

Trenton district heating plans backed by creative financing

By Bruce Bond

A unique package of federal grants, tax-free revenue bonds and leveraged leasing to finance a \$35 million district heating system for downtown Trenton, N.J. may be the trail blazer for a resurgence of district heating and cooling programs in the United States.

The financial precedents in this package automatically improve the environment for other planned alternative energy projects anywhere in the country, in the opinion of Alan Hills, vice president in the public finance department of Prudential-Bache Securities, Inc. and the man who assembled the package.

"For the first time, tax-exempt revenue bonds are being used to finance a cogeneration district heating project on a self-supporting basis — that is, where the payback will be made solely from the project's own revenues," Hills explains. "The bond issue is also the first district heating IDB issued under a new liberalized provision of the 1982 federal tax law."

The provision, lobbied through Congress by municipalities and brokerage houses, is part of the Tax Equity and Fiscal Responsibility Act of 1982. It authorizes tax-exempt revenue bonds for district heating and removes the \$10 million limit that generally applies to industrial revenue bonds.

Prudential-Bache has just completed management of the underwriting of \$14.1 million of revenue bonds issued by the New Jersey Economic Development Authority as the final phase of the financing package.

The Trenton program is the first district heating project for a U.S. city since the early 1920s. Once common, district heating systems continue to operate in such municipalities as New York, Boston, Philadelphia and Detroit. Their popularity waned, however, with the growing abundance and lessening costs of oil, gas and electricity.

Today, fresh national concerns with fuel availability and prices, conservation and urban economic revitalization may be recreating this cogeneration market, some experts believe.

Private ownership is unique. Another singular feature of the Trenton program is that it will be owned and operated by private enterprise, not by the municipality. This was arrived at largely through a process of elimination.

Cogenerated district heating as a device for revitalizing downtown Trenton had been a glint in the eye of perennial Trenton Mayor Arthur Holland for some time. He put together a task force of businessmen and civic leaders in 1977 to determine feasibility.

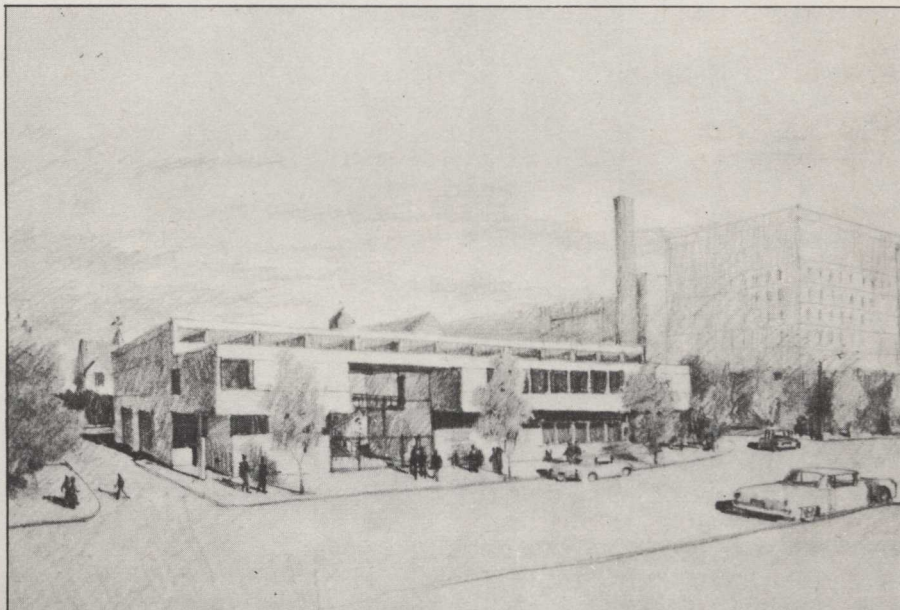
The first major step was a joint study by the city and Public Service Electric & Gas Company. The study found that the district heating program, operated by the utility, would be feasible and would provide a shot

in the arm for the downtown area.

Then PSE&G decided that operating the district heating system was not in its interest. The task force determined that Trenton itself just did not have the know-how or personnel to manage a utility program of such magnitude. The outlook was bleak, but the task force undertook a search for alternative management.

Eventually, after a series of abortive contacts with northeastern consulting firms, the task force approached Cogeneration Development Corporation, then a subsidiary of Cummins Engine Company. CDC had been active in planning cogeneration programs for office buildings and was able to convince the task force that it could handle a project of the size planned for Trenton.

CDC officers meanwhile purchased the company from Cummins and spun off new organizations to implement the Trenton program. Cogeneration Constructors is responsible for delivering the fixed-fee, turn-



Trenton project: Conceptual plan for downtown district heating system built around twin 6-Mw Cooper diesel generator sets, two supplementary-fired boilers, and a 4.5-mile network of pipes.

Trenton (continued)

key project to Trenton District Energy Company, which will own and operate the facility.

Multi-national involvement. Cogeneration Constructors is made up of three U.S. and Canadian subsidiaries of the Swedish firm, Skanska Cementgjuteriet. They are Grove Overseas Corporation and Skanska USA, both of Vienna, Virginia, and Foundation Company, Ltd. of Toronto. Trenton District Energy Company is made up of Cogeneration Development Corp. and a number of associated individuals.

Physically, the Trenton project involves two six-megawatt Cooper LSVB-20-GDT diesel generators, two supplemental boilers to be supplied by International Boiler Works, an acre of land and a 4.5-mile network of pipes.

Electricity will be sold to PSE&G. Heat from the generators' cooling and exhaust systems will be pumped in the form of hot water to customer buildings and then recycled to the power plant. At the outset, 18 buildings will be served. They are the New Jersey State House, 13 other state office buildings, the Trenton State Prison, Mercer Medical Center, Mercer County Detention Center and an apartment complex.

Imaginative financing has been the heart of the program. Trenton applied a \$371,000 grant from the Department of Energy to the cost of interconnecting the facility with PSE&G's power grid. Another grant of \$3,880,000 from the Department of Housing and Urban Development has been converted to a 20-year loan from the City of Trenton to TDEC.

The tax exempt bonds will produce \$14.1 million. Another \$12.5 million will derive from leveraged leasing. Leveraged leasing is a financing mechanism whereby a third party investor acquires a project's assets and its tax write-offs and leases the assets back to the operator.

The limited partners of TDEC will supply \$1,161,000. Remaining funds will come from investing the other funds prior to their use.

This Trenton package will go a long way toward overcoming the factors such as lack of up-front risk capital and investor unfamiliarity that have impeded the re-emergence of district heating in this country, Hills feels sure.

District heating could become a major market for cogeneration in this country as it is in Europe. ■

In Brief...

Coal-derived fuels continue to claim much of DOE's research attention and funds. Just announced: research contracts to GE (\$1.055 million) and United Technologies (\$257,000) to study the relative quality of such fuels as coal-water mixtures and synthetic gas for powering gas turbines. Hydrocarbon Research Inc. (\$4.3 million) will test a new technology which links two vessels to convert coal into liquid fuel.

Energy statistics for 1982 are available in three volumes from DOE's energy information administration. A 1982 *Annual Report to Congress* includes 100 EIA reports for the year. Summaries of energy data and projections are contained in the *Annual Energy Review* and the *Annual Energy Outlook*. Write to EIA, Room 1F-048, Forrestal Bldg., Washington, D.C. 20585 or call 202-252-2363.

Laser pulses flashing millions of times a second can "paint" integrated circuits directly on silicon wafers, claim Lawrence Livermore scientists. This "laser pantography"

should be turning out 100 transistors a second by the end of the year, they say. This means that small computers may soon be bringing the capabilities of today's supercomputers to small power producers.

John B. Wing, a West Pointer who came to GE from Continental Resources Company in 1982, now heads GE's cogeneration market development and selected advanced energy projects. As general manager of the Energy Applications Program Department (EAPD), Wing succeeds Edwin F. Phelps, now president of UMC Industries, Stamford, CT.

Old tires are the latest source of oil, natural gas and assorted other by-products, according to Carbon Oil & Gas Co. It is building a new plant in Struthers, Ohio, to shred, melt and reduce tires to oil vapor, natural gas, carbon char and assorted dreck. The vapor will be condensed into No. 6 industrial fuel oil, and the carbon will be sold to electric utilities as two percent sulphur coal, the company says.

PG&E plant taps electric power from gas transmission

Pacific Gas & Electric is in its first year of operation of a new cogeneration addition to the Gerber pipeline pumping station in northern California. The system taps waste heat from the gas turbine compressor set to produce electric power for the local PG&E electric distribution system.

The cogeneration plant, dedicated last Fall, is incorporated into an existing transmission station that's been in simple cycle operation since the late 1960's. Gas transmission is handled by a Rolls-Royce Avon 1533-76G gas generator, coupled to a Cooper Bessemer RT48 power turbine driving a centrifugal gas compressor. Unit is site-rated 12,800 hp at 80°F, 300-ft elevation site conditions — with a simple cycle thermal efficiency of 25.3%.

In an effort to boost system efficiency, PG&E issued a contract to Mechanical Technology Inc. for design and supply of the heat recovery system and steam turbogenerator. MTI

equipment includes the unfired dual pressure level waste heat boiler operating off the gas turbine nominal 735°F, 162 lbs per second exhaust flow. They also supplied the 6500-rpm dual pressure steam turbine generator that provides site-rated 3700 kW at 4160-V.

According to PG&E, plant operation is showing a combined cycle thermal efficiency over 36% — compared to the simple cycle efficiency of 25.3% — for a better than 40% improvement in system efficiency.

Installed plant cost is reported at about \$9.5 million, including PG&E overheads, and initial operating and maintenance costs are estimated at \$250,000 per year. Over the 15-year life they're assuming for economic evaluation, company sees the levelized annual cost of electric power generated at Gerber of 8.5¢ per kW-hr, compared to the utility's current estimate of 9.7¢ per kW-hr for its overall system power value during the same period.