

District Heating & Cooling

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DHC in Pennsylvania

With Reports On . . .

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SPECIAL REPORT—
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DISTRICT HEATING *in* *Philadelphia* *100 Years and Growing*

The year 1987 marks the 100th anniversary of district heating in Philadelphia. Ten years after the invention of district heating by Birdsill Holly in Lockport, NY, the first steam lines were being laid in downtown Philadelphia as a method of disposing of waste steam from electrical production. Today, Philadelphia's system is the second largest in the nation, with 33 miles of distribution lines and three steam generating facilities.

By K. Dorothea Stierhoff, Baltimore Thermal Energy Corp.
Jeremy S. Elkin, Boston Thermal Energy Corp.

steam needs. This required that steam be provided 24 hours a day, 365 days a year.

The growth of the system through the mid 1920's followed the development of the electrical grid. As new customers joined the electric system, it was also necessary to provide them with steam for space heating. The electrical distribution system was replacing the steam engines used by the individual buildings for power generation and heating.

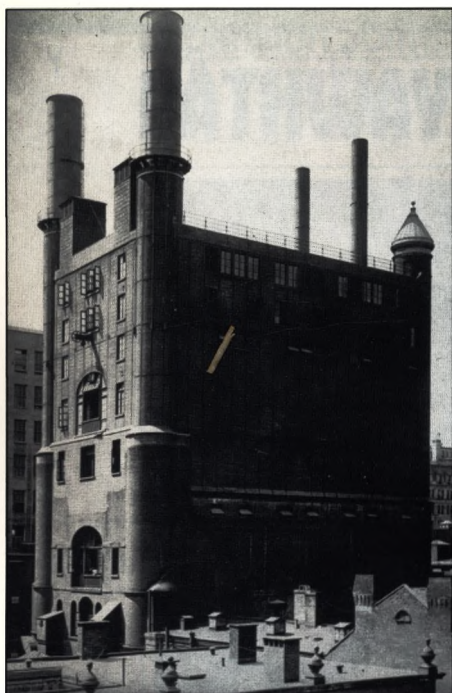
A New Era

During the 1920's the steam district heating system grew, keeping pace with the expansion of the electrical system. In the mid 1920's, a landmark management decision was made by Philadelphia Electric to develop the steam system and make it an integral part of the business.

New boilers were installed at the Edison Plant

The Early Years

The primary reason for the initial development of the district heating system was the disposal of exhaust steam from the Edison Station, thus, the system grew slowly at first. The first customer was an adjacent property and the second was Philadelphia Electric's home office building. In 1906, though, a contract was signed with the first major customer, Jefferson Hospital, to supply their entire



The original Edison station, shown here about 1917, was the first generating facility to supply district steam in Philadelphia.

and in 1927, the Willow Street Station was completed. This facility was the first in Philadelphia devoted to the generation of steam for district heating only and provided no electric generation.

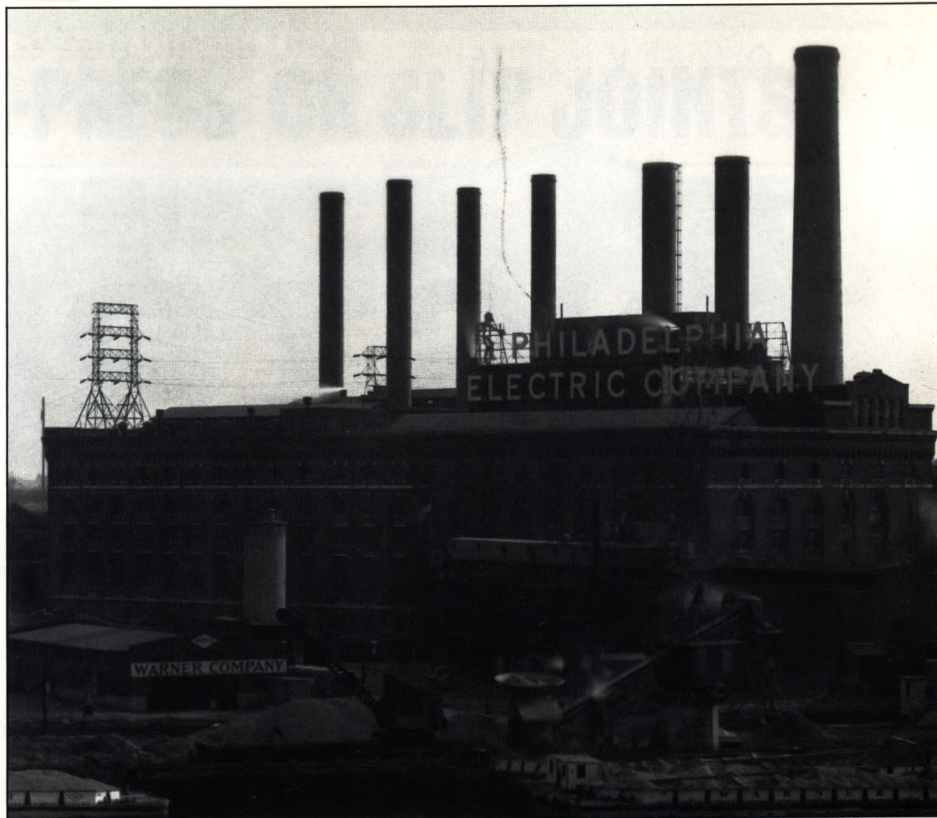
From 1927 to 1932, the franchise area was expanded east and west of Broad Street with distribution lines installed throughout this area.

Growth & Development

The 1950 decade saw the introduction of steam into the buildings comprising the Penn Center Development, the construction of a new Edison Plant at the site of the former Edison Station at 908 Sansom Street, and the extension of the distribution system to serve the University of Pennsylvania. This required tunneling 50 feet below the Schuylkill River and installing a 1100 ft. long, 15 ft. diameter cable tunnel.

In the early 1950's, Philadelphia Electric completed construction of the Schuylkill Station demineralization plant, at that time the largest in the electric production industry. Its initial capacity was 1,200 gallons per minute of purified boiler water. Because of the increased steam heat load, this facility has been expanded to its current capacity of 3,000 gallons per minute.

In the 1960's, extensions were made into numerous city areas such as Independence Hall, Society Hill and the University City Science Center area in West Philadelphia.



When the original Schuylkill Station was completed in 1903, the staff was raised through an interior construction float to the top of the stack, where a luncheon was held 275 feet above the ground.

The last twenty years have seen a constant effort to develop an improved conduit system using new materials and the latest techniques in the construction field. In 1975, a System Automatic Monitoring and Control System (SAMAC) was used to gather data from the steam distribution network for a more efficient operation of the system.

Change of Ownership

In the early 1980's, PECO investigated the possibility of selling the steam system. Discussions were opened with several potential buyers in the mid 1980's, and in January of 1987 the system was sold to Catalyst Thermal Energy Corporation.

What made Catalyst Thermal particularly attractive to the Utility, the City, and the Public Utility Commission was its demonstrated experience and stability as owners and operators of several other systems. Catalyst Thermal established a separate subsidiary, Philadelphia Thermal Energy Corporation, to own and operate the system in the city.

Philadelphia Thermal immediately assumed full responsibility for operating the business, initially staffing customer service, distribution, meter reading and all billing functions. Under a one year interim

operations agreement with PECO, Thermal supervised the plant operations and has recently completed the full staffing and training of over 100 highly skilled engineers, operators and technicians in the three steam plants.

The Future

Philadelphia Thermal's multifaceted business plan looks to the future and incorporates engineering, operational, customer service and marketing efforts. Major elements of this plan include:

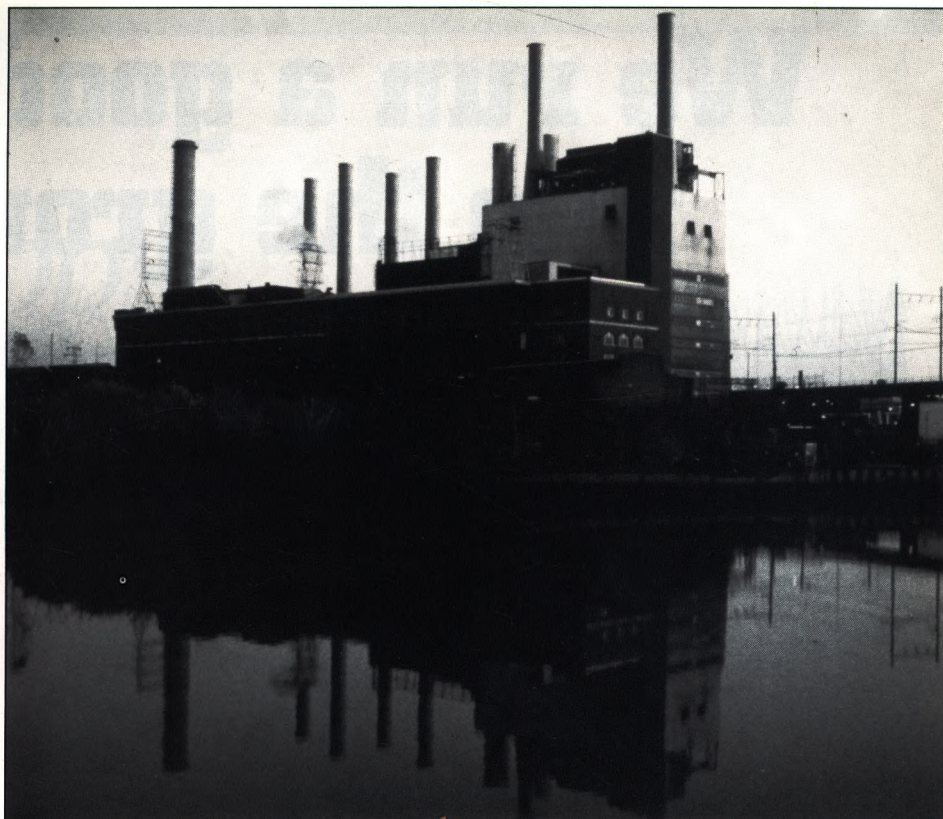
- Increasing service reliability by upgrading the efficiency of the system.
- Diversifying fuel supplies to ensure the lowest possible energy costs.
- Changing to stable-priced solid fuels such as municipal solid waste or coal.
- Increasing the system's customer base to spread fixed costs over greater numbers.
- Providing customers with energy management tools to reduce their overall energy consumption.

A strong communications program was also implemented to apprise all customers of Philadelphia Thermal's progress in the execution of its business plan. The advances achieved in the nine months of system ownership include:



The Willow Station, shown here in the 1940's was Philadelphia's first plant dedicated to the production of district steam.

- **Increased Service Reliability**—A \$7 million capital improvement and intensive maintenance program has been implemented following the engineering staff's extensive review and prioritization of projects. This program includes improved boiler controls, auxiliary upgrades, new boiler burners, tubes, economizers and a rigorous maintenance program in the plants and distribution system.
- **Diversifying fuel supplies**—PTEC has performed preliminary studies on the installation of a coal boiler at Schuylkill Station. Two of the Schuylkill boilers were originally designed to burn coal and were converted to burn #6 oil.
- **Changing to Solid Fuels**—In a continuing effort to gain solid fuels capability, Catalyst Energy Corp. announced in May its plans to convert the Willow Steam Plant into a waste-to-energy facility. The proposed plant will burn 200-250 tons per day of municipal solid waste. Consulting and Engineering firms have been selected to perform both the site engineering and environmental permitting.
- **System Expansion**—The Marketing and Sales Department's efforts have been rewarded with firm commitments and contracts for over 200,000 Mlbs of new load.
- **Energy Management Counseling**—Philadelphia Thermal employs several staff



The Schuylkill Station plant today, the largest power plant owned by Catalyst Thermal, is capable of sending out 2.4 million pounds of steam per hour. Through cogeneration, this facility also produces 50 MW's of electricity.



1950 Construction phase of the tunnel 50' below the Schuylkill plant to West Philadelphia.

HVAC experts whose responsibility is to assist customers in energy conservation and management. To date, more than 100 customers have received energy counsel. An energy conservation seminar program has also been implemented to keep all customers up-to-date on contemporary industry information.

District heating in Philadelphia may be a century old but it is truly "a proven technology with a new beginning". With well

designed operating and maintenance programs, highly skilled and well managed personnel, the capital to expand plants and pipelines and a strategic business plan, the future of district steam in Philadelphia is bright and Philadelphia Thermal looks forward to the next 100 years of efficient energy service.

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