

public power

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FRONT COVER: By next summer the Eugene (Ore.) Water and Electric Board plans to have installed an ALCOA-built Darrieus vertical axis wind turbine larger than the machine at Sandia Labs, near Albuquerque, N.M., shown on the cover. The Eugene turbine will cost \$160,000 and site preparation about \$90,000. The \$250,000 cost is being borne by more than 20 municipals, public utility districts, rural electric co-ops and APPA.

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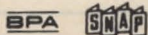
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The Score in Minnesota

14 operating

15 closed

by KAREN ANDERSON and MARY WILLIAMS

Anderson is a contributing editor of PUBLIC POWER. Williams is on the staff of the Minnesota Project, a new privately funded, community assistance and policy study center in Minneapolis.

MINNESOTA PROBABLY HAS MORE district heating systems than any other state. But they are an endangered species. Fifteen systems have been abandoned since the mid-'60s. Only 14 are now operating. One of them—Worthington—plans to close in two years. All 29 operating or former systems except one—Duluth, which is still operating—are among the 127 communities in the state with public power systems.

"We're losing about one system a year," said Dick Kirkham, executive director of the Minnesota Municipal Utilities Association. A long-term supporter of district heating, he has lobbied the governor and state energy office for funds to keep the local systems going.

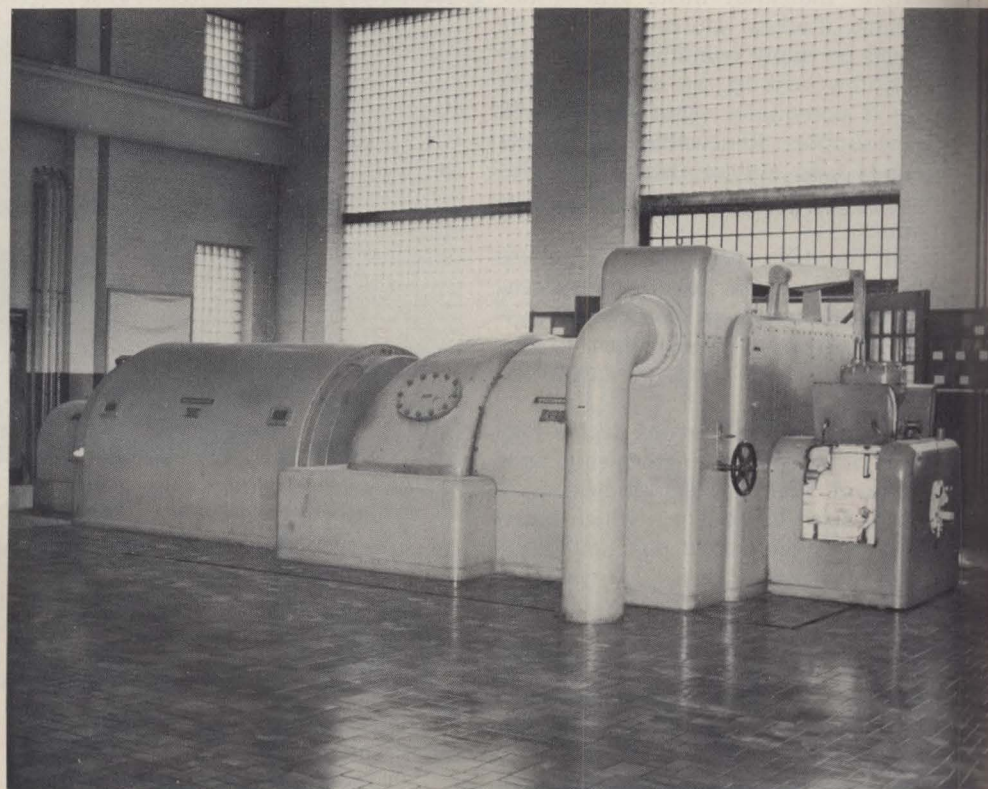
The state energy office has earmarked about \$1.2 million—including some federal money—for district heating. This has funded preliminary studies of installing new district heating in several cities, one of which—Moorhead—has its own electric system. But most of the funds have been channeled to big, dramatic projects such as one proposed for Minneapolis. Most of the state's district heating systems are in towns with populations between 2,500 and 25,000. However, systems are operating in Duluth and on the University of Minnesota campus in Minneapolis. The economic bases of communities with district heating range from mining, tourism and shipping—in the northern communities—to meat packing, food processing, manufacturing and large educational and health institutions in the central and southern parts of the state.

Almost 7,000 industrial, commercial

and residential customers are served by the 14 systems. Most of them limit service to commercial districts, industries and small portions of their residential areas. However, two towns on the Iron Range in northern Minnesota—Hibbing and Virginia—have heavy residential loads.

District heating began in Minnesota at the turn of the century. Steam engines produced power for factories, sawmills and electric generators. Coal and scrap wood fueled these early

Austin, Minn. has maintained its district heating system, which includes this steam turbine generating unit. It includes an extraction element which permits the municipal to bleed off steam at a reduced pressure for the heating system.



boilers. The exhaust steam from the factory or municipal generators fed distribution pipelines connecting the generators to the heating districts. Later on, technological changes and availability of other heat sources and fuels created a variety of problems for the systems.

Why Did They Close?

The towns which have abandoned their systems list rehabilitation and maintenance costs, high fuel costs and rates, and the availability of lower cost natural gas to the steam customers as the major reasons for shutting down.

"Blame it on a combination of old age and high cost," said Don Meyer, superintendent of the New Prague Municipal Utilities. That system, in service since 1936, closed on June 1. The system itself was fairly efficient; the town had purchased new diesel equipment and switched from coal to natural gas in the '50s. But curtailment of natural gas and rising prices for diesel fuel triggered the shutdown.

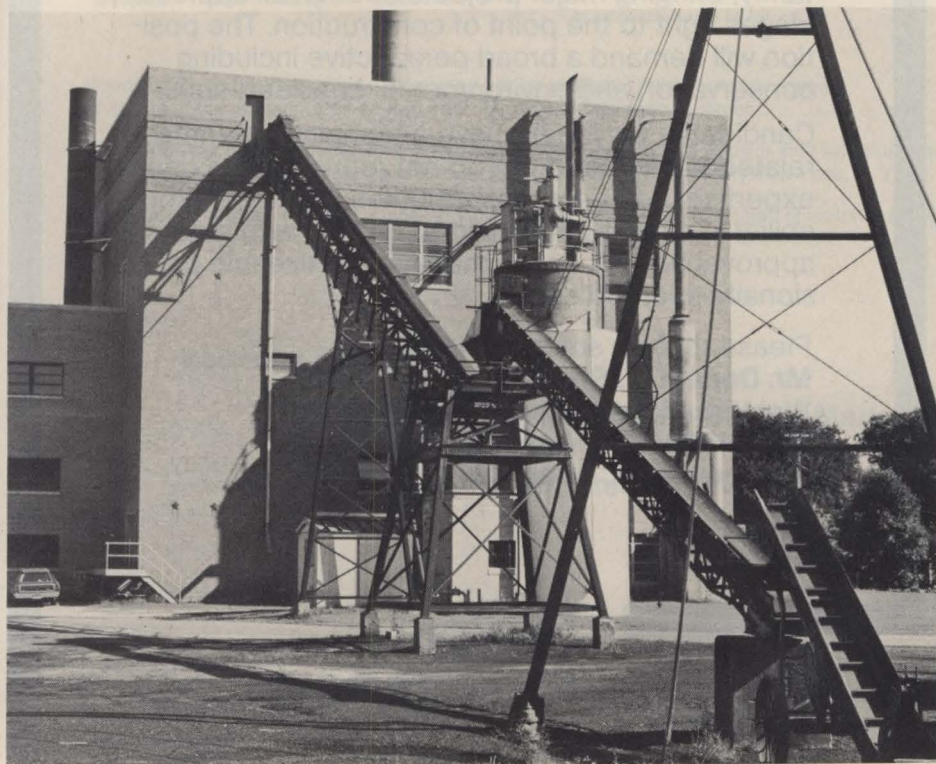
Ironically, while gas was unavailable to the municipal utility to provide electricity and heat, it was available at retail prices to residents, small businesses and institutional customers, for heating. Gas was also available on an interruptible basis to industrial customers in the area.

- operating
- ✕ abandoned

MINNESOTA



The Litchfield, Minn. district heating system is now defunct, but the building houses municipal offices, two standby diesel generators and switch gear. The coal-conveyer system in the front of the picture is not operating now.



Virginia, Minn., claims the largest residential district heating system in the U.S., supplying central steam heat and hot water to more than 3,600 homes. Public Utilities Superintendent Ed Kozan said that the steam department is independent and still financially solvent. But, he points out, insulation has deteriorated badly along the 50-odd miles of buried steam main. "If we had to start from scratch today," he said, "we would probably prefer to go with central hot water."

Virginia wants to do just that, but the upgrading and system conversion to hot water is estimated to cost \$55 million. No help is likely from the state energy agency—which took one look at the utility's figures and said they were 30 percent too high—or the federal government.

The town of Sleepy Eye voted to shut down its system in 1977, then changed its mind. Sleepy Eye's steam, supplied in winter by cogeneration from a coal-fired plant and in summer by a boiler which produces only steam, still operates in the black. But repair costs are rapidly becoming prohibitive, said David Logue, the new superintendent of utilities. Maintenance has been spotty over the last few years. More than \$5,000 has been spent correcting obvious problems this year.

Nevertheless, Logue said, it would hurt the town to lose its district heat. The system's 136 customers include all of the town schools, most churches and main street businesses.

Electricity Subsidized Steam

How did district heating become an endangered technology? Years ago, when most of these cogeneration systems were planned, district heating was viewed as the "suckling pig" to electric generation. The cost to steam customers was the incremental cost of extracting steam from the turbines. This kept the price of steam low for district heating customers. By not taking on a higher proportion of the overall costs, district heating was, in effect, subsidized by generation.

This worked well at first, but when the cost of electricity produced by large, outside central station sources began to decline, a town's district heating customers—often downtown merchants—began to feel the pressure from disgruntled residential electric consumers. The two options for district heating systems, both unattractive, were dramatically higher steam rates or expensive conversion to individual units.

If the electric generating systems could have been integrated with the regional power grids, the municipal utilities would have had a ready market for their electricity. Instead, many communities abandoned their turbines, and brought in simple boilers to supply steam only for the district heating system, thus eliminating cogeneration and its inherent efficiencies.

Cheap Hydro Hurt

As more federal power and other low-cost power sources became available, the city of Alexandria found it would be uneconomical to continue operating its generating plant. Alexandria found it would have to raise its steam rates 65 percent in order to operate a self-sufficient steam system. So the Alexandria system—which generated 3,700 kw of electricity and distributed 41,374,000 pounds of steam through an extensive system—was abandoned.

Economic studies comparing district heating with alternatives can lead to misleading conclusions unless care is taken to consider several factors, according to Herb Blinder, APPA director of technical services.

“Often the need to shift from a ‘suckling pig’ district heating system to a primary heating system appears shocking to heating customers,” said Blinder. “Over the long run a district heating system ought to compete favorably with separate customer-operated heating systems. Then, if some by-product electricity can be added to the district heating operation it ought to enhance its feasibility. But there has to be consistency in the analysis. The fixed charges and operating costs should be examined over equally long periods corresponding to the usual financing of public debt. Realistic inflation factors for retail fuel supplies should be incorporated in the study.”

It is difficult for community leaders to oppose purchase of more electricity at 1.6 cents per kwh when the locally generated electricity costs 3.5 cents to 5 cents per kwh, due to the high fuel costs and limitations on their systems. Federal electricity poses problems for five of the 14 district heating systems which have contracts to buy it. Other systems are unable to purchase federal power even though they would contract for whatever they could get. While this is an inequity for the systems that cannot buy federal power, they may benefit from retention of their local ability to cogenerate both electricity and heat.

Worthington Plant Closing

When Worthington shuts down its system in 1981, it will probably buy all of its electrical requirements from the federal government, and the electric plant will be put on standby. Water and Light Commission Manager Leroy Schindler said he cannot quarrel with the decision to shut down. Although steam was once produced as a by-product of electric generation, lower cost electricity is available elsewhere and the steam load has grown larger than the electric load. Logically, steam rates should rise to about \$10 per thou-

sand pounds, he said. But that would force Worthington's 159 steam customers to pay a premium price for their heat—about \$100 per month—as opposed to \$65 per month for gas heat.

It is unlikely that the small, abandoned district heating systems can be saved, at least without substantial, subsidized repair or reconstruction. There is a shortage of studies comparing costs of district heating with alternatives at today's and tomorrow's higher fuel costs. There may be time to save existing systems, if there is the will to do so. ✽

DIRECTOR- ENERGY SUPPLY PLANNING

An organizational restructuring of this major western Canadian utility has created the challenging new position of Director - Energy Supply Planning. This is a senior position which reports directly to the corporation's chief executive and carries full responsibility for a major functional area.

The Director - Energy Supply Planning will ensure that the corporation has a reliable and cost-effective energy supply (gas and electricity) in the future. This will include demand forecasting, exploring the full range of supply alternatives, developing a comprehensive corporate energy plan and, most importantly, bringing major projects through all approval stages right to the point of construction. The position will demand a broad perspective including conservation and environmental considerations.

Candidates will ideally have a technical or energy-related background but do not require detail design expertise. Key personal attributes include a strong ability in strategic planning, in dealing with external approval bodies, and in managing a sizeable professionally-oriented staff,

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