a.m. to 4:00 p.m.); and No. 3 (4:00 p.m. to 12:00 midnight). This designation was selected in order that changes of shifts would not coincide with the normal operating hours of the shopping center. The Chief Engineer is considered a member of management and is salaried. All other personnel are compensated on an hourly basis, with rates determined in accordance with statistics published by the Texas Manpower Commission for manufacturing employees in the Dallas metropolitan area. Table 4.1 indicates the number and type of personnel and their normal assignment:

As can be seen from the table, the need to cover 21 operating shifts with our four operators necessitates the assignment of one mechanic shift each week to operator duties. This assignment, in turn, reduces the ten available mechanic shifts to nine.

4.2.3 Work Assignment and Schedules

The regular assignment of personnel provides a total of 35 shifts as follows:

1. The Chief Engineer, qualified as operator or mechanic, is normally on duty day shifts -- Monday through Friday -- 5 shifts.
2. One operator per shift is assigned seven days per week. No additional personnel are assigned on Sunday or holidays when the shopping center is closed, 21 shifts.
3. Two maintenance personnel are assigned on three week days (Tue-Thu-Fri). Assignment is flexible in accordance with program or emergency maintenance requirements, 6 shifts.
4. One maintenance man is assigned on Mon-Wed-Sat, 3 shifts.

Holidays, absences for sickness and vacations are covered by overtime or by reducing the normal scheduled work force. The four operating personnel rotate their operating shifts on a four-week repetitive cycle, while the mechanical personnel are normally assigned to the first and second shifts. The mechanical personnel, however, are frequently rescheduled should the requirements for their skills be needed during periods other than their normal assignment. As can be appreciated, this flexibility is necessary in that certain maintenance functions, even those that should receive immediate attention, cannot be performed within the normal operating hours of the shopping center without jeopardizing the continuity of service being provided.

Table 4.2 indicates an actual work schedule for the personnel over a recent five-week period. The symbols thereon indicate how coverage is provided for holidays, absences due to holidays and sickness, and where overtime work was required. This table indicates that in Week 1, Friday was a holiday and the shift schedule was maintained as normal Sunday operation. In Week 2, one mechanic was out sick for two days so the shift of overtime was required. Week 4 represents the normal operating shift schedule.

4.3 MAINTENANCE PROGRAMS

The maintenance activities of the total energy plant's staff can be classified as three types:

1. Preprogrammed maintenance (preventive).
2. Scheduled maintenance/repairs as indicated by operating reports.
3. Emergency or breakdown maintenance.

Several bases are used for programming or scheduling maintenance activities, namely:

1. Hourly or elapsed time for engine-generator equipment and accessories.
2. Seasonally for heating and cooling components.
3. Monthly for tenant HVAC equipment.
4. Continuous analysis for lube oil and cooling water system.

To a large extent, preventive maintenance as well as repairs resulting from breakdown of equipment failure are completed by the total energy plant's staff. Where specialized skills and/or test equipment is required, outside service organizations are utilized to make periodic inspections and tests. The maintenance program on the various components of the total energy system are in a large part fashioned after the manufacturers' recommended procedures. The four engine-generator units and their accessories, which are the most critical components of the system necessary to maintain continuity of service to the plant's customers, receive the most critical inspections and adjustments. The various items are divided into categories that require inspection, testing and/or replacement every 168 hours or weekly, 720 hours or monthly, and for three-, six-, and twelve-month cycles. An elapsed hour chart is maintained in the Chief Engineer's office indicating the time at which the last inspection was made and the time at which the next event will be due. Replacement parts where required are maintained in stock at the plant or ordered sufficiently in advance of the due date for the scheduled replacement. Repairs necessitated as a result of a breakdown rendering the entire unit nonoperational, which necessitates utilizing the standby equipment, are, of course, handled on an emergency basis. In such cases, all available manpower are assigned to disassemble, inspect, repair, replace, and reassemble the unit in the most expeditious manner commensurate with the availability of parts to reinstate the desired standby capacity as soon as possible.

Table 4.3 indicates the contents of the engine generator log chart identifying the various maintenance items and indicating the time each repair was last performed and when next due. In addition to the maintenance chart described above, an analysis of the daily logs by the Chief Engineer for significant variations or deviations from the norm results in the assignment of the mechanical staff to take corrective action. In addition, the operators maintain a chronological log of events wherein each operator enters his starting time, when the major components of the system are started and stopped, malfunctions observed, corrective actions taken, and request for maintenance services not capable of being performed during his/her operating shift. Each operator signs the chronological log upon completion of the shift and turnover of the plant to the next assigned operator.

Seasonal maintenance schedules are maintained for the absorption chiller, centrifugal chiller, cooling towers and the boiler. These activities are scheduled in advance of the cooling and/or heating season to assure that the units are capable of performing at their maximum efficiency. Due to the specialized nature of equipment needed to test and analyze the performance of the chillers, contracts are maintained with the Service Department of the Trane Company who, each Spring, conduct detailed tests and inspections of the chilled water, condenser water, and refrigerant systems of these machines. Any recommended repairs or corrections are made prior to the cooling season. The fire tube boiler requires an annual inspection for a State operating certificate. This is normally conducted in the summer and any repairs or adjustments recommended by the State's inspector are completed prior to the winter heating season.

As in the case of the chillers and boilers, the electrical switchgear and 5-kV distribution system requires periodic inspection by outside service organizations equipped with the necessary test equipment to verify the adequacy of cable insulation. These organizations also provide the necessary electronic test equipment to test and adjust the numerous control circuits, relays, and circuit-breaker, trip settings essential to the control and distribution of the electric energy generated by the plant.

The lubricating oil supplier for Sher-Den -- Mobil Oil Corporation -- provides laboratory analyses of lube oil conditions on a periodic basis. Samples extracted from each of the engine generators is transmitted to the laboratory and chemical analyses are conducted to determine, among other things, metal content, acidity, ash and water content. The subsequent report indicates recommended action or modification of the ongoing procedures to be implemented.

In a similar manner, water systems, i.e., condenser, hot and chilled water, are inspected and tested periodically by representatives of the company furnishing water conditioning chemicals. The function of their report is to guide the operating personnel in the control of algae formation and provide adequate inhibitors for rust and corrosion control in the systems condensers, heat exchangers, chillers, boiler, and associated piping circuits.

4.4 OPERATING DATA AND REPORTS

The following describes the various operating logs maintained in the plant and the reports generated periodically:

Operator's chronological log. A permanent ledger is maintained in the plant wherein each shift operator records his assumption of operating duties from the prior shift and his transfer of duties to the following shift. In the interim, entries are made when any item of equipment is put into service or taken out, when any adjustments or deviations are made from the normal procedure, and a description of specific problems are encountered.

Daily log sheets. Operating log sheets are maintained for each engine generator, the chiller, and boiler. The log sheet provides for recording on an hourly basis the various temperatures, pressures and status conditions of equipment in use. Each operator in turn makes entries for the period of time he/she is on duty.

Maintenance records. A separate maintenance history is maintained in a journal for each engine generator and other major equipment. Maintenance activities, either scheduled or emergency in nature, are entered into a journal indicating the date, time and hours, and describing the maintenance performed.

A separate journal is maintained for recording service work performed in individual tenant spaces. This record indicates routine change of filters, lubrication, or other minor adjustments as well as other items performed as a result of tenant complaints.

Time sheets. Time records are compiled by the Chief Engineer weekly, indicating the hours worked by each member of the staff on each day and where vacation time, sick leave, or overtime was in effect. A copy of this document is forwarded to the home office for use in preparing the weekly payroll and to compile the necessary records for tax purposes.

Electric meter readings. On a monthly basis, each tenant as well as the Landlord's electric meter is read and recorded. A table presentation is prepared indicating current reading, previous reading, and current usage. After analysis by the Chief Engineer to ascertain that no obvious errors have been made in the readings, this information is forwarded to the home office for use in the computation of the monthly electric billings.

Production report. Monthly, the Chief Engineer prepares a production and consumption report that indicates the hours each piece of equipment was operated; the amount of electrical energy produced and consumed by the plant; natural gas and water meter readings and consumption; and lube and fuel oil purchases, present inventories, and consumption. This report is utilized by the home office's management to evaluate the performance and efficiency of the system.

Charges for services and supplies. The Chief Engineer maintains a petty cash account for purchases of miscellaneous items. A monthly accounting is prepared to indicate the nature and amount of all disbursements. Although major supplies, i.e., fuel oil, natural gas, chemicals are procured on a contract basis, the Chief Engineer has authority to procure additional parts or services within a given amount locally. All invoices for parts and services are reviewed for accuracy, coded to appropriate expense categories and forwarded to the home office approved for payment.

Quarterly P&L reports. From the data extracted from the above as well as billing records maintained in the home office, a quarterly report of income and expenses by category is developed.

Breakdown report. All breakdowns of a major nature and in particular those resulting in any form of interruption of service are required to be documented in a narrative report indicating all circumstances resulting from the breakdown, correction action taken, and the nature and extent of service interruption. The history of these reports is used to determine where changes in plant equipment or operating procedures are required.

4.5 ANALYSIS OF MONTHLY PRODUCTION REPORTS

In the following Table 4.4 covering the year 1976, the monthly production and operating figures are summarized. For this year, the actual kW demand on the total energy plant (Col. 1) varied from a low of 2080 in December to a high of 2630 in September. Analyzing the various components of this demand, i.e., station service, tenants and Landlord, it is apparent that the aggregate of these three consumers (Col. 5) is greater than the total amount registered in the plant. This is explained by the fact that each demand register meter retains the highest 15-minute demand experienced during the month. As is the case with a multitude of users, the high demands of each unit will not be coincident. Therefore, a diversity is experienced. This is similar to a public utility whose peak generating demand is considerably lower than the sum of the demands of all of its customers. The diversity experienced by the total energy plant (Col. 5) varies from a high of 81% to a low of 91%. The lower diversities are experienced in the summer months when more mechanical equipment is in operation. Comparing the three components of the load to the actual demand on the plant, station service (Col. 2) would account for approximately 40%, the tenants (Col. 3) 65%, and the Landlord (Col. 4) 5.8%. These figures would have to be adjusted for the diversity factor to enable the components to equal 100%.

The kWh section of the table indicates that the gross generated (Col. 6) varies seasonally from a low of 890,000 in December to a high of 1,290,000 in July. As would be expected, this variation is due in a large part to the requirements for station service (Col. 7), which more than doubled from winter to summer. The components of the electrical production indicate that station service (Col. 7) consumes 34%, the tenants (Col. 8) 63%, and the Landlord (Col. 9) approximately 5%. Here again, the sum of the parts does not equal the whole and in fact exceeds gross generated (Col. 6) by approximately 2%. This variation is explained in part by the fact that the 50 kWh registers located in the tenant spaces have indicating wheels or digits that have a tendency to roll over to the next whole number eliminating fractional readings. It can be seen that the variations experienced in the summer months are smaller when station service is consuming a bigger portion of the gross generated. There is also room for error in that it is impossible to read all 50 meters simultaneously and the elapsed time from reading the first meter to the last will result in additional kWh being generated by the plant and distributed to the meter, but not included in the first meter reading.

As previously mentioned, the station service (Col. 7) consumption varies seasonally from a low of 26% to a high of 40% of the total. This variation is attributable directly to the operation of the electric chilling equipment and associated auxiliaries during the summer months. Tenants' consumption varies to a lesser degree. This variation is attributed to the operation of self-contained air conditioning equipment located in some tenant spaces. The Landlord's consumption (Col. 9) remains relatively constant.

In the second half of the table, engine generating hours (Col. 11) and average kW load per hour (Col. 12) are indicated for each of the months. As shown, this results in an average load of only 47% in November and a high of 59% in August. When considering the peak demand vs the operating engines on the line, the load factor increases to a high of 70%. However, considering the cyclic conditions from day to night, this peak load factor is sustained for only a small portion of the time. When considering the total installed capacity, the peak load barely reaches 50%.

In this portion of the chart, operating hours for the boiler (Col. 13), absorption machine (Col. 14) and centrifugal chiller (Col. 15) are indicated monthly. As was explained previously under operating procedures, the boiler is used to provide peak cooling in the summertime and off-hour heating in the winter months. Therefore, the figure of 30 or 40 hours in the summer months and 200 or 300 hours in the winter months is as expected. Conversely, the centrifugal hours are higher in the summer months and considerably lower in the winter months. The absorber is used to cool with whatever waste heat is available. Therefore, hours on this unit run in the neighborhood of 600 to 700 hours from early Spring to late Fall, and diminish to a low 100 for the other months of the year when the waste heat is needed to generate hot water.

Gross fuel consumption (Col. 16), which is the combination of natural gas and fuel oil, is expressed herein in millions of Btu. Fuel allocation to operate the boiler (Col. 17) is deducted to obtain the net fuel consumption (Col. 18) of the engine generating units. Dividing this figure by the gross kWh generated (Col. 6) determines the fuel rate of Btu per kWh (Col. 19). Note that there is no significant variation or pattern of fuel rate throughout the year although the fuel efficiency seems to be slightly better in the summer months when the load factor on the operating units is higher. An examination of the fuel rate curves supplied by the manufacturer would also indicate that increases in load factor at the operating levels in force would have little effect on the fuel efficiency.

The last column (Col. 20) on the chart indicates water consumption. As would be expected, water losses in the cooling tower due to evaporation and blowdown have a dramatic effect in the summer. The water consumption in December/January of 850,000 gallons peaks to 2,444,000 gallons in the month of August. Hand-in-hand with the consumption of water is the use of chemicals.

4.6 ANNUAL LOAD PROFILES

From daily log sheets and the data presented in the previous section, Fig. 4.5 has been prepared to graphically display electrical production history over the past four years, showing total kW hours consumed monthly from January 1973 through June 1977 for station service, tenant, Landlord and total.

On the Fig. 4.5 graph the total consumption (kWh) has been plotted for 1973 through 1976 by main user category: namely, station service, and tenants. This graph is indicative of overall energy consumption and demonstrates the conservation efforts that were implemented after 1973. The top curve, which is total generated, clearly demonstrates downward trend from 1973 through 1975. Although the peak in 1976 exceeded that of 1975, the average monthly generation continued to be below that of the prior year. The initial months of 1977 would indicate that this trend has been reversed. The middle curve, which is the amount of power consumed by tenants and landlord, also shows to a lesser degree a drop from the 1973 level through 1975 with a leveling off in 1976 and a slight rise reported for the first half of 1977. Likewise, in the bottom curve, power consumed by the plant's equipment and auxiliaries shows the same general downward trend from 1973 through 1976 with 1977 showing a slight increase.

In the following, the average monthly consumption is shown for the four years:

	Station Service	Tenant/ Landlord	Gross (kWh)
1973	534	840	1349
1974	502	722	1202
1975	457	688	1104
1976	359	706	1033

The drop in power use by the plant approximating 10% per year is the direct result of improved efficiency and more closely controlled operating procedures.

4.7 SYSTEM DOWN TIME

4.7.1 Major Equipment Problems

The initial startup of the Sher-Den Mall Total Energy Plant took place in June 1970, at which time there was only partial occupancy of the shopping center.

In May 1971, occupancy level of the tenant spaces reached 95% and operating demands of the plant equipment were approaching design conditions. The major problems encountered in the initial operations are described below and are classified in three general categories; generators, engines, and electrical distribution:

Generators

The generator, manufactured by Fairbanks Morse Division of Colt Industries, and its exciter, manufactured by the General Electric Co., were supplied as part of the engine-generator package. Between initial startup and early 1972, at least 10 tail bearing failures occurred in the generator. These bearings, located on the outboard side of the generator, are double-row, self-aligning ball bearings, mounted in the end plate of the generator housing. The bearing is lubricated by an oil bath that is manually maintained by a sight glass. The outer bearing race housing is separated from the machined portion of the frame by a semiflexible insulating ring to allow for minor movement. In the initial bearing failures, the ball bearings would "gaul," seizing the inner race with the outer race causing the inner race housing to turn on the generator shaft. In two of the failures, the generator shafts were severely damaged requiring machining and sleeving to obtain the original diameter. Numerous experiments were conducted by Fairbanks Morse with different type bearings, bearing insulators, and machining of the generator housing before a satisfactory solution was devised. Subsequent to June 1972, this problem has been nonexistent.

Engines

Numerous mechanical problems were experienced with the Fairbanks Morse engines as purchased and installed. Cylinder liner leakage was extensive in all four engines and cylinder liner seals were replaced several times. The liners were returned to the manufacturer and seals of the various types of material were installed. Injector nozzles failed on numerous occasions. In some cases, injector nozzle life was limited to two or three days. The gas valves as originally installed experienced an extremely short life. Inspection of these units indicated a deformation of the seat area and extensive wear in the valve guides. Torsional vibration dampening pins required replacement after .006 in. of wear. Gear train failures occurred in all four engines and the gear driven jacket water pumps experienced failures as a result. Injector fuel pump failures occurred on each of the installed engines with injection tube nuts backing off, disconnecting the tube and permitting fuel oil to spray on the engine exterior. This condition resulted in a fuel oil fire on engine #1 on June 9, 1972, which fire resulted in serious damage to the engine and gauge board and rendered this engine inoperable until August 31, 1972.

Throughout the period of the above described engine problems, continuing discussions with the Engineering and Service Departments of Fairbanks Morse resulted in an agreement to implement several modifications and improvements to the units. In the spring of 1973, a program was implemented to install newly designed pistons and liners, a water-cooled exhaust manifold, a modified turbocharger system, injectors of an improved design, motor driven jacket water pumps and other miscellaneous modifications, all aimed at eliminating the problems described. During the period of modification, Fairbanks Morse also supplied an additional 675-kW engine generator set as back-up power while the modifications were being implemented. Fairbanks Morse also provided a new warranty and a guaranty of performance and maintenance cost for 12 months following the completion of modifications. Personnel from the Fairbanks Morse Service Department were assigned full time to the Sher-Den plant during the modifications period and the subsequent warranty period.

A similar arrangement was negotiated with Fairbanks Morse providing for modifications to the vibrating dampening pins and gear train to resolve these problems. Subsequent to the implementation of modifications and improvements described, operating problems with the units have been minimal and within normal expectation of our maintenance program.

Electrical Distribution System

Beginning on June 25, 1971, and until January 25, 1972, numerous problems were encountered with the electrical distribution feeder cables. The cables were furnished by Kaiser Aluminum and installed by the electrical contractor. Initially electric shorts in the manholes were believed to have resulted from runoff of surface water contacting faulty splices. Although new and improved splicing material was provided by the 3M Co., the problem persisted. Samples of the feeder cable were exhaustively examined and tested for adequate insulation. Although it was never completely established that the cable was of defective manufacture, it was the Company's position that a breakdown of insulation quality under normal operating loads resulted in the aforementioned electrical shorts. In early 1972, a program was implemented to replace all of the primary 5-kV cables from the total energy plant to the pad-mounted transformers located throughout the complex. The cable was supplied by Kaiser Aluminum at no cost to the Company. However, as the electrical contractor was not at fault in his installation of the original material, the Company was required to bear the cost of labor to remove the original material and reinstall the replacement cable.

Many of the problems described above resulted in service failures both partial and total in nature to the tenants who were occupying the Sher-Den Mall at that time. These are identified in the following description of plant outages.

4.7.2 Plant Outages

Outages of the system or failure of plant components are of several types. Those resulting in an engine shutdown may be mechanical in nature or the result of human error. Those involving a single unit usually do not affect the overall plant performance and are not considered as outages in that they do not affect the quality or quantity of services provided to the Sher-Den Mall. The following enumerates the number of outages and the elapsed time of all outages in each of the years 1971 to 1977:

Year	Outage Time	Minutes < 30	< 60	< 120	> 120	Total
1971	1747	7	2	2	1	12
1972	784	3	1	3	1	8
1973	58	5	0	0	0	5
1974	0	0	0	0	0	0
1975	2	1	0	0	0	1
1976	0	0	0	0	0	0
1977	19	2	0	0	0	2
Total	2610					28

As indicated, the years 1971 and 1972 accounted for the majority of the outages. These periods are also the ones in which the major problems described previously occurred. For instance, 11 of the 12 outages experienced in 1971 were attributed to electrical feeder failures, and one of these accounted for almost 24 hours. Two of the eight outages occurring in 1972 were the result of electrical feeder failures. Therefore, the electrical feeder problem in itself is responsible for 46.4% of the total failures to date, and 73.1% of the total time of service curtailment. Although there was no total power loss to the shopping center due to the fire described previously, or the multiple instances of tail bearing failures, these conditions did result in limiting the power available from the plant and, therefore, an intentional curtailment of air conditioning service during May and June 1972.

The total time of outages experienced to date, exclusive of those experienced in 1971 and 1972, is considered infinitesimal in relation to the total operating time of the plant and is even further reduced in significance when consideration is given to the fact that outages that occur outside of the normal operating hours of the center have little or no effect on the tenants of the Sher-Den Mall.

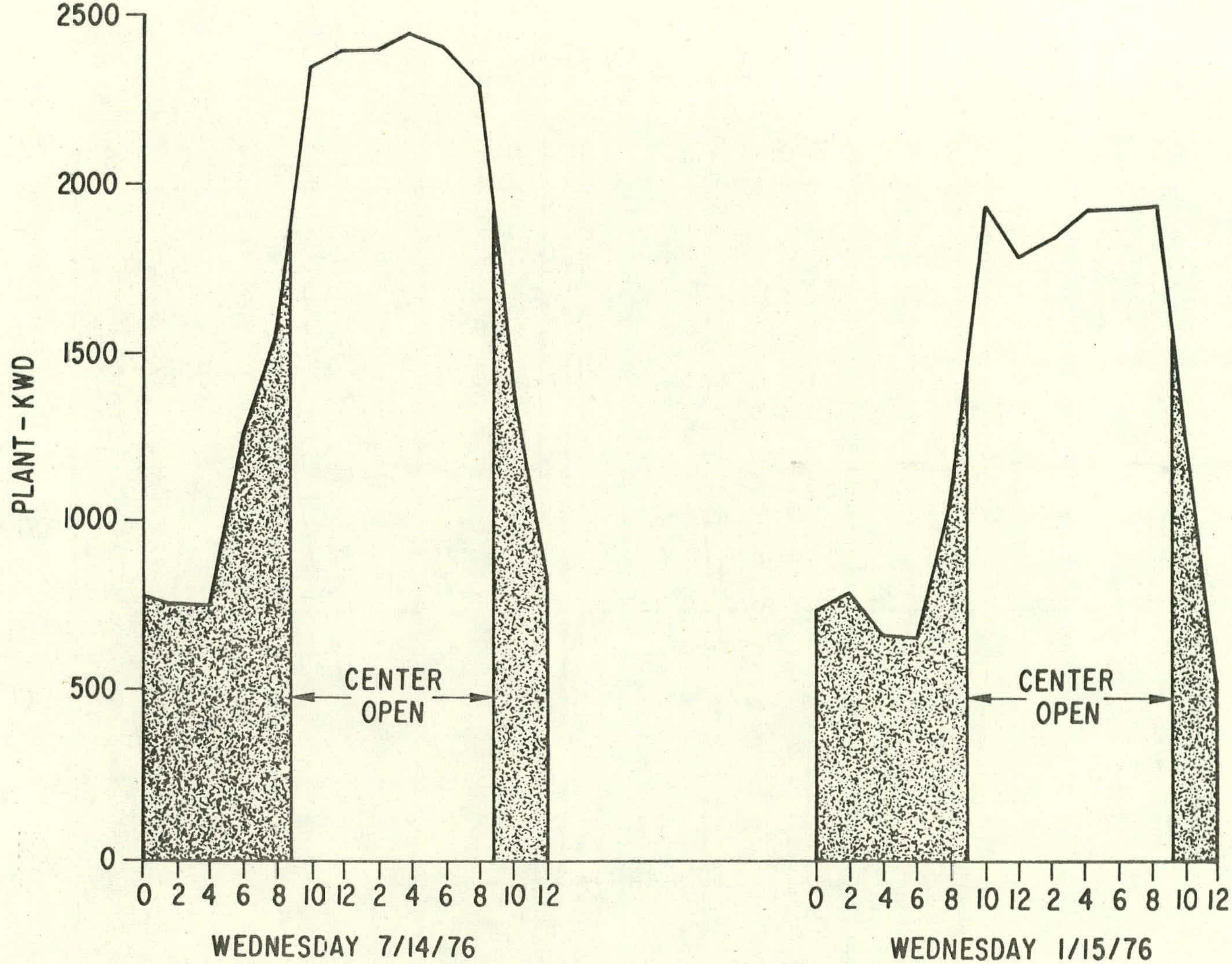


Fig. 4.1 Hourly Load Curves for a Typical Summer and Winter Day

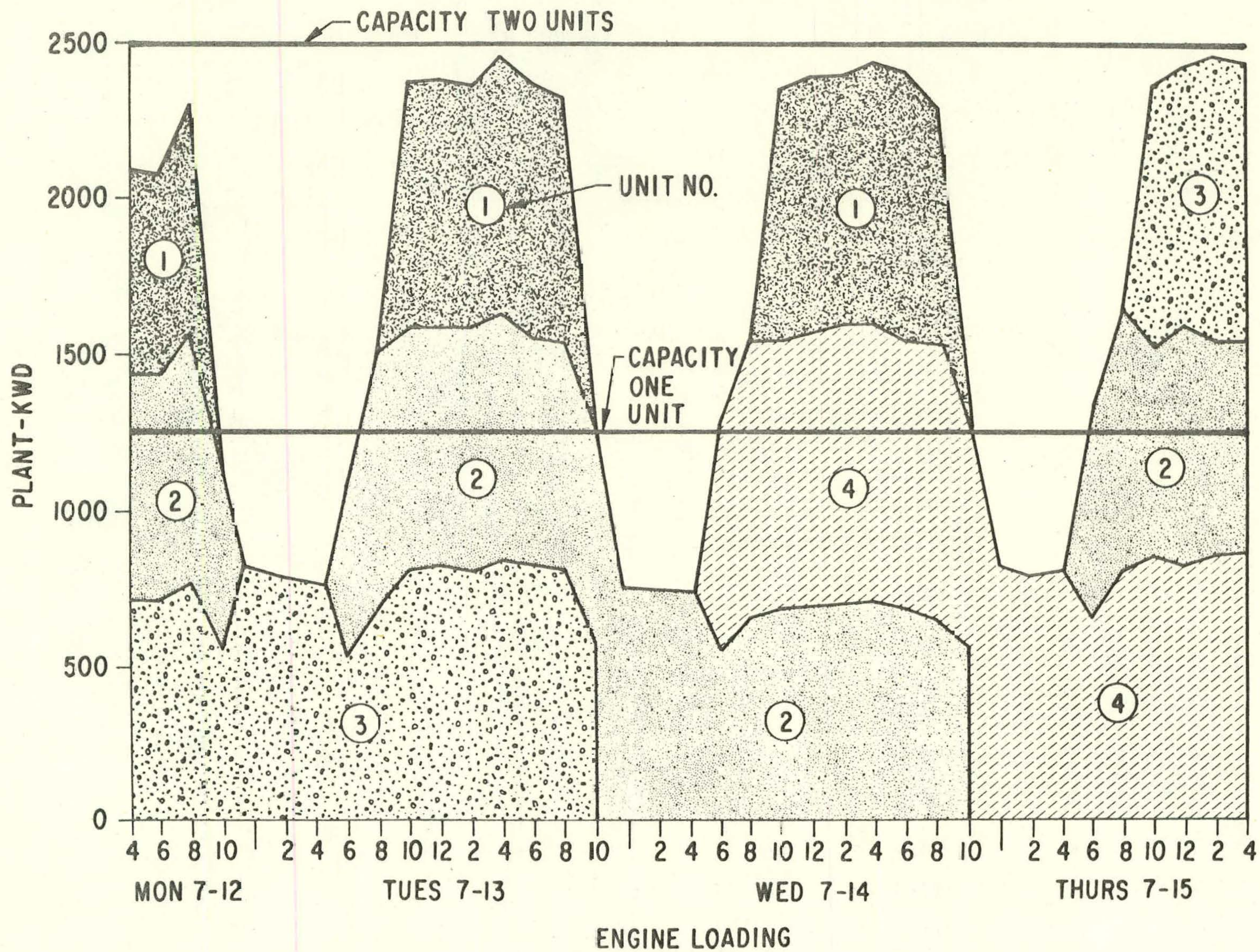


Fig. 4.2 Typical Plant Loads for Randomly Selected Consecutive Days

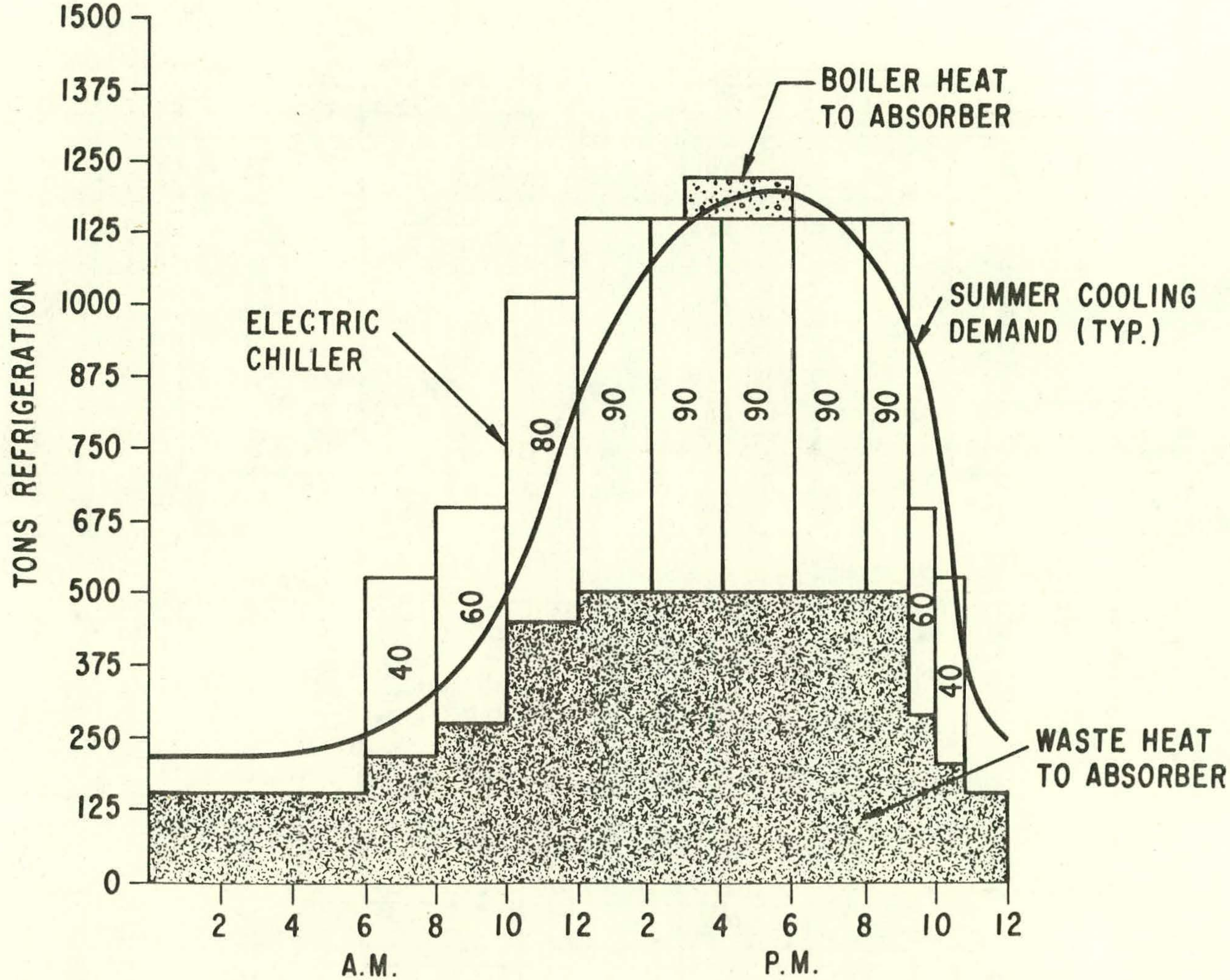


Fig. 4.3 Schedule of Cooling Equipment into Summertime Daily Operating Cycle

MONTH	KW DEMAND (1) PLANT KW	(2) STATION SERVICE KW	(2) %	(3) TENANTS KW	(3) %	(4) LANDLORD KW	(4) %	(5) TOTAL KW	(5) VAR. %
JANUARY	2,331	941	40.3	1,595	68.5	143	6.1	2,680	1.15
FEBRUARY	2,240	852	38.0	1,578	70.4	137	6.1	2,569	1.15
MARCH	2,412	1,049	43.4	1,588	65.8	136	5.6	2,773	1.15
APRIL	2,270	851	37.4	1,614	71.1	138	6.0	2,503	1.15
MAY	2,390	849	35.3	1,647	68.9	142	5.9	2,538	1.10
JUNE	2,510	1,052	41.9	1,638	65.2	142	5.6	2,333	1.13
JULY	2,550	1,052	41.2	1,653	64.8	145	5.6	2,350	1.12
AUGUST	2,600	1,043	40.1	1,703	65.5	145	5.5	2,391	1.11
SEPTEMBER	2,630	1,043	40.1	1,681	64.6	150	5.7	2,373	1.09
OCTOBER	2,350	839	35.7	1,654	70.3	142	6.0	2,634	1.12
NOVEMBER	2,320	841	36.2	1,658	71.4	169	7.2	2,668	1.15
DECEMBER	2,080	819	39.3	1,628	78.2	109	5.2	2,557	1.23
TOTAL	–	–	–	–	–	–	–	–	–
AVG./MONTH	–	–	–	–	–	–	–	–	–

MONTH	KWH HOURS IN 1000's (6) PLANT KWH	(7) STATION SERVICE KWH	(7) %	(8) TENANT KWH	(8) %	(9) LANDLORD KWH	(9) %	(10) TOTAL KWH	(10) VAR. %
JANUARY	929	285	30.7	630	67.8	54	5.8	970	1.04
FEBRUARY	758	238	31.4	602	79.4	42	5.5	883	1.16
MARCH	1,191	409	34.3	740	62.1	59	5.0	1,207	1.01
APRIL	973	345	35.5	604	62.1	46	4.7	996	1.02
MAY	1,113	402	36.1	683	61.4	50	4.5	1,135	1.02
JUNE	1,068	425	39.8	618	57.9	43	4.0	1,086	1.02
JULY	1,290	527	40.9	716	55.5	54	4.2	1,299	1.00
AUGUST	1,207	488	40.4	685	56.8	49	4.1	1,222	1.01
SEPTEMBER	1,114	422	37.9	663	59.5	50	4.5	1,135	1.02
OCTOBER	977	292	29.9	664	70.0	52	5.3	1,009	1.03
NOVEMBER	893	241	27.0	635	71.1	58	6.5	933	1.04
DECEMBER	890	239	26.8	625	70.2	57	6.4	920	1.03
TOTAL	12,402	4,315	34.8	7,866	63.5	616	4.9	12,797	1.03
AVG./MONTH	1,033	360	34.8	656	63.5	51	4.9	1,066	1.03

MONTH	ENGINE-GENERATORS LOAD AND HOURS (11) ENGINE HOURS	(12) AVERAGE LOAD KW	(12) AVERAGE LOAD %	(12) PEAK LOAD %	HVAC HOURS (13) BOILER	(14) ABSORP.	(15) CENTRIF.	FUEL CONSUMPTION IN MMBTU'S (16) GROSS FUEL CONS.	(17) BOILER FUEL	(18) NET FUEL	FUEL RATE (19) BTU/KWH ENGINE FUEL RATE	WATER USE (20) WATER CONS. GAL. X 1000
JANUARY	1,441	625	50.0	59.7	280	60	220	18,429	3,948	14,481	15,604	874
FEBRUARY	1,161	651	52.0	64.3	187	45	221	13,448	2,635	10,813	14,265	934
MARCH	1,826	654	52.0	60.5	101	45	515	19,697	1,424	18,273	15,342	1,119
APRIL	1,461	662	53.0	63.7	31	666	375	15,104	437	14,667	15,074	942
MAY	1,633	681	54.0	63.7	31	718	433	17,047	437	16,610	14,923	1,487
JUNE	1,459	732	58.0	66.9	21	667	436	15,943	295	15,648	14,651	1,509
JULY	1,753	731	58.0	68.0	30	716	539	19,446	423	19,023	14,747	1,776
AUGUST	1,635	734	59.0	69.3	44	715	510	18,090	620	17,470	14,475	2,445
SEPTEMBER	1,573	706	56.0	70.1	33	716	441	16,908	465	16,443	14,760	1,656
OCTOBER	1,551	624	50.0	62.6	39	654	199	15,980	550	15,430	15,907	1,176
NOVEMBER	1,480	596	47.0	61.8	57	450	86	14,955	803	14,152	15,848	981
DECEMBER	1,457	607	48.0	55.4	353	148	1	15,572	2,954	12,618	14,177	847
TOTAL	18,430				1,207	5,600	3,976	200,619	14,991	185,629	-	15,746
AVG./MONTH	1,535				100	467	331	16,718	1,249	15,469	14,967.6	-

Fig. 4.4 Sher-Den Mall, Summary of Monthly Operating Report, 1976

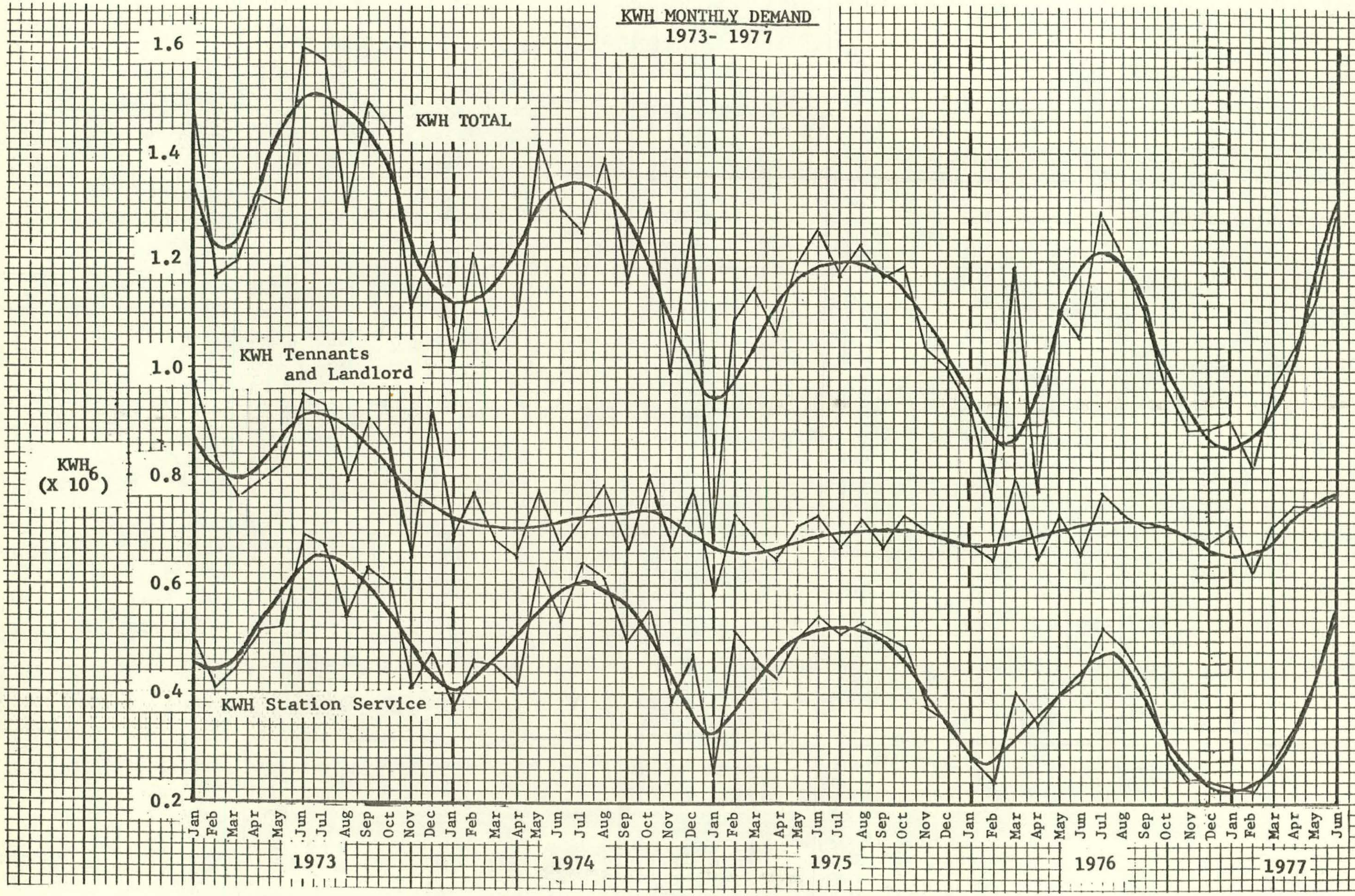


Fig. 4.5 Total Energy Plant, kWh Monthly Demand, 1973-1977

Table 4.1 Sher-Den Operating Staff

Classification	No.	Shifts/Week	Total Shifts	Assignment
Chief Engineer	1	5	5	5
Mechanics	2	5	10	9
Operators	4	5	20	21
Total	7		35	35

Table 4.2 Total Energy Plant Staff's Work Schedule

	WEEK 1							Total
	M	T	W	T	F	S	S	
					H			
M	1	1	◇1	1				4
M		2	2	2		1		4
O1		2	2	2	2			4
O2	2			1	1	2	2	5
O3	1	1			3	1	1	5
O4	3	3	3	3		3	3	6
C	1	1	1	1				4
RECAPITULATION								
C	1	1	1	1				4
M	1	2	2	2		1		8
O	3	3	2	3	3	3	3	20
G.T.	5	6	5	6	3	4	3	32

	WEEK 2							Total
	M	T	W	T	F	S	S	
M	1	1	◇1	S	S			3
M		2	2	2	2	1		5
O1	2			1	1	2	2	5
O2	1	1			3	1	1	5
O3	3	3	3	3		3	3	6
O4		2	2	2	2			4
C	1	1	1	1	1	1		5
RECAPITULATION								
C	1	1	1	1	1			5
M	1	2	2	1	1	1		8
O	3	3	2	3	3	3	3	20
G.T.	5	6	5	5	5	4	3	33

	WEEK 3							Total
	M	T	W	T	F	S	S	
M	1	1	1	1	1			5
M		2	2	2	2	1		5
O1	1	1	(1)		3	1	1	6
O2	3	3	3	3		3	3	6
O3		2	2	2	2			4
O4	2			1	1	2	2	5
C	1	1	1	1	1			5
RECAPITULATION								
C	1	1	1	1	1			5
M	1	2	2	2	2	1		10
O	3	3	3	3	3	3	3	21
G.T.	5	6	6	6	6	4	3	36

	WEEK 4							Total
	M	T	W	T	F	S	S	
M	1	1	◇1	1	1			5
M		2	2	2	2	1		5
O1	3	3	3	3		3	3	6
O2		2	2	2	2			4
O3	2			1	1	2	2	5
O4	1	1			3	1	1	5
C	1	1	1	1	1			5
RECAPITULATION								
C	1	1	1	1	1			5
M	1	2	2	2	2	1		10
O	3	3	2	3	3	3	3	20
G.T.	5	6	5	6	6	4	3	35

	WEEK 5							Total
	M	T	W	T	F	S	S	
M	1	1	1	1	1			5
M		2	2	2	2	1		5
O1		2	2	2	2			4
O2	2			1	1	2	2	5
O3	1	1	(1)		3	1	1	6
O4	3	3	3	3		3	3	6
C	1	1	1	1	1			5
RECAPITULATION								
C	1	1	1	1	1			5
M	1	2	2	2	2	1		10
O	3	3	3	3	3	3	3	21
G.T.	5	6	6	6	6	4	3	36

H - HOLIDAY, SAME AS SUNDAY SCHEDULE.
◇ - MECHANIC FILLS IN FOR OPERATOR.
○ - OVERTIME
S - ABSENCE DUE TO SICKNESS

Shift 1 - 12:00-8:00 AM
Shift 2 - 8:00-4:00 PM
Shift 3 - 4:00-12:00 PM

C - CHIEF ENGINEER
M - MECHANIC
O - OPERATOR

Table 4.3 Engine-Generator, Maintenance Schedule

INTERVAL	ACTIVITY	ENGINE #1 HRS. LAST	ENGINE #1 HRS. DUE	ENGINE #2 HRS. LAST	ENGINE #2 HRS. DUE	ENGINE #3 HRS. LAST	ENGINE #3 HRS. DUE	ENGINE #4 HRS. LAST	ENGINE #4 HRS. DUE
168 Hours or Weekly	Gas Valve Lash - Adj.	35,858	36,058	40,213	40,413	26,760	26,960	41,097	41,297
	Emergency Stop - Test	35,858	36,058	40,213	40,413	26,760	26,960	41,097	41,297
	Fuel Racks - Adj.	35,858	36,058	40,213	40,413	26,760	26,960	41,097	41,297
720 Hours or Monthly	Low Oil Pressure - Test	35,487	36,207	40,213	40,933	26,760	27,480	40,492	41,212
	Boiler Controls - Test	35,487	36,207	40,213	40,933	26,760	27,480	40,492	41,212
	Intercooler - Inspect.	35,487	36,207	40,213	40,933	26,760	27,480	40,492	41,212
	Air Intake Filters - Clean	35,487	36,207	39,967	40,687	26,760	27,480	40,492	41,212
	Lube Oil - Sample	8/15		8/15		8/15		8/15	
2,160 Hrs. or Three Months	Vertical Drive - Inspect.	34,326	36,486	40,061	42,221	25,267	27,427	39,533	41,693
	Gear Train - Inspect.	34,326	36,486	38,394	40,534	25,267	27,427	39,533	41,693
	Blower Drive - Inspect.	35,487	37,647	39,967	42,127	26,061	28,221	40,652	42,812
	Timing Chain - Inspect.	34,662	36,822					39,533	41,693
	Exciter Belts, Brushes, Bearings - Inspect.	34,367	36,527	39,535	41,695	26,051	28,221	39,533	41,693
4,320 Hrs. or Six Months	Piston Rings - Inspect.	33,401	37,721	30,852	35,172	16,171	20,491	39,533	43,853
	Gas Valves - Overhaul	32,229	36,549	36,408	40,728	23,197	27,515	39,533	43,853
	Tail Bearing Oil - Change	32,713	37,033	39,967	44,287	23,043	27,363	39,533	43,853
	Governor - Flush/Adj.	32,924	37,244	38,374	42,694	25,267	29,587	39,533	43,853
	Generator - Clean	34,367	38,687	37,206	41,526	20,715	25,035	39,533	43,853
	Injectors - Overhaul	32,229	34,349	38,362	42,682	22,343	27,163	39,533	43,853
	Crankcase and Oil Separator - Clean	31,462	35,782	38,374	47,134				
	Main & Rod Bearings-Inspect.			35,025	43,785	21,992	30,752	39,533	48,293
8,760 Hrs. or One Year	Generator Align.- Adj.					22,040	30,800		
	Camshaft & Brgs.-Inspect.							36,964	45,724
	Damper Bushing & Pins - Inspect.	28,478	37,238	38,374	47,134	21,992	30,752	35,098	43,858
	Piston & Liners -Inspect.							39,553	48,293
	Filters & Strainers - Clean & Change	35,623	44,384	38,374	47,134	19,223	27,983	39,553	48,293
	Oil & Air Coolers - Clean					20,933	29,693	37,322	46,082
	Air Start System- Inspect.			38,374	47,134	21,992	30,752	39,533	48,293
	F/O, L/O & H_2O Pump - Overhaul			38,374	47,134	21,992	30,752		
	Turbocharger - Service	30,825	39,585						
	F/O Filters - Change	33,515	42,215	37,248	46,008	26,760	35,520	39,277	48,037

5 REVENUE STRUCTURE

5.1 DEVELOPMENT OF RATE STRUCTURE FOR TENANT HVAC AND ELECTRIC CHARGES

5.1.1 Prime Objectives of the Tenant Displaced Cost Analysis

Our (TELCO's) presentation of a Tenant Displaced Cost Analysis was essentially an analysis by major components of the costs that would have been incurred by a user-tenant had he been required to purchase, install, operate, maintain, and replace his individual heating and air conditioning system over the life of his lease commitment. This compilation of individual costs was then presented to the tenant and an HVAC rate established that indicated a substantial savings compared to this aggregate cost.

Therefore, the development and presentation of the Tenant Displaced Cost Analysis study had several important objectives:

1. It was devised as an analytical tool to sell our services on an economic basis; substantial savings over costs incurred by the tenant on an individual purchase and operation basis.
2. To act as a document that indicated the parameters of each cost determination and thus negate long periods of horse trading, interminable delays and polarized positions from which neither party could offer concessions that would enable a final resolution of the HVAC rate.
3. To enable the technicians: consulting engineers, the construction departments of large chain stores, operations managers, etc., to challenge the parameters, to submit their methods of determining the appropriate cost components and to orient all thinking to a review and evaluation of the rate structure items.
4. To establish the individual components as an integral part of the rate structure.
5. To determine the portion of the capital cost supplied and installed by Telco Energy Corporation of Texas and the percentage of the total HVAC capital cost that this investment represented.
6. To bring the associated costs to the bargaining table. These costs were an integral part of our HVAC rate structure although they were not direct energy costs (cooling energy, indicated as kWh/yr and heating energy, indicated as cu ft/yr). These associated costs were maintenance, repairs, and filters; replacement costs; insurance; and taxes.
7. Finally, to review the components of the Subscriber Service Agreement Schedules: Basic HVAC Fees, fuel, wage, and tax adjustments applicable to the basic fees; additional HVAC fees, and the Schedule of Electric Service fees.

5.1.2 Development of the Parameters for Initial Equipment Investment for Central Plant Chilled and Hot Water Systems and Roof Mounted Heating and Cooling Units

In the establishing of the capital costs component of the Basic HVAC Fee, we had no historical reference point as a base determinant nor were these costs stated separately in any franchised utility schedule or regulated by any public appointed authority.

Therefore, based on the experience of our own management team in the marketing, engineering and installing of roof top heating and cooling units and central chilled and hot water systems, we determined the following cost parameters, as shown in Tables 5.1-5.6.*

Tables 5.1-5.3 presented the distribution of component costs for central chilled and hot water systems with various costs for in-store work, depending on the sophistication of the major tenant and the demands of his/her engineering and construction departments. The 20-year economic life cycle is accepted by the national chain construction personnel as a normal life span for this type of equipment with proper maintenance and repairs.

In the original presentation to the Owner of the shopping center, we had developed the Landlord's displaced cost analysis with the understanding that Telco of Texas (a TELCO wholly-owned subsidiary) would assume the capital investment for that portion of the chilled and hot water system serving the key tenants and located within the total energy plant structure. As defined in our feasibility study in Sec. 1, there were seven key tenants and we would obligate our company to purchase and install the components of the HVAC system with the chilled and hot water distribution up to the wall of the total energy plant.

Therefore, based on the original feasibility study and on a distribution between central plant equipment installation costs and in-store equipment installation costs of approximately 33-67%, we estimated the overall capital costs for this category of customer as presented in Table 5.7.

However, as the responsibility for the complete capital investment for these key tenants was not properly spelled out in detail, we had to modify our proposed capital investment from approximately $255,984 to $775,704, an increase of approximately $519,720 that was not included in the original feasibility study and for which we could not receive any reimbursement from the key tenants.

Tables 5.4-5.6 presented the distribution of projected roof tops heating and cooling costs by high- and low-side equipment (this terminology used in the refrigerant trade refers to refrigerant pressures in each part of the packaged unit). The cost per ton is then distributed and the high-side installed equipment cost is amortized over a 10-year period at an interest cost of 8% and at a yearly installment constant of .149. The 10-year economic life cycle is used by major manufacturers of this equipment in determining

---

*Tables appear consecutively at the end of the section.

warranties and by national chain store personnel as a normal life span for this type of equipment if associated with a preventive maintenance repair and replacement program.

These shell and allowance tenants -- this term refers to the Landlord designation of these tenants as he erects a basic shell for the prospective tenants and negotiates an allowance for fixturing the store to the tenant's requirements -- were originally to pay Telco Energy Corp. of Texas for the central plant portion of the HVAC system as a part of their HVAC rate and receive an allowance from the developer for the in-store portion of their HVAC equipment and installation.

Therefore, our HVAC rates would reflect the yearly installment to amortize the central plant portion of the HVAC system. However, the tenants insisted that in their negotiations with the developer/owner, that the complete HVAC system was included in the shell and that their allowance for fixturing did not include any part of the HVAC system. Therefore, once again we had to modify our capital investment (see Table 5.8).

We originally planned for our HVAC revenue structure to include the yearly installment to amortize the central plant portion of the HVAC system. However, due to changes in the initial understanding with the developer, we had to supply all the HVAC equipment for the Landlord <u>without including this investment in our rate structure</u>. Therefore, our capital investment was increased by approximately $312,087.

In summary of the total projected capital investment of the 7 key tenants of	$ 775,704
And, of the 40 shell and allowance tenants of	312,087
Resulting in a total HVAC projected investment of	1,087,791
We intended to invest .... reimbursement	255,984
And, to invest .... for which we were to receive a return over a 10-year period	171,648
The tenants and the landlord were to supply the capital funds for the remainder	660,159
Under our renegotiated agreement, we initially estimated our investment as ... for which we were to receive no revenue reimbursement	1,087,791
Which was .... in excess of our original feasibility commitment	831,807

5.1.3 Parameters for Operating Costs

Lighting - kW and kWh. In those instances in which we received detailed plans and specifications from the proposed tenant, we initially made a takeoff on lighting fixtures, bulbs, motors, exhaust fans, specialized equipment, signs, canopy lighting, and air handlers and determined the kilowatt demand for operating and nonoperating hours and the consumption for each period. In those instances, which in the case of the Mall tenants proved to be in the majority, in which we received no advance plans or drawings, we devised a chart for various demands and usages and estimated the tenant fit from similar types of stores in other shopping centers.

Parameters:

Operating Hours -
5 days x 12 hr/day = 60 x 52 weeks = 3120 hr/yr
Saturday x 9 hr = 9 x 52 weeks = 468 hr/yr
3588 hr/yr

- 3600 hr/yr - Mall Open
- 5100 hr/yr - Mall Closed

8700 hr

Lighting Load has no seasonal pattern.

General Lighting and Miscellaneous Power Use
For Various Kilowatt Demands

	Watts/Sq Ft / 1000	x Hours	= kWh/Sq Ft/Yr / 12	= kWh/Sq Ft/Mo
Open	.0065	3,600	23.4	2.37
Close	.001	5,100	5.1	
Open	.006	3,600	21.6	2.22
Close	.001	5,100	5.1	
Open	.0055	3,600	19.8	2.07
Close	.001	5,100	5.1	
Open	.0050	3,600	18.0	1.92
Close	.001	5,100	5.1	
Open	.0045	3,600	16.2	1.66
Close	.00075	5,100	3.8	
Open	.0040	3,600	14.4	1.51
Close	.00075	5,100	3.8	
Open	.0035	3,500	12.6	1.26
Close	.0005	5,100	2.55	
Open	.0030	3,600	10.8	1.11
Close	.0005	5,100	2.55	
Open	.0025	3,600	9.0	.85
Close	.00025	5,100	1.27	

For example, for Lilley's Department Store, we estimated 110.7 kW demand and 448,999 kWh/yr for lighting and miscellaneous power and air handlers. We applied Texas Power & Light Co.'s rate schedule, LP-20, to this demand and to 1/12 of the kWh/yr and estimated that Lilley's would purchase their lighting and miscellaneous power needs at 1.64¢/kWh, or 34.97¢/sq ft/yr and would utilize 21.3 kWh/sq ft/yr. Although their lighting and miscellaneous power consumption would be metered and their meter read each month with demand and usage applied against the appropriate schedule, we required this base calculation in order to derive the cooling energy charge.

Cooling Energy. If we had sufficient data supplied by the prospective tenant, we prepared a heat gain calculation for the air conditioning design load. We computed the air conditioning peak load based on people, electric load, wall and partitions, windows, ceilings, floor and ventilation requirements. If we had no preliminary data, we utilized 280 sq ft/ton for the large stores and 300, for the Mall stores.

To compute the kW demand, we used 1.4 kW/ton of maximum load and from 2050 to 2270 effective full load hours for refrigeration component and from 2422 to 2587 hr of operation of the air conditioning blowers.

In the case of Lilley's Department Store, we computed the tonnage required at 280 sq ft/ton, or a total demand of 105.0 kW.

We used the refrigerant compressor demand of .95 kW/ton for 2050 EFLh (effective full load hours) and .45 kW/ton for the air conditioning auxiliaries for 2422 hr. Therefore, we estimated that this tenant would require 105.0 kW for air conditioning services and 110.7 kW for lighting and that the store would use an additional 19,002 kWh/mo for air conditioning in addition to 37,417 kWh for lighting.

We then proceeded to recompute the tenant's electrical bill under Texas Power & Light Co.'s LP-20 Rate Schedule and subtracted the initial amount attributed to lighting. This additional or add-on load would appear on the "Tenant Analysis of Operating Cost Structure of a Roof Top Heating and Cooling Plant," under Heating-Cooling Energy.

The additional cost to Lilley's for air conditioning was 1.75¢/kWh, 18.95¢/sq ft/yr for 10.82 kWh/sq ft per yr, or a total of 228,029 kWh. We estimated 2050 EFLh and 2422 hr of operation of air conditioning auxiliaries.

Heating Energy - Cubic Feet/Year. In preparing the heating energy cost we utilized Lone Star Gas Company's Commercial Service Schedule (311) and estimated the fuel costs under the four methods advocated and accepted by consulting engineers: heat loss formula, the degree day formula, the NEMA formula, and corrected heat loss formula developed by Harris & Fitch. If we did not have the data to prepare a heat loss calculation, we utilized between 25 and 35 Btu/sq ft for design heat loss. Heating energy cost was based on 72° temperature indoors for day time operation, 55° temperature indoors for non-operating hours, 18° design temperature, 48.6 average winter temperature, 2272 degree days and credit allowed for heat gain from lights, 65% efficiency factor for the heating equipment and total heating requirements in cubic feet used over a seven-month season. Therefore, in the case of Lilley's Department Store, their heating cost would be 6.40¢/therm or 2.60¢/sq ft/yr. Their total heating charge would be $548 for 856,561 cu ft of natural gas consumption.

Maintenance, Repairs and Filters. The breakdown of the costs for maintenance repairs and filter replacement are explained on the second page of our analysis. These rates include maintenance contract, replacement of parts (valves, pumps, shafts, bearings, belts, isolators), replacement of piping, electrical wiring, filter maintenance, oiling and greasing, painting equipment, refrigerant pump down, and recharge labor for above. The question was raised in various meetings that an individual company's experience is not always in line with our estimate and this descrepancy was due to their engineers' comparing the first one-to-four-years' experience as against our figures, which average out cost expenditures over a 15-20-yr period.

For example, in Sher-Den Mall the following costs were used:

Size of Store	Preventive Maintenance $/Ton	Filter Changes $/Ton	Repairs $/Ton	¢ Sq Ft/Yr
2,250	30	8	25	22.40
6,000	25	7	20	18.20
14,060	20	5	15	14.23
28,350	10	3	10	8.68
9,825 Specialty	8	1.50	7	17.80

Replacement Cost. The replacement cost guidelines are discussed in depth on page three of the Analysis of the Operating Cost Structure of a Roof Top Heating and Cooling Plant and, once again, represent industry experience gleaned from contractors, national chains and manufacturers. In our computations, we have estimated very conservatively that over a 20-yr period 70% of the original installed equipment will be replaced. Recent industry experience has shown that roof tops have an expected life time cycle of from 8-10 yr. Therefore, a periodic sinking fund installment is required to accumulate this amount in a given numer of periods, including the accumulation of interest. We have utilized a sinking fund factor of .069 for 10 yr at 8% interest cost.

Insurance and Taxes. As to insurance and taxes appearing as a component of the HVAC rate, the taxes required to be paid by the Landlord under the lease relate to real estate taxes whereas the components for taxes contained in the HVAC rate relates to a portion of the personal property taxes payable and allocated to the air conditioning equipment. If the tenant had individual air conditioning units installed in his store, a portion of such unit value would be taxed as personal property just as a portion of the total energy plant is so taxed. Similarly, the insurance that the Landlord is required to maintain relates to fire and extended coverage and boiler insurance, but there is no obligation on the part of the Landlord to carry insurance with respect to liabilities occurring as a result of equipment installed in the tenant's store area. It is insurance for this type of liability that the tenant would normally carry that is computed as a component of the HVAC cost. The annual cost of the insurance and taxes for HVAC equipment installed in a shopping center complex was estimated at 1% of the original equipment cost per sq ft/yr.

Total Operating Costs. Total operating costs comprised the cooling energy; heating energy, DHW (domestic hot water) supply energy (optional); maintenance repairs and filters; replacement cost and insurance and taxes.

HVAC Rate per Subscriber Service Agreement. Depending upon the individual tenant's negotiations with the owner we would indicate on the TDCA study, an amount for amortization of the total installed equipment cost or only amortization cost for the high side, and would then show a total owning and operating cost for the roof mounted heating and cooling system and a proposed HVAC rate that indicated a savings to the tenant.

Examples of total owning and operating costs for five selected tenants and the final HVAC rates are listed below:

Tenant	Sq Ft	Total Owning and Operating Cost ¢/sq ft-yr	Finalized HVAC Rate per Subscriber Service Agreement ¢/sq ft-yr
Zales	2,250	95.12	85.00
Mangels	6,000	79.23	67.00
Lilley's	14,067	64.14	58.00
S.H. Kress (Key)	28,350	49.93	45.00
Wyatt Cafeteria (Key)	9,825	163.68	115.00

5.1.4 Typical Tenant Displaced Cost Analysis Studies

We are attaching to this section for your perusal the actual TDCA for Zales (Exh. 5.1);* Mangels (Exh. 5.2); Lilley's (Exh. 5.3); S.H. Kress (Exh. 5.4); and Wyatt's Cafeteria (Exh. 5.5).

5.1.5 J.C. Penney HVAC Rate Determination

In the negotiations to determine an HVAC rate for the J.C. Penney store at Sher-Den Mall, we were confronted with a unique situation in which the major anchor tenant set the HVAC rate for the store and would not engage in a discussion of economic inputs or engineering parameters, or evaluate the quality of the proposed plant installation.

In 1969, the J.C. Penney Co. had 37 stores that were heated and cooled from central or district plants and nine of these were served by total energy

*Exhibits appear consecutively at the end of the section following the tables.

systems. These plants were not designed, owned, or operated by the Penney Company; rather, the systems were common to the shopping centers in which Penney's was a tenant.

The J.C. Penney Co. established their own criteria for onsite energy systems that together with its central plant heating and cooling criteria became the standard for the J.C. Penney store to be located in the Sher-Den Mall Shopping Center. This criteria, which was submitted as the First Amendment of Lease, covered the following:

1. Physical requirements,
2. Insurance protection,
3. Performance standards,
4. Determination of payment for heating and cooling media,
5. Reliability requirements,
6. Standards for electrical power quality,
7. Reliability criteria,
8. Freedom of power usage, and
9. Metering and billing.

The J.C. Penney Co. as the principal anchor tenant represented:

25.6% of total square footage to be served by the total energy plant;

29.1% of the stores to be served by the total energy plant;

44.3% of the major tenants.

The J.C. Penney Store Planning Dept. had developed a working analysis of an average two-level 150,000-sq ft store which would utilize 280 sq ft per ton of refrigeration. The fixed and variable costs were estimated based on past records, fundamental formulas, and rule-of-thumb guidelines. In those cases, as in Sher-Den Mall, in which the J.C. Penney Co. leased the building, the amortization of capital costs for mechanical equipment were not considered in the purchased media analysis, since this parameter was already included as part of the building rental paid by the tenant. In other words, the Landlord would supply the air conditioning system as a component of the base rental charge and, therefore, the term used in this study to designate a tenant with this arrangement is "key" tenant -- that is, this type of tenant received a store with the complete air conditioning and heating system installed and paid for by the Landlord.

Therefore, the J.C. Penney Co. proceeded to evaluate the following fixed and variable cost factors:

<u>Fixed Costs</u>:

1. Repairs, both heating and cooling,
2. Replacement filters,
3. Maintenance costs,

4. Water treatment,
5. Prorated labor for system operation, and
6. Rental for use of the space gained by having the major heating and refrigeration machinery installed outside the building.

Variable Costs:

1. Water usage,
2. Electrical power usage, and
3. Heating fuel usage.

In all discussions with J.C. Penney's construction and engineering personnel, they would emphasize that the development of the above costs reflected numerous proprietary factors, building characteristics and geographic location factors.

Although we were to negotiate an HVAC rate with the J.C. Penney Store Planning Dept. in various geographical locations: Lancaster, Pa.; Tom's River, N.J.; Columbia, Md.; Hagerstown, Md.; Frederick, Md.; Sherman, Tx.; Joplin, Mo.; and for store square footages ranging from 150,000-217,000 sq ft, with varying labor rates, and repair and maintenance costs in different sections of the United States, we were informed that the proportion of the total fixed costs saved by participation in a total energy plant was 5.129¢/sq ft in every location. This figure was derived as follows:

Repairs. Based on 1965 thru 1968 repair costs, the average repair cost was $2.00/ton. Thus, the average annual repair cost was 200¢/ton-yr divided by 280 sq ft/ton or approximately 72¢/sq ft-yr. Of this total, 90% or 64.8¢/sq ft would be allocated to the total energy plant and 10% would remain a tenant expense for repairs to in-house direct system and controls.

Replacement Filters. Based on 375 cfm/ton of refrigeration, 800 cfm of air per 20x20x2-inch filters, at a filter cost of 30¢, and 12 replacements per year, the filter cost was 1.68¢/ton-yr or 0.6¢/sq ft-yr.

Maintenance Service Contract. Based on 50¢/ton-mo or 2.15¢/sq ft-yr, the total expenditure for filters and maintenance services would be 0.60 plus 2.15 or 2.75¢/sq ft-yr. Sixty percent of this total or 1.65¢/sq ft per year would be the cost of general maintenance and supply of disposable filter media in the store area and remaining 40% or 1.1¢/sq ft-yr would be saved and should be allocated to the total energy plant.

Water Treatment Chemicals. Assume $2.00/ton-yr used for water treatment chemicals or 0.715¢/sq ft-yr.

Prorated Labor for System Operation. Approximately 30% of an operating engineer's time can be applied directly to system operation. Therefore, \$3,000 per year divided by a 150,000 sq ft of a building equals 2¢/sq ft-yr. Two-thirds or 1.33¢ will be saved by purchasing heating and cooling. The remaining 0.67¢/sq ft-yr will be required for system operation of the equipment in the store.

Rental Space Gained. Assume two 24x28-ft bays (1344 sq ft) for machinery displaced by total energy system and a rental figure of \$1.50/sq ft-yr. The annual savings on a 150,000-sq ft building works out to 1.333/sq ft-yr. Table 5.9, therefore, presents a summary of fixed costs.

Variable Costs

Water Consumption. Assume 3 gpm of cooling water per ton, 280 sq ft per ton of refrigeration and 150,000 sq ft store area; and 1703 operating hours during the cooling season for refrigeration equipment. The above equals 1088 gas/sq ft per season and at a make-up water requirement of 3%, and \$1.50 per 1000 cf, the cost of make-up water would be 0.657¢/sq ft per season.

Electric Power Usage. Assume 280 sq ft/ton of refrigeration and 150,000 sq ft store area, 0.83 kW/ton and 1400 EFLh of centrifugal chiller operation. The chiller load would equal 621,600 kWh. For the cooling tower, total connected tower condenser hp would be 120 and the total input 112 kW. The total operating hours during the cooling season for refrigeration equipment was estimated at 1703 resulting in 190,736 kWh consumption.

The combined refrigeration input for the independent systems serving the office, coffee shop, and beauty parlor was 88.7 kW operating for 1703 hr or 151,056 kWh. Therefore, the total refrigerant equipment equals 963,392 kWh/yr or 6.42 kWh/sq ft, for a 150,000 sq ft store.

The Hot Water Circulating Pumps. Under this example equal 5.4 kW or 0.00003 kW per sq ft or 0.03 kW/sq ft per 1000 hr of operation. It was estimated that there was 3114 hr below 60° or 0.09342 kWh/sq ft or 10,088 kWh used per year for the hot water circulating pumps.

Fuel Consumption. Assume winter design temperature of 18°, 2272 degree days, average winter temperature 51°, 162 days per heating season, K factor 465.0 (K factor, heat supplied in Btu per degree day per 1000 Btuh heat loss at design conditions) or 1.367 kWh/sq ft-yr. Table 5.10 presents a summary of variable costs.

Under the Subscriber Service Agreement, we elected to provide the additional in-store work associated with maintenance and filter charges at 1.65¢/sq ft-yr. Therefore, our final HVAC rate was 15.00¢ plus 1.65¢ or 16.65¢/sq ft-yr.

Using the J.C. Penney parameters as outlined below, the LP-20 Texas Power & Light Rate Schedule and the lowest fixed cost schedule submitted by a major tenant for repairs, maintenance, filter costs, water treatment, and system operator labor, the HVAC rate schedule for this store would total 22.653¢/sq ft-yr or an increase of $6,172.28 over the final rate approved by the J.C. Penney Co. (See also Table 5.11.)

J.C. Penney Co. Engineering Parameters and Costs Per Public Utility Rate Schedule

Parameters - Lighting, air handlers, return air fans, air compressor and fans for office, beauty parlor and coffee shop:

5.4 watts/sq ft
20.14 kWh/sq ft/yr

Lighting & Miscellaneous Power Costs per LP-20 Rate Schedule:

1.207¢/kWh
24.30¢/sq ft/yr
20.14 kWh/sq ft/yr

Parameters - Air Conditioning:

Peak requirements - 375 tons

Centrifugal chillers: .88 kW/ton
280 sq ft/ton - 340 kW

Cooling tower fans, pumps, air cooled condensers - 81 kW

Refrigeration compressor - beauty parlor, coffee shop and office - 64 kW

1.11 diversity factor

1700 hr equivalent full load hours

2000 hr total operating hours

Air Conditioning Costs Per LP-20 Rate Schedule:

1.303¢/kWh
10.480¢/sq ft-yr
8.04 kWh/sq ft-yr

Parameters - Hot Water Pumps:

12 HP - 11.2 kW for 3114 hr of operation

Parameters - Gas Heating Fuel:

Peak requirements - 2,300,000 Btu-h
Winter design - 18°
2272 degree days
K factor - 465.0
162 days per heating season
Average winter temperature - 51°

Gas Heating Fuel Costs Per Lone Star Gas Co. - Commercial Service Schedule 311:

1.6814¢/sq ft-yr

Thus, the First Amendment of Lease* under Paragraph D set the HVAC rate at 15¢/sq ft-yr plus 1.65¢ sq ft yr and the square footage served as 102,820 sq ft, or a total heating and cooling media payment per year of $17,119.53. The 22.653¢ proposed by Sherman Energy Management Services, Inc., utilizing the engineering parameters developed by the J.C. Penney Co. and serving the same square footage would result in a payment of $23,291.81 or an increase of $6,172.28 per year, or 36.1%. In the first full year of operation, 1971, the total HVAC revenue for Sher-Den Mall equalled $178,753.03 and this difference, $6,172.28, represented a potential revenue loss of 3.45%.

On October 23, 1974, we informed the J.C. Penney Co. Store Manager at Sher-Den Mall that

> due to the scale of increased operating costs incurred in the management of the Total Energy Plant, we reluctantly are compelled to institute an energy, labor, water, water treatment, maintenance, and filter escalation charge in accordance with the First Amendment of Lease made July 1, 1970.

Under this First Amendment covering the central utility plant, the lease states in part under paragraph D 4 --

> The foregoing annual service charge may be adjusted -- for any increase or decrease that may have taken place in the unit cost of fuel and electricity and in the prevailing wage rate for labor in the locality where the utility plant is located -- provided that the amount payable by tenant for heating and cooling media for any lease year shall not exceed the annual service charge ceiling imposed by paragraph 1 of this Section D.

---

*First Amendment of Lease. This agreement, made as of this 1st day of July 1970 by and between Meyer Steinberg, doing business as Sher-Den Mall, having his office at 538 Braniff Tower, Exchange Park, Dallas, Texas, 75235 ("Landlord"), and J.C. Penney Company, Inc., a Delaware corporation having its principal office at 1301 Avenue of the Americas, New York, New York, 10019 ("Tenant").

Section D - Paragraph 1 - reads in part --

.....that the total amount payable by Tenant for the heating and cooling media furnished by Landlord during any lease year shall not exceed the aggregate amount of money (hereinafter called the 'Annual Service Charge Ceiling') which Tenant would have been required to expend during such lease year in order to operate and maintain equipment for heating and cooling the Main Store Building in accordance with the above described standards and criteria if all of the equipment required for such purpose had, contrary to fact, been located in the Main Store Building and had been operated and maintained solely by Tenant, excluding from such expenditures, however, any charge for the cost of such equipment or depreciation thereon, repairs to or replacement of such equipment, rent for the space occupied by such equipment, interest on the cost of such equipment, insurance on such equipment, and taxes on such equipment or on the space occupied by such equipment.

As the escalation clause referred to above is not a formula type escalation charge similar to the adjustment clause incorporated in other major tenants' leases, we had to compute the appropriate increase in each component of the J.C. Penney annual service charge in order to equitably pass through the proportionate share of the operating cost increase against the square footage of the J.C. Penney Co. receiving heating and cooling services from Total Energy Plant operated by Sherman Energy Management Services, Inc.

In a letter to Mr. M.E. Pickens,* we analyzed the appropriate increase in each component of the J.C. Penney annual service charge, and on August 7, 1975, in a final commitment letter J.C. Penney** agreed, commencing September 1, 1975, to revise the annual service charge to 25¢/sq ft or an increase of 8.35¢/sq ft-yr. This revised maximum annual service charge equalled $25,705.00 per year (25¢ x 102,820 sq ft) or an increase of $8,585.47 over the First Amendment yearly rate of $17,119.53.

5.2 FUEL COSTS

As shown in the figures and tables of this section, the most significant component of operating costs is the cost of fuel consumed in the production of electricity and hot and chilled water. These costs, which at current prices account for over 60% of all operating costs, have also been those that have seen the most dramatic escalation over the years since the total energy plant was installed in the Sher-Den Mall. Over the past four years covered by this report, these costs have increased 329%.

---

*Letter to Mr. M.E. Pickens, Manager, J.C. Penney Co., Inc., 100 Sher-Den Mall, Sherman, Texas 75090 dated October 23. 1974, from Merton D. Levy, Vice President, Sherman Energy Management Services, Inc., 330 Madison Ave., N.Y. 10017, Room 2300.

**Letter from Joseph T. Zarcone, Real Estate Dept., Property Management Div., J.C. Penney Co., Inc.

The primary fuel used in the plant is natural gas, which is furnished under contract by the Lone Star Gas Co. and delivered through their pressure regulating equipment located adjacent to the total energy plant. The secondary fuel, which is No. 2 distillate fuel oil, is purchased from distributors of the major oil companies on a negotiated price per gallon. An inventory of fuel oil is maintained in a 20,000 gallon underground storage tank. Table 5.12 indicates the quarterly and annual consumption of fuel oil, in gallons, and gas, which is purchased in units of one thousand cubic feet (MCF) and expressed in units of one million Btu (MMBtu). Fuel oil gallons are converted to MMBtu in the ratio of 140,000 Btu per gallon and added to gas consumption to give total consumption. As can be seen, fuel oil and natural gas consumption has gradually decreased from 1973 through 1976. The total decrease of approximately 25% roughly parallels the total decrease in production of electricity for use by the tenants and in the plant for the same period of time.

Under normal production procedures, approximately 90% of the total fuel consumption is in the form of natural gas; the remaining 10% being fuel oil, which is used as a pilot fuel in the internal combustion engines driving the electric generators. The fuel oil serves as a back-up fuel, which can be used by the dual fuel engines and boiler in the event of a failure or curtailment of natural gas supplies. Partial intentional curtailments were imposed by the Lone Star Gas Co. during certain winter months in 1973, 1974, and 1975. As the table shows, the percentage of gas used during these periods fell to a low of 70% as compared to over 90% for the 1976 season.

The cost per unit of fuel for both a gallon of oil and a thousand cubic feet of gas (MCF) has increased drastically from initial operations of the Sher-Den total energy plant. In the first year covered by this report, fuel oil was available at less than 12¢/gal in tank car lots (8000 gal), while natural gas in quantities of 50,000 MCF per month was delivered at roughly 30¢/MCF. In the last quarter of 1976, fuel oil was 37¢/gal and natural gas $1.67/MCF, and further increases have been realized in both these products throughout the first three quarters of 1977. As a result, the unit cost of fuel oil has increased 171% and gas 398% over the four-year period covered by this report. When combining the two products in the ratio of their use, the average increase has been 329%. Although fuel oil has not increased to the extent of natural gas, gas is still the most economical form of fuel for operating the plant. If the plant were operated on 100% fuel oil, approximately 7.14 gal of fuel oil would be required to replace the energy value of each MCF of gas, and the average cost per MMBtu would be $2.56 in comparison to $1.59 actually experienced during the calendar year 1976 (see Table 5.12).

In Table 5.13, these total fuel costs have been computed with the production of electric power for each quarter from 1973 through 1976. Although the amount of electric energy produced for customers as well as for the operation of the plant itself has reduced significantly over the years, the fuel rate or Btu consumed per kWh produced (both gross and net of fuel consumed by the boiler) has changed only slightly. Therefore, the unit cost of fuel has had a marked effect only on the cost to produce a unit of electric energy -- increasing 0.562¢/kWh in 1973 to 2.390¢/kWh in 1976. In comparison, average revenue derived from the sale of electricity in cents per kWh, which charges are adjusted to equal the public utility rates applicable to each user, has increased to a lesser degree for the same period -- increasing from 1.73 in 1973 to 3.138 in 1976.

The factor not considered in the above is the allocation of the value of energy recaptured from waste heat produced as a by-product of engine driven electric generators to the cost of producing heating and cooling services versus a credit to the cost of producing electricity.

5.3 LABOR

Operating and maintenance labor constitutes the second largest portion of operating costs, accounting for 16.3% of the total. These costs are, in a large part, necessitated by the need to have round-the-clock attendance in the plant by at least one operator to assure continuity of operation of the electrical generation portion of the plant. As previously detailed in Sec. 4, the Sher-Den total energy plant is staffed with one chief engineer and six operator-mechanics. With the exception of the Chief Engineer, all personnel are paid on an hourly basis. Due to the skills required to operate and maintain the total energy plant, hourly rates were initally established with reference to the average hourly rate paid to manufacturing workers in the Dallas metropolitan area, as reported monthly by the Texas Manpower Commission (TMC). As indicated on Table 5.14, our average rate in 1973 was roughly 10% above the referenced rate reported by the TMC, and the annual base payroll was $61,396. Since then hourly rates have increased approximately 7% per year and for the period covered by this report aggregate an increase of 22.7%. The staff at Sher-Den is nonunion, as is a majority of the work force in the Grayson County area. The wage and benefit package is negotiated directly between the Company and the employees annually and is predicated on national and local labor trends.

The Company provides each employee with medical coverage after three months of continuous employment, including hospitalization (Blue Cross) and major medical. This coverage provides reimbursement of 100% of cost in excess of $100 per family per year. This program, which currently costs $41.50 per man per month, is provided at no cost to the employee. In addition, a term life insurance policy is provided each man in the face amount of $10,000. The staff at Sher-Den receives nine paid holidays, five paid sick days (the unused sick days being paid to the employee at year end), and vacation of one week after six months and two weeks after one year's service. Time and one-half is paid for all hours worked in excess of 40 hours per week, as are all hours worked on designated holidays. Table 5.14 further indicates that while the base pay has increased 22%, overtime has decreased a similar amount so that total wages over the four-year period have increased a net of 16.7%. Employee benefits and payroll taxes have increased 43% and 32%, respectively, due in a large degree to the escalating cost of medical services and changes in federal and state tax regulations. Adding these costs to wages paid, total labor costs amounted to $91,643 for 1976, up 18.3% from 1973. At the current level, overtime amounts to almost 10% of the base pay while benefits add another 4.4% and taxes amount to 5.9%.

5.4 MAINTENANCE COSTS

Maintenance is the third largest component of operating costs, amounting to 6.79% of the total. These costs are primarily for service and replacement parts in that most labor for maintenance is provided by the plant's staff. Categories of maintenance involve:

1. Routine service and maintenance of the heating and cooling components located in the tenant spaces and the Mall. These include periodic replacement of filter media, cleaning of coils and diffusers, adjustment of thermostats and an occasional replacement of belts, bearings, or a fan motor.

2. Maintenance of heating and cooling components in the total energy plant that primarily involve seasonal service of chillers and the boiler, cooling tower cleaning, periodic pump packing and servicing of controls. (See Table 5.15).

3. Engine generator maintenance, which by far is the largest component of maintenance cost, relates to the engine generator equipment. This cost has risen to almost 75% of the total dollars spent and has tripled since 1973. Though these changes appear dramatic, the current amount of expenditure is believed to be a more realistic level required to sustain the engines in good working condition. (See Table 5.15).

5.5 WATER AND WATER TREATMENT CHEMICALS

Water and water treatment account for only 3.2% of current costs. Water consumption is largely related to the operation of the cooling system in that water consumption in the engine generator portion of the plant and in the heating componenets is almost negligible. As shown Table 5.16, water consumption in thousands of gallons is by far the largest during the third quarter of each year when the maximum demand on the cooling system is experienced. Conversely, the first three months of the year consume the least amount of water. There has been a "reduction" in annual water consumption over the four years, 1973-1976, of 12.14%, which at least in part is attributable to efficiencies in the plant and possibly lower demands by the shopping center. The unit cost per 1000 gal, however, has increased 26% so that total cost for water has increased only 12%. Water is purchased from the City of Sherman on a block rate basis; therefore, the unit cost per 1000 gal is lower when consumption is highest and vice versa. There is no separate assessment for sewer charges in the City of Sherman and costs thereof are included in quarterly water charges.

Chemicals used to maintain stable water conditions and minimize rust, corrosion and deposits in the equipment and piping system, as well as algae in the cooling towers, are consumed largely in proportion to the amount of evaporation in the condenser water systems and, therefore, to the amount of water makeup required. A minor portion of chemicals is used to maintain the hot and chilled water closed systems and well as for periodic cleaning of waste heat boilers, etc. Chemicals are purchased in bulk in accordance with the suppliers program. Invoices for same occur at various times of the year, and therefore costs are not directly proportional to consumption. However, the annual cost for water and water treatment products combined on a unit basis does show a significant increase over the years reflecting the combined escalating cost of water and chemical products.

5.6 OTHER EXPENSES

Other expenses classified as indirect costs, which are applicable to the operation of the total energy plant at the Sher-Den Mall, consist of (1) property taxes, (2) insurance, and (3) franchise fees.

The total energy plant is assessed by the City and School District of Sherman and Grayson County as personal property. The original and current assessed value of the system by the City and School District is $749,830, and the tax rate is $1.37 and $1.92 per $1000 of assessed value, respectively, resulting in a combined tax of $23,920 to the City and School District. The State and County's assessed value of the personal property is $428,340 and the annual tax is $6254. This category also includes the corporation franchise tax imposed by the State of Texas on the corporate entities that own and operate the total energy system in the Sher-Den Mall Shopping Center. These, in the aggregate, amount to less than $1900 per annum. There has been no significant change in the tax rate during the years covered by this report.

In accordance with the conditions of the Company's agreements with the Owner of the Sher-Den Mall Shopping Center, insurance is provided covering loss or damage by fire or other perils in the face amount of $2 million. In addition, general liability insurance is provided to cover claims for personal injury, death, or property damages resulting from the operating of the system in the face amount of $5 million. Boiler and machinery coverage is provided on all items and components of the system in the total amount of $2,800,000. The parent company also carries a general liability umbrella policy, the cost of which is prorated over all of the Company's installations. Mandatory workmen's compensation insurance for the employees at the Sher-Den Mall total energy plant is included in this category. Insurance costs, which amounted to $10,134 in 1973, have escalated to $13,998, or 38.1%, for the year 1976.

A franchise fee, which has been discussed in a previous section, is a fixed sum of $15,000 per annum paid to the Owner of the Shopping Center as a fee for permission to install and operate the system, supply services to the tenants, and for providing the space in which the system is located. Table 5.17 summarizes the history of the above described indirect costs.

5.7 COSTS SUMMARY AND ALLOCATION

5.7.1 Summary

Table 5.18 summarizes all components of operating expenses described in the preceding Secs. 5.2-5.6 for each of the years 1973 through 1976.

As previously indicated, the most significant component of operating cost has always been fuel cost and over the years is the one that has experienced the most significant escalations. Actual fuel cost has increased 203%

since 1973 (even more so on a cost per unit basis) and accounts for 81.3% of all increases since that time. Fuel and labor now account for 74% of all costs. Maintenance and lube oil costs have also escalated in excess of 100%; maintenance, because of the anticipated requirements after initial operation, and lube oil, because of escalation prices for petroleum products. These two items, however, contribute only a minor portion of total costs.

Together with the indirect operating costs described in the preceding paragraph, all costs have accelerated a total of $264,000 or 91.3% more than those incurred in the base year 1973. These cost increases have been realized even though total production of the plant has decreased by 3,789,000 kWh or 23% lower than that experienced in the base year 1973.

5.7.2 Cost Allocation to Services

Each of the components of operating expenses described in the preceding items are allocable to the production of the two basic services provided by the total energy plant; namely, electricity and hot and chilled water. Precise determinations are possible in some categories such as fuel and maintenance as to what quantity or cost is required for electricity vs the heating and cooling portion of the plant. However, the cost accounting system cannot accurately divide other categories like labor and miscellaneous expenses and supplies. Therefore, formulae for allocating costs are applied that were based in part on the quantity and efficiency of the services produced.

In Table 5.19, the total cost of operation for each of the years 1973 through 1976 has been divided between electric and HVAC services. In the case of electricity, each component is shown as a unit cost for electricity produced and sold (¢/sq ft). In this form, costs are more directly related to the revenue stream generated for each of the services provided.

Allocations of cost components are computed in accordance with the following formulae:

Fuel. Cost for electric generation is the gross fuel consumption less fuel used in the boiler. The portion of fuel used to generate power for the plant is added to boiler fuel to determine HVAC fuel.

Labor. Of the six operator-mechanics, one man is charged 100% to HVAC service of Mall and tenants' systems. Time studies show that two-thirds of the remaining five mens' time is attributable to the electric portion of the plant. The Chief Engineer's time is distributed in proportion to the allocation of the six men, resulting in a ratio of 68.6% to electricity and 31.4% to HVAC.

Maintenance. All parts and supplies as well as outside services are coded as invoices are received. Separate accounts are generated therefore for electric and HVAC.

Water and Chemicals. Chemicals for water treatment are consumed in direct relation to water consumption, which is primarily a consumable for the chiller water system. Spot tests indicate that 95% of these products are a requirement of the HVAC system.

Lube Oil. Records indicate that approximately 95% of these materials are used in the dual fuel engines.

Miscellaneous. These costs, which are a small percentage of the total, are divided equally between the two functions.

Indirect Costs. Since taxes are assessed on the system as a whole and insurance coverage is not divisible, these costs and the franchise fees are allocated in relation to the components of total capital cost developed in Table 3.7 (Sec. 3), namely, 50.6% to HVAC and 49.4% to electricity.

5.8 OTHER CHARGES

The statements of income and expenses prepared quarterly by the Company's accountants include as "Other Charges" a charge to each of its operating subsidiaries for depreciation, debt service (interest) incurred by the Company under its various loan agreements with the bank and other lenders, and, when necessary, charges for write-offs of uncollectible receivables (bad debts).

5.8.1 Interest

Debt services or interest paid to a commercial lending institution is paid pursuant to a consolidated loan agreement covering all the Company's total energy systems. Charges are allocated in the ratio of the capital cost of each system to the combined cost of all systems. The loan agreement provides for a constant payment of 9% per annum of the original principal amount, of which 4% is interest on the outstanding principal and the balance is applied as reduction of principal. The Sher-Den total energy system is allocated 24% of the total debt and interest charges equal to $125,927, of which approximately, $55,000 is interest.

5.8.2 Depreciation

When there is no statistical record either stemming from the past assets of the company or adaptable from other companies with similar assets on which to base any of the previously mentioned actuarial methods, the useful service life of the asset must be estimated. Basically, there are five fundamental methods useful in "guessing" at plant lives. Usually, a combination to two or three methods would be used in estimating the useful service life of the capital asset. The methods are:

1. Component assessment,
2. Similar operations,
3. Limiting factors,
4. Market economics, and
5. Projected competitors.

In the application of these methods, we conducted written and telephone surveys with diesel engine manufacturers, franchised utilities, Public Utility Commissions, competitors, and trade associations.

The substantive comments made by the management personnel of these companies follow.

Fairbanks Morse, Inc., Power Systems Division, Diesel Engine Life Expectancy

The large heavy duty diesel engines are designed and sold for an indefinite life. All moving and wearing parts are replaceable. The 38 D8 1/8 engine (four of these engines, turbocharged, after-cooled were installed in the Total Energy Plant at Sher-Den Mall) was developed in 1935. Seven thousand Model 38 D8 1/8 engines are in service and many of them were removed from navy ships and reinstalled in all types of power plants. In most cases power plants that are kept in good running condition are more valuable today than when they were purchased. It is our opinion that we will be building or supplying parts for the Model 38 D8 1/8 for at least the next 75 years.

Caterpillar Tractor Co., Caterpillar Diesel and Gas Engine Life Expectancy

The accounting department has used the following depreciation base for diesel and gas engines installed in our own headquarters plant. Life of the engines before a major overhaul: diesel, 25,000 hr; gas, 30,000 hr.

This life cycle would be divided by the average amount of hours of annual use - approximately 2500 hours per year. Therefore, the engines would be depreciated over 10 years to 12 years' life. The 2500 hours of use would, of course, depend on the load factor on the plant.

When the engine is rebuilt during a major overhaul, the cost involved in the major overhaul would be capitalized and a new depreciation period commenced. Caterpillar Corp. has not received any formal approval from the IRS as to the life expectancy depreciation rate schedule for their diesel and gas engines.

New Jersey Board of Public Utilities

Depreciation rates for all public utility systems are subject to IRS schedules that are executed by the various State power commissions. Each piece of equipment is classified under the appropriate type of plant account for which there is a corresponding depreciation rate. To change these rates, the utility company must submit revised equipment lifetimes to the commissions for review before altering their present rates.

By uniform systems of account classification:

Type of Plant	Annual Rate
Electric public utility -	
steam production	2.45%
other	4.08%
transmission	2.29%
distribution	3.68%
general	4.11%
Hydroelectric plant -	
hydroelectric production	2.87%
hydroelectric storage	1.43%
other	3.40%
distribution	3.96%
Gas public utility -	
gas production plant	5.15%
local storage plant	9.64%
distribution plant	3.04%
general	2.76%
Jersey Natural Gas Company -	
manufactured gas production plant	3.44%
local storage plant	2.20%
transmission plant	2.12%
distribution plant	2.93%
general plant	8.13%
South Jersey Gas -	
production plant	2.57%
storage plant	1.64%
transmission plant	2.06%
distribution	1.56%
general	3.39%

Elizabethtown Gas Company

Depreciates their Total Energy Plant at a 5% rate.

Group to Advance Total Energy

No consistent depreciation policies are being followed by total energy companies. The industry appears to be taking the position that TE plants should be considered by the IRS as a single utility plant, not as separate functional plant with accounts subject to the various IRS schedules established for public utilities. Four or five years ago, some total energy companies established twenty years as an average rate; however, the industry is now seeking quicker write-offs.

Among the total energy companies are the following:

Utility Systems Corp.

Use IRS guidelines for individual pieces of equipment. The rates average between 20 and 30 years.

Ohio Energy Systems

When OES joint ventures a TE plant, depreciation rate depends on the depreciation policies of the other party. In such a situation, the IRS guidelines for individual equipment plants are used.

Often the depreciation rate may coincide with the terms of the lease and/or the mortgage. If a short-term contract is written, then the Company tends to depreciate at high rate.

Tri Energy Corp.

We advocate relating depreciation rates to the terms of the financing on the plant, which usually is 12 to 30 years. For example, a large gas turbine plant has an unlimited life because of continual maintenance and it would be depreciated over the life of the corresponding lease.

Utilities Leasing Corp.

Majority of TE companies use 20 years. As size of plant increases, then so does time span for write-off. Uleasco uses 25 years' straight line, does not accelerate for tax purposes. The rate will usually relate to the length of the lease; however, if a long-term lease is written on the plant (i.e., over 25 or 30 years), the long-term lender will not want to risk taking such a long-term write-off and consequently the rate of depreciation will be shorter than the lease.

The System Lease between Telco Energy Corporation of Texas (the "Lessor") and Meyer Steinberg d/b/a Sher-Den Mall (the "Lessee"), provides that Telco will lease the system to the owner for an initial term of 35 years and for optional renewal terms of three successive periods of 10 years each.

Notes D and E, below, the Financial Statements of the Total Energy Leasing Corporation for the period ending December 31, 1970, state the depreciation policy of the Corporaton and the write-down of the plant investment to realizable value.

Note D

It is the intention of management to sell the three "total energy" systems presently owned. In the opinion of management, the amount realizable upon the sale of such systems would be approximately $2,900,000 less than the cost thereof and, accordingly, the carrying amount of the companies' 'total energy' systems has been reduced by that amount.

Therefore, in accordance with the above statement, the capital investment in the total energy system at Sher-Den Mall was reduced by $900,000, from a carrying value of $2,822,601.17 to $1,922,601.17 and the 30-yr depreciation schedule for the period 1970 through 1976 reflects the book entries presented in Table 5.20.

Note E - Depreciation Policy

Depreciation of 'total energy' systems located in shopping centers has been computed by the straight-line method, over their estimated lives of 30 years. It is the companies' policy to capitalize expenditures for major betterments and renewals, and to charge expenditures for maintenence and repairs to an expense account as incurred; as at December 31, 1969, prior to the commencement of revenue-producing operations, the latter expenditures were deferred. It is the companies' policy also, upon retirement or other disposal of fixed assets, to remove from the accounts the cost of the assets and the related accumulated depreciation and to credit or charge any gain or loss thereon to operations.

5.8.3 Bad Debts and HVAC Allowance for Fuel Escalation Rebate for Prior Periods

For the 4-yr period of this study, a search of the accounting records and a compilation of entires to the accounts reserve for doubtful accounts and bad debts indicates that the loss in revenue billings was 1/2 of 1% or less for each year. Table 5.21 presents the yearly costs.

In the fiscal year 1975, we issued a fuel escalation rebate allowance covering a partial rebate for the period November 1973 through March 1975 in the amount of $18,164.74. This allowance appeared under the section Extraordinary Expenses for the year 1975.

Our monthly charge for HVAC comprises a basic contract fee and escalation clauses for fuel, wage, and tax adjustments (see Exhibit 5.6). Our first fuel adjustment escalation was for the month of November 1973, and we notified all subscriber tenants that due to the increasing shortage of fuels, our principal supplier, Mobil Oil Corp., had advised us that commencing October 1, 1973, our cost per gallon of fuel would be increased by 45%, and our natural gas supplier, Lone Star Gas Co., had been gradually escalating our cost of natural gas each month under a gas cost adjustment clause. These charges had been absorbed previously by Sherman Energy Management Services, Inc., but now were to be passed through to our tenant subscribers in accordance with Schedule 1 - Part 1 Basic HVAC Fees - Paragraph C.(1) Fuel Adjustments - (see Exhibit 5.6).

The method of calculating the fuel adjustment by weighing the proportion of natural gas and diesel fuel utilized each month and converting this escalation to cents per equivalent MCF and then to the applicable formula was as follows.

<u>Gas Cost Escalation on Lone Star Gas Billing for October 1973</u>:

$.0298 x 21,686 MCF = $646.24.

<u>Fuel Oil - Mobil Oil Invoices for October 1973</u>:

18.65¢/gal less 12.9¢/gal base x 11,670 gal = $671.03. (Equivalent MCF for oil purchases = 1,634 MCF.) Therefore, $646.24 plus $671.03 equals $1,317.27, divided by 23,320 equivalent MCF equals 5.65¢/MCF.

U.S. Theater, Wards and Kress had special formula escalations that for the month of October totalled $175.76.

Therefore, the fuel cost escalation for the remainder of the tenants who had signed the standard Subscriber Service Agreement was $1,317.27 minus $175.76 equals $1,141.51 and as the subscriber square footage was 185,867, the fuel cost escalation 0.61415¢/sq ft for the month of November 1973 was 0.61415 sq ft.

In January 1975, we compiled a table that indicated for our subscribers the monthly fuel escalation in cents per equivalent MCF, the percentage increase from the base period (November 1973) and the total dollar expenditure by Sherman Energy Management Services, Inc. relating to fuel cost escalation.

An analysis of these costs revealed that:

1. From a basic fuel cost in November 1973 of 28.467¢ per equivalent MCF, our fuel cost had escalated to over 71¢ per equivalent MCF, or an increase of 42.60¢/MCF within a one year period (November 1973 through December 1974).
2. This increase represented a fuel cost escalation of 149.6% over the basic fuel cost existing only one year ago. (Base cost of equivalent MCF in November 1973 was 28.467¢. Base cost of natural gas was 23.67¢/MCF and base cost of #2 diesel fuel oil was 12.9¢/gal.)

3. The plant had consistently operated on a high percentage of natural gas to #2 diesel fuel - approximately 93% natural gas and 7% fuel oil.

However, the tenant subscribers requested that we review our method for "passing through" fuel cost increases under the appropriate clause of our HVAC agreements. We recognize the fact that due to special escalation formulae negotiated by major tenants, inequities existed that could have resulted in charges that were less than fair to some of the smaller tenants.

Therefore, we revised our fuel cost adjustment computation so that it would be based upon an allocation of our total fuel consumption to the HVAC and electric portion of our system. The portion of our fuel consumption used exclusively for HVAC operations was allocated "pro rata" among all tenants receiving HVAC (378,463 sq ft) and fuel adjustment provisions of the electric rate schedules of Texas Power & Light Co. as applied to our unit cost of fuel and assessed to each tenant in accordance with their actual electric consumption.

This modification in our escalation formulae resulted in the following revisions of our HVAC and electric fuel adjustment charges for the period November 1973 through March 1975. The new formulae were utilized commencing with April 1975 billings (see Table 5.22).

Therefore, based on the above modifications, our total HVAC fuel adjustment charge for the period November 1973 through March 1975 was reduced by $22,309.98 and our electric fuel adjustment charge was increased by $4,145.24, or a net credit of $18,164.74.

5.8.4 Independent Accountants' Report

The system's P&L statements prepared by the Company's accountants, quarterly and annually, are included as Exhibits 5.7-5.10. The figures shown there may differ slightly in certain categories from those previously presented in those accruals, and other adjustments have been made from time to time to conform to established accounting practices.

5.9 BUDGET VARIANCE ANALYSIS

A variance may be defined as the difference between actual and standard or budgetary cost. The process of analyzing variances involves subdividing the total variance in such a way that management can assign responsibility for off-budget performance. The decision on how far to go in analyzing variances should be based on the use that management has for the information.

Our budget variance analysis concentrated on HVAC revenue components (square footage served, basic HVAC fees and fuel cost escalation); electric revenue components (basic rate schedules, electric fuel adjustments factor and kilowatt hours sold, and the fuel cost component -- natural gas or #2 diesel fuel; which represented approximately 60% of total direct and other operating expenses and warranted an extensive analysis and review with the Chief Engineer.

The input for our first detailed budget preparation to be reviewed in this study was the 1973 Budget prepared in the late fall of 1972 and in January 1973.

Input Parameters

A. Square Footage

Gross Leasable Area - 485,678 sq ft

1. HVAC Service

	Sq Ft
Existing tenants	320,477
Landlord - Mall Area	59,850
Total	380,327

2. Electric Service

Tenants plus Landlord	380,327
Area receiving electric service only	98,766
Total	479,093
Vacancies - proposed new tenants - HVAC and electric services	6,585
Projected HVAC sq ft 1973 380,327 + 6,585 =	386,912
Projected electric sq ft 479,093 + 6,585 =	485,678

B. Electric Generation Forecast

	kWh
Existing Tenants	9,669,986
New Tenants	36,560
Landlord	664,094
Total Saleable	10,370,640
T.E. Plant - 25%-30% of kWh sold	2,942,382
T.E. Plant - electric cooling	1,179,679
Total Plant	4,122,061
Total Generation Forecast	14,492,701

C. HVAC Fuel Adjustment - None

Electric Fuel Adjustment - .0924¢/kWh

D. Electric Rate Schedule -

Texas Power & Light Co. GS-1 and LP-20

E. Fuel Usage and Distribution

12,500 Btu to produce one kWh	181,156 MCF
Boiler fuel heating	19,600 MCF
Boiler Fuel Absorption Cooling	20,000 MCF
Total	220,756 MMBtu
Gas 82.7%	182,533 MCF
Fuel Oil 17.3%	273,024 gal

The 1973 annual variance analysis form indicating budget components, actual accomplishments and favorable and unfavorable variance is presented in Table 5.23.

Comments

HVAC Service, Sales. The existing and new tenant occupancy varied during the year from a high point of 327,628 sq ft to an end of year tenancy of 319,557 sq ft or an average occupancy of 324,842 sq ft. The loss of potential HVAC revenue ($196,138 - 187,536 = $8,602) was due primarily to a higher average vacancy rate and higher final vacancy rate, new tenants receiving these services at a later date than scheduled, a mix of new tenants with a lower basic rate than budgeted. The HVAC fuel adjustment charge was added to the basic rate for the first time in November 1973 and for the 1973 calendar year represented only 1.4% of HVAC revenue. The real estate taxes remained stable so that there was no real estate tax pass-through and the wage adjustment was less than forecasted.

Electric Service, Sales. The electric kilowatt hours sold to tenants and landlord was budgeted at a modest 3% increase, but remained constant from 1972 usage of 10,060,953 kWh. The electric fuel adjustment was budgeted at 0.0924¢/kWh and although fluctuating throughout the year (.06440¢/kWh to 0.154¢/kWh) equalled 0.10348¢/kWh for the fiscal period.

Electric kWh Produced. In the generation of 16,191,000 kWh, we have already commented upon the kWh sold that are essentially controlled by our subscriber tenants. Although our central air conditioning plant and auxiliary electric equipment utilized 4,968,906 kWh in 1972, we scheduled a reduction in this category to 4,122,061 kWh (pumps - fans - motors - lighting - 2,942,382 kWh; electric centrifugal 1,179,679 kWh). Our actual consumption of 6,417,000 kWh exceeded our budget by 55.6% and signaled our operations management that a detailed modification in the operation of our chilled water plant was necessary and a closer supervision of electric centrifugal startup and demand settings was needed.

Plant Efficiency. It was the consensus of management that with the close of 1972 our major generator problems had been isolated and that the tail bearing failures would not recur. As Fairbanks Morse had also agreed to implement several modifications in their engines and to install newly designed pistons and liners, water cooled exhaust manifold, modified turbocharger system, injectors of an improved design, motor driven jacket water pumps and other engine modifications, we believed that our net Btu per kWh generated would decrease significantly from our previous year's experience and we budgeted our operation at 12,499 Btu per kWh. However, our actual performance did not indicate any significant improvement over prior year's operations.

Fuel Usage. While we were successful in controlling our use of gas and diesel oil in our boiler operation, which enabled us to utilize only 56% of our budgeted fuel for this function, our net Btu requirement per kWh generated as indicated above was 15,110, and thereby accounted for usage variance of 42,287 MMBtu in excess of budget forecast based actual kWh generated. Therefore, if we multiplied our budgeted fuel usage for HVAC by our actual plant generation (12,499 Btu/kWh x 16,191,000 kWh generated), our total fuel usage would have been 22,475 MMBtu for boiler use plus 202,371 for generation or a total of 224,846 MMBtu and a budget variance of 1.8%.

Type of Fuel. The primary fuel used in the plant is natural gas and the secondary fuel is #2 distillate fuel oil. Fuel oil gallons are converted to MMBtu in the ratio of 140,000 Btu per gallon and added to gas consumption, which is purchased in units of one thousand cubic ft (MCF) and expressed in units of one million Btu (MMBtu). Under normal seasonal use, our distribution between the two fuels varies from 93-7 ratio of gas to fuel oil for nine months to a 50-50 ratio in the winter months. In our overall budget estimates we used 82.7% natural gas and 17.3% fuel oil. However, our actual usage breakdown was 88.8% natural gas and 11.2% fuel oil, which closely paralleled optimum use. Therefore, if we utilize this actual distribution of fuel types and the standard Btu/kWh budgeted with actual kWh generated, our total projected fuel usage of 224,846 MMBtu would be distributed as follows: natural gas, 199,663 MCF; #2 diesel fuel, 179,876 gal.

Cost of Fuel. To express the price per gallon of #2 diesel oil in terms of the price for 1000 cf of gas, we multiplied the price of one gal of oil by 7.1428. Therefore, as we budgeted the price of natural gas at 28.36¢ /MCF and #2 diesel fuel at 87.50¢/EMCF, diesel oil was 3.08 times more expensive per EMCF. In the actual purchase of fuel, gas was purchased for 30.02¢/MCF and oil for 94.43¢/EMCF and, therefore, diesel oil was 3.145 times more expensive. Therefore, we not only benefitted from the improved ratio of gas/oil purchases - 88.8/11.2 vs 82.7/17.3, but also saved money, as the multiplier between the two fuels increased over our estimate. Therefore, we had three variances to analyze: plant efficiency and usage; type of fuel used; and price variance.

Plant Efficiency and Usage	Favorable	Unfavorable
If we had produced 16,191,000 kWh at 12,499 Btu/kWh, we would have used 202,371 EMCF instead of 244,658 EMCF, or an excess use of 42,287 EMCF at 37.19¢/EMCF		$15,927
In producing chilled and hot water through firing of our boiler, we used 22475 EMCF and budgeted 39600 EMCF - a savings of 17125 EMCF at 37.19¢	$6,369	
Distribution of Fuel		
In utilizing more gas than fuel oil compared to our budget, we saved the following: actual use 237,378 MCF at 30.02¢ = $71,265; 212,108 gal at 13.22¢/gal = $28,050 ($99,315)		
Budgeted Distribution - in terms of actual consumption and cost		
220,919 MCF at 30.02¢ = $66,320; 330,100 gal at 13.22¢/gal = $43,639 ($109,959)		
$109,959 - $99,315 =	$10,644	
Price of Fuel in terms of actual consumption		
237,378 MCF at 30.02¢/MCF = $71,265 212,108 gal at 13.22¢/gal = $28,050 ($99,315)		
237,378 MCF at 28.36¢/MCF = $67,320 212,108 gal at 12.25¢/gal = $25,983 ($93,303)		
$99,315 - $93,303 =		$6,012
	$17,013	$21,739
Net Unfavorable Variance	$ 4,726	

The 1974, 1975 and 1976 annual variance analyses indicating budget components, actual performance and favorable and unfavorable variances are shown in Tables 5.24-5.26.

Table 5.1 Cost Parameters for a Central Chilled and Hot Water System Based on 300 Sq Ft/Ton and Various Costs for In-Store Equipment, Ductwork, Controls, and Piping

Central Chilled and Hot Water System - $/Ton	810	750	606	530
Centrifugal Chiller, Compressor, Condenser, Boiler, Ventilation Equipment, Piping, Valves, Electrical Controls, Building Improvements - ¢/Sq.Ft.	61.0	61.0	61.0	61.0
Cooling Tower, Pumps, Piping and Valves, Controls, Electrical Wiring - ¢/Sq.Ft................	19.0	19.0	19.0	19.0
Four-Pipe Distribution System - ¢/Sq.Ft................	23.0	18.0	18.0	15.0
In-Store Work: Air Handler, Cooling and Heating Coils, Motor, Filters, Controls, Insulation, Elec. Wiring, Ductwork, Registers, Thermostats, Test-Start - ¢/Sq.Ft.............	167.0	152.0	104.0	82.0
Total Installed Cost Per Square Foot - (300 Sq.Ft./Ton) ¢/Sq.Ft....	270.0	250.0	202.0	177.0
Total Installed Cost Per Sq.Ft. (280 Sq.Ft./Ton)	289.0	268.0	216.0	189.0
Total Installed Cost Per Sq.Ft. (250 Sq.Ft./Ton)	324.0	300.0	242.0	212.0

Table 5.2 Amortized Installed Equipment Cost for Central Chilled and Hot Water Systems Based on 20-Yr Economic Life at 8% Interest and Constant Annual Reduction Factor of .10185

Installed Price:	$810/Ton		$750/Ton		$606/Ton	
Sq.Ft./Ton	Install. Equip. Cost ¢/Sq.Ft.	Yearly Payment to Amortize Over 20 Years ¢/Sq.Ft.	Install. Equip. Cost ¢/Sq.Ft.	Yearly Payment to Amortize Over 20 Years ¢/Sq.Ft.	Install. Equip. Cost ¢/Sq.Ft.	Yearly Payment to Amortize Over 20 Years ¢/Sq.Ft.
300	270.0	27.49	250.0	25.46	202.0	20.57
280	289.0	29.43	268.0	27.29	216.0	21.99
250	324.0	32.99	300.0	30.55	242.0	24.64

Table 5.3 Amortized Installed Equipment Cost for Total Energy Plant Portion Only[a] of Central Chilled and Hot Water Plant Based on 20-Yr Economic Life at 8% Interest and Constant Annual Reduction Factor of .10185

	Installed Price: $240/Ton	
	¢/Sq. Ft.	Yearly Installment to Amortize Total Energy Plant Investment Only ¢/Sq.Ft./Year
Square Feet/Ton:		
300	80.0	8.15
280	86.0	8.76
250	96.0	9.78

[a]Centrifugal chiller, compressor, condenser, boiler, ventilation equipment, piping, valves, electrical controls, building improvements, cooling tower, pumps, piping and valves, controls and electrical wiring. Complete installation of this equipment and its components to the common mall between the total energy plant and the shopping center.

Table 5.4 Component and Percentage Breakdown of Packaged Rooftop Heating and Cooling Units by High- and Low-Side Equipment and Installation

	Percent of Total Cost Installed
Equipment Cost - High Side	
Hermetic compressors, steel insulated cabinet, air cooled condensers, condenser fans, magnetic starters, high and low pressure cutouts, refrigerant piping, internal wiring, 24 volt controls, filter driers, low ambient controls	51.0
Equipment Cost - Low Side	
Permanent air filters, cooling coil with DX valves, blower and blower motors and drives, natural gas heater, gas controls, cooling, heating thermostat, air transition plenums, fresh air damper controls, cabinet	21.0
Installation - High Side	
Steel preparation, wiring start-up and test	4.0
Installation - Low Side	
Mounting transition plenum, furnishing and installing ductwork, diffusers, insulation, electrical wiring, mounting thermstat, gas piping, etc.	24.0
Total Equipment and Installation.....	100.0

Table 5.5 Cost Parameters for a Rooftop Heating and Cooling System Based on 300 Sq Ft/Ton by Equipment and Installation Components

	300 SQUARE FEET/TON			280 SQUARE FOOT/TON		
Cost Per Ton	Cost Per Sq.Ft. ¢/Sq.Ft.	High Side Equip.& Install. ¢/Sq.Ft.	Low Side Equip.& Install. ¢/Sq.Ft.	Cost Per Sq.Ft. ¢/Sq.Ft.	High Side Equip.& Install. ¢/Sq.Ft.	Low Side Equip.& Install. ¢/Sq.Ft.
$525	175.0	96.0	79.0	187.0	103.0	84.0
$465	155.0	85.0	70.0	166.0	91.0	75.0
$425	142.0	78.0	64.0	152.0	84.0	68.0
$385	128.0	71.0	57.0	137.5	76.0	61.5
$330	110.0	61.0	49.0	118.0	65.0	53.0

Table 5.6 Amortized High-Side Installed Equipment Cost for Rooftop Heating and Cooling Units Based on 10-Yr Economic Life at 8% interest and Constant Annual Reduction of 1.49

Installed Price: (High Side Equipment Only)	$289/Ton		$256/Ton		$211/Ton		$182/Ton	
Sq.Ft./Ton	¢/SqFt.	Yearly Payment to Amortize Over 10 Years ¢/SqFt/Yr	¢/SqFt.	Yearly Payment to Amortize Over 10 Years ¢/SqFt/Yr	¢/SqFt	Yearly Payment to Amortize Over 10 Years ¢/SqFt/Yr	¢/SqFt.	Yearly Payment to Amortize Over 10 Years ¢/SqFt/Yr
300	96.0	14.30	85.0	12.67	71.0	10.58	61.0	9.09
280	103.0	15.35	91.0	13.56	76.0	11.32	65.0	9.69

Table 5.7 Distribution of Initial Investment for a Chilled and Hot Water System for Key Tenants per Feasibility Study

Ten.	Total Sq.Ft. From Feasibility Study	Total Investment Cost of Chilled & Hot Water System ¢/Sq.Ft.	Total Investment Cost of Chilled & Hot Water System in $	Central Plant Investment by Telco	Landlord Investment for In-Store Work
1	119,853	2.68	321,206	$ 105,998	$ 215,208
2	90,000	2.68	241,200	79,596	161,604
3	34,200	2.40	82,080	27,086	54,994
4	26,650	2.14	57,031	18,821	38,210
5	17,550	1.82	31,941	10,541	21,400
6	7,900	3.22	25,438	8,395	17,043
7	8,800	1.91	16,808	5,547	11,261
			$ 775,704	$ 255,984	$ 519,720

Table 5.8 Distribution of Initial Investment for Projected Rooftop Heating and Cooling System for Mall Tenants per Feasibility Study

# of Stores From Feasibility Study	Total Sq.Ft. From Feasibility Study	Total Cost of HVAC System Per Sq.Ft. in $	Investment for Complete System in $	Investment for Central Plant Portion Only (55%) in $
2	16,340	2.00	32,680	17,974
4	21,000	2.00	42,000	23,100
6	23,400	2.14	50,076	27,542
6	17,880	2.28	40,766	22,421
4	8,880	2.28	20,246	11,135
5	7,550	2.42	18,271	10,049
7	8,400	2.42	20,328	11,180
5	4,150	2.60	10,790	5,934
1 (Mall)	54,950	1.40	76,930	42,312
			312,087	171,648

Table 5.9 Summary of Fixed Costs per J.C. Penney Analysis for HVAC Services Allocated to Central Plant and J.C. Penney Co. Store (cents per sq ft)

Item	Proportion of Total Cost Saved by Purchasing HVAC Services from Total Energy Plant	Proportion of Total Cost Exp. by Store Served by the Total Energy Plant	Total Cost to the Store With Their Own Complete HVAC System
Repairs	0.648	0.072	0.720
Maintenance and Filter Costs	1.100	1.650	2.750
Water Treatment	0.715	-	0.715
Prorated Labor for System Oper.	1.333	0.666	2.000
Space Rental	1.333	-	1.333
Total	5.129	2.388	7.518

Table 5.10 Summary of Variable Costs per J.C. Penney Analysis for HVAC Services Allocated to Central Plant and J.C. Penney Co. Store (cents per sq ft)

Item	Proportion of Total Cost Saved by Purchasing HVAC Services from Total Energy Plant	Proportion of Total Cost Exp. by Store Served by the Total Energy Plant	Total Cost to the Store With Their Own Complete HVAC System
Water Consumption	0.6570	-	0.6570
Electric Power Usage - (chillers, tower fans, chilled and condenser water pumps)	7.5110	-	7.5110
Hot Water Circulating Pumps	0.1090	-	0.1090
Heating Fuel	1.6000	-	1.6000
Total	9.8770		9.8770

FINAL DETERMINATION OF HVAC RATE FOR THE J.C. PENNEY CO. STORE AT SHER-DEN MALL

Fixed Costs -	5.1290
Variable Costs -	9.8770
Total -	15.0060

Table 5.11 HVAC Rate Schedule Submitted by Total Energy Leasing Corporation to the J.C. Penney Co. Based on Their Parameters for Variable Costs and Lowest Fixed Cost Schedule Submitted by a Major Key Tenant

Fixed Costs	Cost Per Sq Ft/Yr
Repairs, maintenance, filters, water treatment, prorated labor, space rental	7.8000
Variable Costs	
Water	.6570
Electric Air Conditioning - 8.04 kWh per sq ft per yr x 1.303¢/kWh	10.4761
Heating - 3,307,380 cu ft/yr: 6 months' use - Lone Star Gas Co. - Schedule 311	1.6814
Hot water circulating pumps - .322 kWh/sq ft per yr x 1.207¢/kWh	.3886
In-store maintenance and filter charge	1.6500
Total	22.6530

Table 5.12 Total Energy Plant Fuel Consumption and Cost

Year	Qtr.	Oil Gallons	Fuel Oil Equivalent MMBTU	Gas MCF MMBTU	Total Equivalent MMBTU	% Gas	Cents/ Gal.	Cents/ MCF	Total Dollars	Cents/ MMBTU
1973	1	96,193	13,466	41,952	55,418	75.70	11.75	34.10	25,609	46.21
	2	35,065	4,909	67,144	72,053	93.18	11.75	28.40	23,543	32.67
	3	34,940	4,892	69,974	74,926	93.37	12.75	33.30	23,895	31.89
	4	45,910	6,428	58,308	64,736	90.07	17.04	31.63	26,268	40.57
Total 1973		212,108	29,695	237,378	267,133	88.86	13.22	30.02	99,315	37.19
1974	1	47,310	6,624	45,424	52,048	87.30	26.10	48.95	34,583	66.44
	2	31,872	4,462	57,862	62,324	92.80	30.24	53.61	40,658	65.24
	3	30,155	4,222	64,619	68,841	93.90	30.95	56.09	45,580	66.21
	4	59,905	8,387	55,792	64,189	86.90	31.25	64.86	54,909	85.54
Total 1974		169,242	23,695	223,697	247,402	90.40	29.57	56.19	175,730	71.03
1975	1	39,260	5,496	47,183	52,679	73.60	32.47	91.46	55,902	106.12
	2	30,140	4,219	47,757	51,976	91.80	31.22	96.31	55,406	106.59
	3	28,160	3,943	61,029	64,972	89.80	32.80	96.12	67,895	104.50
	4	28,840	4,038	47,614	51,652	70.70	34.45	120.54	67,331	130.36
Total 1975		126,400	17,696	203,583	221,279	82.57	32.70	100.84	246,534	111.41
1976	1	36,440	5,102	46,712	51,564	90.50	34.95	137.17	76,801	148.90
	2	28,165	3,943	44,315	48,094	92.14	35.77	144.35	75,222	156.40
	3	30,640	4,290	49,950	54,545	91.50	36.48	151.40	86,895	159.31
	4	29,124	4,077	43,290	46,510	93.10	37.07	166.90	81,620	175.49
Total 1976		124,369	17,412	134,267	200,713	91.80	35.93	149.75	320,538	159.70
Change '76 vs 73		(87,739)		(53,111)	(66,420)		22.11	119.73		122.51
% Change "		(41.39)		(22.37)	(24.85)		171.79	398.83		329.41

Table 5.13 Production and Fuel Rate

		KWH x 1000			BTU/KWH		¢/KWH		
Year	Quarter	Gen.	Sold	Plant	Gross	Net	Gross	Net	¢/KWH Sold
1973	1	3,838	2,572	1,360	14,177	13,315	.650	.615	1.700
	2	4,209	2,559	1,730	17,118	15,734	.559	.514	1.730
	3	4,349	2,628	1,843	17,228	15,550	.549	.503	1.750
	4	3,795	2,324	1,484	17,058	15,581	.692	.624	1.860
Total 1973		16,191	10,083	6,417	16,499	15,111	.613	.562	1.730
1974	1	3,206	2,146	1,277	16,233	14,679	1.080	.975	1.950
	2	3,818	2,094	1,586	16,323	15,428	1.060	1.006	2.120
	3	3,901	2,167	1,753	17,647	16,158	1.170	1.070	2.130
	4	3,445	2,255	1,416	18,623	16,129	1.590	1.336	2.190
Total 1974		14,370	8,662	6,032	17,216	15,627	1.222	1.110	2.101
1975	1	3,229	1,989	1,238	16,314	15,974	1.730	1.695	2.330
	2	3,522	2,086	1,479	14,548	14,101	1.570	1.503	2.900
	3	3,568	2,064	1,551	18,209	15,990	1.900	1.671	2.710
	4	3,239	2,111	1,220	15,946	14,647	2.070	1.909	2.820
Total 1975		13,558	8,250	5,488	16,320	14,821	1.818	1.651	2.702
1976	1	2,877	2,127	932	17,923	15,143	2.690	2.255	3.050
	2	3,154	2,043	1,172	15,248	14,878	2.380	2.327	3.170
	3	3,611	2,219	1,437	15,105	14,660	2.410	2.335	3.120
	4	2,760	2,091	772	16,850	15,290	2.960	2.683	3.200
Total 1976		12,402	8,481	4,313	16,261	14,968	2.585	2.390	3.138
Change 1973 vs 1976								1.828	1.408
Percentage of Change								325.260	81.387

Table 5.14 Total Energy Plant Annual Labor Cost

	1973	1974	1975	1976	$ Increase 73 vs.76	% Increase 73 vs.76
No. of Employees	9	9	7	7		
Avg.Hourly Rate	3.83	4.14	4.32	4.70	.87	22.7
Avg.Hourly Rate (Ref.Texas Manpower Commission)	3.50	3.77	4.32	4.57	1.07	30.6
Base Pay	$ 61,396	64,068	68,144	75,378	13,982	22.7
Overtime Pay	9,601	6,306	8,984	7,459	(2,142)	(22.3)
Total Wages	70,997	70,374	77,128	82,837	11,840	16.7
Employee Benefits	2,338	2,196	4,133	3,357	1,019	43.5
Payroll Taxes	4,116	4,147	4,549	5,449	1,333	32.3
Total Labor Cost	$ 77,451	76,717	85,810	91,643	14,192	18.3
Overtime % Base	15.6	9.8	13.2	9.9		
Benefits % Base	3.8	3.4	6.0	4.4		
Taxes % Total	5.7	5.4	5.3	5.9		

Table 5.15 Major Components of Maintenance Cost

	1973	1974	1975	1976	% Total
Heating-Cooling	$ 6,692	7,371	3,272	9,483	25.2
Engine Generator	9,848	14,882	19,375	28,144	74.8
Total	$16,540	22,252	22,647	37,627	100.0

Table 5.16 Water and Chemical Consumption and Cost

Year	Quarter	Water Consumption in Gallons	Water and Sewer Charge ¢/1000 Gal.	Annual Water Cost	Annual Chemical Cost	Total Costs Water and Chemicals	¢/1000 Gal. Water Consumed
1973	1	3,564,594	47.05	$1,498	$ 1,073	$ 2,571	72.11
	2	3,557,990	51.24	1,803	313	2,116	59.47
	3	6,315,814	46.75	2,803	3,152	5,955	94.28
	4	4,375,126	49.43	2,527	2,552	5,079	116.09
Total 1973		17,813,524	48.37	$8,631	$ 7,090	$ 15,721	88.25
1974	1	1,884,212	53.02	884	2,409	3,293	174.78
	2	4,704,995	50.41	2,372	1,225	3,597	76.45
	3	6,645,531	46.09	2,960	2,817	5,777	86.92
	4	3,958,789	51.51	2,042	2,099	4,141	104.60
Total 1974		17,193,527	50.26	8,258	8,550	16,808	97.76
1975	1	2,401,477	52.39	1,258	1,440	2,698	112.37
	2	4,074,153	50.28	2,048	2,015	4,063	99.73
	3	5,802,114	47.93	2,781	2,124	4,905	84.54
	4	3,146,733	51.85	1,632	-0-	1,632	51.86
Total 1975		15,424,475	50.05	7,719	5,579	13,298	86.21
1976	1	2,927,614	63.54	1,860	1,409	3,269	111.65
	2	3,921,015	63.09	2,474	2,654	5,128	130.78
	3	5,877,896	58.57	3,443	1,554	4,997	85.01
	4	3,006,163	63.51	1,909	2,366	4,275	142.22
Total 1976		15,732,688	61.57	9,686	7,983	17,669	112.30
Change '76 vs. '73		2,080,836	13.00	1,055			24.05
Percentage Change		12.14	26.00	12.00			27.25

Table 5.17 Property Taxes, Insurance, and Franchise Fees

	1973	1974	1975	1976
Taxes	$ 31,279	$ 32,293	$ 32,045	$ 32,111
Insurance	10,134	11,004	13,429	13,998
Franchise Fees	15,000	19,577	15,000	15,000
Total	$ 56,413	$ 62,874	$ 60,474	$ 61,109

Table 5.18 Total Energy Plant Operating Expense Summary

	ANNUAL COST 1973	1974	1975	1976	% Total Cost 1976	Total Increase 1973 Vs. 1976	% Inc. 1973 Vs. 1976	% of Total Increase
Total KWH Generated X 1,000	16,191	14,370	13,558	12,402		(3,789)	(23.0)	
Fuel	$105,551	$176,406	$251,407	$320,466	57.85	$214,915	203.6	81.31
Labor	78,560	77,598	86,687	90,544	16.34	11,984	15.2	4.31
Maintenance	16,540	22,251	22,647	37,624	6.79	21,084	127.5	7.97
Water & Chemicals	15,721	16,808	13,299	17,669	3.19	1,948	12.4	.74
Lube Oil	6,874	13,674	13,914	14,045	2.55	7,171	104.3	2.71
Supplies & Misc.	9,889	7,236	6,754	12,481	2.25	2,592	26.2	.98
Total Direct Oper.Exp.	233,135	313,973	394,708	492,829	88.97	259,694	111.4	98.22
Total Indirect " "	56,413	62,874	60,474	61,109	11.03	4,696	8.3	1.78
Total Cost	$289,548	$376,847	$455,182	$553,938	100.0	$264,390	91.3	100.00

Table 5.19 Total Energy Plant Allocation of Operating Expenses

	1973		1974		1975		1976	
	$	¢/KWH	$	¢/KWH	$	¢/KWH	$	¢/KWH
Electric								
KWH Sold	10,083		8,665		8,240		8,482	
Electric Costs:								
Fuel	$ 58,389	.579	$ 93,031	1.074	$136,756	1.660	$193,332	2.279
Labor	53,892	.534	53,232	.614	59,467	.721	62,113	.732
Maintenance	9,848	.098	14,881	.172	19,375	.235	28,144	.332
Water & Chemicals	786	.008	840	.010	665	.008	883	.010
Lube Oil	6,350	.063	12,990	.150	13,218	.160	13,343	.157
Miscellaneous	4,945	.049	3,618	.042	3,377	.041	6,240	.074
Indirect	27,867	.078	31,060	.358	29,374	.362	30,188	.356
Total Electric Costs	$162,077	1.607	$209,652	2.420	$262,732	3.188	$334,243	3.941
HVAC								
Square Footage Served	384,692		379,352		382,496		385,174	
HVAC Costs:								
Fuel	$ 47,162	12.259	$ 83,375	21.978	$114,651	29.974	$127,134	33.007
Labor	24,668	6.412	24,366	6.280	27,220	7.015	28,431	7.328
Maintenance	6,692	1.739	7,370	1.899	3,272	.843	9,480	2.443
Water & Chemicals	14,935	3.882	15,968	4.115	12,634	3.256	16,786	4.326
Lube Oil	524	.136	684	.176	696	.179	702	.181
Miscellaneous	4,944	1.285	3,618	.932	3,377	.870	6,241	1.609
Indirect	28,545	7.420	31,814	8.199	30,600	7.887	30,927	7.971
Total HVAC Costs	$127,470	3.136	$167,195	44.074	$192,450	50.314	$219,701	57.039

Table 5.20 TELCO of Texas, Sherman Energy Management Services, Inc., Depreciation Account

Year	Total Energy System Capital Investment	Accumulated Depreciation	Straight-Line 30 Year Depreciation Expense
1970	$ 1,922,601.17	$ 8,011.00	$ 8,011.00
1971	1,893,995.57	71,100.12	63,089.12
1972	1,894,343.89	134,239.10	63,138.98
1973	1,916,004.82	197,744.90	63,505.80
1974	1,916,004.82	261,611.72	63,866.82
1975	1,916,469.82	325,487.54	63,875.82
1976	1,916,849.82	389,379.84	63,892.30

Table 5.21 Bad Debts and Reserve for Doubtful Accounts

	Revenue	Net Charges or Credits or Bad Debts and Reserve for Doubtful Accounts	% of Total Revenue
1973	$ 362,030	$ 1,900	.524
1974	450,279	(8,991)	-
1975	522,512	2,655	.508
1976	602,570	709	.117

Table 5.22 Modification in HVAC and Electrical Fuel Adjustment Charges

Month/ Year	HVAC FUEL ADJUSTMENT Original Allocation ¢/sqft/mo.	HVAC FUEL ADJUSTMENT Rev.Charge Pro Rata ¢/sqft/mo.	ELECTRIC FUEL ADJUSTMENT Original Allocation ¢/KWH/Mo.	ELECTRIC FUEL ADJUSTMENT Rev.Charge Formula ¢/KWH/Mo.
1973				
November	.61415	.21305	.14560	.05755
December	.61415	.21305	.15400	.08092
1974				
January	.94160	.33324	.16520	.16672
February	2.10000	.78066	.17360	.34901
March	1.99000	.72264	.21000	.45593
April	2.09400	.76572	.22500	.50807
May	2.92000	1.04440	.24300	.46108
June	3.31000	1.17240	.21900	.46306
July	3.84000	1.41350	.24900	.46596
August	4.06000	1.51690	.30000	.48127
September	3.57000	1.39184	.36000	.49645
October	3.50000	1.36840	.36000	.50173
November	4.01000	1.57530	.33000	.53420
December	3.99500	1.56240	.33000	.57526
1975				
January	5.00000	1.99225	.32100	.76771
February	3.54000	1.44805	.33000	.84058
March	6.03400	2.40940	.56400	1.02221

Table 5.23 1973 Variance Analysis

	Budget	Actual	Favorable Variance (Unfavorable) A/B
HVAC Service Analysis			
Square Footage:			
Existing Tenants	320,477	324,842	101.4
New Tenants	6,585		-
Landlord	59,850	59,850	100.0
Total	386,912	384,692	(99.4)
Revenue:			
Existing Tenants	$ 165,096	$ 183,585	(95.5)
New Tenants	3,124		
Landlord	23,940		
Purchase Gas Adj.	-	2,680	-
Wage Cost Adj.	2,548	1,271	(49.8)
Real Estate Tax Adj.	1,428	-	-
Total	$ 196,138	$ 187,536	(95.6)
Electric Service Analysis			
KWHR Sold	10,370,640	10,080,583	(97.2)
Revenue:			
Existing Tenants and Landlord	$ 169,244	$ 163,972	(96.8)
New Tenants	1,709		
Electric Fuel Adj.	9,548	10,432	(92.7)
Total	$ 180,501	$ 174,404	(96.6)
Electric KWH Produced			
Generation	14,492,701	16,191,000	111.7
Sold	10,370,640	10,083,000	(97.2)
Plant	4,122,061	6,417,000	(155.6)
Unaccounted	-	(309,000)	-
Plant Efficiency			
Gross BTU per KWH	15,232	16,499	(108.3)
Net BTU per KWH	12,499	15,110	(120.8)
Fuel Usage			
Generation MMBTU	181,156	244,658	(135.0)
Boilers - Heating	20,000	22,475	56.7
Boilers - Cooling	19,600		
Total	220,756	267,133	(121.0)
Type of Fuel & Percent			
Gas - MCF (82.7)	182,533	237,378 (88.8)	(130.0)
Oil - Gallons	273,024	212,108	77.7
Oil - EMMBTU (17.3)	38,223	29,695 (11.2)	77.7
Total EMMBTU	220,756	267,133	(121.0)
Cost of Fuel			
Gas - $	$ 51,765	$ 71,265	(137.6)
Gas - ¢/MCF	28.36	30.02	(105.8)
Oil - $	33,446	28,050	83.8
Oil - ¢/Gallon	12.25	13.22	107.9
Oil - ¢EMCF	87.50	94.43	
Total - $	$ 85,211	$ 99,315	(116.5)
Ratio Analysis			
HVAC Revenue - ¢/HVAC Sq. Ft. Served	50.69	48.75	(96.1)
Electric Revenue -¢/KWHR Sold	1.740	1.730	(99.4)
KWH Sold/Sq.Ft. Served	21.35	20.85	(97.6)
Cost of Fuel - ¢/KWH Gen. Gross	.587	.613	(104.4)
Electric Square Ft. Served	485,678	483,597	

Table 5.24 1974 Variance Analysis

	Budget	Actual	Favorable Variance (Unfavorable) A/B
HVAC Service Analysis			
Square Footage:			
Existing Tenants	318,479	319,502	100.3
New Tenants	-	-	
Landlord	59,850	59,850	100.0
Total	378,329	379,352	100.3
Revenue:			
Existing Tenants	$ 155,248	$ 179,665	(99.7)
New Tenants	-	-	-
Landlord	24,844		
Purchase Gas Adj.	65,258	81,050	124.1
Wage Cost Adj.	4,720	7,500	158.8
Real Estate Tax Adj.	-	-	
Total	$ 250,070	$ 268,215	107.3
Electric Service Analysis			
KWHR Sold	9,886,812	8,552,000	(87.6)
Revenue:			
Existing Tenants	$ 150,295	$ 150,079	(98.1)
New Tenants	1,601		
Landlord	10,247		
Electric Fuel Adj.	19,346	22,985	118.8
Total	$ 181,489	182,064	100.3
Electric KWHR Produced			
Generation	16,102,991	14,370,000	(89.2)
Sold	9,886,812	8,662,000	(87.6)
Plant	6,216,179	6,032,000	97.0
Unaccounted	-	(324,000)	-
Plant Efficiency			
Gross BTU/KWH	15,500	17,217	(111.1)
Net BTU/KWH	14,195	15,627	(110.1)
Fuel Usage			
Generation - MMBTU	228,581	224,564	98.2
Boilers - Heating	11,016)	22,838	
Boilers - Cooling	10,000)		(108.7)
Total	249,597	247,402	99.1
Type of Fuel (Percent)			
Gas MCF - (87.7)	218,813	223,697 (90.4)	(102.2)
Oil Gallons	219,882	169,242	76.9
Oil - EMMBTU (12.3)	30,784	23,695 (9.6)	
Total EMMBTU (100.0)	249,597	247,402	99.1
Cost of Fuel			
Gas - $	$ 114,170	$ 125,695	(110.1)
Gas - ¢/MCF	52.18	56.19	
Oil - $	56,845	50,004	88.0
Oil - ¢/Gallon	25.85	29.57	
Oil - ¢/EMCF	184.64	211.21	
Total - $	171,015	175,730	(102.7)
Ratio Analysis			
HVAC Revenue - ¢/HVAC Sq.Ft. Served	66.10	70.70	106.9
Electric Revenue - ¢/KWH Sold	1.835	2.101	114.4
KWH Sold/Sq.Ft. Served	21.15	18.48	(87.4)
Cost of Fuel - ¢/KWH Generated	1.062	1.222	(115.1)
Electric Sq.Ft. Served	467,462	468,544	

Table 5.25 1975 Variance Analysis

	Budget	Actual	Favorable Variance (Unfavorable) A/B
HVAC Service Analysis			
Square Footage:			
Existing Tenants	318,712	321,856	100.9
New Tenants	-	-	
Landlord	60,640	60,640	100.0
Total	379,352	382,496	100.8
Revenue:			
Existing Tenants	$ 161,028	$	
New Tenants	-	182,785	(98.3)
Landlord	24,872		
Purchase Gas Adj.	121,619	103,177	(84.8)
Wage Cost Adj.	12,149	11,745	(96.7)
Real Estate Tax Adj.	-	-	-
Total	319,668	297,707	(93.1)
Electric Service Analysis			
KWHR Sold	9,039,820	8,259,338	(91.4)
Revenue:			
Existing Tenants	$ 155,345		102.4
New Tenants	-	171,066	
Landlord	11,719		
Electric Fuel Adj.	34,415	51,873	150.7
Total	201,479	222,939	110.7
Electric KWHR Produced			
Generation	15,051,820	13,558,000	(90.1)
Sold	9,039,820	8,259,338	(91.4)
Plant	5,282,000	5,487,098	(103.8)
Unaccounted	(270,000)	(188,436)	69.7
Plant Efficiency			
Gross BTU/KWH	16,648	16,320	98.0
Net BTU/KWH	13,700	14,821	(108.1)
Fuel Usage			
Generation - MMBTU	206,210	200,948	97.4
Boilers - Heating	44,375	20,329	45.8
Boilers - Cooling	-	-	-
Total	250,585	221,279	88.3
Type of Fuel (Percent)			
Gas MCF - (91.7)	229,675	203,583 (92.0)	88.6
Oil Gallons	149,349	126,400	84.6
Oil - EMMBTU (8.3)	20,910	17,696 (8.0)	
Total EMMBTU (100.0)	250,585	221,279	88.3
Cost of Fuel			
Gas - $	$ 195,776	$ 205,205	(104.8)
Gas - ¢/MCF	85.24	100.80	
Oil - $	45,971	41,329	89.9
Oil - ¢/Gallon	30.78	32.70	
Oil - ¢/EMCF	219.85	233.56	
Total - $	$ 241,747	$ 246,534	(101.98)
Ratio Analysis			
HVAC Revenue - ¢/HVAC Sq.Ft. Served	84.26	77.83	(92.3)
Electric Revenue - ¢/KWH Sold	3.20	2.6999	(84.3)
KWH Sold/Sq.Ft. Served	19.29	17.51	(90.7)
Cost of Fuel - ¢/KWH Generated	1.606	1.818	(113.2)
Electric Sq.Ft. Served	468,524	471,668	

Table 5.26 1976 Variance Analysis

	Budget	Actual	Favorable Variance (Unfavorable) A/B
HVAC Service Analysis			
Square Footage:			
Existing Tenants	321,856	325,324	101.0
New Tenants			
Landlord	60,640	59,850	(98.7)
Total	382,496	385,174	100.7
Revenue:			
Existing Tenants			
New Tenants	$ 196,560	192,636	(98.0)
Landlord			
Purchase Gas Adj.	144,005	123,145	(85.5)
Wage Cost Adj.	19,335	18,897	(97.7)
Real Estate Tax Adj.	-	-	
Total	359,900	334,678	(92.9)
Electric Service Analysis			
KWHR Sold	8,928,000	8,482,510	(95.0)
Revenue:			
Existing Tenants			
New Tenants	$ 234,400	$ 238,253	101.6
Landlord			
Electric Fuel Adj.	19,900	27,888	140.1
Total	254,300	266,141	104.7
Electric KWHR Produced			
Generation	13,739,000	12,402,000	(90.3)
Sold	8,928,000	8,482,510	(95.0)
Plant	4,823,000	4,314,534	89.5
Unaccounted	-	(395,044)	
Plant Efficiency			
Gross BTU/KWH	16,589	16,264	98.0
Net BTU/KWH	14,788	15,045	(101.7)
Fuel Usage			
Generation - MMBTU	203,178	186,588	91.8
Boilers - Heating			
Boilers - Cooling	24,750	15,129	61.1
Total	227,928	201,719	88.5
Type of Fuel (Percent)			
Gas MCF - (91.7)	209,010	184,267 (91.3)	88.2
Oil Gallons	135,128	124,639	92.2
Oil - EMMBTU (8.3)	18,918	17,450 (8.7)	92.2
Total EMMBTU (100.0)	227,928	201,717	88.5
Cost of Fuel			
Gas - $	$ 267,532	$ 275,945	(103.1)
Gas - ¢/MCF	128.00	149.75	
Oil - $	48,646	44,783	92.0
Oil - ¢/Gallon	36.00	35.93	
Oil - ¢/EMCF	257.10	256.64	
Total - $	316,178	320,728	(101.4)
Ratio Analysis			
HVAC Revenue - ¢/HVAC Sq.Ft. Served	94.09	86.89	(92.3)
Electric Revenue - ¢/KWH Sold	2.84	3.13	110.2
KWH Sold/Sq.Ft. Served	18.92	17.88	(94.5)
Cost of Fuel - ¢/KWH Generated	2.301	2.585	(112.3)
Electric Sq.Ft. Served	471,802	474,346	

EXHIBIT 5.1

Analysis of the Operating Cost Structure of Rooftop Heating and Cooling Plant

Center - Sher-Den Mall Tenant - Zale Sher-Den Mall Inc. Square Feet - 2,250 Type of System - RTH&C Operating Hours - 3,744 A/C Tonnage - 8.0	Basic Annual Cost by Function ¢/sq ft/yr	Annual Dollar Expend-iture	kWh/yr* cf/yr**	Rate Schedule	
				Electric Utility	Gas Utility
Installed Equipment Cost (Hi Side) (Amortized over 10 years) (1)	18.68	420			
Cooling Energy (2) kW Demand 14	32.36	728	33,527*	Texas Power & Light Co.	Lone Star Gas Co.
Heating Energy (3)	8.00	180	98,300**	General Service GS-1	Commercial Service Schedule (311)
Maintenance, Repairs and Filters (4)	22.40	504			
Replacement Cost Amortized (5)	9.12	205			
Insurance & Taxes (6)	4.56	103			
Total Operating Costs	76.44	1,720			
Total Owning & Operating Cost RMH&C System	95.12	2,140			
Lighting Energy (7) kW Demand 24	Meter	Meter	89,470*		
HVAC Rate per Subscriber Service Agreement	85.00				

EXHIBIT 5.1 (Cont'd)

NOTES: Explanation of Rate Structure

(1) A complete roof top heating and cooling plant for 2,250 square feet is estimated at $2.28 per square feet installed. As the RTH&C plant less the instore work and air handler is amortized over 10 years and represents 55% of the installation (.149 factor x .55), the amortized installed equipment cost for the portion of the system supplied is included in the tenant displaced cost analysis.

(2) Cooling Energy Cost based on 14 kW Demand - 2,050 effective full load hours for refrigeration component. 2,422 hours of operation for air conditioning auxiliaries. Total kWhr - 33,527.

(3) Heating Energy Cost based on 72° temperature indoors for daytime operation. 65° temperature indoors for non-operating hours. 18° design temperature. Average winter temperature 48.6°. Credit allowed for heat gain from lights. No. of Degree Days - 2,272.

(4) Maintenance, Repairs & Filters - includes maintenance contract, replacement of parts - valves, pumps, shafts, bearings, belts, isolators, replacement of piping, electrical wiring, filter maintenance, oiling and greasing, painting equipment, refrigeration pumpdown and recharge labor for above. Computed at $30/ton for preventative maintenance, $8/ton for filter changes and $25/ton for repairs, including labor charges.

(5) Replacement Cost - Amortized: See attached write-up on air handlers, electrical wiring, water piping and valves.

(6) Insurance Policies purchased and Taxes assessed against HVAC equipment. The annual cost of the insurance and taxes for HVAC equipment, installed in a shopping center complex, is estimated at 1% each of the original equipment cost per square foot per year.

(7) Lighting and Miscellaneous power kW Demand computed as follows: General Lighting Design Layout and Specialty Lighting 10.0 watts/sq ft, Miscellaneous Power .5 watts/sq ft, Air Handlers .33 watts/sq ft, Nonoperating Hours .1 watts/sq ft.

EXHIBIT 5.1 (Cont'd)

Replacement Cost

Evaporator coil replacement experience: 2/3 of one coil every 20 year period. Labor to reinstall -- 2 men one to two days.

AIR HANDLING SECTION

ITEM	EQUIVALENT REPLACEMENT
Casings	1/2 in 20 years
Heating Coils	2/3 in 20 years
Humidifiers	4 in 20 years
Fan Motors	1 in 20 years
Fan Bearings	2 in 20 years
Fan Shaft	1 in 20 years
V Belts	2 sets in 20 years
Dampers	1 in 20 years
Paint	4 times in 20 years

WATER & REFRIGERANT PIPING

Black Iron Pipe	5% per year
Galvanized Iron Pipe	3% per year
Wrought Iron Pipe	2% per year
Copper Pipe	2% per year

ELECTRICAL WIRING

Equipment Wiring	4% per year
Control Wiring	2% per year
Electrical Temperature Controls	10% per year
Motor Starting Equipment	1 in 20 years
Switches	1 in 20 years

VALVES

Temperature Control Equipment	10% per year
Shut Off Valves	3% per year
Refrigerant Expansion Valves	10% per year
Refrigerant Solenoid Valve	10% per year

EXHIBIT 5.2

Analysis of the Operating Cost Structure of Rooftop Heating and Cooling Plant

Center - Sher-Den Mall, Sherman, Texas Tenant - Mangel's Dept. Store Square Feet - 6,000 Type of System - RTH&C Operating Hours - 4,056 A/C Tonnage - 21	Basic Annual Cost by Function ¢/Sq Ft /Yr	Annual Dollar Expend-iture	kWh/yr* c.f./yr**	Rate Schedule: Electric Utility	Rate Schedule: Gas Utility
Installed Equipment Cost (Amortized over 10 years) (1)	29.80	1,788			
Cooling Energy (2) kW Demand 38	24.33	1,490	79,665*	Texas Power & Light Co.	Lone Star Gas Co.
Heating Energy (3)	3.08	185	243,800**	Large General Service LP-20	Commercial Service Schedule (311)
Maintenance, Repairs and Filters (4)	18.20	1,092			
Insurance & Taxes (5)	3.32	199			
Total Operating Costs	79.23	4,754			
Total Owning & Operating Cost RHM&C System					
Lighting Energy (6) kW Demand 33	Meter	Meter	133,850*		
HVAC Rate per Subscriber Service Agreement	67.00	4,020			

EXHIBIT 5.2 (Cont'd)

NOTES: Explanation of Rate Structure

(1) A complete roof top heating and cooling plant for 6,000 square feet is estimated at $2.00 per square foot installed. As the RTH&C plant is amortized over 10 years, the amortized installed equipment cost is included in the tenant displaced cost analysis.

(1-A) Roof top heating and cooling plant includes - hermetic compressor, insulated cabinet, air-cooled condensers, condenser fans, magnetic starters, high-low pressure cut-outs, refrigerant piping, electric wiring, 24-volt controls, filter drier, low ambient controls, throwaway filters, cooling coils and TX valves, blower motor and drives, natural gas heater, heater controls, cooling-heating thermostats, air transition plenum, fresh air dampers, linkages, damper motors. Installation - roof preparation - cutting, patching, flashing, flashing collars, wiring - power and control, piping, check, test and start system, mounting transition plenum, furnishing and installing ductwork, diffusers, insulation, mounting thermostat and control panel, gas piping, etc.

(2) Cooling Energy Cost based on 38 kW Demand - 2,050 effective full load hours for refrigeration component. 2,422 hours of operation for air conditioning auxiliaries. Total kWh - 79,665.

(3) Heating Energy Cost based on 72° temperature indoors for daytime operation. 60° temperature indoors for non-operating hours. 18° Design temperature. Average winter temperature 48.6°. Credit allowed for heat gain from lights. Number of degree days - 2,272.

(4) Maintenance, Repairs & Filters - includes maintenance contract, replacement of parts - valves, pumps, shafts, bearings, belts, isolators, replacement of piping, electrical wiring, filter maintenance, oiling and greasing, painting equipment, refrigeration pumpdown and recharge labor for above. Computed at $25/ton for preventative maintenance, $7/ton for filter changes and $20/ton for repairs, including labor charges.

(5) Insurance policies purchased and taxes assessed against HVAC equipment. The annual cost of the insurance and taxes for HVAC equipment, installed in a shopping center complex, is estimated at 1% each of the original equipment cost per square foot per year.

(6) Lighting and miscellaneous power kW demand computed as follows: General lighting design layout and specialty lighting 4.9 watts/sq ft, miscellaneous power .25 watts/sq ft, air handlers .35 watts/sq ft, nonoperating hours .25 watts/sq ft.

EXHIBIT 5.2 (Cont'd)

Replacement Cost

Evaporator coil replacement experience: 2/3 of one coil every 20-year period. Labor to reinstall -- 2 men one to two days.

AIR HANDLING SECTION

ITEM	EQUIVALENT REPLACEMENT
Casings	1/2 in 20 years
Heating Coils	2/3 in 20 years
Humidifiers	4 in 20 years
Fan Motors	1 in 20 years
Fan Bearings	2 in 20 years
Fan Shaft	1 in 20 years
V Belts	2 sets in 20 years
Dampers	1 in 20 years
Paint	4 times in 20 years

WATER & REFRIGERANT PIPING

Black Iron Pipe	5% per year
Galvanized Iron Pipe	3% per year
Wrought Iron Pipe	2% per year
Copper Pipe	2% per year

ELECTRICAL WIRING

Equipment Wiring	4% per year
Control Wiring	2% per year
Electrical Temperature Controls	10% per year
Motor Starting Equipment	1 in 20 years
Switches	1 in 20 years

VALVES

Temperature Control Equipment	10% per year
Shut Off Valves	3% per year
Refrigerant Expansion Valves	10% per year
Refrigerant Solenoid Valve	10% per year

EXHIBIT 5.3

Analysis of the Operating Cost Structure of Rooftop Heating and Cooling Plant

Center - Sher-Den Mall Tenant - Lilley's Dept. Store Sq Ft - (14,060+7,020)/21,080 Type of System - RTH&C Operating Hours - 4,056 A/C Tonnage - 75 Tons	Basic Annual Cost by Function ¢/Sq Ft /Yr	Annual Dollar Expend-iture	kWh/yr * cf/yr**	Rate Schedule Electric Utility	Rate Schedule Gas Utility
Installed Equipment Cost (Amortized over 10 Years) (1)	25.00	5,270			
Cooling Energy (2) kW Demand 105	18.95	3,995	228,029*	Texas Power & Light Co.	Lone Star Gas Co.
Heating Energy (3)	2.60	548	856,560**	Large General Service LP-20	Commercial Service Schedule (311)
Maintenance, Repairs and Filters (4)	14.23	2,999			
Insurance & Taxes (5)	3.36	708			
Total Operating Costs	39.14	8,250			
Total Owning & Operating Cost RMH&C System	64.14	13,520			
Lighting Energy (6) kW Demand 110	Meter	Meter	448,999*		
HVAC Rate per Subscriber Service Agreement	58.00	12,226			

EXHIBIT 5.3 (Cont'd)

NOTES: Explanation of Rate Structure

(1) A complete rooftop heating and cooling plant for 21,040 square feet is estimated at $1.68 per sq ft installed. As the RTH&C plant is amortized over 10 years, the amortized installed equipment cost is included in the tenant displaced cost analysis.

(1-A) Rooftop heating and cooling plant includes - hermetic compressor, insulated cabinet, air-cooled condensers, condenser fans, magnetic starters, high-low pressure cut-outs, refrigerant piping, electric wiring, 24-volt controls, filter drier, low ambient controls, throwaway filters, cooling coils with DX valves, blower motor and drives, natural gas heater, heater controls, cooling-heating thermostats, air transition plenum, fresh air dampers, linkages, damper motors. Installation - roof preparation - cutting, patching, flashing, flashing collars, wiring - power and control, piping, check, test and start system, mounting transition plenum, furnishing and installing ductwork, diffusers, insulation, mounting thermostat and control panel, gas piping, etc.

(2) Cooling Energy Cost based on 105 kW Demand - 2,050 effective full load hours for refrigeration component. 2,422 hours of operation for air conditioning auxiliaries. Total kWh - 228,029.

(3) Heating Energy Cost based on 72^{o} temperature indoors for daytime operation. 55^{o} temperature indoors for non-operating hours. 18^{o} Design temperature. Average winter temperature 48.6^{o}. Credit allowed for heat gain from lights. No. of degree days - 2,272.

(4) Maintenance, Repairs & Filters - includes maintenance contract, replacement of parts - valves, pumps, shafts, bearings, belts, isolators, replacement of piping, electrical wiring, filter maintenance, oiling and greasing, painting equipment, refrigeration pumpdown and recharge labor for above. Computed at $20/ton for preventive maintenance, $5/ton for filter changes and $15/ton for repairs, including labor charges.

(5) Insurance policies purchased and taxes assessed against HVAC equipment. The annual cost of the insurance and taxes for HVAC equipment, installed in a shopping center complex, is estimated at 1% each of the original equipment cost per square foot per year.

(6) Lighting and miscellaneous power kW demand computed as follows: General lighting design layout and specialty lighting 4.5 watts/sq ft, miscellaneous power .25 watts/sq ft, air handlers .50 watts/sq ft, nonoperating hours .25 watts/sq ft

EXHIBIT 5.3 (Cont'd)

Replacement Cost

Evaporator coil replacement experience: 2/3 of one coil every 20-year period. Labor to reinstall -- 2 men one to two days.

AIR HANDLING SECTION

ITEM	EQUIVALENT REPLACEMENT
Casings	1/2 in 20 years
Heating Coils	2/3 in 20 years
Humidifiers	4 in 20 years
Fan Motors	1 in 20 years
Fan Bearings	2 in 20 years
Fan Shaft	1 in 20 years
V Belts	2 sets in 20 years
Dampers	1 in 20 years
Paint	4 times in 20 years

WATER & REFRIGERANT PIPING

Black Iron Pipe	5% per year
Galvanized Iron Pipe	3% per year
Wrought Iron Pipe	2% per year
Copper Pipe	2% per year

ELECTRICAL WIRING

Equipment Wiring	4% per year
Control Wiring	2% per year
Electrical Temperature Controls	10% per year
Motor Starting Equipment	1 in 20 years
Switches	1 in 20 years

VALVES

Temperature Control Equipment	10% per year
Shut Off Valves	3% per year
Refrigerant Expansion Valves	10% per year
Refrigerant Solenoid Valve	10% per year

EXHIBIT 5.4

Analysis of the Operating Cost Structure of Rooftop Heating and Cooling Plant

Center - Sher-Den Mall S.C. Tenant - S. H. Kress & Co. Sq Ft - 28,350 Type of System - RTH&C Operating Hours - 4,056 A/C Tonnage - 107	Basic Annual Cost by Function ¢/Sq Ft /Yr	Annual Dollar Expend-iture	kWh/yr* cf/yr**	Rate Schedule Electric Utility	 Gas Utility
Cooling Energy (1) kW Demand 152	20.06	5,687	363,104*	Texas Power & Light Co.	Lone Star Gas Co.
Heating Energy (2)	3.05	864	1,218,473**	Large General Service	Commercial Service
DHW Supply Energy (3)	7.42	2,104	115,746*		
Maintenance, Repairs & Filters (4)	8.68	2,461		LP-20	(Schedule 311)
Replacement Cost Amortized (5)	7.42	2,103			
Insurance & Taxes (6)	3.30	935			
Lighting Energy (7) kW Demand 120	Metered	Metered	484,530*		
Total Operating Costs	49.93				

EXHIBIT 5.4 (Cont'd)

NOTES: Explanation of Rate Structure

(1) Cooling Energy Cost based on 152 kW Demand - 2,270 effective full load hours for refrigeration component. 2,587 hours of operation for air conditioning blowers. Total kWH/yr - 363,104.

(2) Heating Energy Cost based on 72° temperature indoors for daytime operation. 55° temperature indoors for nonoperating hours. 18° Design temperature. Average winter temperature 48.6°. Credit allowed for heat gain from lights. No. of Degree Days - 2,272.

(3) Based on heating of water for Food Service Dept. and kitchen and sanitary use.

(4) Maintenance, Repairs & Filters - included maintenance contract, replacement of parts - valves, pumps, shafts, bearings, belts, isolators, replacement of piping, electrical wiring, filter maintenance, oiling and greasing, painting equipment, refrigeration pumpdown and recharge labor for above. Computed at $10/ton for preventive maintenace. $3/ton for filter changes. $10/ton for repairs, including labor charges.

(5) Replacement Cost - Amortized: See attached write-up on compressors coils, air handlers, electrical wiring and valves.

(6) Insurance Policies purchased and Taxes assessed against HVAC equipment. The annual cost of the insurance and taxes for HVAC equipment, installed in a shopping center complex, is estimated at 1% each of the original equipment cost per square foot per year.

(7) Light & Miscellaneous Power kW Demand computed as follows:

Stock & Receiving & Service Areas	2.1 watts/sq ft
Sales Area	3.6 watts/sq ft
Food Area & Kitchen Area	7.0 watts/sq ft
Raised Office Area	2.8 watts/sq ft
Air-Handlers	.53 watts/sq ft
Non-Operating Hours	.5 watts/sq ft

EXHIBIT 5.4 (Cont'd)

Replacement Cost

Industry experience for compressor replacements is as follows: Two compressor breakdowns per unit over 20 years. Labor charges computed on basis of $300 per mechanical failure and $450 per light burnout.

Evaporator coil replacement experience: 2/3 of one coil every 20 year period. Labor to reinstall -- 2 men one to two days.

Non-cleanable condenser coil replacement experience -- 2 coil changes over 20 year period. Labor to reinstall coil -- 1 man -- one day.

AIR HANDLING SECTION

ITEM	EQUIVALENT REPLACEMENT
Casings	1/2 in 20 years
Heating Coils	2/3 in 20 years
Humidifiers	4 in 20 years
Fan Motors	1 in 20 years
Fan Bearings	2 in 20 years
V Belts	2 sets in 20 years
Dampers	1 in 20 years
Paint	4 times in 20 years

WATER & REFRIGERANT PIPING

Black Iron Pipe	5% per year
Galvanized Iron Pipe	3% per year
Wrought Iron Pipe	2% per year
Copper Pipe	2% per year

ELECTRICAL WIRING

Equipment Wiring	4% per year
Control Wiring	2% per year
Electrical Temperature Controls	10% per year
Motor Starting Equipment	1 in 20 years
Switches	1 in 20 years

VALVES

Temperature Control Equipment	10% per year
Shut Off Valves	3% per year
Refrigerant Expansion Valves	10% per year
Refrigerant Solenoid Valve	10% per year

EXHIBIT 5.5

Analysis of the Operating Cost Structure of Roof Top Heating and Cooling Plant

Center = Sher-Den Mall Tenant - Wyatt Cafeteria Sq Ft - 9,825 Type of System - RTH&C Operating Hours - 3,640 A/C Tonnage - 106	Basic Annual Cost by Function ¢/Sq Ft/Yr	Annual Dollar Expend-iture	kWh/yr* cf/yr**	Rate Schedule Electric Utility	Rate Schedule Gas Utility
Installed Equipment Cost (Amortized over 10 yrs)	48.11	4,727			
Cooling Energy (1) kW Demand 150	64.1	6,297	360,057*	Texas Power & Light Co.	Lone Star Gas Co.
Heating Energy (2)	3.0	295	396,586**	Large General Service	Commercial Service
DHW Supply Energy (3)	14.57	1,432	2,417,811**		(Schedule 311)
Maintenance, Repairs & Filters (4)	17.80	1,749		LP-20	
Replacement Cost Amortized (5)	9.66	949			
Insurance & Taxes (6)	6.44	633			
Total Operating Costs	115.57	11,355			
Total Owning & Operating Cost RMH&C System	163.68	16,082			
Lighting Energy (7) kW Demand 51	Metered	Metered	232,211*		

EXHIBIT 5.5 (Cont'd)

NOTES: Explanation of Rate Structure

(1) Cooling Energy Cost based on 150 kW Demand - 2,270 effective full load hours for refrigeration component. 2,587 hours of operation for air conditioning blowers. Total kWh 360,057.

(2) Heating Energy Cost based on 75° temperature indoors for daytime operation. 55° temperature indoors for nonoperating hours. 18° Design temperature. Average winter temperature 48.6°. Credit allowed for heat gain from lights. No. of Degree Days - 1,669.

(3) Based on heating of water for sanitary and maintenance use.

(4) Maintenance, Repairs & Filters - includes maintenance contract, replacement of parts - valves, pumps shafts, bearings, belts, isolators, replacement of piping, electrical wiring, filter maintenance, oiling and greasing, painting equipment, refrigeration pumpdown and recharge labor for above. Computed at $8/ton for preventive maintence. $1.50/ton for filter changes. $7/ton for repairs, including labor charges.

(5) Replacement Cost - Amortized: See attached write-up on compressors coils, air handlers, electrical wiring and valves.

(6) Insurance Policies purchased and Taxes assessed against HVAC equipment. The annual cost of the insurance and taxes for HVAC equipment, installed in a shopping center complex, is estimated at 1% each of the original equipment cost per square foot per year.

(7) Light and miscellaneous power kW Demand computed as follows: General Lighting - Dining Design Layout 4.1 watts/sq ft, air handlers .53 watts/ sq ft, nonoperating hours .5 watts/sq ft Kitchen lighting 2.4 watts/sq ft, signs and canopy lighting 1.3 watts/sq ft.

EXHIBIT 5.5 (Cont'd)

Replacement Cost

Industry experience for compressor replacements is as follows: two compressor breakdowns per unit over 20 years. Compressor replacement costs less body value trade-in for the contemplated roof top units. Labor charges computed on basis of $300 per mechanical failure and $450 per light burnout.

Evaporator coil replacement experience: 2/3 of one coil every 20 year period. Labor to reinstall -- 2 men one to two days.

Non-cleanable condenser coil replacement experience -- 2 coil changes over 20 year period. Labor to reinstall coil -- 1 man -- one day.

AIR HANDLING SECTION

ITEM	EQUIVALENT REPLACEMENT
Casings	1/2 in 20 years
Heating Coils	2/3 in 20 years
Humidifiers	4 in 20 years
Fan Motors	1 in 20 years
Fan Bearings	2 in 20 years
Fan Shaft	1 in 20 years
V Belts	2 sets in 20 years
Dampers	1 in 20 years
Paint	4 times in 20 years

WATER & REFRIGERANT PIPING

Black Iron Pipe	5% per year
Galvanized Iron Pipe	3% per year
Wrought Iron Pipe	2% per year
Copper Pipe	2% per year

ELECTRICAL WIRING

Equipment Wiring	4% per year
Control Wiring	2% per year
Electrical Temperature Controls	10% per year
Motor Starting Equipment	1 in 20 years
Switches	1 in 20 years

VALVES

Temperature Control Equipment	10% per year
Shutoff Valves	3% per year
Refrigerant Expansion Valves	10% per year
Refrigerant Solenoid Valve	10% per year

EXHIBIT 5.6

SCHEDULE I

Subscriber:

Schedule of HVAC Fees

PART I—BASIC HVAC FEES

A. (1) Standard Fees under Section 3.1 of Subscriber's Service Agreement

Minimum Rate per sq. ft. per year $.......... *

Size of Subscriber Space: .... sq. ft.

(2) Annual Basic HVAC Fee: $........ Monthly Basic HVAC Fee: $........

B. Normal Business Hours: "Normal business hours" as used in this agreement shall mean the period from ...... A.M. to ...... P.M. ...... on weekdays, from ...... A.M. to ...... P.M. on Saturdays and from ...... A.M. to ...... P.M. on Sundays.

C. Adjustments Applicable to all Basic HVAC Fees.

(1) Fuel Adjustment—If the local market price of gas, oil, propane or other energy medium used by Owner in manufacturing heated and chilled water shall increase or decrease, the Basic HVAC fee payable by Subscriber shall, effective simultaneously therewith, be increased or decreased by an amount equal to Subscriber's pro-rated share of such increase or decrease (determined on a square foot basis among all Subscribers).

(2) Wage Adjustment—If the wages paid to personnel employed in the operation and maintenance of the HVAC System shall increase or decrease, the Basic HVAC Fee Payable by Subscriber shall, effective simultaneously therewith, be increased or decreased by an amount equal to Subscriber's pro-rated share of such increase or decrease (determined on a square foot basis among all Subscribers).

(3) Tax Increases—If the taxes payable by Owner with respect to the System and/or the heated and chilled water provided thereby shall be increased or decreased from those payable during the calendar year in which this agreement commences, the Basic HVAC Fee payable by Subscriber shall, effective simultaneously therewith, be increased or decreased by an amount equal to Subscriber's pro-rated share of such increase or decrease (determined on a square foot basis among all Subscribers).

PART II—ADDITIONAL HVAC FEES

1. The charge for full heated or chilled water service provided by Owner during other than normal business hours shall be two times the pro-rated hourly rate for such service during normal business hours.

*to said amounts shall be added the adjustments from October 1973.

EXHIBIT 5.7

Sherman Energy Management Services, Inc., Statement of Income & Expenses, 1973

Sales Income	1/1/73 To 3/31/73	4/1/73 To 6/30/73	7/1/73 To 9/30/73	10/1/73 To 12/31/73	1/1/73 To 12/31/73
Electricity	$ 43,811.21	$ 44,242.55	$ 44,418.22	$ 42,022.16	$174,494.14
HVAC	47,485.75	47,039.76	45,917.16	47,094.17	187,536.84
Other	-	-	-	-	-
Total Operating Income	$ 91,296.96	$ 91,282.31	$ 90,335.38	$ 89,116.33	$362,030.98
Direct Oper. Expenses					
Labor	$ 17,595.33	$ 18,079.11	$ 17,812.70	$ 18,621.08	$ 72,108.22
Employee Benefits	634.96	578.49	534.53	589.58	2,337.56
Payroll Taxes	1,138.99	1,081.89	1,041.55	853.38	4,115.81
Fuel Oil	13,302.70	6,998.85	4,857.03	8,105.67	33,264.25
Fuel Gas	15,099.98	19,600.98	19,440.65	18,145.36	72,286.97
Gen. Maintenance	1,013.56	(197.99)	2,741.73	6,290.93	9,848.23
HVAC Maintenance	632.26	3,252.09	1,658.49	1,149.51	6,692.35
Water	1,497.44	1,803.29	2,803.28	2,527.20	8,631.21
Water Treatment	1,073.34	312.61	3,152.15	2,551.56	7,089.66
Lube Oil	1,038.89	-0-	2,329.28	3,504.91	6,873.08
Telephone	382.09	457.57	394.26	321.86	1,555.78
Supplies	2,056.89	2,145.57	2,066.57	1,541.83	7,810.86
Miscellaneous	247.78	7.50	266.05	-	521.33
Total Direct Oper.Exp.	$ 55,714.21	$ 54,119.96	$ 59,098.27	$ 64,202.87	$233,135.31
Other Expenses			$		
Franchise Fee	$ 3,750.00	$ 3,750.00	$ 3,750.00	$ 3,750.00	$ 15,000.00
Franchise & Prop. Taxes	7,740.00	7,740.00	7,740.00	8,059.03	31,279.03
Insurance	2,826.00	1,986.89	2,626.10	2,695.11	10,134.10
Total Other Expenses	$ 14,316.00	$ 13,476.89	$ 14,116.10	$ 14,504.14	$ 56,413.13
Total	$ 70,030.21	$ 67,596.85	$ 73,214.37	$ 78,707.01	$289,548.44
Net Operating Profit	$ 21,266.75	$ 23,685.46	$ 17,121.01	$ 10,409.32	$ 72,482.54
Other Charges					
Interest - Bank	$ 13,991.93	$ 14,147.40	$ 14,407.84	$ 13,945.03	$ 56,492.20
Interest - Other	-	-	-	-	-
Depreciation	15,800.00	15,800.00	15,800.00	16,105.80	63,505.80
Bad Debts Expense	-	-	-	1,900.00	1,900.00
Total Other Charges	$ 29,791.93	$ 29,947.40	$ 30,207.84	$ 31,950.83	$121,898.00
Net (Loss) for the Period	$ (8,525.18)	$(6,261.94)	$(13,086.83)	$(21,541.51)	$49,415.46)

EXHIBIT 5.8

Sherman Energy Management Services, Inc., Statement of Income & Expenses, 1974

	1/1/74 To 3/31/74	4/1/74 To 6/30/74	7/1/74 To 9/30/74	10/1/74 To 12/31/74	1/1/74 To 12/31/74
Sales Income					
Electricity	$ 41,991.31	$ 44,444.54	$ 46,191.08	$ 49,437.74	$182,064.67
HVAC	57,905.34	65,349.90	68,727.53	76,232.78	268,215.55
Other					
Total Operating Income	$ 99,396.65	$109,794.44	$114,918.61	$125,670.52	$450,280.22
Direct Oper. Expenses					
Labor	$ 16,801.57	$ 17,241.91	$ 17,241.11	$ 19,970.94	$ 71,255.53
Employee Benefits	610.62	613.41	618.02	354.45	2,196.50
Payroll Taxes	1,077.02	1,053.08	700.97	1,316.12	4,147.19
Fuel Oil	12,101.14	8,480.67	9,318.88	18,662.47	48,563.16
Fuel Gas	23,976.57	31,779.93	37,248.23	34,837.73	127,842.46
Gen. Maintenance	5,490.64	2,159.50	1,905.55	5,325.10	14,880.79
HVAC Maintenance	2,458.21	3,052.65	1,086.45	773.30	7,370.61
Water	883.91	2,372.00	2,960.02	2,042.01	8,257.94
Water Treatment	2,409.02	1,225.01	2,816.22	2,099.49	8,549.74
Lube Oil	2,233.09	3,153.39	3,177.96	5,109.53	13,673.97
Telephone	341.54	323.08	153.05	286.07	1,103.74
Supplies	1,139.86	1,149.64	1,138.49	1,658.61	5,086.60
Miscellaneous	40.86	122.04	231.81	651.02	1,045.73
Total Direct Oper.Exp.	$ 69,564.05	$ 72,726.31	$ 78,596.76	$ 93,086.84	$313,973.96
Other Expenses					
Franchise Fee	$ 3,750.00	$ 3,750.00	$ 3,750.00	$ 8,327.16	$ 19,577.16
Franchise & Prop. Taxes	7,750.00	7,977.34	7,387.52	9,177.34	32,292.20
Insurance	2,833.00	2,833.00	2,706.93	2,631.17	11,004.10
Total Other Expenses	$ 14,333.00	$ 14,560.34	$ 13,844.45	$ 20,135.67	$ 62,873.46
Total	$ 83,397.05	$ 87,286.65	$ 92,441.21	$113,222.51	$376,847.42
Net Operating Profit	$ 15,999.60	$ 22,507.79	$ 22,477.40	$ 12,448.01	$ 73,432.80
Other Charges					
Interest - Bank	$ 13,751.86	$ 14,572.10	$ 13,380.85	$ 13,372.99	$ 55,087.80
Interest - Other	-	-	-	-	-0-
Depreciation	16,000.00	16,000.00	16,000.00	15,099.02	64,099.02
Bad Debts Expense	-	-	-	(8,991.49)	(8,991.49)
Total Other Charges	$29,761.86	$ 30,572.10	$ 29,380.85	$ 20,480.52	$110,195.33
Net (Loss) for the Period	$(13,762.26)	$ (8,064.31)	$ (6,903.45)	$ (8,032.51)	$ (36,762.53)

EXHIBIT 5.9

Sherman Energy Management Services, Inc., Statement of Income & Expenses, 1975

	1/1/75 To 3/31/75	4/1/75 To 6/30/75	7/1/75 To 9/30/75	10/1/75 To 12/31/75	1/1/75 To 12/31/75
Sales Income					
Electricity	$ 46,385.62	$ 60,550.24	$ 56,240.04	$ 59,763.52	$222,939.42
HVAC	83,817.74	68,105.19	69,704.81	76,079.41	297,707.15
Other	235.46	629.18	539.72	461.16	1,865.52
Total Operating Income	$130,438.82	$129,284.61	$126,484.57	$136,304.09	$522,512.09
Direct Oper. Expenses					
Labor	$ 18,423.62	$ 18,837.47	$ 19,654.30	$ 21,109.83	$ 78,025.22
Employee Benefits	1,094.89	1,001.73	984.39	1,032.33	4,113.34
Payroll Taxes	1,444.47	1,216.31	894.62	993.45	4,548.85
Fuel Oil	12,927.62	9,274.98	8,963.57	9,743.72	40,909.89
Fuel Gas	45,805.39	45,695.16	52,658.87	66,337.52	210,496.94
Gen. Maintenance	8,287.75	2,990.45	2,198.45	5,898.63	19,375.28
HVAC Maintenance	646.20	640.86	1,942.93	42.00	3,271.99
Water	1,258.15	2,048.50	2,780.82	1,631.73	7,719.20
Water Treatment	1,440.09	2,014.75	2,124.36	-0-	5,579.20
Lube Oil	4,372.74	3,977.52	2,146.75	3,417.21	13,914.22
Telephone	313.81	323.96	192.06	235.72	1,065.55
Supplies	978.15	1,060.67	1,699.29	1,321.41	5,059.52
Miscellaneous	192.70	301.24	63.78	70.92	628.64
Total Direct Oper.Exp.	$ 97,185.58	$ 89,383.60	$ 96,304.19	$111,834.47	$394,707.84
Other Expenses					
Franchise Fee	$ 3,750.00	$ 3,750.00	$ 3,750.00	$ 3,750.00	$ 15,000.00
Franchise & Prop. Taxes	8,005.00	7,995.00	8,923.35	7,112.20	32,045.55
Insurance	2,905.50	3,327.03	3,598.13	3,598.13	13,428.79
Total Other Expenses	$ 14,660.50	$ 15,072.03	$ 16,271.48	$ 14,470.33	$ 60,474.34
Total	$111,846.08	$104,455.63	$112,575.67	$126,304.80	$455,182.18
Net Operating Profit	$ 18,592.74	$ 24,828.98	$ 13,908.90	$ 9,999.29	$ 67,329.91
Other Charges					
Interest - Bank	$ 12,901.58	$ 12,842.28	$ 12,773.06	$ 12,579.30	$ 51,096.22
Interest - Other	2,800.00	-0-	204.54	236.60	3,241.14
Depreciation	16,315.00	16,315.00	16,315.00	16,324.05	65,269.05
Bad Debts Expense	244.00	(58.90)	-0-	2,469.57	2,654.67
Total Other Charges	$ 32,260.58	$ 29,098.38	$ 29,292.60	$ 31,609.52	$122,261.08
Net (Loss) for the Period	$(13,667.84)	$(4,269.40)	$(15,383.70)	$(21,610.23)	$(54,931.17)

EXHIBIT 5.10

Sherman Energy Management Services, Inc., Statement of Income & Expenses, 1976

	1/1/76 To 3/31/76	4/1/76 To 6/30/76	7/1/76 To 9/30/76	10/1/76 To 12/31/76	1/1/76 To 12/31/76
Sales Income					
Electricity	$ 64,962.42	$ 64,921.67	$ 69,339.72	$ 66,916.86	$266,140.67
HVAC	77,216.77	83,720.64	85,560.65	88,179.47	334,667.53
Other	378.75	432.14	295.74	645.75	1,752.38
Total Operating Income	$142,557.94	$149,074.45	$155,196.11	$155,742.08	$602,570.58
Direct Oper. Expenses					
Labor	$ 18,033.89	$ 19,229.25	$ 22,164.29	$ 22,310.86	$ 81,738.29
Employee Benefits	716.98	687.15	952.80	999.85	3,356.78
Payroll Taxes	1,485.99	1,335.45	1,308.14	1,319.77	5,449.35
Fuel Oil	12,620.00	9,931.49	11,209.02	10,679.98	44,440.49
Fuel Gas	64,633.46	63,970.48	78,637.25	68,784.91	276,026.10
Gen. Maintenance	3,329.70	7,369.33	8,435.46	9,009.93	28,144.42
HVAC Maintenance	3,042.87	3,373.86	2,155.19	907.89	9,479.81
Water	1,860.47	2,473.96	3,442.68	1,908.98	9,686.09
Water Treatment	1,408.65	2,654.34	1,554.02	2,365.94	7,982.95
Lube Oil	3,087.33	3,079.35	4,022.22	3,855.67	14,044.57
Telephone	349.59	354.31	210.20	352.07	1,266.17
Supplies	1,672.61	3,231.59	499.95	543.31	5,947.46
Miscellaneous	2,166.40	1,086.43	858.79	1,155.16	5,266.78
Total Direct Oper.Exp.	$114,407.94	$118,776.99	$135,450.01	$124,194.32	$492,829.26
Other Expenses					
Franchise Fee	$ 3,750.00	$ 3,750.00	$ 3,750.00	$ 3,750.00	$ 15,000.00
Franchise & Prop. Taxes	7,970.91	7,970.00	7,970.00	8,199.79	32,110.70
Insurance	3,613.26	3,598.00	3,598.00	3,188.90	13,988.16
Total Other Expenses	$ 15,334.17	$ 15,318.00	$ 15,318.00	$ 15,138.69	$ 61,108.86
Total	$129,742.11	$134,094.99	$150,768.01	$139,333.01	$553,938.12
Net Operating Profit	$ 12,815.83	$ 14,979.46	$ 4,428.10	$ 16,409.07	$ 48,632.46
Other Charges					
Interest - Bank	$ 12,251.79	$ 12,055.21	$ 12,054.49	$ 12,054.49	$ 48,415.98
Interest - Other	102.36	-0-	61.10	45.67	209.13
Depreciation	16,319.30	16,319.30	16,319.30	16,327.63	65,285.53
Bad Debts Expense	-0-	(306.11)	-0-	1,015.29	709.18
Total Other Charges	$ 28,673.45	$ 28,068.40	$ 28,434.89	$ 29,443.08	$114,619.82
Net (Loss) for the Period	$(15,857.62)	$(13,088.94)	$(24,006.79)	$(13,034.01)	$(65,987.36)

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The preceding five sections have described the Company's concept of implementing a total energy system in a commercial shopping center, the mechanical and electrical components of the Sher-Den Mall total energy plant, the capital costs thereof, the operating experience over the past four years (1973 through 1976) and the revenue and operating costs associated with furnishing utility services under our various contracts with the tenants of the Sher-Den Mall. In this concluding section, we attempt to identify, clarify and evaluate the advantages and disadvantages, both tangible and intangible in nature, that have resulted from the installation and operation of the total energy system in the Sher-Den Mall Shopping Center in Sherman, Texas.

Although the study indicates that operations to date have not attained the financial results projected in the original feasibility study, significant advantages have been provided to the developer of the project in the form of displaced costs and to the tenants of the shopping center in the form of reliability, flexibility, and quality of services.

In the concluding portion of this section, we, therefore, attempt to apply the experience gained at Sher-Den Mall Shopping Center and identify the parameters that should serve as guidelines for future commercialization of total energy systems that will provide reliable integrated services to the public while accomplishing the highest possible level of conservation of the nation's natural resources.

The pros and cons described below are listed in their relative order of importance or magnitude of impact on the project.

6.2 ADVANTAGES

The installation of the total energy system at the Sher-Den Mall provided several advantages to the Owner of the shopping center and the users of energy services. By design and in operation, the system generates onsite electric power for lighting and other electrical devices of all the occupants at the center. At the same time, it utilizes by-products of electrical generation -- the heat rejected to the engine cooling water and the exhaust gases of combustion (waste heat) -- to partially offset the energy necessary to generate the heating and cooling media to these same occupants. In fact, the total energy consumption of this system is significantly less than it would have been had the heating and cooling energy media been generated by separate equipment and from individual energy sources.

The third party participation, that of Total Energy Leasing Corporation through its wholly-owned subsidiary, Sherman Energy Management Services, Inc., was an essential ingredient in the development of this project. Normally a shopping center development company comprises real-estate-oriented individuals whose primary expertise is the design and construction of rental space for retailing purposes. The developer has an obligation to the community to provide a convenient, attractive and comfortable facility wherein a proper mix of products and services are offered to the shopping public. The objective of the developer is to obtain leases with credit-worthy tenants of a sufficient length of term in order to assure the mortgagability of his development by institutional investors. Utility services are a secondary concern of the developer; however, they are a necessity in the modern version of the large totally enclosed malls that provide year-round comfort conditioning of the common area spaces. In addition to the requirement to heat, cool, and light common areas of the shopping center and light surrounding parking facilities as well; the developer also has a requirement to provide heating and cooling facilities for his/her major tenants, and, depending on the terms of leases, may be required to provide such facilities for other tenants of the project. Therefore, the developer does have concern for the initial capital cost of these facilities.

Total Energy Leasing Corporation is a professional energy company, independently financed, whose sole objective was the design, construction, and operation of efficient reliable energy systems serving a multitude of users located within a single development. This corporation provided a separate entity that participated in the development and operation of the project, yet did not interfere with the normal lessor/lessee arrangements. Telco's installation of total energy plant providing electricity and heating and cooling services results in an additional revenue stream that is independent of the basic rental paid by the tenants for the space occupied and does not infringe on the normal leasehold mortgage financing.

The installation by Telco of a central energy plant for heating and cooling services, with a four-pipe distribution system, provided the ultimate in flexibility to the users in that both hot and chilled water were provided simultaneously at all times during the year, enabling individual tenants to obtain the most appropriate media for their individual space conditions. The installation of a large central heating and cooling plant provided facilities that were far superior to a multitude of individual roof top units. This central facility provided a full-time staff of skilled technicians to assure continued efficient performance and service. This staff planned operation of the environmental service to more closely conform to the business routine of the shopping center.

Probably the most tangible and significant benefits to the Sher-Den Mall Shopping Center was the displaced cost realized as a result of Telco's third party participation in the project. Had the shopping center been built without Telco, electric service would have been obtained from the lines of Texas Power & Light Co. and certain electric distribution costs -- especially throughout the parking lot areas -- would have been borne by the developer. An entire heating and cooling system would have been required for the Mall, for the major department stores, and for the individual Mall tenants. Whether these costs would have been the obligation of the developer or in part a responsibility of the individual tenants, the aggregate expenditure would have been significant. As detailed in Sec. 3, Telco's cost for the heating and cooling portion of the plant and its distribution facilities approximated $1.4 million. For a project of this size, this investment approximates $3.00/sq ft and represents over 13% of the total project cost. Had the tenants individually been required to obtain their own heating and cooling equipment, the aggregate cost of all facilities would probably have exceeded that of the central plant. As shown below, this extensive displaced cost proved to be an unmanageable investment for Telco, but it did represent a real economic benefit to all the tenants of the Sher-Den Mall Shopping Center.

6.3 DISADVANTAGES

6.3.1 Investment

The capital cost of the system far exceeded the original projections. This was in part due to errors in the original estimates, project delays and escalations associated therewith, and overdesign and excess capacity. The most significant factor, however, contributing to excessive capital costs resulted from the risk associated with our contractual obligations to supply the heating and cooling distribution system for a shopping center whose configuration and tenant mix was not finalized. Telco, by virtue of its third party participation with the developer, displaced all of his obligations to provide a complete facility for the Mall space and major tenants. These tenants, because of their economic leverage, demanded and received elaborate heating and cooling equipment not only for the main retailing spaces but for the detached TBA facilities that had no corresponding HVAC income. Heating and cooling distribution equipment was also supplied by Telco for the smaller strip tenants whose space was normally leased on a shell basis with the tenant providing the interior finish including heating, cooling, and lighting. There was no provision for the recoup of this additional investment.

The electrical capacity of the plant proved to be too large for the actual demands of the tenants. This factor was even more significant in the years since 1973 when energy conservation practices reversed the anticipated energy growth. For this same reason the selection of engine generators at 1250-kW each proved to be inefficient at the actual experienced demand loads. Units of 1000-kW capacity would have been more appropriate and would have permitted more efficient loading. The four-pipe distribution system, although providing the ultimate in flexibility of services, was expensive to install and is not conducive to energy conservation. While it is true that some waste heat is available at all times in proportion to the amount of electricity being generated, the need to provide energy to the hot water system for specific area reheating during periods when maximum cooling is required is counterproductive.

6.3.2 Income

The income for electrical services rendered depends on the amount of power consumed by the Mall and the tenants, while heating and cooling income is directly proportional to the amount of space served. Contractually, the charges for electricity are identical to those charged by Texas Power & Light Co. The heating and cooling charges are assessed on a cents per square foot basis and vary in accordance with the amount of space occupied and the internal operating load of the individual tenant.

As shown in Table 6.1, electric income in 1973 came close to that of the original feasibility projection. However, an analysis of the figure reveals that the amount of electricity produced for consumption by the tenants was significantly less than projected (14%). The loss of sales volume was offset to a degree in that the average electric rates in effect in 1973 were somewhat higher than those used in the projections. Electric consumption by customers continued to decrease in 1974 and 1975 as a result of a conscientious energy conservation program so that electric sales volume is now only 70% of the feasibility level. As indicated in the table, the average electric rate has increased steadily as a result of the gradual changes in the rate structure of the public utility. Over the period 1973 through 1976, rate increases amounted to 81.86%, but electric sales income increased only 52.10%.

The amount of space served with heating and cooling services and producing revenue approximates 385,000 sq ft, whereas original projections estimated 467,500 sq ft. Serviced area has changed little since 1973. This was a serious deviation from the originally planned complex and though a portion of the income appears to have been made up by the higher HVAC charges charged in 1973, the system is not compensated for higher costs incurred in 1973. Pursuant to our contractual agreements, HVAC rates were increased through 1976, as certain of our operating costs indices rose. HVAC sales income increased 79.38% through the study periods.

As in the case of capital investment, inequities occurred with the major tenants in the negotiation of HVAC rates for services provided. Electrically, the major tenant, because of the sheer size of space occupied, usually qualifies for a lower rate schedule, which, from the standpoint of the total energy plant, is marginal to produce. In the case of heating and cooling services, the major tenants demanded and received rates that were close to or below cost and further negotiated escalation clauses that gave them minimal exposure for inflationary trends, taxes or other commodity increases. This latter condition proved extremely harmful with the resulting escalation of fuel prices. The absence of the square footage projected and the attending electric consumption was the result of revised scope of the development and the inclusion of certain nonairconditioned space. Both factors have reduced the project to marginal feasibility. Had the electric and HVAC projected service quantities been realized, income at current rates would have been increased by approximately $173,429 annually.

6.4 OPERATING COSTS

As previously described in Sec. 5, all of the categories of operating cost have increased significantly over the years, with natural gas and fuel oil being the predominant leaders. Errors in original projections relating to operating cost are primarily related to the anticipated heat rate of the prime movers, the dual fuel engines. Advertised heat rates of 9,000 Btu per kWh were stated by the various manufacturers of this equipment. In experience, however, fuel consumption has averaged about 15,000 Btu per kWh. This factor alone adds to the current cost of operation by requiring the purchase of additional fuel at a cost of $121,000 annually.

A second error in developing the original projections involved the amount of electric power required for the operation of the total energy plant auxiliaries. As the figures show, 2,000,000 kWh annually was projected, while actual experience exceeded 6,000,000 kWh in 1973. Operating efficiencies and refined procedures have reduced this number of 4,300,000 kWh in 1973. Part of the reason for this misjudgment is attributable to the fact that waste heat that was anticipated to be available for cooling in the absorption cycle was needed to maintain the hot water system at sufficient temperature for reheat. Therefore, additional kilowatts were required to operate electrical cooling equipment.

Labor cost and, more specifically, the amount of personnel was underestimated in that a great deal of automatic control equipment was included in the design to enable the plant to function unattended during certain off hours and on the weekends, which expectation did not materialize. Although the cost of this equipment was substantial, it has proved ineffective in safely maintaining the equipment and providing the required continuity of service. Therefore, added personnel to those originally projected were required.

Although the contractual arrangements with our customers provided for increases in service rates as the system's fuel cost, labor cost, and taxes increased; due to certain inequitable contract escalation clauses these increases are not fully covered. Also, the operation is unable to recoup increases in cost of other categories such as lube oil and water treatment chemicals that have experienced the same kind of escalating factors as raw fuel. Therefore, unless other compensating cost savings are achieved, increases of these nonescalatable items will continue to reduce the system's operating profit.

6.5 RECOMMENDATIONS

There were significant advantages accruing to the Landlord and the tenants of the Sher-Den Mall by virtue of Telco's participation in the project, and the total energy plant as installed represents an efficient integrated utility system. However, the financial goals of Telco were not realized and several areas of the project need restructuring in future viable applications of total energy to the shopping center market.

To better match the plant's capacity to the utility demands, the system design should provide for the complete project expectation. The commitment to purchase and install, however, should be staged as the service area becomes firm. This arrangement would avoid overbuilding due to the reduction of needed service customers.

The four-pipe distribution system, although flexible, is an unjustifiable luxury and should be eliminated in favor of a system that can make maximum utilization of outside air for intermediate heating or cooling.

The major department stores are marginal electric customers and their present posture of demanding inequitable HVAC rates plus exemption from their fair share of escalating costs, dictate that these areas not be served by the total energy system. This deletion would reduce the plant's size and cost by approximately 50% while significantly increasing the unit revenue for services provided to the Mall and Mall tenants.

The concept of displaced cost used at Sher-Den Mall resulted in unbearable financial obligations to Telco. The plant owner should provide the incremental cost of the total energy system or limit his investment to the confines of the plant proper.

The contractual arrangement with the developer should be in some form of partnership under which he/she shares in the interest and the benefits of the system serving the Mall and Mall tenants.

A single service rate structure should be instituted for the combined electric and heating and cooling services. This would provide the needed protection for the owner/operator when operating cost increases occur and enable an equitable share of such increases by all users.

The energy conservation qualities of the total energy system must be enhanced by the utilization of more efficient prime movers with guaranteed fuel rates. Solar devices and heat pumps should be incorporated to make use of alternate energy sources.

The degree of automation and automatic controls should be increased to reduce the labor component, especially with projects of this size range.

It is believed that the implementation of the above and other lessons learned in the Sher-Den project can enhance the operating performance of this type of system to reasonable economic success. These factors require a more thorough evaluation, which is beyond the scope of this Case Study.

Table 6.1 Sher-Den Mall Total Energy Plant, Income and Expense Factors

	Original Projection	Actual Results 1973	1974	1975	1976	Change 1973 Vs. 1976	% Inc. 1973 Vs. 1976
Electric Sale x 1,000	11,700	10,083	8,665	8,240	8,482	(1,601)	(15.9)
Electric Plant	2,000	6,417	6,032	5,488	4,313	(2,104)	(32.7)
HVAC Served	467,500	384,692	379,352	382,496	385,174		-
Income - Electricity	$182,162	$174,405	$182,064	$221,528	$267,015	$ 92,610	53.1
- HVAC	208,510	187,537	268,215	297,707	334,730	147,193	78.5
¢/KWH Electric Rate	1.56¢	1.731¢	2.101¢	2.689¢	3.148¢	1.417¢	81.8
¢/Sq.Ft. HVAC Rate	44.60¢	49.570¢	70.700¢	77.830¢	86.900¢	37.330¢	75.3
Heat Rate BTU/KWH	9,000	15,110	15,627	14,821	15,045	-	-
Fuel Consumption - MMBTU	155,100	267,133	247,402	221,279	201,717	(65,416)	(24.5)
Fuel Cost-$/MMBTU	.27	.37	.71	1.11	1.59	1.22	329.7
Operating Cost - Total	$160,371	$289,548	$376,847	$455,182	$553,938	$264,390	91.3
Elec. ¢/KWH Allocation		1.607	2.420	3.188	3.941	2.334	145.2
HVAC ¢/Sq.Ft. Allocation		33.136	44.074	50.314	57.039	23.903	72.1
Operating Profit	$230,330	$ 72,483	$ 73,433	$ 67,330	$ 48,633	$ 23,850	32.9