

# DISTRICT HEATING

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REDEVELOPMENT IN HARTFORD, CONN. (See Page 70)

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# CENTRAL STATION HEATING and COOLING in HARTFORD

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**THE HARTFORD GAS COMPANY**

The steam plant story in Hartford can not be told without reference to the significant part played by urban renewal. Many cities throughout the United States have plunged into urban renewal with enthusiasm only to discover that huge vacant lots now exist and commendable dreams for their "city of tomorrow" are hopelessly mired in financial and community frustration. The Committee for Economic Development reported that as of January 1, 1960 more than 699 Federally-aided renewal projects had been started in 417 communities. However, of these projects, some dating back to 1950, only 36 had been completed by January 1, 1960 and only 65 others are scheduled for completion by the end of 1962. Financing was not the only roadblock these projects ran into. Many failed to assess correctly the value of an informed public backing for their plans; others neglected to develop the community leadership necessary to pilot a city-wide rebuilding program. In Hartford, the Chamber of Commerce backed the appointment by the Mayor of a non-partisan, nonpolitical body of representative citizens named "The Committee for Hartford." This Committee helped achieve an enlightened public interest in support of urban redevelopment, renewal, and improvement and financial and public backing was successfully obtained.

## CONSTITUTION PLAZA REDEVELOPMENT

A 14-acre area in the city center—formerly one of the worst slum areas, now named Constitution Plaza, is the site of the City's first redevelopment. A system of expressways, now under construction, makes it readily accessible from all directions. Construction is well underway. A large Hartford bank has agreed to lease about half of a 20-story office building, and another local bank will have a sizable branch office in another major office building of 18 stories. A studio building for The Travelers Broadcasting Service Corporation, housing the radio and television facilities, was completed and went into service in September of this year. Construction has started on a hotel of over 300 rooms which has been leased by the Hotel Corporation of America. A shopping center will also be provided. All of this construction will be on a platform and is planned around an attractively landscaped plaza with ramp parking for 1,800 cars, located underneath the platform.

Nearby, The Phoenix Mutual Life Insurance Company has started construction of a new home office building featuring a 12-story elliptical shaped office tower. The decision to build in this location was made only after serious consideration of suburban sites. The

use of high cost land in the downtown area for institutional office space had to be justified from an economic standpoint. Their study favored the downtown site for the following reasons:

- a. centrally located and more accessible for employee travel,
- b. an employee survey indicated an overwhelming preference for the downtown location,
- c. rental floor area in the proposed high rise building can become available for future growth.

The selected site is adjacent to that of Constitution Plaza and can be readily served by the Hartford Gas Company's facilities. Its completion is scheduled for the summer of 1963.

The Constitution Plaza commercial construction alone is anticipated to cost \$40 million. An appraisal value (for tax purposes) of \$25 million will boost the City's tax income by \$1 million—offsetting the tax losses from the demolition of the old buildings and payment of the annual carrying charges on the bond issues. From this area the City formerly had received \$200,000 tax revenue and now will receive in excess of \$1,200,000. The other projects will likewise have beneficial effects on the City's revenues and ultimately for the Hartford taxpayer.

## HARTFORD UTILITY ENTERS PICTURE

Being actively interested in this project not only from a community point of view, but also from a load building standpoint, The Hartford Gas Company approached the developer with the proposal of constructing a gas-distribution system throughout the area to supply roof-top mounted boilers and absorption units for each individual building proposed. The developer had engaged Seelye Stevenson Value & Knecht, a New York firm of consulting engineers, who reported that an on-site central plant to furnish heating and cooling would provide the greatest over-all economy—in spite of the initial higher investment costs. Subsequently, a well-known consultant of Baltimore, employed by The Hartford Gas Company, confirmed the general conclusions reached.

After careful consideration of all aspects of the situation, The Hartford Gas Company decided on the central plant idea of heating and cooling. However, in view of the relatively large investment involved, the Gas Company's first approach was to lease and operate

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## FRONT COVER PICTURE

The aerial perspective of downtown Hartford, Conn., shows the proposed route of pipelines through which the Hartford Gas Company will supply cooling and heating service from its new plant in the Southeast section of the city (upper left). The Connecticut River is at the far left and Constitution Plaza, the city's new \$40,000,000 redevelopment project already under construction, is the dark complex of buildings at the lower left. Other dark-shaded structures, to be served when the plant opens

next year, include (1) the Travelers Insurance Company Building, the city's tallest structure, in the center of the drawing; (2) the Federal Building at the top; and (3) planned Bushnell Plaza, the gray buildings at the upper right. Future Riverview Apartments at the upper left and others connected by dotted lines indicate new and existing construction which probably will be served by extending the pipelines. Lightly shaded buildings are nearby structures offering a potential area of growth for this service.

## Hartford

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a facility constructed by the developer. Subsequently, when The Travelers Insurance Company became the developer of Constitution Plaza, the idea of a central plant owned and operated by The Hartford Gas Company was proposed and agreed to, when the Travelers Company decided to include the entire steam and air-conditioning requirements of their existing group of buildings, representing a load approximately equal to the size involved in the proposed Constitution Plaza project. They were at the time furnishing their own heating requirements from a modern 100,000 lb per hr plant and had decided on installing complete air conditioning for over one million square feet in their home office building modernization program.

Prior to the decision, three major considerations had to be evaluated by the Gas Company:

1. The distribution and sale of steam and chilled water did not come under the jurisdiction of the Connecticut Public Utilities Commission, and therefore a separate or subsidiary company would be involved.
2. The price economics of the sale of off-peak or interruptible gas in competition with No. 6 oil.
3. Financing of the total project estimated at approximately \$4,500,000.

As a result of careful study, it was decided to proceed on the basis of forming two subsidiary companies, the owning company, "The Hartford Steam Company," and the operating company, "The Hartford Steam Service Company." Further studies showed that labor savings and other advantages could be realized by locating the facilities at the nearby existing site of the Hartford Gas Company's gas plant. The Hartford Gas Company will acquire 100 percent of the stock of the subsidiary Hartford Steam Company, largely in exchange for land on which the central steam plant is being constructed.

## UNIQUE SERVICE

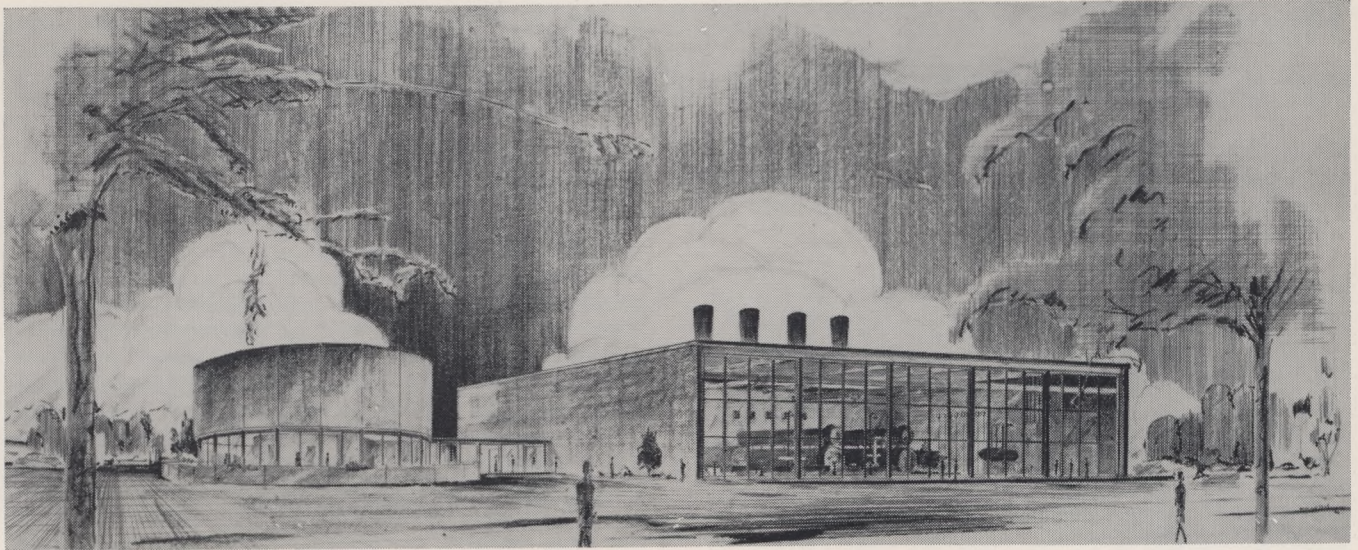
Although many companies currently sell steam for heating, this will be the first privately-owned gas utility company in the country providing, on a metered basis, both heating and air-conditioning service. In doing so, it fulfills the prediction made some 25 years ago by Dr. Willis H. Carrier, founder of the Carrier Corporation, that some day air-conditioning would be merchandised on a utility basis.

After the decision was made to proceed with the construction of the central-station plant, every effort was made to secure as much business as possible from existing buildings along the route of the proposed mains. Also, negotiations were entered into with the Federal Government for the heating and cooling requirements of a large federal office building to be constructed nearby by the General Services Administration. Although bids had been let providing for individual boiler and chiller facilities in the basement of the building, the bids were subsequently changed and a contract was signed providing purchased heating and cooling service from the new central system.

Further, as a result of a City bond issue last fall, Bushnell Plaza, another central-city redevelopment site, got underway which contemplates a high-rise apartment structure and shopping center. Other possibilities of additional load are in prospect so provisions for expansion has been made.

## RATE DEVELOPMENT

Estimated heating revenues were based on rate structures devised by the Company, with assistance from members of the Rates and Regulations Committee of the National District Heating Association. These rates were patterned after similar rates widely used by the Association's member companies. However, no utility rates for the commercial sale of chilled water for cooling were available and it was necessary to devise schedules which have had to pass the scrutiny of the prospective customers including the General Services Administration of the United States Government.



**Fig. 1**—Projected new plant of the Hartford Gas Company to house cooling and heating equipment. Initially the building will contain three Carrier Air Conditioning Company steam-turbine-driven centrifugal refrigerating machines with a total of 6,000 tons of cooling capacity plus\* a Carrier 500 ton absorption refrigerating machine, and steam boilers with a capacity of 225,000 lb per hr. Chilled water from the refrigerating machines and the steam will be piped more than a half mile to give utility-furnished air-conditioning service to Constitution Plaza and other buildings in the downtown Hartford area. Charles DuBose, Hartford architect who is coordinating architect for the \$40,000,000 Constitution Plaza project, designed the building to permit a 50 per cent increase in air-conditioning capacity. The use of this central plant makes it unnecessary for the buildings in and adjacent to the redevelopment area to have their own individual heating and cooling plants, thereby saving valuable space for other purposes. The design of the control center has been changed from circular to rectangular. When needed another 3000 ton centrifugal machine will be added. \*Nearby.

The rates are on a demand and commodity basis providing revenues approximately one-half from the demand portion of the rate and one-half from commodity. Escalation clauses are stipulated covering fuel, labor and taxes along with a minimum monthly charge. Both steam and chilled water will be metered so that customers will pay only for what they use. Both rates are designed to be competitive with individually installed systems and also to provide profit which will be reflected in additional earnings to the Hartford Gas Company. Steam will be recorded in lb per hr and the chilled water in tons of refrigeration. Measurement of the chilled water will be in lb of water flowing, together with the rise in temperature of the water used, thus giving Btu recordings which will be converted to tons of refrigeration.

Service contracts have been negotiated with Constitution Plaza Inc., The Travelers Insurance Company and the Phoenix Mutual Life Insurance Company, to purchase chilled water and steam service for a 30-year period, based on the rate schedules devised with escalation clauses on fuel, labor and taxes. On the strength of these commitments, financing through 30-year, first mortgage bonds, has been arranged with the Connecticut General Life Insurance Company.

As a temporary measure, the aforementioned existing Travelers boiler plant, a 100,000 lb per hr facility, housed in an adjacent separate building, was leased and a 500 ton absorption refrigeration unit was installed. This plant is now the source of steam and chilled water supplying Travelers Broadcast House, The Hartford Steam Boiler Inspection and Insurance Company, and the Hartford Times, until the new plant located on Gas Company property is completed in May 1962.

The firm of Seelye Stevenson Value & Knecht, consulting engineers of New York City, was retained by The Hartford Gas Company to design the plant and distribution system with Charles DuBose of Hartford as architect. The F. H. McGraw Company, also of Hartford, was engaged as General Contractor to construct the project.

### CENTRAL PLANT

The plant (See Fig. 1) will consist of two interconnected buildings. The smaller building will house offices, gas dispatch center, laboratory and control room. The larger building will contain the boilers and refrigeration equipment needed to supply the steam and chilled water.

The cooling equipment will consist of two centrifugal refrigeration machines, with a capacity of 3,000 tons each, and two smaller centrifugals with capacity of 1,500 tons each and added to this will be the 500 ton absorption unit now installed in the leased Travelers boiler plant. Three boilers are contemplated which have a combined steam capacity of 225,000 lb per hour or the equivalent of 6,750 boiler horse power. The steam, in addition to being sold for heating, will serve both the turbine-driven and absorption refrigeration units providing a more even year-round boiler load and consequently more efficient operation. Gas will be used to fire the boilers except in severe winter weather when No. 6 oil will be used, thus making it possible to improve the over-all load factor in the pur-

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chase of natural gas. The plant site being adjacent to the Connecticut River, will permit the use of river water for condensing thereby eliminating the need for cooling towers.

## DISTRIBUTION SYSTEM

The distribution system will consist of two sets of pipelines. Both the supply and return lines for chilled water are 24 in. in diameter with 1 in. insulation of expanded polystyrene on the supply line (40°F). The return line (55°F) will not be insulated. The steam-supply line will be a prefabricated conduit consisting of a protective steel casing containing an air space and insulation around a 12 in. steel pipe that carries the steam. The condensate return line will be 5 in. in diameter, stainless steel pipe insulated with granulated gilsonite, a natural hydrocarbon mineral. All lines will be coated and the system cathodically protected. The total length of the initial piping involved will be 5,200 ft for each of the two supply lines and each of the two return lines.

The plant is so constructed that expansion of future boiler and chiller units can readily be made and provision has been made for the looping of the pipe lines so that heating and cooling service can be extended to new buildings yet to be built in the long range redevelopment program, or to new customers in existing buildings.

## ADVANTAGES TO UTILITY

The Hartford Gas Company in promoting and becoming an integral part of the City's redevelopment program, was interested in arresting the decay going on in the downtown area, where a large portion of the Company's investment in distribution facilities is located. Over the years, with the move to the suburbs and outlying areas of residential and commercial customers, the gas revenues from the city core area were dwindling and not fully recovered in the suburbs due



Fig. 2—Prospect Street Pipe-Line Excavation Looking South from Atheneum North—June 23, 1961.

in part to some instances of gas services not being available in the outlying sections where the former downtown customers relocated.

While the Company has been active in the sale of gas for year-round air conditioning for both residential and commercial application, the rate of acquisition of this load has been relatively slow when compared with the need to increase the summer gas sales in order to improve load factor. To be able, through the central plant, to acquire an additional summer cooling load equivalent to approximately 10,000 tons, will be a most gratifying boost toward the Company's objectives, and in addition, become one of the major factors in the City's modernization program definitely identifying gas with air-conditioning.

## CUSTOMER ADVANTAGES

The advantages to the customers have been promptly recognized by the engineering and architectural concerns engaged in the design and construction of the new buildings. It has been definitely shown in each case considered, that the total owning and operating cost of the individual building with its own heating and cooling plant is greater than the cost of purchased service, and in addition, there are many other advantages.

Savings of space is one major advantage. By having steam and chilled water piped from a central source, the user eliminates the need to install large boilers and refrigeration equipment in his building. This space can then be used as a retail sales area, for storage, files, additional office space, or many other purposes. It is interesting to note that, because all buildings on Constitution Plaza will receive heating and air-conditioning services from a central plant, none contain in their plans any provision for boiler rooms, chimneys or chilled-water plants.

The need to build and maintain cooling towers is also eliminated. In the case of new buildings, this reduces construction costs and frees the architect for better design. In existing buildings, it reduces operating noise level, eliminates the annoying mist which often sprays passers-by on the street below and of course, improves the appearance of the building, and perhaps the most important, eliminates the smoke nuisance.

The central-plant approach to heating and cooling in commercial buildings eliminates the capital expense of equipment. It reduces payrolls because the owner need not hire a licensed operator for the equipment and maintenance costs are transferred to the supplier.

These are just a few of the advantages to the user which the central-station concept offers.

Supplying heating and cooling to segments of a city by a gas utility not only offers growth opportunities for the company, but it also will act as a stimulant in the efforts of the company to obtain customer acceptance in all other branches of its marketing activities, and most important, it is in the best interests of the user and the community.