
Rochester

New York

A District Heating Case Study



United States Conference of Mayors

Rochester

New York

A District Heating Case Study

September 1986



UNITED STATES CONFERENCE OF MAYORS
1620 Eye Street, N.W.
Washington, D.C. 20006
(202) 293-7330

September 1986

The research for this study was made possible through a contract from the United States Department of Housing and Urban Development and Argonne National Laboratory. However, data, policies, and positions stated herein do not necessarily reflect the opinions of the U.S. Department of Housing and Urban Development, Argonne National Laboratory, or of the Federal Government.

ROCHESTER, NEW YORK

A District Heating Case Study

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
HISTORY OF DISTRICT HEATING IN ROCHESTER	2
FORMATION OF THE ROCHESTER DISTRICT HEATING COOPERATIVE.	2
Assessment of Alternatives	2
Steam Cooperative as New Owner	3
FACTORS CRITICAL TO DEVELOPMENT OF THE STEAM COOPERATIVE	4
Attracting Members	4
Legal Issues	5
Political Support	5
THE ROCHESTER DISTRICT HEATING SYSTEM	6
BENEFITS OF DISTRICT HEATING	7
CONCLUSIONS	8
APPENDIX A--PROJECT SUMMARY	9
Project History	9
Technical Facts	10
RDH Officers	10
APPENDIX B--REFERENCES	11
ACKNOWLEDGEMENTS	12

Executive Summary

The history of district heating in Rochester is similar to that of other communities in the United States. Established in 1889, the steam system in Rochester was originally developed by Rochester Gas and Electric Company (RG&E) as an outgrowth of its expanding centralized electric system in the downtown area. It eventually became the accepted source of energy for newly constructed buildings and by 1963 had become the fourth largest district heating system in the country, serving 621 customers. However, after reaching this peak, the system began to decline and by the end of 1985 the number of customers had decreased to less than 75.

The decline of Rochester's system over the past two decades has been attributed to a number of factors: RG&E's aggressive marketing of natural gas; the changing complexion of downtown Rochester; steadily increasing steam prices; and RG&E's decision in the early seventies to convert the coal-fired boilers to burn natural gas or oil, followed by the 1973 Arab oil embargo which drastically raised fuel costs and resulted in further increases in steam rates. Moreover, as a regulated utility, RG&E was forced to continue operating distribution lines with very few customers, resulting in significant steam loss and inefficiencies.

In July 1984, the New York Public Service Commission authorized RG&E to abandon the steam system by October 1985.

Faced with the prospect of having to install individual boilers, a number of the existing steam customers organized a group to examine alternatives to abandonment of the system. The group's efforts ultimately resulted in the formation of the Rochester District Heating Cooperative (RDH) in November 1984. The first steam users cooperative in New York State, RDH began providing its own steam to its members in January 1986. Initially, RDH purchased some of its steam from RG&E; but it is now supplying all the system's steam requirements using leased package boilers. Its new permanent boiler plant is under construction and is expected to be operational by February 1987.

Rochester's steam cooperative is proving to be a viable, cost-effective alternative to abandonment of the system initially proposed by RG&E. By forming the cooperative, RDH members were able to avoid expending capital to construct and install individual on-site boiler systems. As a non-profit organization, whose main objective is to provide steam to its members at the lowest possible cost, RDH has been able to reduce steam rates substantially, with users paying an average of \$14 per thousand pounds of steam. A steam cooperative also provides its users with an opportunity to have a voice in shaping policies and making decisions regarding issues which directly affect them and the steam service they receive.

History of District Heating in Rochester

Rochester's district heating system was established in 1889, making Rochester the third community in the nation to install a centralized steam heating system. Owned by Rochester Gas & Electric Co. (RG&E), the system was developed as an outgrowth of the utility's desire to increase electricity sales in downtown Rochester. Many of RG&E's prospective customers were already producing their own electricity with on-site coal-fired steam turbines and using exhaust steam for space heating. RG&E sought to overcome this obstacle to electrical sales by offering to deliver steam and thereby attract more customers. The steam system thus grew in conjunction with the electrical service and gradually replaced the on-site turbines of downtown Rochester's buildings and industries; it eventually became the accepted source of energy for newly constructed buildings.

By 1963, the Rochester district heating system was ranked as the fourth largest in the country, serving 621 customers. Since then, the number of customers has dropped substantially to less than 75 by 1985. The loss of customers has been attributed to the

combined results of steadily increasing steam prices and the aggressive marketing of natural gas by RG&E. Further contributing to the decline of the system was a decision by RG&E, in the early seventies, to convert its coal-fired boilers to fire natural gas or oil—a response to the more stringent federal air quality and emission regulations enacted in the late sixties. Shortly after the fuel conversion, the United States was confronted with the 1973 Arab oil embargo, drastically raising fuel costs and resulting in a corresponding increase in steam prices. As a regulated utility, RG&E was required to provide steam service to all customers on an average cost of service basis and, in many cases, was forced to continue operating distribution lines with very few customers, thereby incurring significant line losses and inefficiencies. The system became less and less profitable, prompting RG&E to begin seriously considering abandoning the steam business. In July 1984, the New York Public Service Commission awarded RG&E substantial steam rate increases and granted approval for the utility to submit a plan to abandon the system by October 1985.

Formation of the Rochester District Heating Cooperative

Assessment of Alternatives

Prior to the abandonment authorization by the PSC, the City of Rochester had contracted with the New York State Energy Research and Development Authority (NYSERDA) to conduct an economic and technical assessment of reconfiguring and revitalizing the downtown steam

system. The assessment was financed on a cost-sharing basis between NYSERDA and the Rochester community, with NYSERDA contributing approximately two-thirds of the cost, and RG&E, the City of Rochester and steam customers providing the remaining one-third. In May 1984, the city hired Resource Development Associates, Inc. (RDA) to conduct a technical, institutional

and financial analysis of the feasibility assessment. A work group was formed with representatives from Monroe County, the city, steam system customers, RG&E, and NYSERDA.

The work group, which became known as the steam users group, drew up a work plan for the feasibility study, which ultimately concluded that a scaled back, reconfigured steam system would be feasible with a new owner-operator. The steam customers involved with the group were particularly concerned about the prospect of having to invest capital for new individual boiler plant facilities and operators. Ownership schemes were evaluated on the basis of financial capability, ability to deliver steam at a reasonable rate, and ability to operate within the existing legal and regulatory framework in the state, county, and city. Alternative ownership arrangements investigated included: (1) city and/or county ownership; (2) private ownership; (3) formation of a special steam district involving local government ownership; and (4) formation of a non-profit cooperative corporation. In August 1984, the steam users group began seriously considering the formation of a steam users cooperative and began notifying steam customers that viable alternatives existed to abandonment of the system and costly installment of individual on-site boilers. Throughout this period RG&E continued to work with the steam users group and indicated its willingness to consider alternatives.

The private sector, particular Xerox Corporation and Chase Lincoln Bank, contributed substantially to the cooperative, providing leadership, in-kind contributions and seed money to get the project started.

Steam Cooperative as New Owner

In September 1984, representatives of the steam users group visited Pittsburgh to investigate a working example of a district heating and cooling cooperative, the Pittsburgh Allegheny County Thermal, Ltd.

(PACT). A non-profit cooperative that took over most of downtown Pittsburgh's steam system in 1983, PACT became the model for the development of Rochester's district heating cooperative. On November 9, 1984, the Rochester District Heating Cooperative, Inc. (RDH) was formed to purchase, reconfigure, own and operate a portion of the steam system. A non-stock cooperative corporation, its stated purposes, as outlined in the Certificate of Incorporation (pursuant to Article 2 of the Cooperative Corporations Law), are as follows:

For the mutual assistance of its members in obtaining steam energy for their use, at cost, by owning, operating or managing a steam system to produce, transmit, furnish and distribute steam energy to its members;

To the extent that the sale is permitted under Section 501(c)(12) of the Internal Revenue Code of 1954, as amended from time to time, and under the New York Public Service Law, as amended from time to time, and the New York Transportation Corporations Law, as amended from time to time, to furnish electricity to members and to sell excess steam and/or electricity to third parties; and

To do all things necessary and proper in the furtherance of and in connection with the foregoing purposes to the fullest extent permitted by Section 14 of the Cooperative Corporations Law and by the Business Corporations Law.¹

In March 1985, a letter of intent was signed between RG&E and RDH for transfer of a portion of the steam system, and finally, in December 1985, ownership of Rochester's district heating system was transferred to RDH.

¹ Resource Development Associates, *Rochester District Heating System Reconfiguration Technical and Economic Feasibility*, January 1985; verified by the New York State Secretary of State Office

The takeover and reconfiguration of the steam system was financed by \$9 million in tax-exempt industrial development bonds issued by the County of Monroe Industrial Development Agency (COMIDA). The tax-exempt bonds could have been issued by COMIDA, the city, or NYSERDA. Although the city was very supportive of the co-op, it preferred not to be the bond issuer. NYSERDA was interested in issuing the bonds, but the co-op had been working with COMIDA for some time when NYSERDA's interest was expressed, and it was deemed more practical to proceed with COMIDA as issuer.

The primary issue regarding the use of tax-exempt financing centered around the large private steam users. The question was not only whether the entire project was eligible for tax-exempt financing, but also whether the individual co-op members were. Bond counsel cautioned that if any one private user consumed 10 percent or more of the steam, it would make the bonds taxable. These restrictions did not apply to the city and county, as they are tax-exempt entities. The largest private consumers are Xerox Corporation and Chase Lincoln Bank; the solution

was to ensure that the co-op was large enough—about 250,000 Mlbs.—so that these two companies would use less than 10 percent each of the steam. This was accomplished with the county's participation in the co-op, and Xerox and Chase Lincoln each use approximately 5-6 percent of the steam.

RDH is presently composed of 31 members—18 of which are under long-term (15 year) contracts, and 13 of which are short-term. Every customer is a member of the cooperative because RDH provides steam only to its members. RDH is governed by a Board of Directors composed of 11 members, all of whom represent customers of the steam system: 3 from Monroe County; 1 from the city; 2 from Genesee Hospital; 4 from large load users; and 1 from small load users. Board members are either appointed or elected by RDH members as provided in the By-Laws. The board in turn elects officers including a president, vice president, secretary, and treasurer. (See Appendix A for listing of current officers). The board meets biweekly, and decisions regarding the budget, steam rates, membership and other such matters require membership approval based on patronage voting.

Factors Critical to the Development of the Steam Cooperative

Attracting Members

Achieving credibility and promoting the idea of a steam cooperative as an alternative to RG&E's abandonment of the system became one of the biggest challenges for the steam users group. The group often met with skepticism from steam customers who were unsure of the viability and practicality of a cooperative as an alternative mode of ownership. Although most customers were apprehensive about the prospect of having to

expend capital for individual on-site boilers if RG&E were to abandon the system, many were uncertain as to whether or not a cooperative would be a viable alternative. Many did not understand how RDH would be able to supply steam at a lower price than that charged by RG&E. How a cooperative would finance itself was also a major concern. Other concerns among those approached included: the question of risks involved in joining the cooperative, why it was necessary to sign a long-term contract, how steam prices would

be determined; and how much voice each member would have in shaping policies and decisions made by RDH.

In response to such reaction, the steam users group coordinated a strong publicity and marketing program to inform and educate steam customers about the basic goals and purposes of RDH and the advantages of forming a steam cooperative over abandoning the system. Managing public information became a priority for the steam users group early in the process of the cooperative's formation. The group held meetings regularly and published a newsletter in an effort to secure the support of potential members. Securing a minimum base load and identifying a core group willing to make a commitment to the cooperative became the thrust of marketing activities. Upon recommendation of the consultants that a cooperative would be the most feasible alternative, the steam users group held a press conference to announce the formation of the Rochester District Heating Cooperative. In this way the group hoped to keep the community well informed and to minimize unrealistic expectations.

Legal Issues

Sorting through the legal ramifications of forming a steam cooperative proved to be another major obstacle for proponents of RDH. The first cooperative of its kind in the state of New York, RDH encountered unique legal restraints that had to be resolved before it could attract municipal members and commence operations. Legislation had to be introduced to address two key issues: (1) pursuant to its charter, the County of Monroe was not allowed to enter into long-term contract as a cooperative member; and (2) the cooperative, in order to be economically feasible, had to become exempt from Public Service Law. In July 1985 the New York State Legislature enacted two critical bills; one exempted RDH from regulation by the Public Service Commission and the other allowed the County of Monroe to participate as a member of the cooperative. In September 1985, the

Rochester City Council unanimously agreed to join RDH and granted the cooperative a franchise to operate within the city. This was followed shortly thereafter by the County legislators' vote of 26-2 to allow the County of Monroe to join RDH to heat its Civic Center buildings.

Another significant legal issue facing RDH is its status under existing tax laws including sales tax, gross receipts tax and real property taxes. While RDH intends to pay its fair share of all applicable taxes, as the first district heating cooperative in New York State RDH must carefully examine its status under all applicable tax laws.

Political Support

Support from the city was crucial in saving Rochester's steam system. The City initiated and helped fund the RDA feasibility study to assess alternatives to abandonment of the system. (Other funding came from NYSEDA, and from private companies in the city, such as RG&E, Xerox, Kodak, Chase Lincoln Bank, and others.) Although the city, because of economic considerations, was not interested in taking over the system, it was more than willing to support all efforts to save district heating as long as the private sector assumed ownership. The city was well aware of the economic advantages of the continued existence of a central source of heat for downtown Rochester and recognized that savings in capital expenditure would be realized by the customers through the formation of a steam cooperative. The City Council's unanimous agreement to join RDH and authorize it to operate within the city was a major legislative victory for proponents of RDH.

Convincing the county legislature to join the cooperative was perhaps one of the biggest hurdles faced by the steam users group. Because the county was the biggest user of the steam system, the cooperative would not have been economical without the county's agreement to join as a member of the system. Although the Monroe County administration was brought into discussions

with the concerned steam customers very early in the process of forming the cooperative, the county took a long time considering the other options before deciding to join RDH. After careful evaluation of the steam cooperative alternative proposed by the steam users group, the county decided it would be economically advantageous for downtown Rochester to retain the steam system. Its decision to join RDH was, thus, largely based on an interest in retaining the district heating system as an economic development project that would serve to make the city's downtown area more attractive to business and industry. The

passing of legislation to allow the county to sign up as a long term member of the cooperative was a critical factor in the development of RDH, assuring the base load demand necessary to make the formation of a steam cooperative economically feasible.

The state also played an important role by providing funding for the initial study through NYSERDA. In addition to providing moral support for the idea of a steam cooperative, NYSERDA worked on behalf of RDH during the time that RDH was awaiting legislative approval.

The Rochester District Heating System

From January 1986 through April 30, 1986, RDH provided approximately 65% of the system's steam requirements using two leased packaged boilers, and purchased the rest from RG&E. From May 1, 1986, to date, RDH has provided 100% of its members' steam requirements. A permanent boiler plant is currently under construction and is expected to be operational by February 1987. The new boilers will be of a package water tube design with standard burners and high efficiency combustion controls. The expected annual thermal efficiency of the plant will range from 73-78% with peak efficiencies exceeding 80%. Although RDH acquired the system in good operating condition, RDH plans to re-configure the distribution system in order to reduce line losses by concentrating the steam load within a defined geographic area. The reconfigured system consists of a scaled back underground steam piping system to serve a limited customer base (currently totaling 31 members). RDH also is installing a new gas-fired boiler plant that will be equipped with new state-of-the-art metering and control devices. User-members of the cooperative include the City of Rochester, County of Monroe, Genesee Hospital, Chase Lincoln First Bank, N.A., and Xerox Corporation.

RDH has established a unique pricing system which permits RDH to reward members with non-temperature-dependent loads. Under this system, each member pays the same energy charge rate for steam consumed. Demand charges are based on each member's particular peak demand. The total cost of service charged by RDH to its members is substantially less than that previously charged by RG&E. Steam prices average about \$14 per Mlb. There are no volume discounts. Members who have signed a Membership And Use Agreement for less than the term of the RDH financing (15 years) pay a premium for steam because they do not support the cooperative's debt service in the same way as full term members. As a non-profit cooperative, the RDH Board of Directors establishes steam charges such that revenues equal expenses plus reserves.

In the future, RDH plans to investigate condensate return lines, cogeneration and alternative fuels such as coal or solid waste to further stabilize the price of steam. RDH also plans to add new members, thereby spreading fixed costs over a larger base.

Benefits of District Heating²

Reduced capital costs—Centralized heating systems offer users significant savings in capital investment by eliminating the need to buy and install individual on-site boiler systems.

Reduced operating and maintenance costs—District heating also reduces operating and maintenance costs by transferring these responsibilities from the building owner or operator to the centralized steam system.

Increased building space use—District heating systems permit more efficient use of building space by precluding the need to allot space for on-site boilers. The space saved can be utilized more profitably for other purposes.

Improved air quality—Replacing numerous individual boiler systems with one central heating plant reduces emissions and contributes to reduced air pollution.

Low cost—District heating systems are highly capital intensive, but because they can use fuels such as coal, solid waste and cogenerated thermal energy, their fuel costs can be significantly lower than competing systems that use oil or natural gas.

Community and economic development—District heating also can help promote economic development and revitalization of downtown areas in older cities. The availability of a cost-effective, centralized heating system can serve to attract industry and business.

² Committee on District Heating and Cooling, Energy Engineering Board and Building Research Board, Commission on Engineering and Technical Systems, and National Research Council, *District Heating and Cooling in the United States*, National Academy Press, Washington, D.C. 1985.

Conclusions

District heating systems offer users significant savings in capital expenditure by eliminating the need to construct and install individual on-site boiler systems. Operation and maintenance costs are reduced by connecting to a centralized steam system.

A steam users cooperative is a viable, cost-effective alternative to abandonment of old district heating systems. A district heating cooperative precludes the need for capital investment in new boiler plant facilities and operators for users who have been long reliant on a centralized heat source and who may be unwilling or unable to construct and operate individual on-site boiler systems.

As a non-profit organization whose sole objective is to provide steam to its members at the lowest possible cost, a steam users cooperative can significantly reduce steam prices for its members.

A steam cooperative also provides users with an opportunity to have a voice in shaping policies and making decisions regarding issues that will directly affect them and the steam service they receive.

Organizing and forming a steam users cooperative requires a lot of planning, hard

work, and persistence. Since such cooperatives are relatively new, promoting the idea of a steam cooperative can meet with apprehension among residents, politicians, and the business community. For this reason, a strong public information and marketing program is essential in order to attract sufficient numbers to make the formation of a cooperative economically feasible.

There are legal ramifications involved in forming a steam cooperative that must be resolved in order for such a cooperative to become a feasible alternative. In the case of Rochester, legislation was necessary to allow the county to enter into a long-term contract as a cooperative member and to grant RDH exemption from regulation by the New York Public Service Commission.

Generating political support is critical in forming a steam users cooperative. The formation of RDH would not have succeeded without support from the city, county and state.

District heating can help promote economic development and urban revitalization by providing a stable, cost-effective energy source that can serve to attract industry and business.

Appendix A

Project History

- 1889 Rochester district heating system is established by Rochester Gas and Electric Company (RG&E)
- 1963 Rochester district heating system is ranked as fourth largest in the country, serving 621 customers
- 1973 Arab oil embargo; steam prices increase drastically and district heating system continues to lose customers
- 1984 (May) City of Rochester hires Resource Development Associates to conduct feasibility study to assess alternatives regarding district heating system
- 1984 (July) New York Public Service Commission awards RG&E steam rate increases and orders RG&E to submit plan to abandon system by October 1985
- 1984 (September) Representatives of steam users group visits Pittsburgh to discuss option to form Rochester steam cooperative with the Pittsburgh Allegheny County Thermal, Ltd.
- 1984 (November) The Rochester District Heating Cooperative (RDH) is formed
- 1985 (March) Letter of intent is signed between RG&E and RDH for transfer of steam system to RDH
- 1985 (July) New York State Legislature unanimously exempts steam cooperative from regulation by the Public Service Commission and allows County of Monroe to participate as member of RDH
- 1985 (September) Rochester City Council unanimously agrees to join RDH and authorizes cooperative to operate within the city
- 1985 (October) County legislators vote 26-2 to allow county to join RDH
- 1985 (December) Ownership of steam system is transferred to RDH
- 1986 (January) RDH begins providing steam to its members, using temporary leased boilers, and purchasing the rest from RG&E
- 1986 (April) RDH begins providing 100% of its own steam requirements
- 1987 (February) Construction of permanent boiler plant is expected to be completed

Technical Facts

Location: Rochester, New York

Area served: Downtown Rochester

Owner/Operator: Rochester District Heating Cooperative, Inc.

Cost of purchase and reconfiguration of steam system: \$9 million

Financing: Industrial development bonds issued by County of Monroe Industrial Development Agency

Current Number of Users/Members: 31 Members/41 Buildings

Steam Transmission Lines: 22,000 feet

Boiler System: *Temporary* - 2 gas-fired leased boilers;

summer average load: 15,000 lbs./hour;

winter average load: 180,000 lbs./hour

Permanent - 3 gas-fired boilers, 2 rated at 150,000 lbs./hour and 1 at 50,000 lbs./hour;
also, one existing back-up boiler rated at 125,000 lbs./hour

RDH Officers

President: Armand A. Lartigue,
Xerox Corporation

Vice-President: Dr. Gerald C. McDonald,
Monroe County Department of Physical Service

Treasurer: Jean G. Boles,
Xerox Corporation

Secretary: Michael A. Howard, Esq.,
Boylan, Brown, Code, Fowler, Randall & Wilson

Appendix B

References

Wade, David and Lartigue, Armand, "Formation of the Rochester District Heating Cooperative," paper presented at the International District Heating and Cooling Association Conference, Minneapolis, June 1985.

Resource Development Associates, *Rochester District Heating System Reconfiguration Technical and Economic Feasibility*, January 1985.

Lartigue, Armand, "The Rochester District Heating Cooperative," paper presented at the HUD-DOE Fourth National District Heating and Cooling Conference, Washington, D.C., January 1986.

Oak Ridge National Laboratory, *Potential Opportunities for Revitalization of the Rochester, New York Steam District Heating System*, September 1981.

Newletters (*UPDATE*) from Rochester District Heating Cooperative, February 1985 - December 1985.

Committee on District Heating and Cooling, Energy Engineering Board and Building Research Board, Commission on Engineering and Technical Systems, and National Research Council, *District Heating and Cooling in the United States*, National Academy Press, Washington, D.C., 1985.

Interviews conducted with various RDH representatives in March 1986, Rochester, New York.

Acknowledgements

The U.S. Conference of Mayors extends its appreciation to the following people for their assistance and contribution of time and resources for interviews conducted in preparation of this study:

Armand A. Lartigue, Manager, Monroe County Site Services, Real Estate/General Services Division, Xerox Corporation

Jean G. Boles, Manager, Facilities Services Central, Real Estate/General Services Division, Xerox Corporation

Michael A. Howard, Esq., Boylan, Brown, Code, Fowler, Randall & Wilson

Ralph J. Esposito, Deputy County Executive, County of Monroe

James E. Malone, Deputy Mayor, City of Rochester

Richard Korbel, Director of Neighborhood Development, City of Rochester

John Wilson, Esq., Boylan, Brown, Code, Fowler, Randall & Wilson

Paul R. Edwin, former General Manager, Rochester District Heating Cooperative

Joseph F. Reisdorf, Jr., Acting General Manager, Rochester District Heating Cooperative

William Hanselman, President, Resource Development Associates

We would particularly like to thank Armand Lartigue for the assistance he provided in coordinating the interviews conducted by the case study team during its visit to Rochester.

Further information on the Rochester district heating system and the Rochester District Heating Cooperative may be obtained by contacting :

General Manager
Rochester District Heating
50 Chestnut Street
Rochester, NY 14604
716/546-8890

This case study was prepared by staff members of the Office of Development Programs, United States Conference of Mayors: Maria R. Rivera and Ronald W. Musselwhite.