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**DISTRICT HEATING FEASIBILITY
INDUSTRIAL CORRIDOR, JAMESTOWN, NEW YORK**



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JAMESTOWN, NEW YORK

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Final Report

Prepared for

THE NEW YORK STATE
ENERGY RESEARCH AND DEVELOPMENT AUTHORITY

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ABSTRACT

The Industrial Corridor of Jamestown, New York, is an area of the City in which more than twenty industrial/manufacturing companies are located. These companies' thermal demands, in addition to space heating, include significant process heating loads related to wood and metal product manufacturing. This study investigated in depth, the technical and economic feasibility of implementing a district heating system in the Industrial Corridor which can serve both process and space heating loads. Such a system which can reduce the energy costs of its customers will enhance their continued viability and competitiveness with outside industries, and thereby, benefit the community as a whole which relies on this large employment base for economic stability and growth.

Based upon the heat load assessment conducted, the study focused upon nine companies with the largest thermal demand. Alternative system implementation designs were considered including new conventional centralized boiler plants, gas turbine cogeneration, and both high temperature hot water and steam as the heat transport media in an underground distribution system.

The study concluded that, in view of the nature of existing prospective customer loads being primarily steam based, the most economical system for near term phased development is a steam based system with a new conventional centrally located steam boiler plant. The economic potential for a cogeneration system was found to be sensitive to electricity buy back rates, which at present, are not attractive. Implementing a modern high temperature hot water system would require significant customer retrofit costs to convert their steam based systems to hot water, resulting in long and unattractive pay back periods. Unless customer hot water retrofit costs can be expended without penalty to the district system economics, hot water district heating is not considered economically feasible.

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The study was conducted by the Power Technology Division of Burns and Roe under the supervision of Dr. Ishai Olikier. The following members of Burns and Roe's staff contributed substantially to the performance of the study: R.A. Tom and D. Gray.

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EXECUTIVE SUMMARY

This report presents the results of an investigation into the feasibility of implementing a district heating system to serve the Industrial Corridor of Jamestown, New York. The study assesses the potential heating loads, develops in conceptual form the distribution system and central heating plant design and implementation plans, and evaluates the system and customer economics for both conventional boiler and cogeneration district heat sources.

The Industrial Corridor depicted in Figure S-1, consists of many companies with a diversity of manufactured products. A district heating system which can lower energy costs of the companies in the Industrial Corridor will enhance their continued competitiveness with outside industries, spur economic development in the community as a whole and ensure the future stability and growth of this employment base on which the city relies.

THERMAL LOAD

Of the twenty companies identified in Figure S-1, the following nine companies were selected for the thermal load analysis because of the size of their potential loads and proximity to each other:

Area A

1. MRC Bearing
2. Weber-Knapp

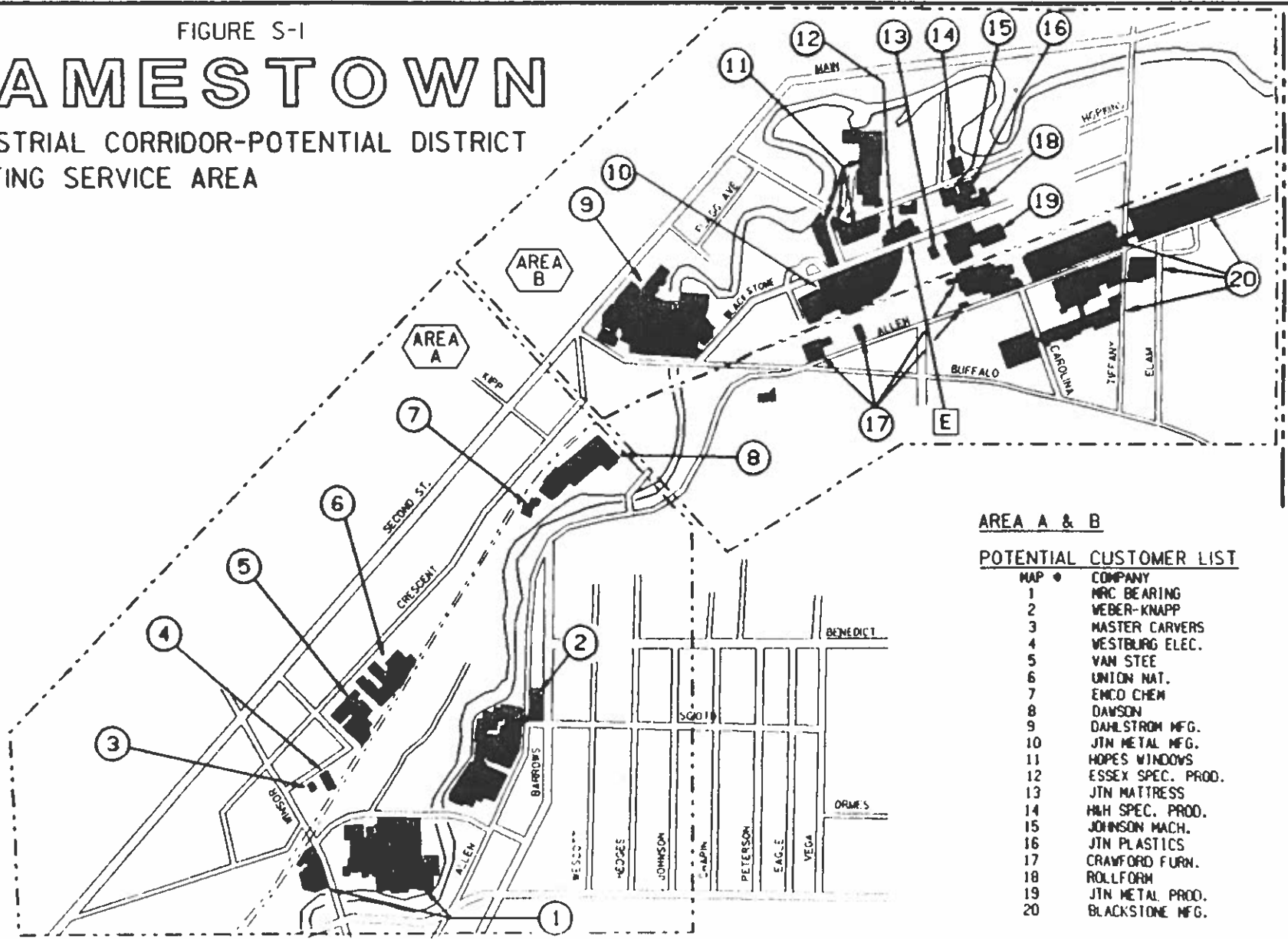
Area B

1. Crawford Furniture
2. Dahlstrom Manufacturing
3. Hopes Windows
4. Essex Specialty Products
5. Jamestown Metal Manufacturing

FIGURE S-1

JAMESTOWN

INDUSTRIAL CORRIDOR-POTENTIAL DISTRICT
HEATING SERVICE AREA



AREA A & B

POTENTIAL CUSTOMER LIST

MAP #	COMPANY
1	MRC BEARING
2	WEBER-KNAPP
3	MASTER CARVERS
4	WESTBURG ELEC.
5	VAN STEE
6	UNION NAT.
7	EMCO CHEM
8	DAVISON
9	DAHLSTROM MFG.
10	JTN METAL MFG.
11	HOPES WINDOWS
12	ESSEX SPEC. PROD.
13	JTN MATTRESS
14	H&H SPEC. PROD.
15	JOHNSON MACH.
16	JTN PLASTICS
17	CRAWFORD FURN.
18	ROLLFORM
19	JTN METAL PROD.
20	BLACKSTONE MFG.

6. Jamestown Metal Products

7. Blackstone Manufacturing

Of the eight major companies identified in Area A, MRC Bearing's and Weber-Knapp's combined annual natural gas consumption convertible to district heating accounts for over 73% of the area's total. In Area B, the above seven companies account for over 98%.

The results of the thermal load analyses performed for these nine potential customers are summarized in Table S-1. In Area A, the peak potential district heating load was estimated at 26.70 million btu's per hour (mmbtuh), 105.72 mmbtuh in Area B, and 132.42 mmbtuh overall. These peaks include all process and space heating loads now served by boilers as well as direct-fired unit heater and roof-top unit space heating loads. Also noted in Table S-1 are the peak load totals without the direct-fired loads and the annual district heating loads (mmbtu) with and without direct-fired.

Evident from the heat load assessment results is the high percentage of direct-fired loads for customers such as Hopes Windows, Weber-Knapp, and Blackstone who rely primarily on direct gas-fired equipment for space heating. Conversion of these loads to district heating would require unit replacement with steam or hydronic systems.

It should also be noted that internal loads for the various customers are process type (more so than domestic hot water), in which steam at pressures as high as 75 psig are utilized in manufacturing processes. Overall, internal steam loads account for nearly 20% of the total peak load including direct-fired, and 44% of the peak load without direct-fired loads.

TABLE S-1
CUSTOMER LOAD ANALYSIS SUMMARY

AREA A	Peak District Heating Loads (mmbtuh)					Normalized Annual Load Totals (mmbtu/yr)		Customer Avg. Efficiency	
	Heating		Internal	Peak Load Totals		With	Without	With	Without
	Boilers	Dir Fired		w/Dir Fired	w/o Dir Fired	Dir. Fired	Dir. Fired	Dir. Fired	Dir. Fired
MCR Bearing	8.52	0	0 *	8.52	8.52	22,067	22,067	65.0%	65.0%
Weber Knapp	3.11	11.99	3.08	18.18	6.19	32,478	20,750	76.3%	70.9%
Area A Total:	11.63	11.99	3.08	26.70	14.71	54,545	42,817		
AREA B									
Crawford Furniture	1.52	1.08	0.04	2.64	1.56	6,385	3,617	72.6%	67.1%
Dahlstrom	12.30	0.00	6.21	18.51	18.51	45,254	45,254	65.0%	65.0%
Essex Specialty Products	1.62	1.56	0.11	3.29	1.73	7,334	2,862	72.2%	65.2%
Hopes Windows	1.97	15.08	1.99	19.04	3.96	32,110	9,394	79.8%	65.4%
Jamestown Metal Mfg.	1.37	0.42	2.62	4.41	3.99	12,100	11,540	65.2%	65.0%
Jamestown Metal Prod.	1.92	0.00	1.34	3.26	3.26	7,176	7,176	65.0%	65.0%
Blackstone	0.00	44.92	9.65	54.57	9.65	147,147	52,450	75.1%	65.0%
Area B Total:	20.64	63.12	21.96	105.72	42.60	257,506	132,293		
Area B W/O Blackstone:	20.64	18.20	12.31	51.15	32.95	110,359	79,843		
System Total									
With Blackstone:	32.27	75.11	25.04	132.42	57.31	312,051	175,110		

* Included in Boilers Heating

HEAT SOURCE AND DISTRIBUTION SYSTEM ANALYSIS

In consideration of the load characteristics identified during the heat load assessment, several options were considered for the optimum heat source and heat transport media design. While a conventional low temperature hot water district heating system (250 Deg. F maximum) could serve space heating loads, and a high temperature hot water system both space heating and high thermal level process demands, the associated retrofit costs to the potential customers would be high resulting in extended payback periods to recover conversion costs through energy savings.

It was recognized early in the study that both space heating and process loads must be satisfied to implement a marketable system, and from the customer point of view, low retrofit costs were a major concern to achieve favorable economic results. Accordingly, the focus of this study was directed toward the feasibility of implementing a steam district heating system with a new central heat source.

Two conceptual designs were developed for a central heat source: (1) boilers only and (2) cogeneration. The cogeneration option consisted of installing gas turbines with heat recovery boilers (with supplementary firing capability) in conjunction with conventional steam boilers for peaking and standby service. Both options were developed with base case phased implementation plans to service the entire load potential of the nine customers in Areas A and B within three years. In the cogeneration option, boilers alone would be installed in the first year to minimize initial capital investment which could then serve in the peaking and standby capacity in future years.

The estimated system capital costs including the central plant and distribution system are summarized in Tables S-2 and S-3. Three phase implementation plans for the boiler and cogeneration option are summarized in Table S-4. The implementation plans are based upon serving all customers in Area A the second

TABLE S-2

INDUSTRIAL CORRIDOR DISTRICT HEATING SYSTEM COST ESTIMATE
COGENERATION OPTION (1988 DOLLARS)

	<u>PHASE 1</u>	<u>PHASE 2</u>	<u>PHASE 3</u>
BOILER PLANT			
1000-HP Steam Boilers & Controls	\$222,000	\$111,000	
Auxiliary Equipment	28,000	14,000	
Boiler Breeching 22,000	9,000	9,000	
Mechanical & Piping Installation	408,000	201,000	
Subtotal:	\$680,000	\$335,000	
COGENERATION PLANT			
Gas Turbine-Generator w/Accessories (4000kw)		\$1,400,000	\$1,400,000
NOX Control (Water Injection)		50,000	50,000
Heat Recovery Boiler w/Auxiliary Firing and Accessories		470,000	470,000
Gas Compressor		190,000	190,000
Deionized Water Treatment System		75,000	75,000
Switchgear & Motor Control Console		105,000	75,000
Auxiliary Equipment		100,000	100,000
Mechanical & Piping Installation		340,000	270,000
Electrical/I&C Installation		330,000	260,000
Subtotal:		\$3,060,000	\$2,890,000
UTILITY INTERCONNECTION	\$50,000	\$100,000	\$0
SITE			
Land	\$150,000	\$0	\$0
Building & HVAC w/Site Preparation	85,000	175,000	100,000
Subtotal:	\$235,000	\$175,000	\$100,000
DISTRIBUTION SYSTEM			
Piping	\$515,000	\$411,000	\$84,000
Customer Metering	43,000	15,000	30,000
Subtotal:	\$558,000	\$465,000	\$114,000
SYSTEM SUBTOTAL:	\$1,523,000	\$4,135,000	\$3,104,000
Engineering, Design and Construction Management @ 10%	\$152,300	\$413,500	\$310,400
Contingency @ 10%	\$152,300	\$413,500	\$310,500
PHASE TOTAL COST:	\$1,827,600	\$4,915,200	\$3,724,800
OVERALL SYSTEM COST:			\$10,467,600

TABLE S-3

INDUSTRIAL CORRIDOR DISTRICT HEATING SYSTEM COST ESTIMATE
ALL BOILER OPTION (1988 DOLLARS)

	<u>PHASE 1</u>	<u>PHASE 2</u>	<u>PHASE 3</u>
BOILER PLANT			
Steam Boilers & Controls	\$222,000	\$222,000	\$171,000
Auxiliary Equipment	28,000	28,000	21,000
Boiler Breeching	22,000	22,000	22,000
Mechanical & Piping Installation	408,000	408,000	231,000
Subtotal:	\$680,000	\$680,000	\$445,000
SITE			
Land	\$150,000	\$0	\$0
Building & HVAC w/Site Preparation	85,000	52,500	52,500
Subtotal:	\$235,000	\$52,500	\$52,500
DISTRIBUTION SYSTEM			
Piping	\$515,000	\$411,000	\$84,000
Customer Metering	43,000	15,000	30,000
Subtotal:	\$558,000	\$465,000	\$114,000
SYSTEM SUBTOTAL:	\$1,523,000	\$1,197,000	\$611,500
Engineering, Design and Construction Management @ 10%	\$152,300	\$119,750	\$61,150
Contingency @ 10%	\$152,300	\$119,750	\$61,150
PHASE TOTAL COST:	\$1,827,600	\$1,390,200	\$733,800
OVERALL SYSTEM COST:			\$3,951,600

TABLE S-4
COGENERATION OPTION

	<u>Production Plant</u>	<u>Total Plant Capacity (Lbs/Hr)</u>	<u>System Peak Load (Lbs/Hr)</u>
Phase 1	68,000 lb/hr Boiler Plant 2-1,000 HP Boilers	68,000 (34,000)*	52,000
Phase 2	Add Single Cogen. Unit 57,000 lbs/hr Fired and 1-1,000 HP Boiler	159,000 (102,000)	79,200
Phase 3	Add 2nd Cogen. Unit	216,000 (159,000)	134,700

BOILERS ONLY OPTION

	<u>Production Plant</u>	<u>Total Plant Capacity (Lbs/Hr)</u>	<u>System Peak Load (Lbs/Hr)</u>
Phase 1	68,000 lb/hr Boiler Plant 2-1,000 HP Boilers	68,000 (34,000)*	52,000
Phase 2	Add 2-1,000 HP Boilers	136,000 (102,000)	79,200
Phase 3	Add 1-1,000 HP and 1-350 HP Boiler	181,900 (147,900)	134,700

*Plant Capacity with Largest Unit Out of Service (Typical)

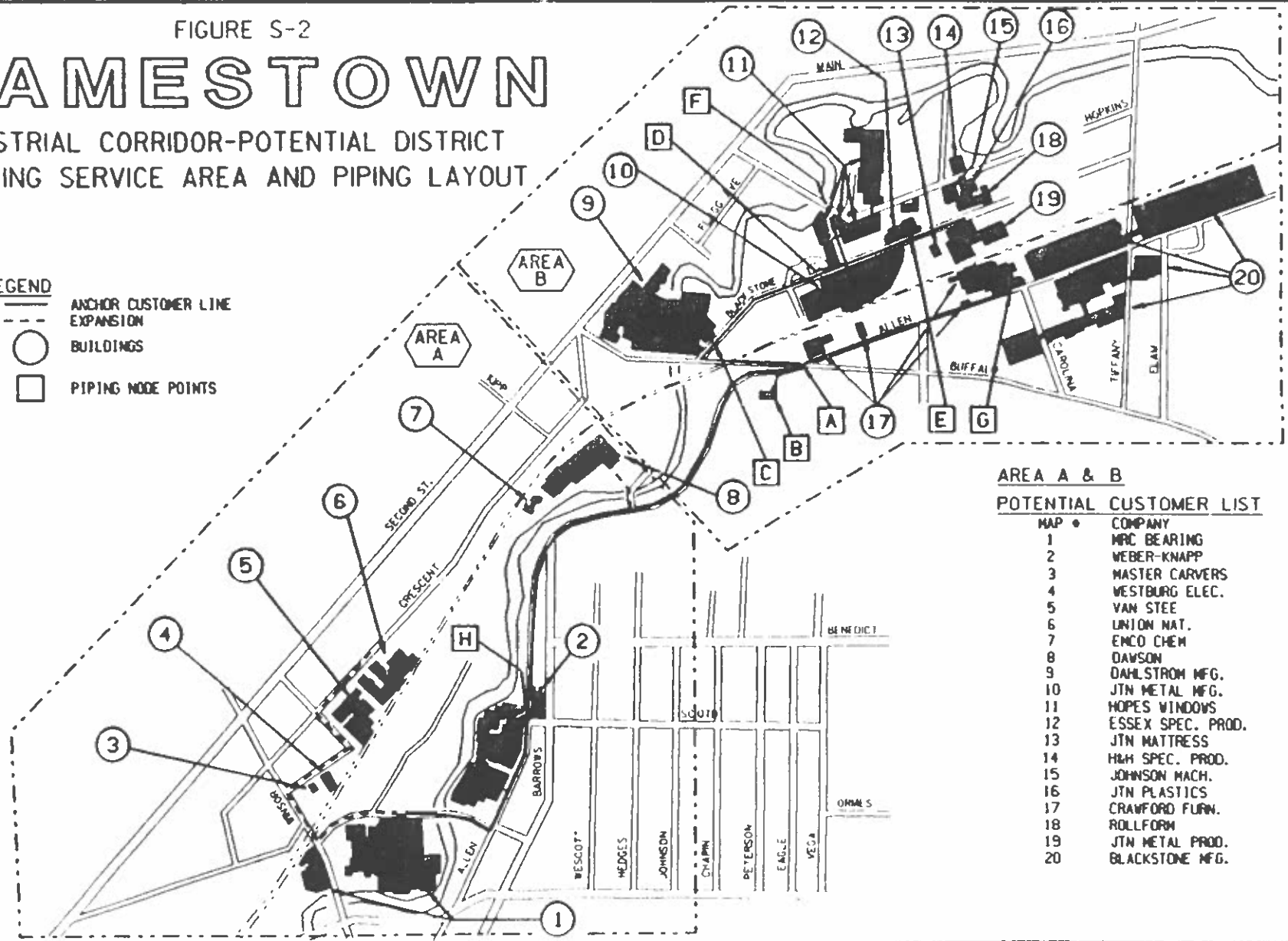
FIGURE S-2

JAMESTOWN

INDUSTRIAL CORRIDOR-POTENTIAL DISTRICT
HEATING SERVICE AREA AND PIPING LAYOUT

LEGEND

- ANCHOR CUSTOMER LINE EXPANSION
- BUILDINGS
- PIPING NODE POINTS



AREA A & B

POTENTIAL CUSTOMER LIST

MAP #	COMPANY
1	MRC BEARING
2	WEBER-KNAPP
3	MASTER CARVERS
4	WESTBURG ELEC.
5	VAN STEE
6	UNION NAT.
7	EMCO CHEM
8	DAVSON
9	DAHLSTROM MFG.
10	JTN METAL MFG.
11	HOPES WINDOWS
12	ESSEX SPEC. PROD.
13	JTN MATTRESS
14	H&H SPEC. PROD.
15	JOHNSON MACH.
16	JTN PLASTICS
17	CRAWFORD FURN.
18	ROLLFORM
19	JTN METAL PROD.
20	BLACKSTONE MFG.

year, and Blackstone in the third year. The transmission and distribution system (90 psig maximum steam) with condensate return is depicted in Figure S-2 in single line form which also indicates the potential central plant location. The maximum steam and condensate line sizes required are 18-inch and 10-inch respectively from the Central Plant (Node B) to Node A.

SYSTEM ECONOMIC ANALYSIS

System economic analyses were performed using the "required revenue" approach to establish the necessary unit cost of district heat for both municipal and private ownership over a twenty year period. The economic analyses were performed for the base case boiler and cogeneration options using the base economic parameters indicated in Table S-5. Other options were considered for system implementation and evaluation as identified in Table S-6.

Table S-6 summarizes the results for all the cases initially evaluated. Unit costs of district heat required in each of the first three years are shown as well as a 20-year levelized rate for each case. In summary, these results are:

- o For the base case, the boilers-only option is superior to the cogeneration option primarily because the low \$30/MWhr value of cogenerated power cannot offset the higher carrying charges or fixed annual expenses associated with the added capital cost of the cogeneration units;
- o Municipal ownership, as can be expected, is more favorable in the respective case comparisons due to lower financing costs and tax effects;
- o The economic viability of the cogeneration option relies upon lower fuel and/or higher cogenerated power rates to be competitive with a conventional boiler plant based system, and requires full implementation into Phase 3; and

TABLE S-5
BASE CASE PARAMETERS

	<u>Municipal Ownership</u>	<u>Private Ownership</u>
Debt Cost	7%	9.5%
Taxes	0%	40%
Property Taxes	0%	1.5%
Insurance	.75%	.75%
Buy Back Rate (\$/MWhr)	30	30
Electricity Cost (\$/MWhr)	30	30
Fuel Cost (1988 \$/MMBtu)	2.71	2.87*
Labor (\$1000/manyear)	25	25
O & M Materials	1.7%	1.7%
GT Heat Rate (Btu/Kwhr)	13,480	13,480
Boiler Efficiency	85%	85%

*Includes 6% Sales TAX

TABLE S-6
BASE AND SENSITIVITY CASES EVALUATED

<u>Municipal Case No.</u>	<u>Private Case No.</u>	<u>Description</u>
MS1	PS1	Base Case - Cogeneration Option
MS2	PS2	Cogen. Option - Implement Phases 1 & 2 Only
MS3	PS3	Base Case - Boiler Option
MS4	PS4	Cogen. Option - \$35/MWhr Buyback Rate
MS5	PS5	Cogen. Option - \$35/MWhr, Phase 1 & 2 Only
MS6	PS6	Boiler Option - Implement Phase 1 & 2 Only
MS7	PS7	Cogen. Option - 15% Lower Fuel Costs

TABLE S-7

UNIT COST OF DISTRICT HEAT - CASE SUMMARY

<u>Ownership</u>	<u>Case</u>	<u>Description</u>	<u>Cost of Heat (\$/MMBTU)</u>			<u>20 Years Levelized Rate</u>
			<u>1989</u>	<u>1990</u>	<u>1991</u>	
Municipal	MS1	Base Case, Cogen. Option	\$6.97	\$9.61	\$8.25	\$8.963
Municipal	MS2	Cogen. Option, Phase 1 & 2 Only	\$6.97	\$9.61	\$9.69	\$10.253
Municipal	MS3	Base Case, Boiler Option	\$6.97	\$7.51	\$6.19	\$7.481
Municipal	MS4	Cogen Option, \$35/MWH	\$6.97	\$8.76	\$7.31	\$7.782
Municipal	MS5	Cogen. Option, \$35/MWH, Phase 1 & 2 Only	\$6.97	\$8.76	\$8.81	\$9.184
Municipal	MS6	Boilers Option, Phase 1 & 2 Only	\$6.97	\$7.51	\$7.67	\$8.828
Municipal	MS7	Cogen. Option, 15% Lower Fuel	\$6.44	\$8.44	\$7.01	\$7.379
Private	PS1	Base Case, Cogen. Option	\$7.92	\$11.97	\$10.28	\$10.634
Private	PS2	Cogen. Option, Phase 1 & 2 Only	\$7.92	\$11.97	\$11.99	\$12.118
Private	PS3	Base Case, Boiler Option	\$7.92	\$8.61	\$6.97	\$8.195
Private	PS4	Cogen Option, \$35/MWH	\$7.93	\$11.11	\$9.34	\$9.502
Private	PS5	Cogen. Option, \$35/MWH, Phase 1 & 2 Only	\$7.93	\$11.11	\$11.10	\$11.043
Private	PS6	Boilers Option, Phase 1 & 2 Only	\$7.92	\$8.61	\$8.73	\$9.721
Private	PS7	Cogen. Option, 15% Lower Fuel	\$7.37	\$10.73	\$8.97	\$9.004

- o From the customer point of view, the boiler option under municipal ownership (Case MS3) is best, offering the lowest rates (with the exception of the lower fuel cost cogeneration sensitivity case MS7 or scenarios with higher than \$35/MWhr cogenerated power rates).

CUSTOMER ECONOMIC ANALYSIS

Customer economic analyses were performed by estimating retrofit costs and comparing present system owning and operating costs with district system costs on a unit rate basis for 20 years. Owning and operating costs of existing systems were estimated including non-fuel costs related to boiler maintenance, operating labor, chemicals, insurance, and capitalization of future boiler replacement costs on an annual basis. Unit heat costs for existing system operations were compared with district heating costs, providing annual overall savings estimated for each year. Payback periods were then calculated as the time required for district heating cumulative savings to exceed the customer's unpaid principal of the retrofit costs assumed to be 100% financed.

Initial customer economic analyses were performed for each of the seven municipal and private ownership cases. Results are summarized in Table S-8, which indicates the payback year and the year of continued annual positive cashflow for each case. Overall, these results show the same trend as the district heating rate comparison, notably, the best case from the point of view of all customers is the boiler option under municipal ownership. Paybacks are within four years and less for MRC Bearing, Dahlstrom Manufacturing, Jamestown Metal Manufacturing, and Jamestown Metal Products. The longer paybacks associated with Essex Specialty Products, Crawford Furniture, Hopes Windows, Blackstone and Weber-Knapp, are not attractive due to the high proportion of direct-fired loads which are more efficient and incur high retrofit costs.

In view of these results, a further case for system implementation was considered (as a modification to Case MS3) in which the direct-fired loads of

Table S-8

CUSTOMER PAYBACK AND FIRST YEAR POSITIVE ANNUAL CASHFLOW SUMMARY

CASE	MRC BEARING		WEBER KNAPP		CRAWFORD FURN.		DAHLSTROM		ESSEX SPEC. PRODUCTS		HOPES WINDOWS		JAMESTOWN METAL MFG.		JAMESTOWN METAL PROD.		BLACKSTONE MANUFACTURING	
	PAY	POS.	PAY	POS.	PAY	POS.	PAY	POS.	PAY	POS.	PAY	POS.	PAY	POS.	PAY	POS.	PAY	POS.
	BACK	CASH	BACK	CASH	BACK	CASH	BACK	CASH	BACK	CASH	BACK	CASH	BACK	CASH	BACK	CASH	BACK	CASH
	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR
MS1	18	1999	>20	2003	18	2001	14	1996	15	1997	>20	2007	1	1991	4	1991	>20	2008
MS2	>20	2005	None	None	>20	2004	>20	2003	>20	2004	None	None	1	1992	9	1993	NA	NA
MS3	4	1991	10	1991	11	1991	3	1991	6	1991	>20	2000	1	1989	2	1989	20	2001
MS4	9	1994	15	1997	14	1991	7	1991	10	1991	>20	2000	1	1989	3	1989	19	2001
MS5	20	2000	>20	2004	20	2002	16	1998	17	1999	>20	2007	1	1989	4	1989	>20	2008
MS6	18	2000	>20	2007	19	2004	11	1995	14	1991	None	None	1	1989	2	1989	NA	NA
MS7	7	1992	13	1996	12	1991	5	1991	8	1991	18	1998	1	1989	3	1989	16	1999
PS1	>20	2005	>20	2009	>20	2004	>20	2002	>20	2004	None	None	11	1994	12	1995	None	None
PS2	None	None	None	None	>20	2006	>20	2008	>20	2006	None	None	19	2000	>20	2000	NA	NA
PS3	9	1993	20	2000	15	1991	7	1991	10	1991	>20	2005	2	1989	3	1989	>20	2008
PS4	20	2000	>20	2004	>20	2002	18	1998	18	1999	>20	2006	6	1991	8	1992	>20	2007
PS5	>20	2006	>20	2009	>20	2004	>20	2004	>20	2004	None	None	13	1996	15	1997	None	None
PS6	>20	2005	None	None	>20	2004	>20	2001	>20	2004	None	None	2	1989	5	1989	NA	NA
PS7	17	1998	>20	2002	18	2000	15	1996	16	1997	>20	2004	4	1991	6	1991	>20	2005

Case Descriptions

Municipal Private

Base Case, Cogeneration Option
 Cogeneration Option, Phase 1 & 2 Only
 Base Case, Boilers Option
 Cogeneration Option, \$35/MW hr Buy Back Rate for Power
 Cogeneration Option, \$35/MW hr Buy Back Rate, Phase 1 & 2 Only
 Boiler Option, Phase 1 & 2 Only
 Cogeneration Option, 15% Lower Fuel Cost

MS1 PS1
 MS2 PS2
 MS3 PS3
 MS4 PS4
 MS5 PS5
 MS6 PS6
 MS7 PS7

the above latter five customers were not converted. The system capital costs and economic analyses were revised accordingly and the payback analyses redone for each customer. For this case (MS8), the implementation plan was also revised such that the remaining boiler load of Blackstone would be connected in Phase 2, thereby eliminating Phase 3. Figure S-3 summarizes the resulting significant effect on customer paybacks. By eliminating the direct-fired loads from these five customers, the paybacks were reduced to six years and less. Further, the marginally higher district heating rates of Case MS8 only increased the payback of one of the other customers, MRC Bearing, from 4 to 6 years.

CONCLUSIONS

From the customer point of view, the results of this study have shown that under near term economic conditions (fuel cost, cogenerated power buy back rates, financing and tax considerations) a steam district heating system is technically and economically feasible in the Industrial Corridor under specific conditions. Municipal ownership with a conventional boiler plant heat source provides the most attractive district heating rates, while private ownership can also be considered feasible.

Unless cogenerated power is priced higher, or special low gas rates can be provided for a cogeneration facility, cogeneration is not a viable option.

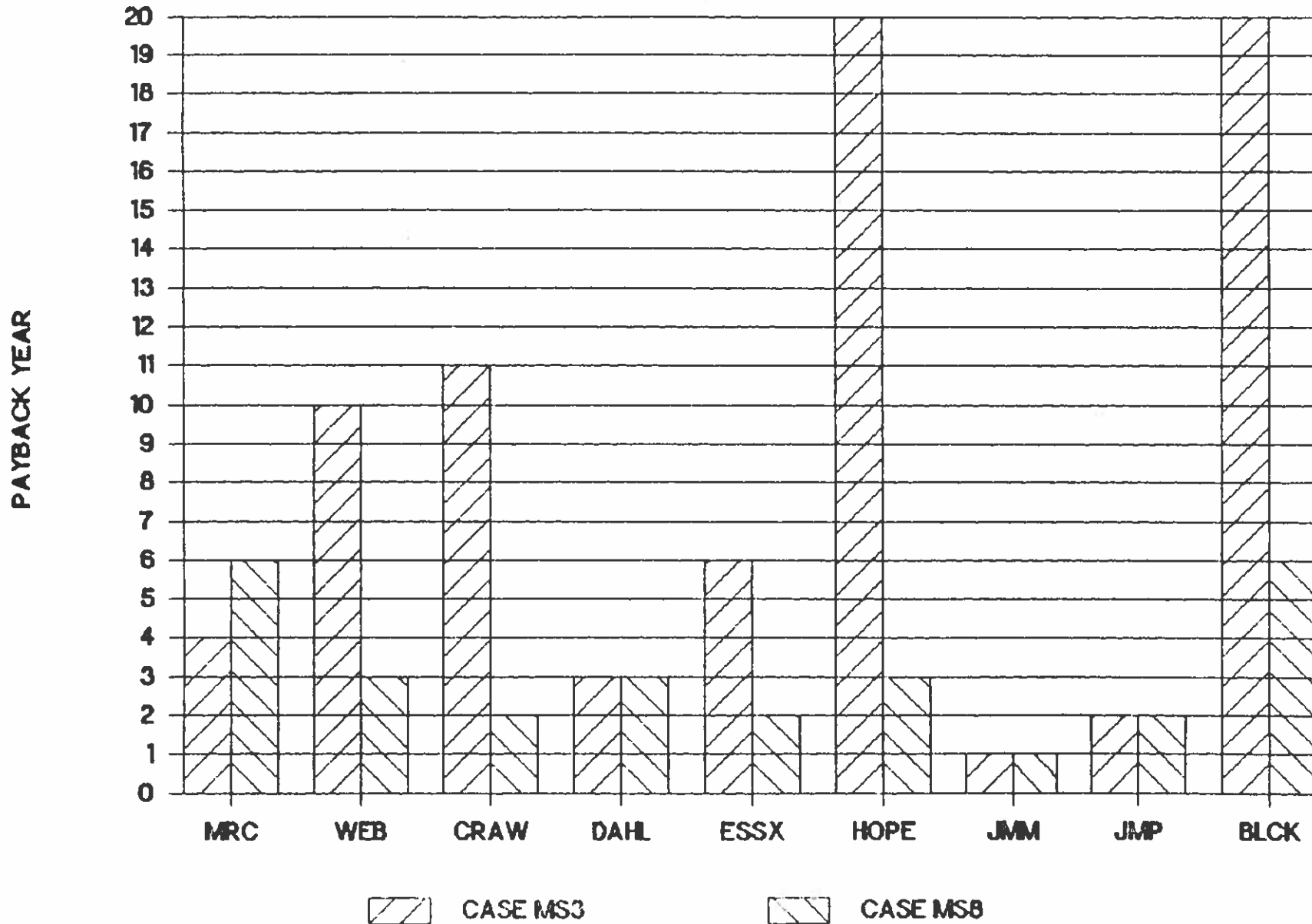
Implementation of a more modern hot water district heating system in lieu of steam would, for the most part, depend upon the willingness of potential customers to expend the significant additional retrofit costs required without penalizing the system for extended paybacks. Extended paybacks could, however, be alleviated by subsidized loans or grant assistance to customers for their retrofit costs, or by hot water conversions necessitated by presently deteriorating building steam systems.

Accordingly, district heating in the Industrial Corridor is considered to have significant potential. However, more advanced engineering and economic analysis

Figure S-3

CUSTOMER PAYBACK YEAR COMPARISON

CASE MS3 vs CASE MS8



is required to better define and optimize the most beneficial system for both system owner and customer prior to an implementation decision. Renewed consideration could be given to a modern hot water based system if customer's technical and economic constraints to such a system are identified and evaluated in greater detail than the scope of this study allowed.

SECTION 1

INTRODUCTION

This study develops in conceptual form, a centralized district heating system for the Industrial Corridor of Jamestown, New York. It was performed under the direction of the New York State Energy Research and Development Authority.

Jamestown is located in upstate New York about an hour and a half drive southwest of Buffalo. The city, once a major center of the furniture manufacturing industry, continues to be industry based. In addition to furniture and related wood products still being manufactured, the city's industries today also include numerous metal parts and product manufacturing concerns. Many of these companies are located south of downtown Jamestown, along the Chadakoin River in an area known as the Industrial Corridor.

The essentials of a district heating system are the energy sources, transmission and distribution piping system, and the heat load (energy consumers). A heat load was identified and quantified, as outlined in Section 2. Options for heat source development are presented in Section 3, and possible routing for the underground piping system is presented in Section 4. The development of the prospective district heating system is discussed in Section 5.

The institutional and regulatory aspects of the prospective system are discussed in Section 6. In Section 7, budgetary estimates of this system's capital, maintenance and operation costs are used in an economic analysis to develop the unit cost of district heating and determine the economic feasibility of installing a system in Jamestown. Section 8 discusses the retrofit of potential customers and presents the results of customer economic analyses performed based upon the established unit costs of district heat.

SECTION 2

HEAT LOAD

INTRODUCTION

For the purpose of this study, the Industrial Corridor has been segregated into Areas A and B as shown in Figure 2-1, with 20 major companies identified. During the initial phase of this study, fuel records were obtained for a majority of the companies to identify likely candidates for economical district heating potential in terms of (1) present annual fuel consumption, (2) types of present fuel uses, and (3) location. Table 2-1 summarizes the fuel records data collected for the 20 companies.

Within Area A the two major potential loads are MRC Bearing and Weber-Knapp which are located within close proximity of each other, and closest to Area B. These two potential district heating customers represent nearly 74% of the area's total fuel consumption, with the majority of their fuel consumption coming from steam boilers serving space heating and process loads. The remaining companies in Area A were not considered for initial system study and in-depth load assessment as (1) their respective loads are significantly smaller, (2) a large portion of their fuel consumption is in direct-fired heating equipment which must be replaced to convert to district heating, and (3) their location on the other side of the river in conjunction with the smaller load potential would lessen the overall system economics if included.

Within Area B there are several large fuel users including Essex Chemical, Dahlstrom, Hopes Windows, Blackstone, Jamestown Metal Manufacturing, Jamestown Metal Products and Crawford Furniture. With the exception of Blackstone and Hopes Windows, each of these customers fuel consumption is predominantly in steam boilers. Approximately 64% of Hopes Windows fuel consumption and 54% of Blackstone's is in direct-fired space and makeup air heating equipment.

The original heating system for the Hopes Number 5 building included an air distribution ductwork system with steam heating coils. If a new steam source were to be provided this system may be reusable. This would avoid having to spend funds on the new rooftop unit, while satisfying the safety requirement of no open flame in the building.

CRAWFORD FURNITURE

Crawford Furniture is one of Jamestown's largest wood furniture manufacturers. They buy untreated boards and take them through a process which includes treatment in seven steam supplied drying kilns. The scrap wood is sold to individuals who are willing to pick it up during the summer and is also used to completely heat their Atlas building and 95% of the brick factory building during the winter. Operators to load wood into the boiler are needed around the clock in the wintertime.

There is also an office/warehouse building which uses a water supplied humidity system, while steam is used in the main factory building for humidification. Steam unit heaters are used in the four floor factory building with cast iron radiators in the office area and an auxiliary gas-fired rooftop unit. The warehouse has a gas-fired air rotation system with no distribution ductwork. The office area attached to the warehouse has a gas-fired rooftop heating/air conditioning unit.

They also have a showroom heated by steam unit heaters from a three-year-old 30-HP boiler.

JAMESTOWN METAL PRODUCTS

Jamestown Metal Products employs similar processes to that of Jamestown Metal Manufacturing. They have installed a new 5-step wash process which uses 18,000 gallons of a chemically treated liquid, of which 11,000 gallons are heated.

They have one main 150-HP boiler which is 20 years old, with a smaller 15-HP boiler as backup. This small unit allows a more efficient operation during the low load summer months. The larger boiler is due for replacement soon. The building is 165,000 sq. ft.

BLACKSTONE

Blackstone is an international company with one of the largest plant spaces in Jamestown at 630,000 sq.ft. However, the majority of their heat comes from direct and indirect gas-fired rooftop units. Personnel have indicated these units do not work well when the difference between the outside air and the indoor temperature is greater than 15°. All units are tied into an energy management system which maintains a positive pressure in the building. In Jamestown, their primary product is radiators for automobiles and trucks both in the replacement and new vehicle market.

They presently have a \$500,000/year heating bill due to the size of the plant. Most of the units heat 100% outside air. The plant consists of several buildings, with the main building using 250,000 to 400,000 cfm of make-up air. This high exhaust rate is required because the soldering process employed emits fumes which must be vented to the atmosphere.

Blackstone has a changing work load which can be heavily impacted by new technology. Their 170,000 sq.ft. Malleable Iron Plant was sold due to this fluid environment. Some new car radiators are now being produced with plastic components instead of all metal. There is a gas-fired 125-HP boiler which provides two 3,000-gallon rinse tanks with hot water 24 hours/day. There are six 40-gallon domestic hot water heaters just in plant Number 12.

HEAT LOAD ASSESSMENT METHODOLOGY

Buildings with high potential heat loads were surveyed in order to estimate peak and annual load requirements. Information was gathered on building heating and domestic hot water generation systems, fuel consumption histories, building operating parameters and climatic data. The data was used to calculate peak and annual district heating loads for each of the nine customers studied. Burns and Roe has found through past experience, that an older boiler can be conservatively estimated to operate at 65% efficiency while a newer unit would be considered 70% efficient. The loads were broken down into comfort and makeup air heating and internal uses (domestic hot water, process steam, and other non-temperature dependent heat uses).

A further breakdown was made between boiler loads and those associated with direct-fired heating equipment such as gas unit heaters and rooftop units. This distinction was considered necessary in view of the (1) high retrofit costs customers would incur to replace such direct-fired units with hydronic or steam systems, and (2) the high operating efficiency of direct-fired units (85 to 90%). These two factors tend to diminish the economic attractiveness of district heating for the potential customer as the ratio of these loads to total customer load (including boilers) increases.

Peak Load Calculations

Determination of peak loads was performed employing an in-house generated computer spreadsheet program modeled to a modified ASHRAE degree day method. Input data includes monthly fuel consumption records and coincident heating degree day data, estimated annual average boiler and direct-fired heating equipment seasonal efficiencies, and building operating parameters such as indoor design temperature, indoor setback temperatures, normal and setback system operating hours per week, and outside air ventilation quantities. Output data includes peak ventilation and envelope heating loads during both normal and

setback hours, internal average hourly loads, and annual respective useful (without firing inefficiencies) loads for the 12-month period of analysis. An example of the analysis is presented in Exhibit 2-1.

Normalized Annual Load Calculations

While the computer model described above provides annual load quantities for the period of fuel records examined, normalized annual load quantities are required based upon average climatological data to determine both district and customer average loads. This was accomplished utilizing the peak loads determined above for both normal and setback hours in conjunction with 20-year statistical temperature bin (reported annual occurrences of 5°F temperature ranges) data in another computer spreadsheet program developed in-house. The program calculates and totals load quantities in each temperature bin and associated observation hours to determine annual normalized load quantities, generating the load profile curve. An example of the program hard copy is presented in Exhibit 2-2.

HEAT LOAD ASSESSMENT RESULTS

The peak and annual district heating loads determined for the nine potential customers are summarized in Table 2-2. Since many of these customers' facilities include more than one building and/or more than one gas meter, Appendix B includes a summary of each customers specific load analysis results as well as the following:

- o Specific Facility Computer Load Analyses;
- o Graphical Representation of Fuel Consumption by Month; and
- o Overall Facility Load Profile Curves.

As indicated in Table 2-2, Area A was determined to have a peak district heating load of 32.09 million btus per hour (mmbtuh), and Area B, 109.16 mmbtuh. The

EXHIBIT 2-1
LOAD ANALYSIS
for
DAHLSTROM MANUFACTURING

YEAR:	1984
HEATING SEASON HDD:	6597
DAYS IN SEASON:	273
AVG. OUTSIDE TEMP (DEG. F):	40.8
OUTSIDE DESIGN TEMP (DEG. F):	3
NORMAL HOURS PER WEEK:	40
COMFORT SETTING (DEG. F):	70
INTERNAL TEMP GAIN (DEG. F):	5
VENTILATION (CFM):	0
SET-BACK HOURS PER WEEK:	128
COMFORT SETTING (DEG. F):	65
INTERNAL TEMP GAIN (DEG. F):	0
VENTILATION (CFM):	0
ESTIMATED BOILER EFF :	65%
% INTERNAL USE TO DH:	100%

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,378	104,820	10,744.1	31	346.6
FEB.	899	80,110	8,211.3	28	293.3
MAR.	1,167	89,900	9,214.8	31	297.3
APR.	519	75,340	7,722.3	30	257.4
MAY.	385	62,180	6,373.5	31	205.6
*JUNE	35	35,410	3,629.5	30	121.0
*JULY	11	16,530	1,694.3	31	54.7
*AUG.	22	31,240	3,202.1	31	103.3
SEP.	210	44,620	4,573.5	30	152.5
OCT.	360	52,740	5,405.8	31	174.4
NOV.	774	78,700	8,066.7	30	268.9
DEC.	905	94,450	9,681.1	31	312.3
TOTAL	6,665	766,040	78,519.1	365	
DISTRICT HEATING LOADS			NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):			N/A	N/A	60.24
ANNUAL INTERNAL USE (MMBTU):			N/A	N/A	21,986.76
PEAK VENTILATION LOAD (MMBTU/HR):			0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):			0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):			11.38	11.38	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):			6,916.82	22,133.83	29,050.66
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):			6,916.82	22,133.83	29,050.66
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):			11.38	11.38	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):			21.95	11.38	N/A

* months selected as representative of internal loads

EXHIBIT 2-2

Dahlstrom - Load Profile and Annual Normalized District Heating Load Data

Outdoor Temp. (deg. F)	Average Bin Temp	Observed Hours	Total Cum. Hours	Heating Load Temp Difference			Normal Hours	Setback Hours	Normal Plant Heating Load (MMBTUH)	Setback Plant Heating Load (MMBTUH)	Normal Internal (MMBTUH)	Normal Total Load (MMBTUH)
				Normal Degr. F	Normal Load %	Setback Load %						
-10 to -5	-7.5	2	2	77.5	115.7%	116.9%	0.48	1.52	14.23	14.38	6.21	20.44
-5 to 0	-2.5	18	20	72.5	108.2%	108.9%	4.29	13.71	13.31	13.39	6.21	19.52
0 to 5	2.5	5	25	67.5	100.7%	100.8%	1.19	3.81	12.39	12.40	6.21	18.60
5 to 10	7.5	81	106	62.5	93.3%	92.7%	19.29	61.71	11.47	11.41	6.21	17.68
10 to 15	12.5	170	276	57.5	85.8%	84.7%	40.48	129.52	10.56	10.42	6.21	16.77
15 to 20	17.5	267	543	52.5	78.4%	76.6%	63.57	203.43	9.64	9.42	6.21	15.85
20 to 25	22.5	426	969	47.5	70.9%	68.5%	101.43	324.57	8.72	8.43	6.21	14.93
25 to 30	27.5	602	1571	42.5	63.4%	60.5%	143.33	458.67	7.80	7.44	6.21	14.01
30 to 35	32.5	849	2420	37.5	56.0%	52.4%	202.14	646.86	6.88	6.45	6.21	13.09
35 to 40	37.5	756	3176	32.5	48.5%	44.4%	180.00	576.00	5.97	5.46	6.21	12.18
40 to 45	42.5	647	3823	27.5	41.0%	36.3%	154.05	492.95	5.05	4.46	6.21	11.26
45 to 50	47.5	624	4447	22.5	33.6%	28.2%	148.57	475.43	4.13	3.47	6.21	10.34
50 to 55	52.5	666	5113	17.5	26.1%	20.2%	158.57	507.43	3.21	2.48	6.21	9.42
55 to 60	57.5	700	5813	12.5	18.7%	12.1%	166.67	533.33	2.29	1.49	6.21	8.50
60 to 65	62.5	760	6573	7.5	11.2%	4.0%	180.95	579.05	1.38	0.50	6.21	7.59
65 to 70	67.5	772	7345	2.5	3.7%	0.0%	183.81	588.19	0.46	0.00	6.21	6.67
70 to 75	72.5	646	7991	0	0.0%	0.0%	153.81	492.19	0.00	0.00	6.21	6.21
75 to 80	77.5	422	8413	0	0.0%	0.0%	100.48	321.52	0.00	0.00	6.21	6.21
80 to 85	82.5	242	8655	0	0.0%	0.0%	57.62	184.38	0.00	0.00	6.21	6.21
85 to 90	87.5	89	8744	0	0.0%	0.0%	21.19	67.81	0.00	0.00	6.21	6.21
90 to 95	92.5	16	8760	0	0.0%	0.0%	3.81	12.19	0.00	0.00	6.21	6.21
95 to 100	97.5	1	8761	0	0.0%	0.0%	0.24	0.76	0.00	0.00	6.21	6.21

Indoor Design Temperature(Normal): 70 Deg. F
Indoor Design Temperature(Setback): 65 Deg. F
Outdoor Design Temperatures (Note 1) 3 Deg. F
Total Annual Useful Load: 45,254 MMBTU

TABLE 2-2
CUSTOMER LOAD ANALYSIS SUMMARY

AREA A	Peak District Heating Loads (mmbtuh)					Normalized Annual Load Totals (mmbtu/yr)		Customer Avg. Efficiency	
	Heating		Internal	Peak Load Totals		With	Without	With	Without
	Boilers	Dir Fired		w/Dir Fired	w/o Dir Fired	Dir. Fired	Dir. Fired	Dir. Fired	Dir. Fired
MCR Bearing	8.52	0	0 *	8.52	8.52	22,067	22,067	65.0%	65.0%
Weber Knapp	3.11	11.99	3.08	18.18	6.19	32,478	20,750	76.3%	70.9%
Area A Total:	11.63	11.99	3.08	26.70	14.71	54,545	42,817		
AREA B									
Crawford Furniture	1.52	1.08	0.04	2.64	1.56	6,385	3,617	72.6%	67.1%
Dahlstrom	12.30	0.00	6.21	18.51	18.51	45,254	45,254	65.0%	65.0%
Essex Specialty Products	1.62	1.56	0.11	3.29	1.73	7,334	2,862	72.2%	65.2%
Hopes Windows	1.97	15.08	1.99	19.04	3.96	32,110	9,394	79.8%	65.4%
Jamestown Metal Mfg.	1.37	0.42	2.62	4.41	3.99	12,100	11,540	65.2%	65.0%
Jamestown Metal Prod.	1.92	0.00	1.34	3.26	3.26	7,176	7,176	65.0%	65.0%
Blackstone	0.00	44.92	9.65	54.57	9.65	147,147	52,450	75.1%	65.0%
Area B Total:	20.64	63.12	21.96	105.72	42.60	257,506	132,293		
Area B W/O Blackstone:	20.64	18.20	12.31	51.15	32.95	110,359	79,843		
System Total									
With Blackstone:	32.27	75.11	25.04	132.42	57.31	312,051	175,110		

* Included in Boilers Heating

total potential district peak load of 141.25 mmbtuh (41.4 MWt) is approximately three times that of the existing hot water district heating system now serving downtown Jamestown. The average efficiencies shown in Table 2-2 reflect the respective facilities seasonal efficiencies for all fuel burning equipment identified in the load analysis. Load profile curves for Area A, Area B, and the overall system were developed and are shown in Figures 2-3, 2-4, and 2-5 respectively. The Load Factor indicated in each load profile curve represents the ratio of equivalent full load operating hours to total annual hours (8760 hours).

OTHER POTENTIAL CUSTOMER CONSIDERATIONS

It should be noted that internal loads for the various customers are more process type than domestic hot water demands, where steam pressures as high as 75 psig are utilized. Further, in general, process loads which represent 23.5% of the overall system peak load and more than 50% for some customers, are fed by steam in distribution systems which do not segregate process from heating uses, but rather employ pressure reducing stations in the distribution system as required. Also in some instances, such as drying kilns and steam ovens, the load can only be served by steam.

Accordingly, it was deemed necessary to consider options for the heat source and distribution system which could serve the entire steam load of all customers with minimal retrofit cost. Implementing a conventional low temperature (250 to 160°F) hot water district heating system could not serve a majority of the customer process loads, would require extensive retrofit costs in modifying building steam distribution systems to segregate heating and process loads, and would reduce the efficiencies of existing boilers required to stay in operation at reduced loads. The net effect would result in customer paybacks which could not be achieved for many years, if at all.

FIGURE 2-3

AREA "A" LOAD PROFILE

LOAD FACTOR - 23.3%

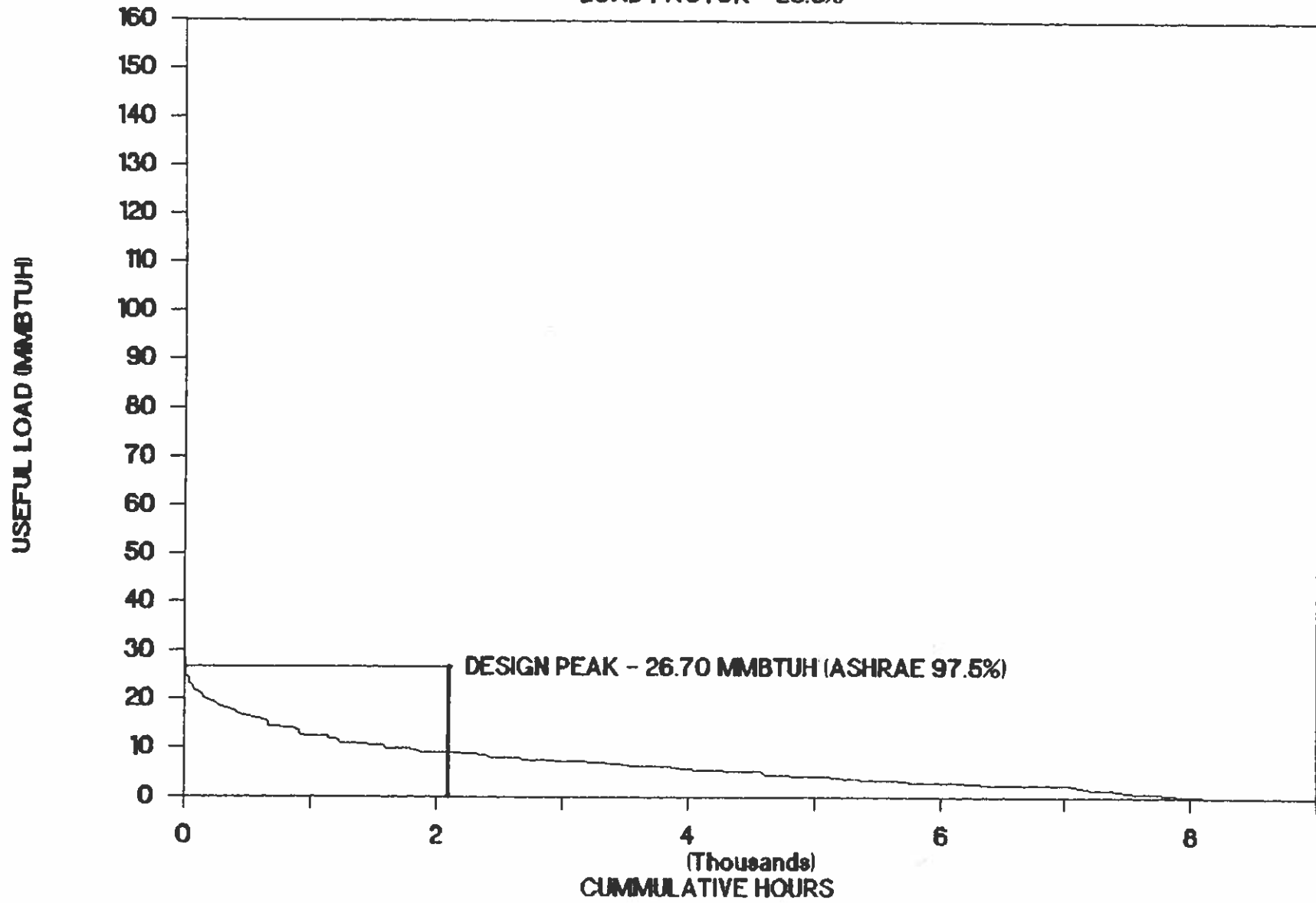


FIGURE 2-4

AREA "B" LOAD PROFILE

WITH BLACKSTONE - 27.8% LOAD FACTOR

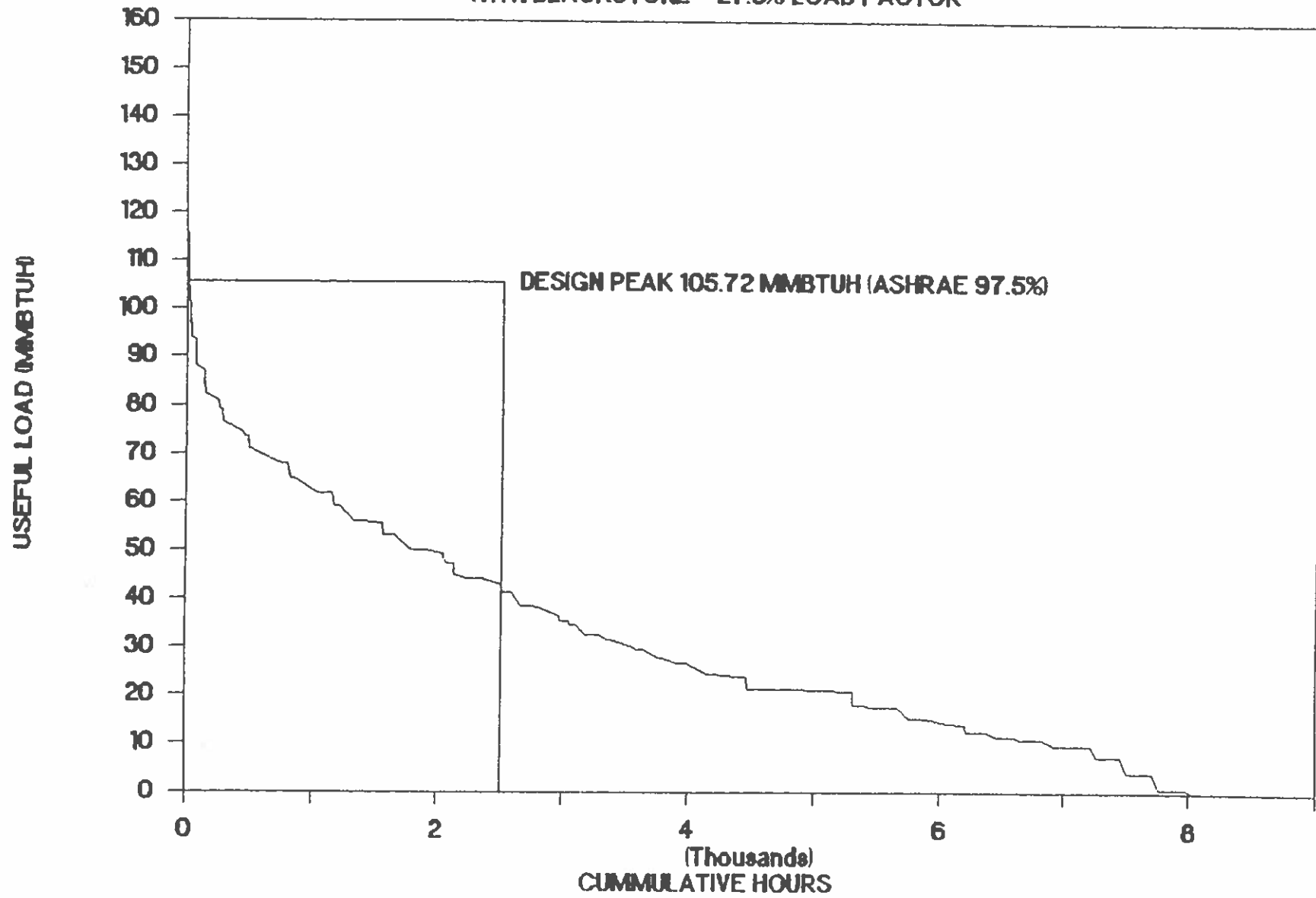
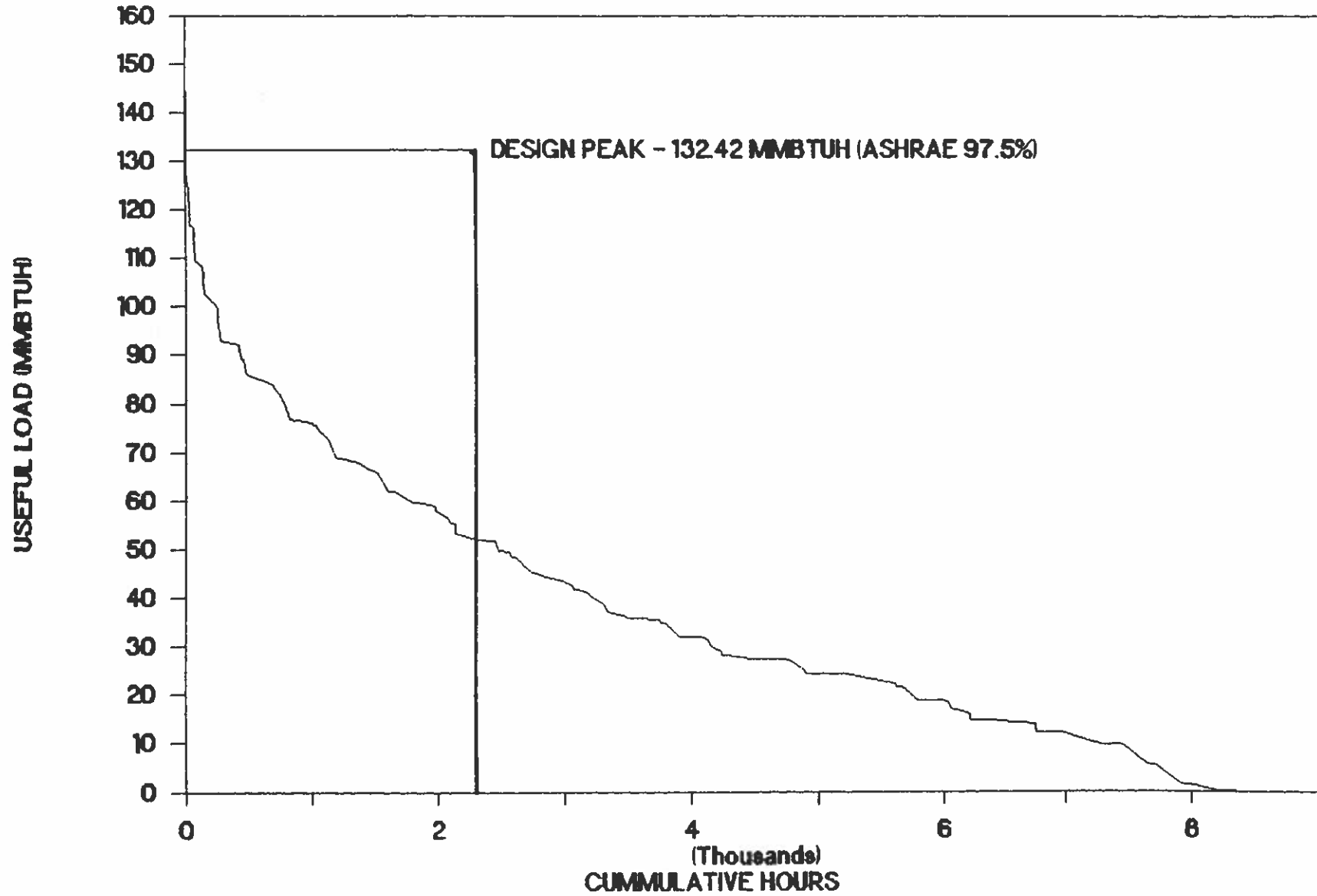


FIGURE 2-5

OVERALL SYSTEM LOAD PROFILE

WITH BLACKSTONE - 26.9% LOAD FACTOR



SECTION 3

HEAT SOURCE ANALYSIS

INTRODUCTION

A variety of heat sources were investigated in Jamestown, ranging from existing boilers of potential customers to a new boiler plant or cogenerating station. The heat sources were evaluated on the basis of reliability, efficiency, overall cost effectiveness and ease of operation.

As pointed out in Section 2, the predominance of existing space heating and process loads of the Industrial Corridor companies are served by steam boilers and distribution systems. In many instances, process loads require high thermal levels which could not be served by conventional hot water district heating systems. From the outset, the heat source and distribution system options were limited to high temperature hot water or steam.

It was also recognized early in the study, that in view of current low gas prices, the economic attractiveness of district heating would depend upon low retrofit costs to achieve favorable customer paybacks. Accordingly, further in-depth study was limited to the feasibility of implementing a steam district heating system. A high temperature hot water system is technically feasible with system capital costs comparable to a steam system. However, the cost of customer heat transfer equipment and/or the cost of converting existing steam systems to hot water would be high, with associated unfavorable customer paybacks.

EXISTING SOURCES

Utilizing existing boilers and other existing heat sources is the least expensive option for a district heating central heat source. They are already partially or fully depreciated, there is less uncertainty in construction costs,

and in many cases the equipment owner will also serve as the district heating utility owner so that the incremental capital cost is zero. The equipment is already onsite so that delivery delays and environmental permitting delays are not a problem. However, there are also many disadvantages in using existing equipment. The size of the available equipment is fixed and may not meet the needs of the district heating system and the location may not be optimum for the district heating distribution network. If the equipment is very old the reliability and efficiency may not be as good as new modern equipment. Also, the system owner must deal with more complex institutional issues in operating or leasing boilers owned by others, including equitable compensation and considerations of boiler owner business failures.

Older equipment is best used as a first phase heat source or to backup a new heat source. The low cost eases the initial development of the system which is the most difficult phase of any project. In future phases, as more modern heat sources are brought on-line, the existing equipment can be used for backup service if desired, or retired to reduce maintenance costs.

One such candidate is a stand alone boiler house with two 1960 Union Iron Works 600-HP steam boilers on Hopes Windows property. Originally coal units, at one point an engineering study was performed to determine ways to conserve fuel and cut operating costs. The original recommendation was to burn wood. At the time of the study New York State was in the process of thinning out some of its state owned and protected forests. Wood was felt to be an almost inexhaustible and economical fuel supply. However, as the study progressed other considerations including manpower and storage space requirements led to the wood fed proposal being abandoned by Hopes.

As an alternative, it was decided to convert one unit into a dual fuel burner boiler. An underground oil tank was installed as well as natural gas piping. Each of these boilers are rated for 200 psi and can produce 22,500 lbs/hr at 100 psi. Once Plant 6 was torn down and Plants 4 and 5 were sold, it was felt

that the large boilers were not economical to run. The second of the two units was never converted from coal and some of its equipment has been removed. When Plant 5 was sold to Essex Specialty Co., the underground fuel oil storage tank which was now on their property, was required to be removed because of the nature of Essex's product.

The pipe tunnels from the boiler house to the remaining Plants 1, 2, and 3 were valved off and each building had its own heat source installed. The converted boiler has, however, been well maintained and is kept as backup to Plants 1 and 3 allowing for emergency repairs and a planned summer outage for maintenance.

A new boiler plant capable of serving all of Areas A and B, including Blackstone Corp., would need to have a total peak capacity of approximately 4,000 HP. Accordingly, the 600 HP boiler at Hopes could logically only be considered a potential backup to a new heat source, particularly in a phased district heating system implementation plan. For example, if the first phase were to include only Area B without Blackstone, the total peak demand is approximately 1600 HP. If a new centrally located boiler plant was constructed with a first phase capacity of two 800-HP or two 1000-HP units, the Hopes boiler could provide necessary backup during the phase. This would minimize initial capital investment and enhance system economics.

NEW BOILER PLANT

The construction of a new steam boiler plant installation, centrally located to ultimately serve both Area A and B, is a possible heat source for the system. The boiler plant would be required to maintain 75 psig steam pressure in the distribution system in order to serve all the customers' existing steam process and space heating loads.

One benefit of installing new boilers at a single central location is that the site and structure to house the boilers can be designed to be easily enlarged to

accommodate more boilers or a cogeneration facility in the future. Centralized system maintenance and operation also maximizes efficiency and reliability.

NEW COGENERATION PLANT

Cogeneration is the production of electricity and heat simultaneously while using less fuel than that needed to produce each individually. In Jamestown particularly, the Board of Public Utilities has expressed the need for more local power generation capacity to supplement the existing municipally owned power station capacity. Thus cogeneration was considered as a potential heat source for the Industrial Corridor. The disadvantage of cogeneration plants, however, is the high capital expense relative to conventional boiler plants. System economics are strongly dependent upon the price at which the cogenerated power can be sold, as will be evidenced in Section 7.

Several options were considered for a prime mover, including gas turbines, steam turbines and combustion engines. A steam turbine system was considered to be too expensive for the size range. To properly match the thermal and electric loads a condensing/extracting type of turbine would be best. This type of arrangement is quite complicated, requires much auxiliary equipment and is expensive. For any steam turbine arrangement to be efficient, higher steam pressures would be required. Typical units have pressures in the range of 400 to 1100 psig. Pressures over 125 psig greatly increase the cost and complexity of a boiler installation.

Both gas turbines and combustion engines are good prime movers for small cogeneration projects. They are inexpensive to install (relative to larger units and steam turbine plants), have high efficiency when designed properly and are easy to operate. On an equivalent energy basis a gas turbine cogeneration system produces about twice as much thermal energy as electricity. A combustion engine produces about the same amount of each. The selection of the gas turbine was based mainly upon district heat thermal requirements and local availability of low cost gas.

The cogeneration system must meet certain restrictions set up by the Public Utility Regulatory Policies Act (PURPA) of 1978. The main requirement being that if over 15% of the systems total energy production is heat, then an average efficiency of 42.5% must be met. And if the thermal portion of the energy production is between 5% and 15% of the total, then an average efficiency of 45% must be attained. The thermal production must be at least 5% of the total for a system to qualify. The average efficiency for purposes of a PURPA evaluation is defined as 50% of the thermal output plus 100% of the electric output (in equivalent energy units) divided by the total fuel input (LHV) on an annual basis.

$$\text{PURPA EFF} = \frac{\underline{E} + Q/2}{\text{Fuel}}$$

where:

Q = Annual useful thermal production;

E = Annual useful electric production; and

Fuel = Annual fuel input (Lower Heating Value).

Gas turbines in the size range appropriate for this project have standalone electric generation efficiencies on the order of 20% to 30%, much less than the PURPA requirements. By capturing the waste heat in their exhaust gases, cogenerated steam is produced and has virtually no effect on electric power production. Since only a 50% credit is given for waste heat recapture, most of the theoretically available heat must be recaptured to meet the PURPA efficiency requirements. This requires that the turbine be sized to meet the base steam load of the district, without being so oversized that there are long periods in which the district steam load is less than the turbine capability.

The unit selected for evaluation is a 4000 KW Solar Centaur H Gas Turbine Cogeneration Facility with supplementary firing to maximize steam production. This unit has an unfired steam generating capacity of over 21,000 lbs/hr, and over 57,000 lbs/hr with supplementary firing in the heat recovery boiler. With

a total district system demand in Areas A and B of approximately 135,000 lbs/hr, two such units in conjunction with peaking and back-up boilers could serve the district system thermal load.

SECTION 4

SYSTEM IMPLEMENTATION

As the economics of district heating often are dependent upon minimizing capital expenses in the initial years, a phased implementation plan for the Industrial Corridor system was developed. Two basic scenarios were considered under the concept of a new central plant, on which the system and customer economic analyses were based.

The first scenario envisions a conventional boiler plant for the first phase of implementation with cogeneration units installed in subsequent phases to ultimately serve the entire load of Areas A and B. The boilers initially installed (along with others in subsequent phases) would serve as peaking and backup units to the cogeneration units. The second scenario considers only conventional steam boilers to serve the load, without cogeneration. In both cases, the location of the central plant was selected approximately between Area A and B (see Figure 5-3) where vacant land exists for possible sale or lease.

Three phases have been developed which could bring district heating to each of the nine potential customers in the Industrial Corridor by the third year, using either heat source option. In the first phase, the load of all Area B customers would be served with the exception of Blackstone. As Blackstone's load is now primarily direct-fired gas units planned for replacement to hydronic units, this in-house conversion would probably be deferred several years. In the second phase (year 2) the distribution system as well as the central plant capacity would be expanded to include Area A customers MRC Bearing and Weber-Knapp. The final phase (year 3) would extend the service and central plant capacity to include Blackstone. During the first phase, backup capacity could be provided by the 600-HP boiler at Hopes Windows. Phase 2 and 3 would include required backup capability at the central plant for single largest unit failure.

A summary of the proposed implementation plans for both the boiler and cogeneration options is presented in Table 4-1.

TABLE 4-1
COGENERATION OPTION

	<u>Production Plant</u>	<u>Total Plant Capacity (Lbs/Hr)</u>	<u>System Peak Load (Lbs/Hr)</u>
Phase 1	68,000 lb/hr Boiler Plant Two 1,000-HP Boilers	68,000 (34,000)*	52,000
Phase 2	Add Single Cogen. Unit 57,000 lbs/hr Fired and One 1,000-HP Boiler	159,000 (102,000)	79,200
Phase 3	Add 2nd Cogen. Unit	216,000 (159,000)	134,700

BOILERS ONLY OPTION

	<u>Production Plant</u>	<u>Total Plant Capacity (Lbs/Hr)</u>	<u>System Peak Load (Lbs/Hr)</u>
Phase 1	68,000 lb/hr Boiler Plant Two 1,000-HP Boilers	68,000 (34,000)*	52,000
Phase 2	Add Two 1,000-HP Boilers	136,000 (102,000)	79,200
Phase 3	Add One 1,000-HP and One 350-HP Boiler	181,900 (147,900)	134,700

*Plant Capacity with Largest Unit Out of Service (Typical)

SECTION 5

TRANSMISSION AND DISTRIBUTION SYSTEM ASSESSMENT

Development of the transmission and distribution system should coincide with the development of heat sources and the addition of known or potential heat loads to the system.

PIPING SYSTEM DESIGN

Piping sizes were determined using the building heating loads and design parameters of the district heating system. Since the boiler plant would be designed to produce 90 psig steam at 360°F, the supply piping must be capable of carrying this quality steam with a minimum of pressure drop between the plant and each customer, to guarantee a minimum service pressure of 75 psig.

Referring to Figure 5-1, a prefabricated conduit piping system consisting of schedule 40 steel pipe, calcium silicate insulation, an air space, steel casing and an exterior coating was selected to meet the design conditions. The expansion movement of the steel service pipe is partially taken up in the air space between the carrier pipe and the conduit. The system is also allowed to expand by the use of expansion "U" loops. This extra piping in the form of a "U" gives the system flexibility. Fittings as well as piping lengths are shop fabricated and shipped to the field.

The pipe is installed by butt-welding the carrier pipe sections together. The two half shells of calcium silicate are then tie-wrapped in place. The outer steel casing is then welded in place and an exterior coating of high melting point asphalt in sheet form is wrapped around and heat shrunk to a tight fit. This coating provides corrosion protection for the outer steel casing.

The condensate return piping will be installed with the larger steam supply piping side-by-side in a single trench. The trenches will generally be less

FIGURE 5-1
DISTRICT HEATING CONDUIT

1. CARBON STEEL CARRIER PIPE
2. CARBON SILICATE INSULATION
3. AIR SPACE
4. OUTER STEEL THINWALL CASING
5. HIGH MELTING POINT (1200°F ASPHALT COATING)

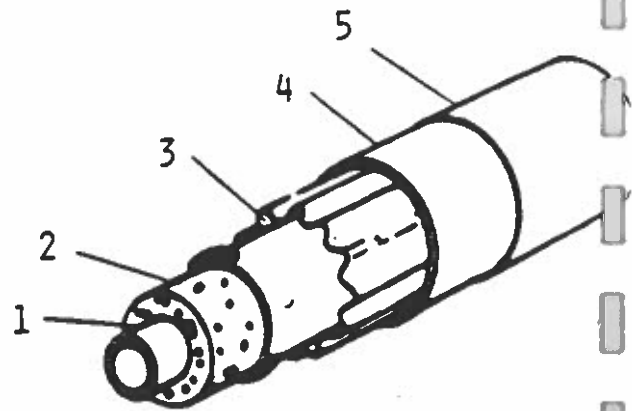
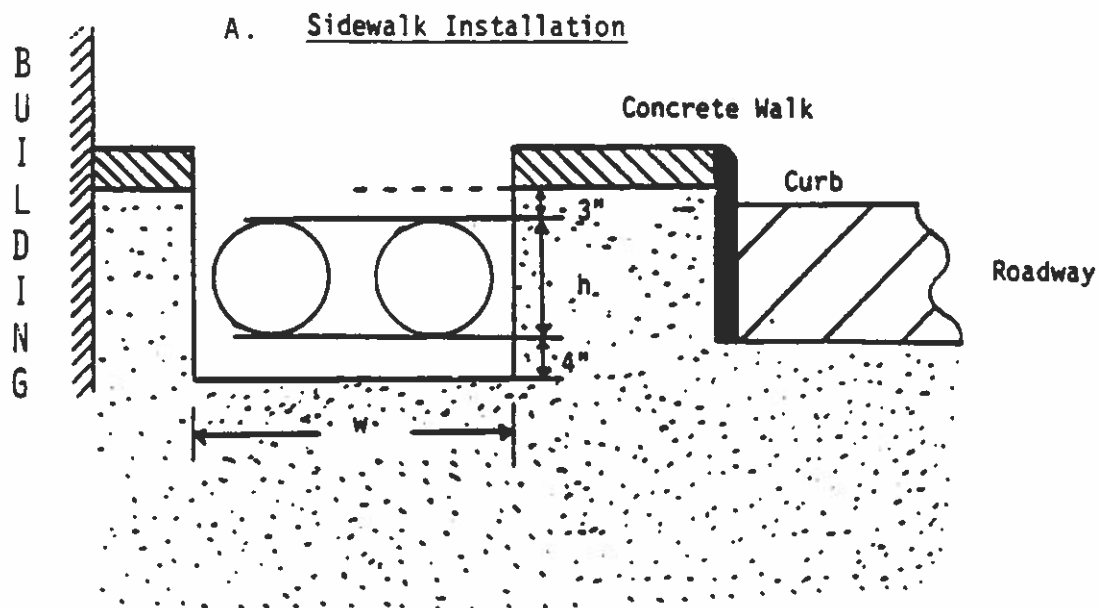


FIGURE 5-2
DISTRICT HEATING CONDUIT INSTALLATIONS

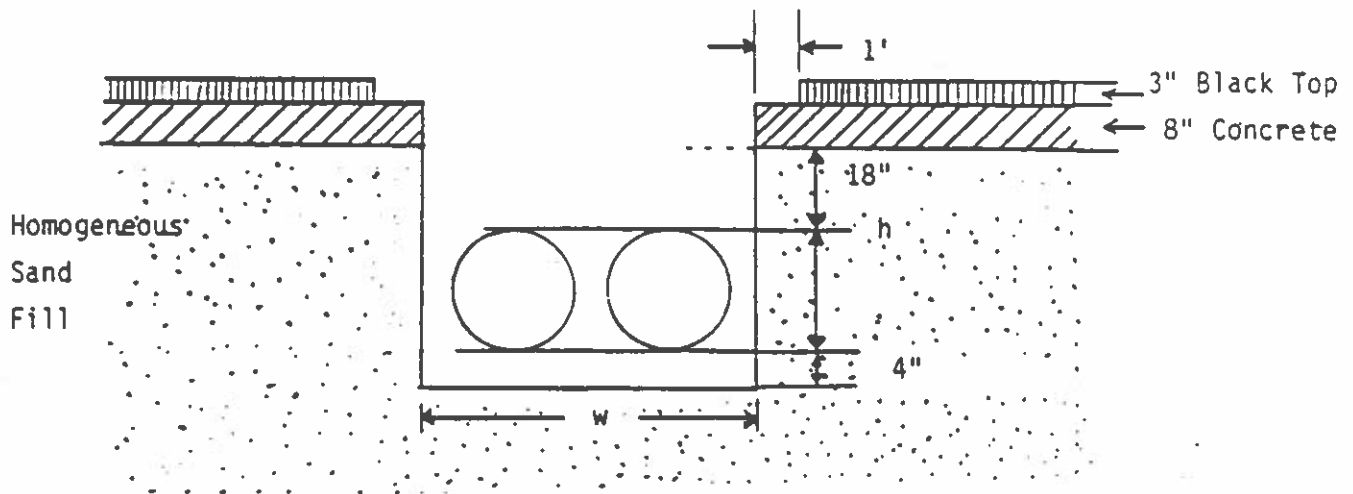


Note: Walk is cut, removed and repaired

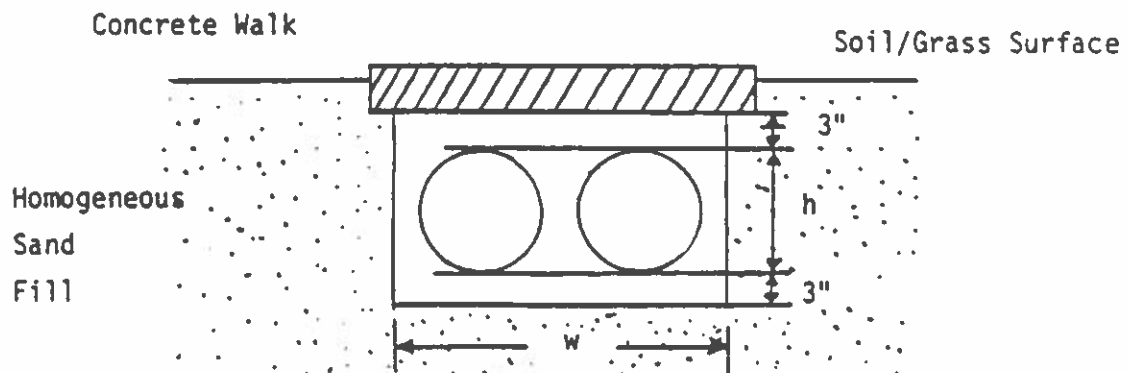
FIGURE 5-2
(Cont'd)

DISTRICT HEATING CONDUIT INSTALLATIONS

B. Street Installation



C. Sidewalk Installation



Note: Walk is broken, removed and new walk installed

than 5 feet deep and require no shoring. The conduit is laid directly in the trench on a compacted 4 inch sand base. The excavation provides for a clearance of 6 inches between conduits and 4 inches between the conduit and trench wall. The conduit is then covered with at least 16 inches of homogeneous stone-free sand. Figure 5-2 shows the typical conduit installations.

PIPE ROUTING AND COST

A potential pipe routing for the system is shown in Figure 5-3 with the line sizes and cost estimate indicated in Table 5-1. The transmission and distribution piping capacity was 20 percent oversized to provide for the present heat loads and potential future expansion.

Often in district heating projects, the cost of the transmission and distribution system represents a significant portion of the total capital investment. Primarily this is due to expensive surface restorations and the interferences encountered under city streets and below sidewalks. In the Industrial Corridor area of Jamestown however, the major portion of the proposed pipe routing is planned along streets and access roads with road shoulders presently unpaved and with few sidewalks. This will minimize surface restoration costs. Fewer interferences with utilities are also expected.

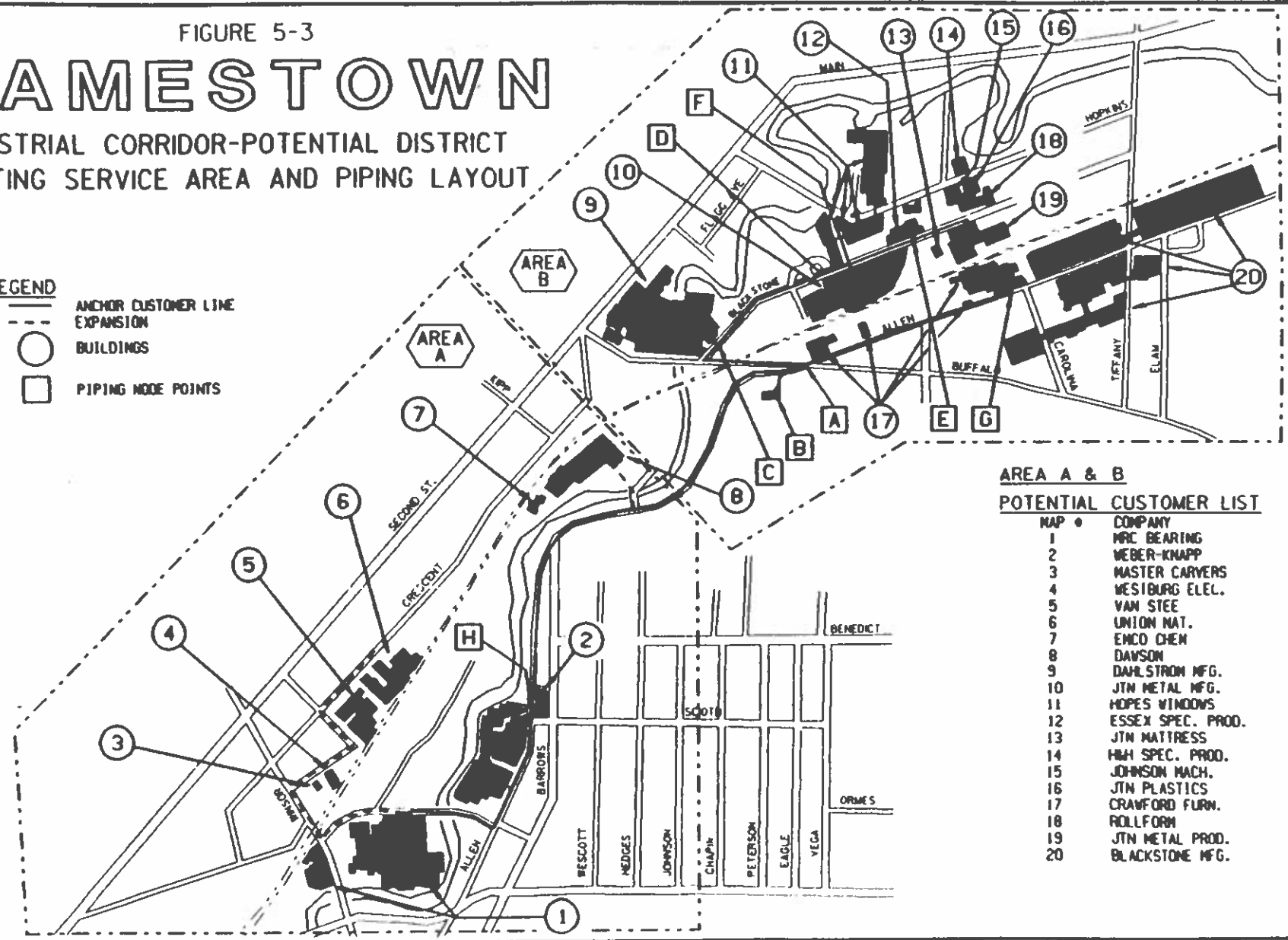
FIGURE 5-3

JAMESTOWN

INDUSTRIAL CORRIDOR-POTENTIAL DISTRICT
HEATING SERVICE AREA AND PIPING LAYOUT

LEGEND

-  ANCHOR CUSTOMER LINE
-  EXPANSION
-  BUILDINGS
-  PIPING NODE POINTS



AREA A & B

POTENTIAL CUSTOMER LIST

MAP #	COMPANY
1	MFC BEARING
2	WEBER-KNAPP
3	MASTER CARVERS
4	WESTBURG ELEC.
5	VAN STEE
6	UNION NAT.
7	EMCO CHEM
8	DAVSON
9	DAHLSTROM MFG.
10	JTN METAL MFG.
11	HOPES WINDOWS
12	ESSEX SPEC. PROD.
13	JTN MATTRESS
14	HIGH SPEC. PROD.
15	JOHNSON MACH.
16	JTN PLASTICS
17	CRAWFORD FURN.
18	ROLLFORM
19	JTN METAL PROD.
20	BLACKSTONE MFG.

TABLE 5-1

DISTRIBUTION PIPING SIZING AND COST ESTIMATE

CUSTOMER OR NODE			NOMINAL PIPE SIZE - INCHES									
			SIZING LOAD - MM/HR			PHASE 1		PHASE 2		PHASE 3		
						STEAM	COND.	STEAM	COND.	STEAM	COND.	
FROM	TO	LENGTH FEET	PHASE 1	PHASE 2	PHASE 3							
B	A	234	161.7			18	10	--	--	--	--	
A	C	496	59.3			10	6	--	--	--	--	
C	D	650	36.7			8	4	--	--	--	--	
C	9	50	22.6			8	4	--	--	--	--	
D	10	50	5.4			4	2	--	--	--	--	
F	11.1	50	10			6	3	--	--	--	--	
F	11.2	50	13.2			6	3	--	--	--	--	
E	19	50	4			4	2	--	--	--	--	
A	G	955	69.8			12	8	--	--	--	--	
G	20	440			66.6	--	--	--	--	12	8	
B	H	2050		32.6		--	--	8	4	--	--	
H	1	900		10.4		--	--	6	3	--	--	
D	F	120	23.2			8	4	--	--	--	--	
D	E	292	8			6	3	--	--	--	--	
G	17	50	3.2			4	2	--	--	--	--	
E	12	50	4			4	2	--	--	--	--	
H	2	50		22.2		--	--	8	4	--	--	
Linear Feet:			3097	3000	440							

TOTAL PIPING COST (\$1000)

	PHASE 1	PHASE 2	PHASE 3
Piping Cost	515	411	84
Contingencies(15%)	103	82	17
Eng & CM(10%)	77	62	13
Total	\$695	\$555	\$114
Cost Per Linear Foot:	\$224	\$185	\$259

SECTION 6

INSTITUTIONAL ASSESSMENT

OWNERSHIP OPTIONS AND FINANCIAL CONSIDERATIONS

Existing and planned district heating systems in the U.S. reflect a variety of corporate structures. The Trenton, New Jersey system was built and operated by a private corporation. The St. Paul, Minnesota system is owned and operated by a non-profit corporate entity with close ties to the city government. Wilmar, Minnesota, owns and operates its system. The existing Jamestown system is also municipally owned. District steam systems in place in various communities also reflect different ownership structures such as the private system in Scranton, Pennsylvania. In planning a district steam system for the Industrial Corridor it is necessary to weigh the desirability of different owner/operator structures.

REGULATORY CONSIDERATIONS

The Public Utility Regulatory Policy Act (PURPA) encourages high-efficiency cogeneration and requires that utilities purchase cogenerated power at rates corresponding to the costs they avoid by not generating power. For a facility to qualify as a cogenerator, it must also meet certain PURPA regulations.

1. The annual thermal or process heat production of the cogeneration facility, Q_p , must be at least 5% of its total energy output ($Q_p + P$). Here, P is the annual electrical output in equivalent energy units.
2. If $Q_p / (Q_p + P)$ is at least 5% but less than 15%, then the overall efficiency of the cogeneration facility must be greater than 45%.

3. If $Q_p/(Q_p+P)$ is greater than 15% then the plant efficiency $(P+0.5 Q_p)/Q_t$ must be greater than 42.5%.

The proposed gas turbine option has an annual efficiency in excess of 45% for all phases, meeting PURPA requirements.

There are also constraints to the operation of a district heating system imposed by the public utility regulatory framework and the franchise authority of the local municipality. The degree of such constraint varies with the form of ownership.

It is necessary to consider the response of potential customers to the ownership option chosen. Private ownership requires interjection of an untried corporate structure. The need for customer trust in the reliability and responsibility of the system is paramount for its saleability. A system owned and operated by the municipal utility will engender such trust at an early stage, particularly in Jamestown where such a utility already exists.

FINANCIAL CONSIDERATIONS

Options available for financing the plant retrofits and piping of a district heating project include: tax deductions and credits, loans and grants, bonds, federal assistance, and private financing.

Tax breaks extended to states or localities may be in the form of income tax deductions for capital investments and/or operating expenses, property tax deductions or exemptions for certain forms of real property, and tax credits.

Loans and grants may come through direct appropriations, special tax levies and federal assistance in the forms of Community Development Block Grants and Urban Development Action Grants. Grants are useful in reducing initial investment costs, while subsidized loans generally lower annual expenses.

The Community Development Block Grants are awarded through the U.S. Department of Housing and Urban Development (HUD) to assist communities in meeting financial needs and promoting revitalization. The grants are available to local governments and community groups, private non-profit entities and development corporations. The grants are often used in conjunction with other forms of financing such as municipal funds or bonds. The grants are awarded on a competitive basis with population, extent of poverty, overcrowded and aging housing and growth lag being the factors analyzed.

Urban Development Action Grants are also administered by HUD and directed towards assisting distressed cities. Eligibility is limited to certain urban areas as specified by HUD. Applications are accepted for any program guided at strengthening the economy or vitality of an urban area through commercial, industrial or residential development. The selections are judged by age of housing, poverty, lack of growth and unemployment. The funding is not granted unless private capital is committed.

Municipal governments may issue bonds to finance a district heating project as was previously done in Jamestown. General obligation (G.O.) bonds are commonly used to finance capital improvements. These bonds are attractive to municipalities when setting the debt service of the bond at an amount less than the eventual payback which results in the issuing unit of government realizing a net gain. G.O. bonds require public support since they are subject to referendums. By pledging property tax revenues in repayment, the municipality can receive a low interest rate.

Revenue bonds are tax-exempt bonds issued by municipalities in order to build or purchase public facilities. Revenue bonds are long term securities that require a special act of legislation for issuance. Revenue bonds carry a risk because they are repayed from the revenues of the facility and such income can fluctuate considerably. Revenue bond financing does not affect the municipal balance sheet or borrowing capacity, the municipality retains control after the bonds have matured.

SECTION 7

SYSTEM ECONOMIC ANALYSIS

The economic analyses of steam district heating in Jamestown were performed from the viewpoints of private and municipal ownership. The analyses determined the annual carrying charges for each investment phase, the composite carrying charges for all investment phases and the unit cost of district heat.

The "required revenue" approach was used to determine the necessary charges for district heating. The annual carrying charges are calculated based on debt-to-equity ratio, return rates, book life, taxes, and insurance rates. The total system costs are comprised of these fixed expenses, operating expenses, and electricity sales credit for the cogeneration option. The calculated system costs were compared with the amount of heat sold to determine the minimum required charges for district heat.

The capital costs are derived in 1988 dollars. They include all direct and indirect costs associated with the heat sources and the transmission and distribution systems for each respective phase.

CAPITAL COST

The capital costs for all phases and cases evaluated were prepared based on previous experience and recent vendor's budget estimates. The costs were based on 1988 dollars and escalated to the implementation dates using a general inflation rate of 4%.

The cost for the base central plant options are shown in Tables 7-1 and 7-2 and broken down by phases. They include all equipment and installation costs plus engineering and construction management and contingency.

TABLE 7-1

INDUSTRIAL CORRIDOR DISTRICT HEATING SYSTEM COST ESTIMATE
COGENERATION OPTION (1988 DOLLARS)

	<u>PHASE 1</u>	<u>PHASE 2</u>	<u>PHASE 3</u>
BOILER PLANT			
1000-HP Steam Boilers & Controls	\$222,000	\$111,000	
Auxiliary Equipment	28,000	14,000	
Boiler Breeching 22,000	9,000	9,000	
Mechanical & Piping Installation	408,000	201,000	
Subtotal:	\$680,000	\$335,000	
COGENERATION PLANT			
Gas Turbine-Generator w/Accessories (4000kw)		\$1,400,000	\$1,400,000
NOX Control (Water INjection)		50,000	50,000
Heat Recovery Boiler w/Auxiliary Firing and Accessories		470,000	470,000
Gas Compressor		190,000	190,000
Deionized Water Treatment System		75,000	75,000
Switchgear & Motor Control Console		105,000	75,000
Auxiliary Equipment		100,000	100,000
Mechanical & Piping Installation		340,000	270,000
Electrical/I&C Installation		330,000	260,000
Subtotal:		\$3,060,000	\$2,890,000
UTILITY INTERCONNECTION	\$50,000	\$100,000	\$0
SITE			
Land	\$150,000	\$0	\$0
Building & HVAC w/Site Preparation	85,000	175,000	100,000
Subtotal:	\$235,000	\$175,000	\$100,000
DISTRIBUTION SYSTEM			
Piping	\$515,000	\$411,000	\$84,000
Customer Metering	43,000	15,000	30,000
Subtotal:	\$558,000	\$465,000	\$114,000
SYSTEM SUBTOTAL:	\$1,523,000	\$4,135,000	\$3,104,000
Engineering, Design and Construction Management @ 10%			
	\$152,300	\$413,500	\$310,400
Contingency @ 10%			
	\$152,300	\$413,500	\$310,500
PHASE TOTAL COST:	\$1,827,600	\$4,915,200	\$3,724,800
OVERALL SYSTEM COST:			\$10,467,600

TABLE 7-2

INDUSTRIAL CORRIDOR DISTRICT HEATING SYSTEM COST ESTIMATE
ALL BOILER OPTION (1988 DOLLARS)

	<u>PHASE 1</u>	<u>PHASE 2</u>	<u>PHASE 3</u>
BOILER PLANT			
Steam Boilers & Controls	\$222,000	\$222,000	\$171,000
Auxiliary Equipment	28,000	28,000	21,000
Boiler Breeching	22,000	22,000	22,000
Mechanical & Piping Installation	408,000	408,000	231,000
Subtotal:	\$680,000	\$680,000	\$445,000
SITE			
Land	\$150,000	\$0	\$0
Building & HVAC w/Site Preparation	85,000	52,500	52,500
Subtotal:	\$235,000	\$52,500	\$52,500
DISTRIBUTION SYSTEM			
Piping	\$515,000	\$411,000	\$84,000
Customer Metering	43,000	15,000	30,000
Subtotal:	\$558,000	\$465,000	\$114,000
SYSTEM SUBTOTAL:	\$1,523,000	\$1,197,000	\$611,500
Engineering, Design and Construction Management @ 10%	\$152,300	\$119,750	\$61,150
Contingency @ 10%	\$152,300	\$119,750	\$61,150
PHASE TOTAL COST:	\$1,827,600	\$1,390,200	\$733,800
OVERALL SYSTEM COST:			\$3,951,600

OPERATING COSTS

The operating costs of the central system are comprised of: operating labor, maintenance labor, maintenance materials and fuel. Included in the maintenance materials are such consumables as make-up water, chemicals and lube oil. For both the municipal and private ownership options operating and maintenance labor was estimated to be nine (9) man-years annually from Phase 3 on. Materials were estimated at 1.7% of the capital investment. Fuel costs are estimated using \$2.71/MMBtu (1988), based on discussions with the National Fuel Company for a service of this size.

CARRYING CHARGES

The carrying charges (or fixed costs) for the plant consist of interest on debt, depreciation, taxes and insurance. These costs are fixed because they do not depend on the plants thermal operation level. The method used to calculate the carrying charges is based on the Electric Power Research Institute (EPRI) methodology as developed in their Technical Assessment Guide.

The method develops charges suitable for use in a required revenue analysis. In this type of analysis the annual revenues required to sustain the project are calculated and compared against the revenue requirements of alternative scenarios to determine the best investment strategy.

Depreciation is calculated on a straight line basis with zero salvage value. Plant life is assumed to be 20 years. Income taxes are calculated using a 40% tax rate (34% federal and 6% state) and apply only to the private ownership option. Tax depreciation was calculated using a 150% declining balance for 19 years. Property taxes were assumed at a levelized rate of 1.5% of the installed cost and insurance at a levelized 0.75%.

OPTIONS AND SENSITIVITY

The analysis used the "required revenue" approach to develop unit costs for the district heating system. A price per million btu's (MMBtu) of district heat was developed covering twenty years for each case and option studied. There were two ownership options studied, Municipal and Private Developer, and two basic heat source options, Boiler Plant and Cogeneration. The Base case cogeneration option assumes sale or avoided cost of excess electricity at an average rate of 3¢/KWH.

Sensitivity analyses were run for both heat source and ownership options. The base case parameters and inputs are shown in Table 7-3 and the sensitivity cases initially studied are shown in Table 7-4.

RESULTS AND RECOMMENDATIONS

Table 7-5 shows the base case unit cost of heat developed for the base case boiler heat source option for both municipal and private ownership. The results are shown graphically in Figures 7-1 and 7-2. Similarly, the results for the base case cogeneration option are shown in Table 7-6, and Figures 7-3 and 7-4. Conclusions drawn from these base case results can be summarized as follows:

- o The boilers only option is superior to the cogeneration option, primarily because of the low \$30/MWhr buyback rate for power which cannot offset the additional carrying charges associated with the added capital cost of the cogeneration units. The rates associated with cogeneration are on average \$1.48/mmbtu higher for municipal ownership and \$2.49/mmbtu higher for private ownership.
- o Municipal ownership, as can be expected, is more favorable than private due to higher financing costs and tax effects. For the cogeneration option, the average municipal rate is \$1.72/mmbtu lower, and \$0.71 mmbtu lower for the boiler option.

TABLE 7-3
BASE CASE PARAMETERS

	<u>Municipal Ownership</u>	<u>Private Ownership</u>
Debt Cost	7%	9.5%
Taxes	0%	40%
Property Taxes	0%	1.5%
Insurance	.75%	.75%
Buy Back Rate (\$/MWhr)	30	30
Electricity Cost (\$/MWhr)	30	30
Fuel Cost (1988 \$/MMBtu)	2.71	2.87*
Labor (\$1000/manyear)	25	25
O & M Materials	1.7%	1.7%
GT Heat Rate (Btu/Kwhr)	13,480	13,480
Boiler Efficiency	85%	85%

*Includes 6% Sales TAX

TABLE 7-4
BASE AND SENSITIVITY CASES EVALUATED

<u>Municipal Case No.</u>	<u>Private Case No.</u>	<u>Description</u>
MS1	PS1	Base Case - Cogeneration Option
MS2	PS2	Cogen. Option - Implement Phases 1 & 2 Only
MS3	PS3	Base Case - Boiler Option
MS4	PS4	Cogen. Option - \$35/MWhr Buyback Rate
MS5	PS5	Cogen. Option - \$35/MWhr, Phase 1 & 2 Only
MS6	PS6	Boiler Option - Implement Phase 1 & 2 Only
MS7	PS7	Cogen. Option - 15% Lower Fuel Costs

TABLE 7-5
UNIT COSTS OF DISTRICT HEAT

BOILERS ONLY OPTION
Municipal Ownership - Case MS3

YEAR	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Unit Cost of Heat - \$/MMBTU										
1. Fixed Expenses	\$1.97	\$2.34	\$1.51	\$1.48	\$1.45	\$1.41	\$1.38	\$1.35	\$1.31	\$1.28
2. O & M Expenses	\$1.51	\$1.55	\$0.91	\$0.95	\$0.98	\$1.02	\$1.07	\$1.11	\$1.15	\$1.20
3. Fuel	\$3.48	\$3.62	\$3.77	\$3.92	\$4.07	\$4.24	\$4.41	\$4.58	\$4.76	\$4.96
Total	\$6.97	\$7.51	\$6.19	\$6.34	\$6.50	\$6.67	\$6.85	\$7.04	\$7.23	\$7.44

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unit Cost of Heat - \$/MMBTU										
1. Fixed Expenses	\$1.25	\$1.22	\$1.18	\$1.15	\$1.12	\$1.09	\$1.05	\$1.02	\$0.99	\$0.96
2. O & M Expenses	\$1.25	\$1.30	\$1.35	\$1.40	\$1.46	\$1.52	\$1.58	\$1.64	\$1.71	\$1.77
3. Fuel	\$5.15	\$5.36	\$5.57	\$5.80	\$6.03	\$6.27	\$6.52	\$6.78	\$7.05	\$7.34
Total	\$7.65	\$7.87	\$8.11	\$8.35	\$8.61	\$8.87	\$9.15	\$9.44	\$9.75	\$10.06

20 Year Levelized Rate: \$7.481

BOILERS ONLY OPTION
Private Ownership - Case PS3

YEAR	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Unit Cost of Heat - \$/MMBTU										
1. Fixed Expenses	\$2.72	\$3.22	\$2.07	\$2.00	\$1.93	\$1.86	\$1.80	\$1.74	\$1.69	\$1.64
2. O & M Expenses	\$1.51	\$1.55	\$0.91	\$0.95	\$0.99	\$1.03	\$1.07	\$1.11	\$1.16	\$1.20
3. Fuel	\$3.69	\$3.84	\$3.99	\$4.15	\$4.32	\$4.49	\$4.67	\$4.86	\$5.05	\$5.25
Total	\$7.92	\$8.61	\$6.97	\$7.10	\$7.24	\$7.38	\$7.54	\$7.71	\$7.90	\$8.09

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unit Cost of Heat - \$/MMBTU										
1. Fixed Expenses	\$1.58	\$1.53	\$1.48	\$1.44	\$1.39	\$1.34	\$1.29	\$1.24	\$1.19	\$1.14
2. O & M Expenses	\$1.25	\$1.30	\$1.35	\$1.41	\$1.46	\$1.52	\$1.58	\$1.65	\$1.71	\$1.78
3. Fuel	\$5.46	\$5.68	\$5.91	\$6.14	\$6.39	\$6.65	\$6.91	\$7.19	\$7.48	\$7.78
Total	\$8.30	\$8.52	\$8.75	\$8.99	\$9.24	\$9.51	\$9.78	\$10.07	\$10.38	\$10.69

20 Year Levelized Rate: \$8.195

FIGURE 7-1 BOILER OPTION - MUNICIPAL OWNERSHIP

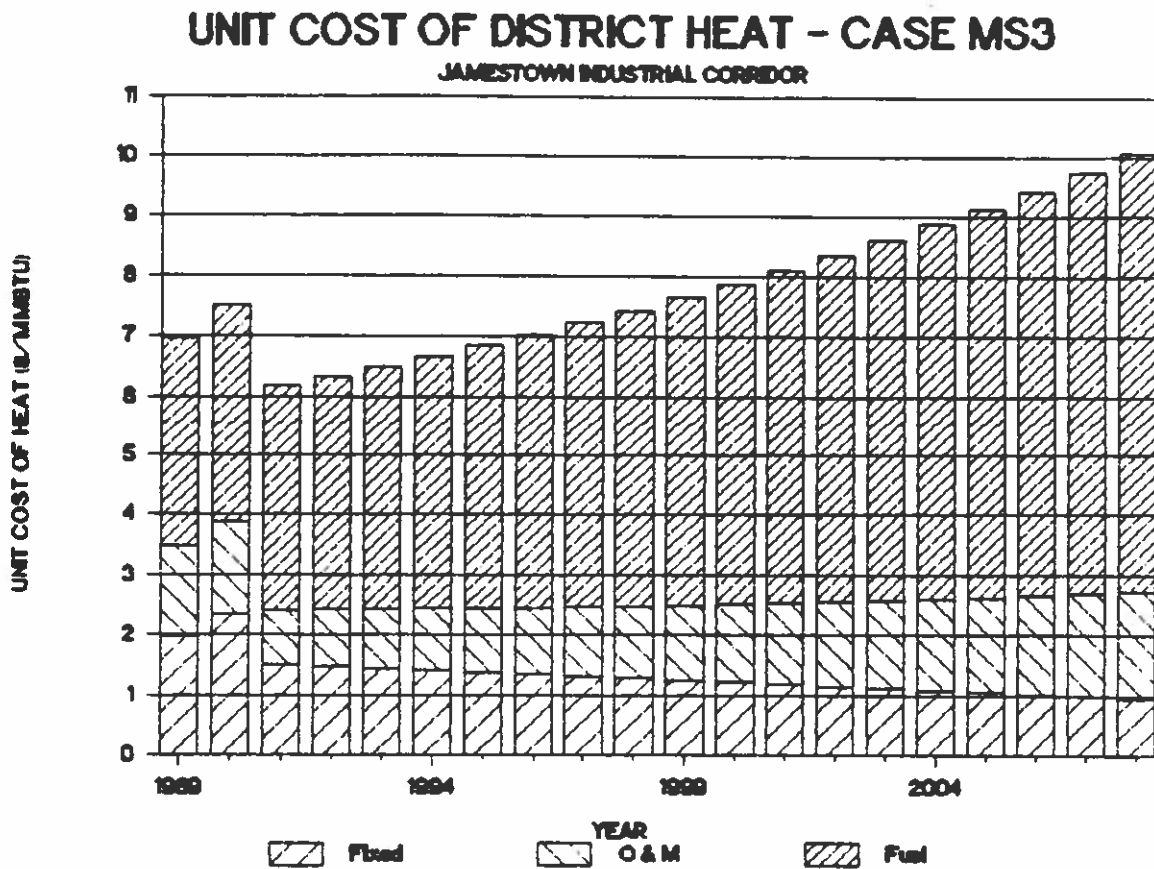


FIGURE 7-2 BOILER OPTION - PRIVATE OWNERSHIP

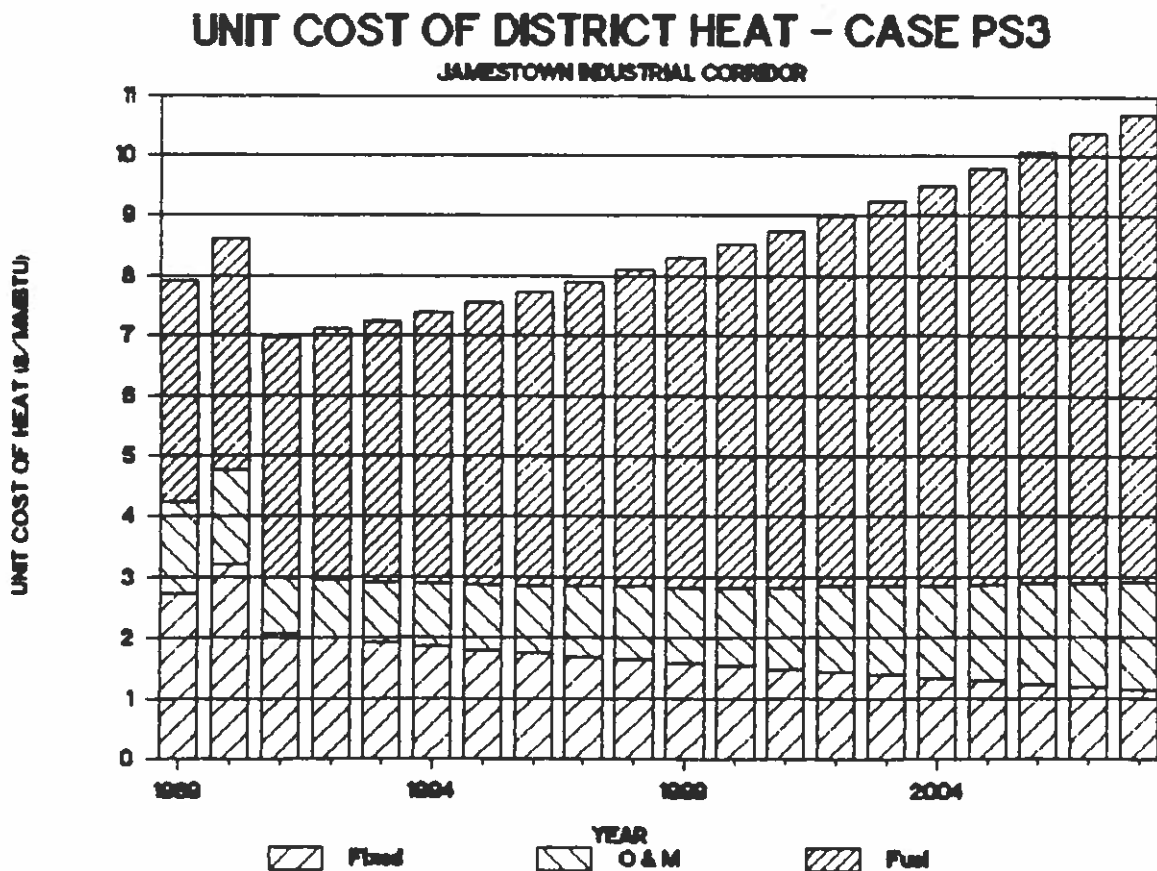


TABLE 7-6

UNIT COSTS OF DISTRICT HEAT

BOILERS/GAS TURBINE COGENERATION OPTION
Municipal Ownership - Base Case MS1

YEAR	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Unit Cost of Heat - \$/MMBTU										
1. Fixed Expenses	\$1.97	\$3.25	\$2.45	\$2.36	\$2.28	\$2.21	\$2.13	\$2.06	\$1.98	\$1.91
2. O & M Expenses	\$1.51	\$1.27	\$0.89	\$0.92	\$0.94	\$0.97	\$1.00	\$1.02	\$1.05	\$1.08
3. Fuel	\$3.48	\$5.08	\$4.91	\$5.04	\$5.18	\$5.32	\$5.47	\$5.62	\$5.78	\$5.94
Total	\$6.97	\$9.61	\$8.25	\$8.32	\$8.41	\$8.50	\$8.59	\$8.70	\$8.81	\$8.93

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unit Cost of Heat - \$/MMBTU										
1. Fixed Expenses	\$1.84	\$1.77	\$1.71	\$1.64	\$1.58	\$1.52	\$1.46	\$1.40	\$1.35	\$1.29
2. O & M Expenses	\$1.11	\$1.14	\$1.18	\$1.21	\$1.25	\$1.28	\$1.32	\$1.36	\$1.40	\$1.44
3. Fuel	\$6.11	\$6.28	\$6.46	\$6.65	\$6.84	\$7.04	\$7.25	\$7.47	\$7.69	\$7.92
Total	\$9.06	\$9.20	\$9.35	\$9.50	\$9.67	\$9.84	\$10.03	\$10.23	\$10.44	\$10.66

20 Year Levelized Rate: \$8.963

BOILERS/GAS TURBINE COGENERATION OPTION
Private Ownership - Base Case PS1

YEAR	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Unit Cost of Heat - \$/MMBTU										
1. Fixed Expenses	\$2.72	\$4.81	\$3.65	\$3.49	\$3.32	\$3.16	\$3.01	\$2.87	\$2.75	\$2.63
2. O & M Expenses	\$1.51	\$1.37	\$0.98	\$1.00	\$1.03	\$1.05	\$1.08	\$1.11	\$1.14	\$1.17
3. Fuel	\$3.69	\$5.79	\$5.66	\$5.80	\$5.95	\$6.10	\$6.26	\$6.42	\$6.59	\$6.77
Total	\$7.92	\$11.97	\$10.28	\$10.29	\$10.29	\$10.31	\$10.35	\$10.41	\$10.48	\$10.57

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Unit Cost of Heat - \$/MMBTU										
1. Fixed Expenses	\$2.51	\$2.41	\$2.30	\$2.20	\$2.10	\$2.01	\$1.91	\$1.82	\$1.73	\$1.64
2. O & M Expenses	\$1.20	\$1.23	\$1.27	\$1.30	\$1.34	\$1.38	\$1.42	\$1.46	\$1.50	\$1.55
3. Fuel	\$6.96	\$7.15	\$7.35	\$7.55	\$7.77	\$7.99	\$8.22	\$8.46	\$8.70	\$9.96
Total	\$10.67	\$10.79	\$10.92	\$11.06	\$11.21	\$11.37	\$11.55	\$11.73	\$11.93	\$12.15

20 Year Levelized Rate: \$10.684

FIGURE 7-3 COGENERATION OPTION - MUNICIPAL OWNERSHIP

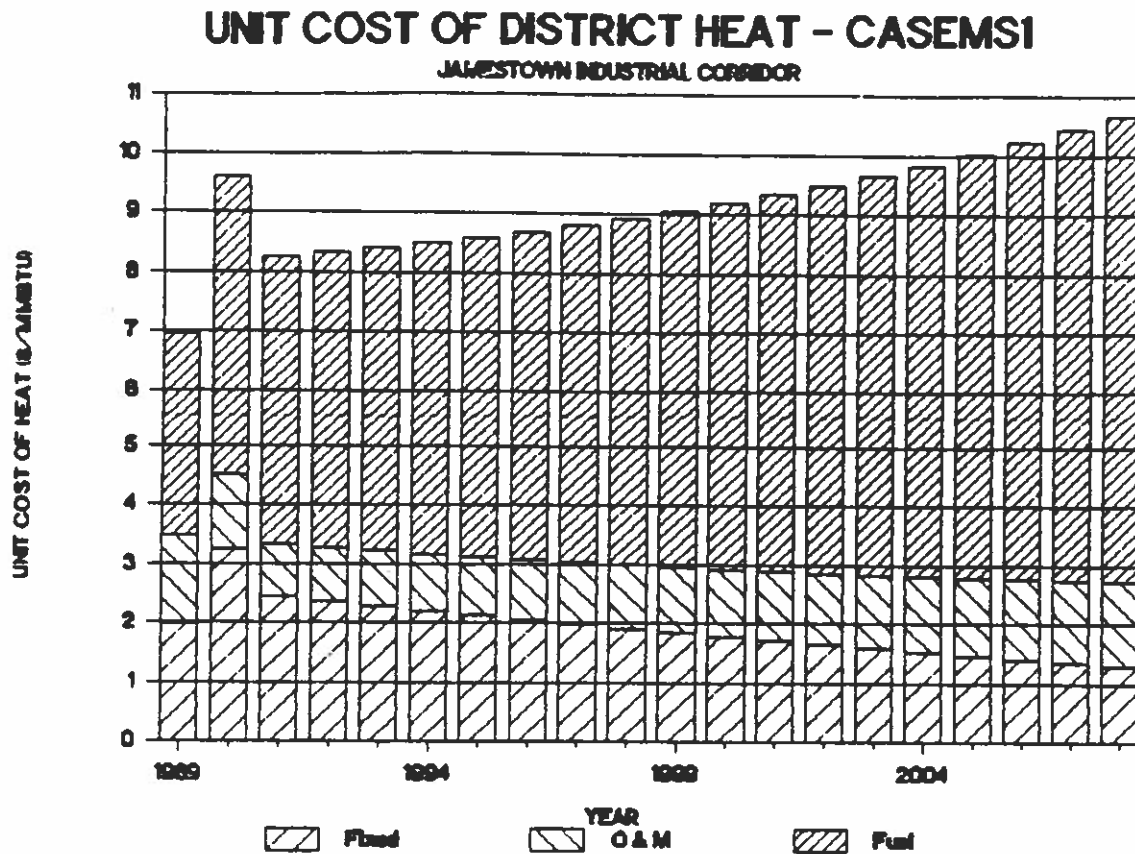
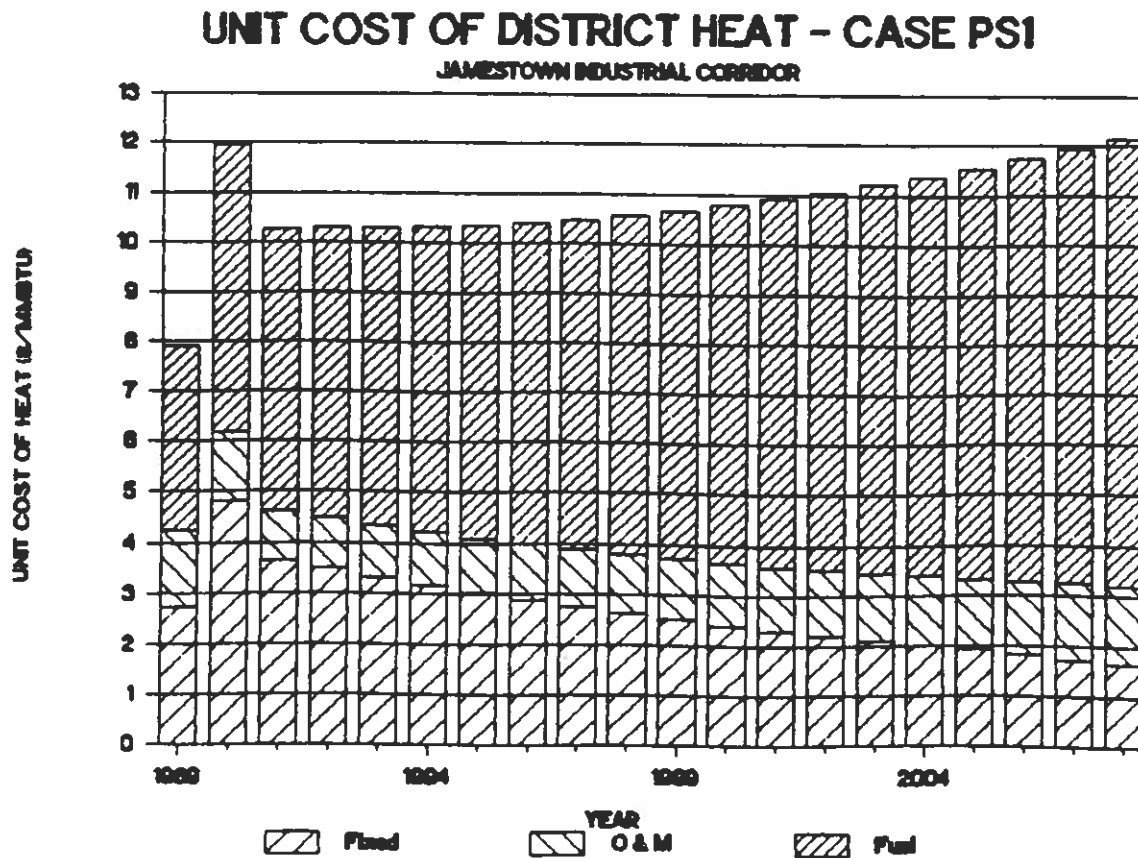


FIGURE 7-4 COGENERATION OPTION - PRIVATE OWNERSHIP



- o From the potential customer point of view, the boiler option under municipal ownership is best, offering the lowest rates.

Table 7-7 summarizes the results for all the cases initially evaluated, indicating the cost of heat for the first 3 years and the levelized rate over 20 years which can be used to readily compare the various cases over the analysis period. The levelized rate represents a unit cost of heat which can be charged each of the first 20 years, calculated at an interest rate of 7%. The levelized rate comparison is shown graphically in Figure 7-5 and can be summarized as follows:

- o The municipal ownership option remains the most favorable case.
- o Implementation of only the first two phases under both ownership and heat source options results in somewhat higher rates than full system implementation indicating, as expected, that the addition of Blackstone's load enhances overall system economics.
- o Increasing the price for cogenerated power to \$35/MWhr begins to enhance the competitiveness of the cogeneration option with boilers. A further sensitivity to cogenerated power cost is illustrated by Figures 7-6 and 7-7. Under municipal ownership, a rate of approximately \$42/MWhr would be competitive with the boiler option.
- o The base case boiler option for private ownership is more favorable than municipal ownership cases MS6 (Boilers, Phase 1 and 2 only), MS1 (base case cogeneration), MS2 (cogeneration phases 1 and 2 only), and MS5 (cogeneration phases 1 and 2 only with power sold at \$35/Kwhr).
- o The private ownership base case cogeneration option and phase 1 and 2 only cogeneration options are the least economic.

It should be noted, however, that levelized rate comparisons do not take into account rate fluctuations in early years which affect customer paybacks.

TABLE 7-7

UNIT COST OF DISTRICT HEAT - CASE SUMMARY

<u>Ownership</u>	<u>Case</u>	<u>Description</u>	<u>Cost of Heat (\$/MMBTU)</u>			<u>20 Years Levelized Rate</u>
			<u>1989</u>	<u>1990</u>	<u>1991</u>	
Municipal	MS1	Base Case, Cogen. Option	\$6.97	\$9.61	\$8.25	\$8.963
Municipal	MS2	Cogen. Option, Phase 1 & 2 Only	\$6.97	\$9.61	\$9.69	\$10.258
Municipal	MS3	Base Case, Boiler Option	\$6.97	\$7.51	\$6.19	\$7.481
Municipal	MS4	Cogen Option, \$35/MWH	\$6.97	\$8.76	\$7.31	\$7.782
Municipal	MS5	Cogen. Option, \$35/MWH, Phase 1 & 2 Only	\$6.97	\$8.76	\$8.81	\$9.184
Municipal	MS6	Boilers Option, Phase 1 & 2 Only	\$6.97	\$7.51	\$7.67	\$8.828
Municipal	MS7	Cogen. Option, 15% Lower Fuel	\$6.44	\$8.44	\$7.01	\$7.379
Private	PS1	Base Case, Cogen. Option	\$7.92	\$11.97	\$10.28	\$10.684
Private	PS2	Cogen. Option, Phase 1 & 2 Only	\$7.92	\$11.97	\$11.99	\$12.118
Private	PS3	Base Case, Boiler Option	\$7.92	\$8.61	\$6.97	\$8.195
Private	PS4	Cogen Option, \$35/MWH	\$7.93	\$11.11	\$9.34	\$9.502
Private	PS5	Cogen. Option, \$35/MWH, Phase 1 & 2 Only	\$7.93	\$11.11	\$11.10	\$11.043
Private	PS6	Boilers Option, Phase 1 & 2 Only	\$7.92	\$8.61	\$8.73	\$9.721
Private	PS7	Cogen. Option, 15% Lower Fuel	\$7.37	\$10.73	\$8.97	\$9.004

FIGURE 7-5

COST OF HEAT SUMMARY

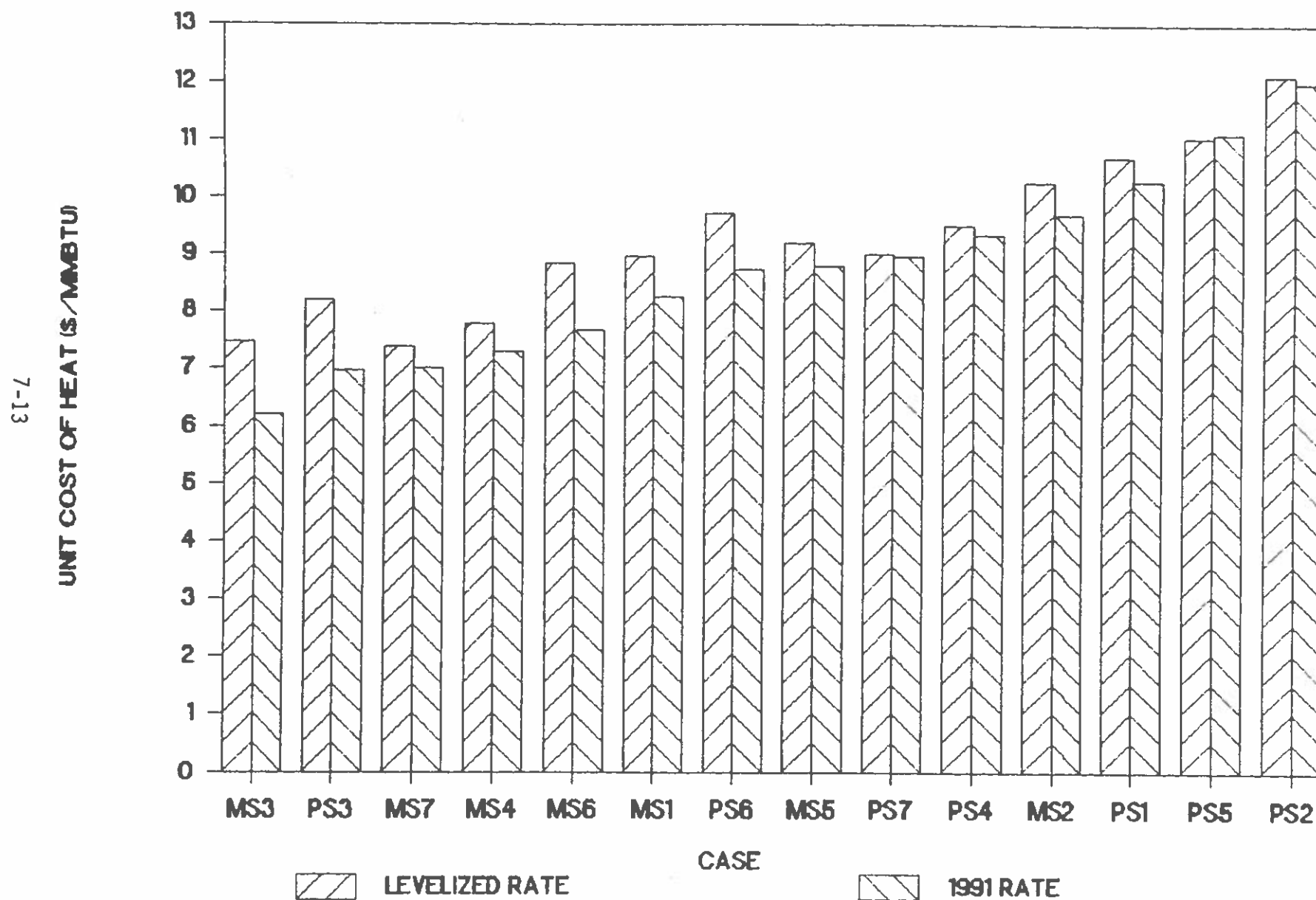


FIGURE 7-6

COST OF HEAT VS PRICE OF POWER SOLD

MUNICIPAL OWNERSHIP

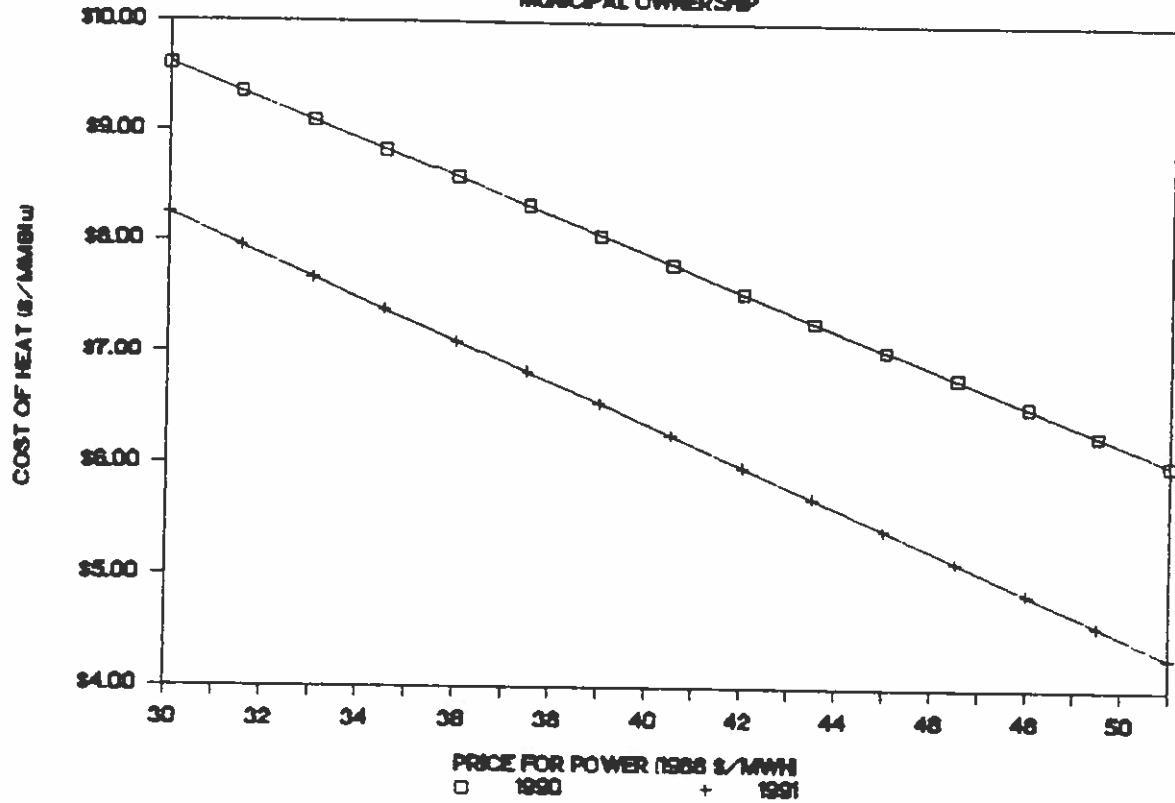
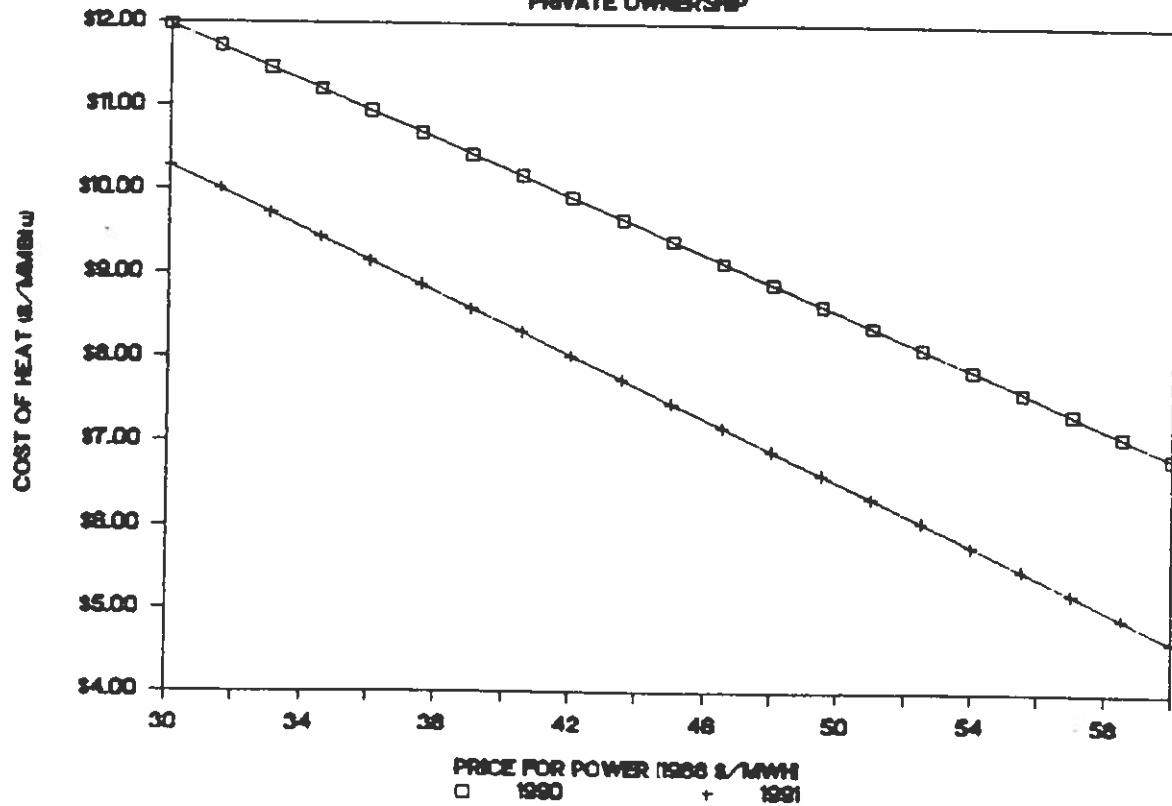


FIGURE 7-7

COST OF HEAT VS PRICE OF POWER SOLD

PRIVATE OWNERSHIP



Accordingly, the customer economic analyses presented in Section 8 provide additional insight for comparing the cases evaluated.

Appendix D includes the individual economic analyses for the various case studies as well as graphical results for the unit cost of heat in each case.

SECTION 8

CUSTOMER RETROFIT, ECONOMIC ANALYSIS, AND CONCLUSIONS

PRESENT OPERATING COSTS

In addition to fuel costs, other operating costs for the nine potential customers were estimated for the purpose of the economic analysis performed comparing district heating with present operations. These costs include water treatment chemicals, boiler operation and maintenance labor, insurance, and capitalization costs for future and near term boiler replacement.

With regard to boiler replacement, the estimate was made on the assumption of 30 years economic boiler service life and boiler(s) replacement at that time. Thirty years is the median average service life for large boilers as reported by ASHRAE under average maintenance conditions. Based upon the respective ages of the potential customers present boilers, replacement costs were based on establishment of sinking funds contributed annually to accumulate funds for future replacement and/or amortization of near term replacement as applicable. These estimates were based upon a 4% annual escalation of present boiler costs, 4.5% sinking fund, and 15-year amortization at 9.5%.

Water treatment chemical costs, and other boiler maintenance costs were estimated based upon the following:

- o TSP - \$315.00 Per Million Pound Steam;
- o Neutralizer - \$10.00 Per Million Pound Steam;
- o Oxygen Scavenger - \$4.00 Per Million Pound Steam;
- o Operation & Maintenance Labor - \$25.00/manhour; and

- o Annual Boiler Efficiency Test & Burner Adjustment - \$1,000/boiler.

Table 8-1 summarizes the above non-fuel owning and operating costs for each customer estimated in 1988 dollars and the cost per million Btus in 1989 (first year of economic analysis). Appendix E provides additional details.

RETROFIT TO DISTRICT HEATING

Two means of interconnecting the potential customers were considered initially, direct steam connection to the customer steam distribution system and indirect connection installing steam generators to isolate the district system from the customer. In cases such as Blackstone, in which existing boilers are hot water, a steam to hot water converter would be required.

Direct System

In the direct system, existing steam boilers would be isolated from the steam distribution and condensate return system by means of new or refurbished isolation valves as required. As the district system will be providing steam in the range of 75 to 90 psig, the service connection will include a pressure reducing valve station. This valve will protect those customers whose existing systems operate or are designed for lower operating pressures and allow for future upgrade of the district system pressure if required by later expansion. As depicted in Figure 8-1, other features of the direct system service connection include a pressure relief valve downstream of the pressure reducing valve, pressure and temperature gages, isolation valves for maintenance and service needs, and two metering stations. Customers existing pumping stations would be utilized for condensate return to the district system.

As the direct system option results in customer steam and condensate losses being absorbed by the district system, both steam supply and condensate return meters are considered necessary. In some cases, customers utilize live steam in

TABLE 8-1
CUSTOMER ESTIMATED ANNUAL NON-FUEL OWNING AND OPERATING COSTS
(1988 Dollars)

	<u>Chemicals</u>	<u>Other Boiler Costs</u>	<u>Boiler Replacement*</u>	<u>\$/mmbtu Total ** Useful Load (1989)</u>
MRC Bearing	\$6,170	\$9,200	\$ 3,200	\$0.84
Weber-Knapp	5,950	10,950	13,060	0.89
Crawford Furniture	1,100	6,900	820	1.43
Dahlstrom	14,200	31,400	15,200	1.36
Essex Specialty Production	750	4,950	5,810	1.53
Hopes Windows	2,900	15,800	4,100	0.74
Jamestown Metal Mfg.	3,700	15,500	9,680	2.54
Jamestown Metal Production	2,350	9,650	3,750	2.30
Blackstone	17,800	14,700	2,700	0.24

* Average over 20 year analysis period

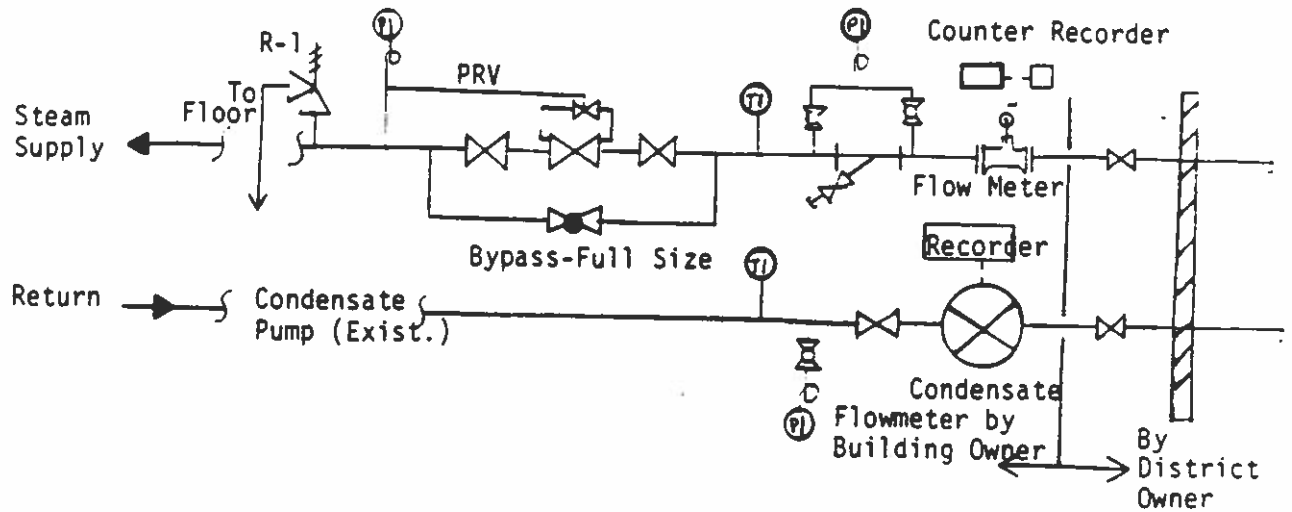
** Includes Direct Fired Loads as Applicable

TABLE 8-2
ESTIMATED CUSTOMER RETROFIT COSTS
(1988 Dollars)

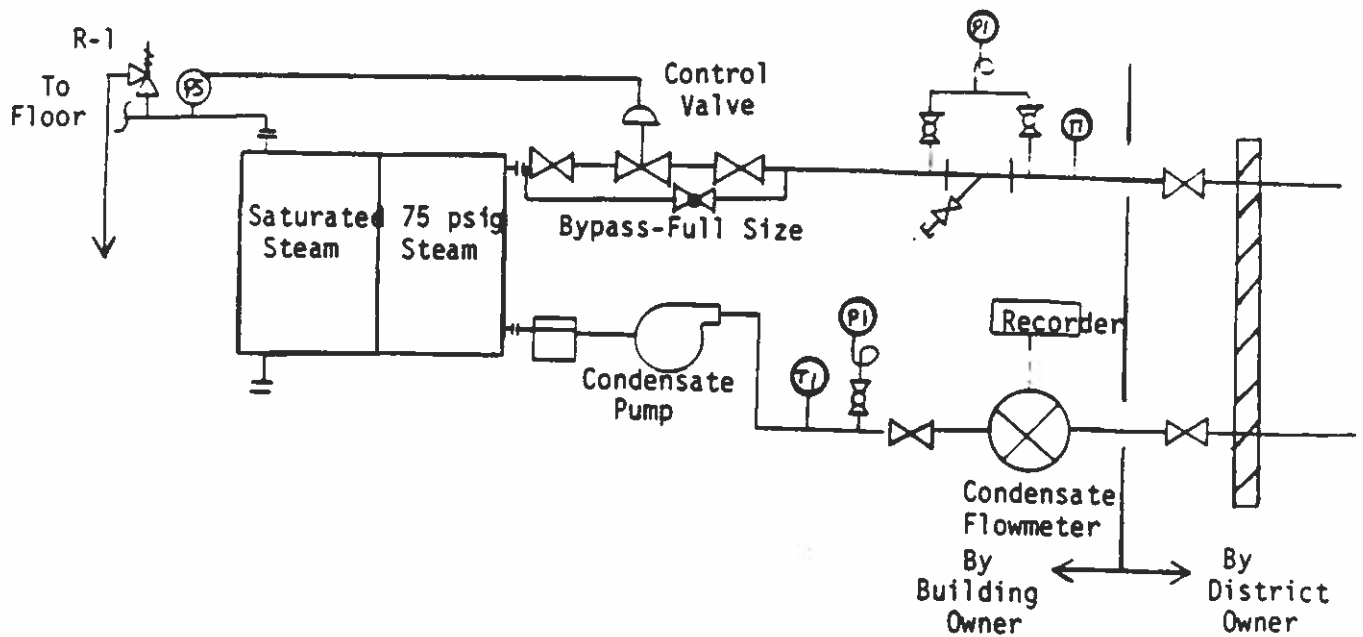
	<u>Direct Connection</u>	<u>Indirect Connection</u>
MRC Bearing	\$ 9,200	\$167,600
Weber-Knapp	28,000	91,200
Crawford Furniture	60,300	97,500
Dahlstrom	16,000	217,800
Essex Specialty Production	32,300	63,900
Hopes Windows	31,000	203,800
Jamestown Metal Mfg.	10,300	67,900
Jamestown Metal Prod.	12,300	39,900
Blackstone	Not Appl.	42,000

Figure 8-1

TYPICAL BUILDING HOOKUP



DIRECT FED SYSTEM



INDIRECT FED SYSTEM

process applications which is not returned. Further, many systems are experiencing significant losses in traps and leaking equipment with associated makeup water requirements. The two meter arrangement will enable customers to be billed accordingly for in-house losses which are passed along to the system, insuring equitable service rates among all customers.

Indirect System

The indirect system (also depicted in Figure 8-1) isolates the customer from the system by means of steam generators, or two-pass shell and tube type heat exchangers (as selected for evaluation). Customers' existing condensate pumps are utilized to pass condensate through the shell side to generate their steam needs. A new condensate pump will be required on the district system side of the steam generator to return condensate to the system.

Control of the steam generator would be by means of a self contained pressure control valve preset to the customers desired main header pressure need. Metering is simply accomplished by a condensate meter since no system losses are incurred at the customer. The condensate meter was selected in view of lower cost and greater reliability over varying load conditions. A further discussion of metering is provided in Appendix C.

The system arrangement would be similar for customers such as Blackstone where existing boiler systems are hot water (i.e. steam to hot water heat exchanger).

CUSTOMER RETROFIT COSTS

Table 8-2 summarizes the retrofit costs for the nine potential customers for both the direct and indirect service connection options. These costs also include the replacement of direct-fired space heating and makeup air heating systems with steam systems as applicable. However, the retrofit cost for Blackstone is based upon service connections only (3 required), as they have

indicated plans to replace their deteriorating gas units with hydronic systems. The cost of this conversion would necessitate new boiler capacity in the absence of district heating, and therefore heat exchanger and conversion costs should not penalize district system economic evaluations.

CUSTOMER ECONOMIC ANALYSIS

The benefit or economic viability of district heating for the Industrial Corridor relies upon achieving attractive customer paybacks to render the system marketable under the present and near term future economic climate. To perform this evaluation, the customer economics were based upon determining customer payback periods or the years needed for cumulative energy cost savings to offset capital expenses incurred by the retrofit. For this analysis, the payback years were calculated as the year in which cumulative savings exceed unpaid principal assuming 15-year 100% retrofit cost financing at 9.5% interest. This analysis was initially conducted for each of the seven municipal and private ownership cases established in Section 7.

Exhibit 8-1 presents a typical analysis for the most attractive district heat rate structure, the base case boiler option under municipal ownership (MS3). As shown in Exhibit 8-1, a comparison is made between annual owning and operating costs for the customer's present system and the annual district system costs over a 20 year period. Customer fuel costs are consistent with recent 1988 gas prices for the customers' respective service classifications and include sales tax. Escalation of both fuel and non-fuel costs (except boiler replacement) were taken as 4%, the same as for the system economics. Existing system rates reflect the estimated boiler/direct-fired heating equipment inefficiencies (i.e. useful load rates) for comparison with district heat costs. Tax effects of savings were also considered in determining the customer paybacks. Retrofit costs were based on direct system connections for best case results.

Table 8-3 summarizes the payback analysis performed for each customer. Indicated are the respective payback years as well as the year of continued pos-

EXHIBIT 8-1

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MS3

DAHLSTROM PAYS BACK IN 3 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$16,000 -->	ESCALATION (1/YR):	4.00% -->	HOOKUP YEAR:	\$16,640
FINANCING CONDITIONS---	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$2,126 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	69,622 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	45,254
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.42 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (1/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	5.27 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.27
CURRENT O&M EXPENSE----	ANNUAL (\$):	45,600 -->	RATE (\$/MMBTU):	1.01 -->	ESCALATION (1/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$13,840 1989-2004 \$20,629 2005-2008

8-7

YEAR	CURRENT SYSTEM			DISTRICT HEATING CONVERSION			COMPARISON			PAYBACK			YEAR		
	FUEL	O&O	ENERGY	ENERGY	ENERGY	ENERGY	AMORTIZATION	TOTAL	ENERGY	TAX	TOTAL	CUMULATIVE		UNPAID	
	RATE	RATE	RATE	COSTS	RATE	COSTS	PRINC.	INTEREST	COSTS	SAVINGS	EFFECTS	SAVINGS		SAVINGS	PRINCIPAL
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1989	5.48	1.36	6.84	309,349	\$6.97	315,204	543	1,581	317,330	(5,855)	3,973	(4,008)	(4,008)	16,093	1989 .
1990	5.70	1.40	7.10	321,115	\$7.51	339,775	597	1,529	341,900	(18,660)	9,540	(11,246)	(15,254)	15,499	1990 .
1991	5.93	1.44	7.37	333,333	\$6.19	279,990	653	1,472	282,115	53,343	(19,351)	31,867	16,613	14,845	1991 ***
1992	6.16	1.49	7.65	346,004	\$6.34	286,976	715	1,410	289,102	59,028	(21,649)	35,253	51,866	14,130	1992 .
1993	6.41	1.54	7.95	359,581	\$6.50	294,301	783	1,342	296,427	65,279	(24,177)	38,977	90,843	13,347	1993 .
1994	6.66	1.58	8.24	372,704	\$6.67	301,978	858	1,268	304,104	70,726	(27,783)	40,817	131,660	12,489	1994 .
1995	6.93	1.64	8.57	387,638	\$6.85	310,022	939	1,186	312,147	77,616	(30,572)	44,919	176,579	11,550	1995 .
1996	7.21	1.69	8.90	402,572	\$7.04	318,446	1,028	1,097	320,572	84,126	(33,211)	48,789	225,368	10,521	1996 .
1997	7.50	1.74	9.24	417,958	\$7.23	327,266	1,126	1,000	329,392	90,692	(35,877)	52,689	278,057	9,395	1997 .
1998	7.80	1.80	9.60	434,250	\$7.44	336,499	1,233	893	338,624	97,751	(38,743)	56,882	334,939	8,162	1998 .
1999	8.11	1.86	9.97	450,994	\$7.65	346,159	1,350	775	348,285	104,834	(41,624)	61,085	396,024	6,812	1999 .
2000	8.43	1.92	10.35	468,190	\$7.87	356,266	1,479	647	358,391	111,925	(44,511)	65,288	461,312	5,333	2000 .
2001	8.77	1.99	10.76	486,744	\$8.11	366,835	1,619	507	368,961	119,909	(47,761)	70,022	531,334	3,714	2001 .
2002	9.12	2.05	11.17	505,298	\$8.35	377,887	1,773	353	380,012	127,412	(50,824)	74,462	605,797	1,941	2002 .
2003	9.49	2.12	11.61	525,210	\$8.61	389,440	1,941	184	391,565	135,771	(54,234)	79,410	685,207	0	2003 .
2004	9.87	2.20	12.07	546,027	\$8.87	401,514	0	0	401,514	144,513	(57,805)	86,708	771,915	0	2004 .
2005	10.26	2.42	12.68	573,633	\$9.15	414,130	0	0	414,130	159,503	(63,801)	95,702	867,617	0	2005 .
2006	10.67	2.50	13.17	595,807	\$9.44	427,310	0	0	427,310	168,498	(67,399)	101,099	968,716	0	2006 .
2007	11.10	2.58	13.68	618,887	\$9.75	441,076	0	0	441,076	177,811	(71,124)	106,687	1,075,402	0	2007 .
2008	11.54	2.67	14.21	642,872	\$10.06	455,452	0	0	455,452	187,420	(74,968)	112,452	1,187,854	0	2008 .

*** PAYBACK OCCURS IN YEAR 1991 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

itive annual cash flow. Overall, the results reflect the same trend as summarized in Section 7, with respect to district heating rates. The best case, from the point of view of all customers, is the boiler option under municipal ownership (Case MS3). The analysis for Case MS3 showed paybacks in the first to fifth year for MRC Bearing, Dahlstrom Manufacturing, Jamestown Metal Manufacturing and Jamestown Metal Products.

As could be expected, the paybacks for Essex Specialty Products, Weber-Knapp, Crawford Furniture, Hopes Windows and Blackstone, are not attractive due to the high proportion of their existing loads being in efficient direct gas-fired units incurring high retrofit costs. In view of these results, a further option or case was considered for study under the municipal ownership, boiler option. In this option, Case MS8:

- o Eliminate the direct-fired loads of these five customers; and
- o Revise the implementation plan such that Phase 2 also includes adding the load of Blackstone boilers only, accordingly eliminating Phase 3.

The result is a system peak steam load reduction to 33,900 lbs/hr for Phase I and 58,700 lbs/hr for Phase 2. Thus, in Phase 1 only one 1,000-HP boiler is required with two additional 1,000-HP boilers in Phase 2. In this case the system capital costs were estimated at \$1,432,800 and \$1,431,000 respectively for Phases 1 and 2. The system economic analysis for Case MS8 is included in Appendix D as well. The resulting district heating rates are marginally higher than Case MS3, but the effect on the five customers is significant as shown graphically in Figure 8-2. The payback of Hopes Windows has been reduced from over 20 years to 3 years, Crawford Furniture from 11 to 2 years, Weber-Knapp from 10 to 3 years, Blackstone from 20 years to 6 and Essex Specialty Products from 6 to 2 years.

This dramatic reduction in paybacks is attributable directly to the lower efficiency of the boiler only loads, the resulting higher boiler owning and operating expenses on a mmbtu basis, and minimal retrofit costs.

TABLE 8-3

CUSTOMER PAYBACK AND FIRST YEAR POSITIVE ANNUAL CASHFLOW SUMMARY

CASE	MRC BEARING		WEBER KNAPP		CRAWFORD FURN.		DAHLSTROM		ESSEX SPEC. PRODUCTS		HOPES WINDOWS		JAMESTOWN METAL MFG.		JAMESTOWN METAL PROD.		BLACKSTONE MANUFACTURING	
	POS.		POS.		POS.		POS.		POS.		POS.		POS.		POS.		POS.	
	PAY BACK YEAR	CASH FLOW YEAR	PAY BACK YEAR	CASH FLOW YEAR	PAY BACK YEAR	CASH FLOW YEAR	PAY BACK YEAR	CASH FLOW YEAR	PAY BACK YEAR	CASH FLOW YEAR	PAY BACK YEAR	CASH FLOW YEAR	PAY BACK YEAR	CASH FLOW YEAR	PAY BACK YEAR	CASH FLOW YEAR	PAY BACK YEAR	CASH FLOW YEAR
MS1	18	1999	>20	2003	18	2001	14	1996	15	1997	>20	2007	1	1991	4	1991	>20	2008
MS2	>20	2005	None	None	>20	2004	>20	2003	>20	2004	None	None	1	1992	9	1993	NA	NA
MS3	4	1991	10	1991	11	1991	3	1991	6	1991	>20	2000	1	1989	2	1989	20	2001
MS4	9	1994	15	1997	14	1991	7	1991	10	1991	>20	2000	1	1989	3	1989	19	2001
MS5	20	2000	>20	2004	20	2002	16	1998	17	1999	>20	2007	1	1989	4	1989	>20	2008
MS6	18	2000	>20	2007	19	2004	11	1995	14	1991	None	None	1	1989	2	1989	NA	NA
MS7	7	1992	13	1996	12	1991	5	1991	8	1991	18	1998	1	1989	3	1989	16	1999
PS1	>20	2005	>20	2009	>20	2004	>20	2002	>20	2004	None	None	11	1994	12	1995	None	None
PS2	None	None	None	None	>20	2006	>20	2008	>20	2006	None	None	19	2000	>20	2000	NA	NA
PS3	9	1993	20	2000	15	1991	7	1991	10	1991	>20	2005	2	1989	3	1989	>20	2008
PS4	20	2000	>20	2004	>20	2002	18	1998	18	1999	>20	2006	6	1991	8	1992	>20	2007
PS5	>20	2006	>20	2009	>20	2004	>20	2004	>20	2004	None	None	13	1996	15	1997	None	None
PS6	>20	2005	None	None	>20	2004	>20	2001	>20	2004	None	None	2	1989	5	1989	NA	NA
PS7	17	1998	>20	2002	18	2000	15	1996	16	1997	>20	2004	4	1991	6	1991	>20	2005

Case Descriptions

Municipal Private

Base Case, Cogeneration Option

MS1

PS1

Cogeneration Option, Phase 1 & 2 Only

MS2

PS2

Base Case, Boilers Option

MS3

PS3

Cogeneration Option, \$35/MW hr Buy Back Rate for Power

MS4

PS4

Cogeneration Option, \$35/MW hr Buy Back Rate, Phase 1 & 2 Only

MS5

PS5

Boiler Option, Phase 1 & 2 Only

MS6

PS6

Cogeneration Option, 15% Lower Fuel Cost

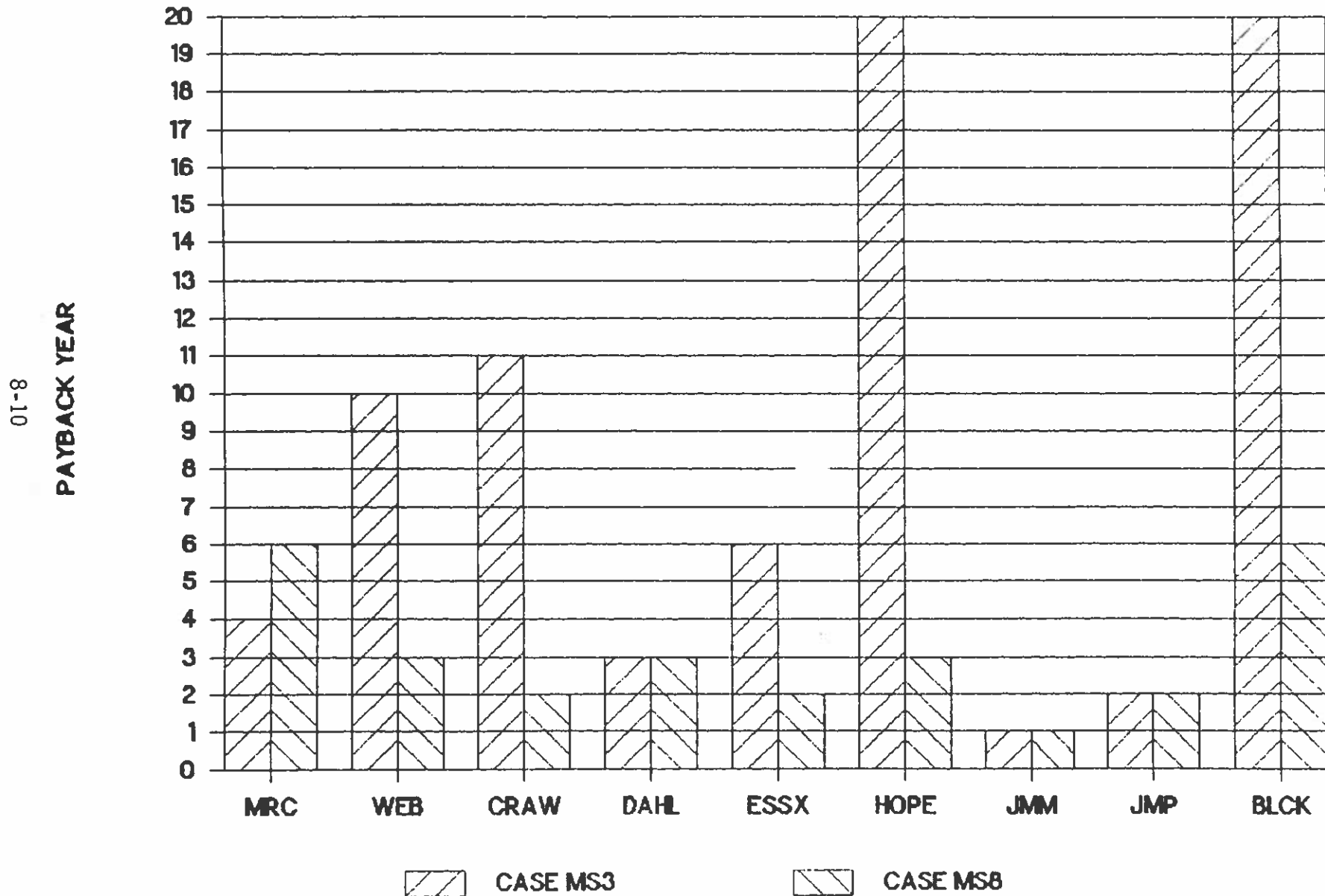
MS7

PS7

FIGURE 8-2

CUSTOMER PAYBACK YEAR COMPARISION

CASE MS3 vs CASE MS8



As to the impact of Case MS8 on the other customers, with the exception of MRC Bearing, whose payback increases from 4 to 6 years, all other paybacks remain at 3 years and less. The individual economic payback analysis for each customer for Case MS8 as well as Case MS3 are provided in Appendix F.

CONCLUSIONS

From the customer point of view, the results of this study have shown that under near term economic conditions (fuel cost, cogenerated power buy back rates, financing and tax considerations) a steam district heating system is technically and economically feasible in the Industrial Corridor under specific conditions. Municipal ownership with a conventional boiler plant heat source provides the most attractive district heating rates, while private ownership can also be considered feasible.

Unless cogenerated power is priced higher, or if special low gas rates can be provided for the cogeneration facility, cogeneration is not a viable option.

Implementation of a more modern hot water district heating system in lieu of steam would, for the most part, depend upon the willingness of potential customers to expend the additional significant retrofit costs required, without penalizing the system for extended paybacks. Extended paybacks could, however, be alleviated by subsidized loans or grant assistance to customers for their retrofit costs, or by hot water conversions necessitated by presently deteriorating building steam systems.

APPENDIX A
OTHER COMPANY DESCRIPTIONS

VAN STEE FURNITURE

Van Stee is a family owned furniture business which specializes in bedroom furniture. Business has slowed in the last four years, prompting them to open their plant doors to the public and sell direct. They buy raw green wood and dry it in their own kiln. In addition to the high steam usage of the kiln, there are steam fan type humidifiers. In 1974, the building was insulated and gas consumption was reduced such that they no longer consume enough to qualify for a reduced commercial rate. In addition to a 200-HP boiler to serve the main building, there is a gas-fired hot air furnace for the office area and there are two gas-fired rooftop make-up air units. Make-up air is needed to replace paint spray booth exhaust.

UNION NATIONAL FURNITURE

Located next door to Van Stee Furniture, Union National manufacturers exotic, hand-painted furniture to custom order, such as dining room tables, china closets, and bedroom dressers. Their operation is similar to Van Stee in that they buy raw wood and take it through the entire process with two steam heated drying kilns and steam humidification. There is also a steam make-up air unit to replace the exhausted air from the paint spray booths.

The building has two boilers, a 200-HP and a 400-HP boiler. The smaller is 65 years old and burns scrap wood which will vary with the work load. The larger boiler fires Number 2 oil and is used for peaking on coldest days and when not enough wood is available for the 200-HP unit.

EMCO CHEMICAL

Emco Finishing Company, because of the chemicals involved, cannot have any open flames in the work area, similar to Essex Chemical. Their hot water boiler is separated from the finishing area by a cinderblock wall. The unit is now three

years old. There is electric baseboard heat in the office. The plant is located on an island next to Dawson Metal.

DAWSON METAL

Dawson Metal has a unique heating system. In addition to a steam boiler which runs in the morning to feed the unit heaters, there is a gas-fired rooftop unit which is centrally located in the warehouse portion of the building. In order to achieve maximum comfort from the hot air supplied, two transparent round flexible plastic air distribution tubes have escape holes cut into them. This distributes an even amount of air throughout the building and can be modified according to the needs along the way by closing off various holes (with tape). The force of the hot air through the plastic tube keeps it inflated. Rips in the plastic can be temporarily patched with duct tape while the entire air tube is inexpensive enough to be replaced annually.

This company represents a typical Jamestown metal products manufacturer, in that there is a heated chemical bath to clean the metal, a bonderizer and batch bath. They also use a bag system to recover heat from the exhaust air from several machines.

MASON CARVINGS

Mason Carvings does specialized carving for the wood furniture industry in a one story building heated by unit heaters. They are in the part of the town near MRC, Chautauqua Hardware and Jamestown Electroplating. All of these companies are potential customers if the present hot water district heating system in Jamestown were to be expanded. Mason Carvings has two 75-HP boilers, one of which fires natural gas and the other which burns wood. The wood burning boiler used scrap wood which is kiln dried and burns clean. The boiler cracked in 1985 and cannot be repaired. Their fuel bill is about \$2,000 in a cold month and they would like to purchase a used boiler which could be converted to burn wood.

If district heating were made available, they would hook-up if the retrofit cost did not exceed \$7,000 (expected cost of used boiler). They presently sell scrap wood for \$2 a box. At night the building is set back to 55°F.

AREA B

JAMESTOWN MATTRESS

Jamestown Mattress is a small business started in 1979, which has recently opened their doors to the public. The downstairs is rented since their market isn't big enough for them to use the entire building. The building is 80,000 sq. ft. and uses natural gas-fired unit heaters, though the original steam distribution system is in-place (condition unknown).

H & H SPECIALTY PRODUCTS

H & H Specialty Products is a small establishment which does piece work. They have been expanding slightly to improve crowded working conditions. It is a very competitive business and depends on making specialized parts for oil tankers. The building is approximately 11,750 sq. ft. and is heated by some electric baseboard as well as gas-fired unit heaters.

JOHNSON MACHINE

Johnson Machine is a small business which depends on custom orders. Work is solicited outside the Jamestown area and includes specialized parts for IBM machines. Machines necessary to do the jobs are very expensive, some costing \$100,000 or more. Non-union labor and low electric cost in Jamestown has enabled the company to survive. District heating is not attractive due to a small building (11,000 sq.ft) and their use of heat pumps.

JAMESTOWN PLASTICS

Jamestown Plastics is next door to Johnson Machine. Some of the 11,000 sq. ft. is used as storage for finished goods from Johnson Machine. The area is maintained at a reasonable temperature by direct-fired natural gas unit heaters.

ROLLFORM

Rollform makes rolled metal products to customer's order. They make a strong metal pallet as their own product but it has a limited use due to its high price compared to a wooden unit. Their heating system consists of ceiling hung gas-fired unit heaters. If they expand within the next couple of years, a hot water heating system would be desirable.

AREA C

BUSH INDUSTRIES

Bush Industries makes wood furniture using high quality particle board with a glued-on veneer finish. They are located in the new J. Mason Industrial Park. Their space heating is 94% gas-fired hot air units. In the process of making computer furniture and entertainment centers they produce a large amount of scrap wood and sawdust which they pay approximately \$1500 a week to have removed. The process also involves a large air compressor load.

JAMESTOWN COMMUNITY COLLEGE

Jamestown Community College is located on Falconer Street in Jamestown, but on the outskirts of the town near Falconer. The school has a large campus consisting of several buildings. The heating system is mostly hot water. In addition to heating there is a pool and a large domestic hot water load due to showers. The college is located next to Lutheran Social Services. Any service connection

installed should serve both complexes. Neither system is old enough to be planning on boiler replacement in the near future.

LUTHERAN SOCIAL SERVICES

Lutheran Social Services is a complex of buildings which provide youth and aged adult care. There are seven buildings, each with their own space heating boiler and domestic hot water heater. All these buildings are heated by hot water, although there is no central tie-in location. This complex is close to Jamestown Community College which is also a hot water system.

APPENDIX B

CUSTOMER LOAD ANALYSES

MRC BEARING 1985 GAS CONSUMPTION BREAKDOWN
(All Usages in Hundred Cubic Feet)

PERIOD	WINDSOR (Boiler)	PLANT METER 1 (Bir & Ovens)	PLANT METER 2 (Bir & Ovens)	CHANDLER Direct Fired (DF)	CCF TOTAL USAGE
10/22-11/21/85	3586	27140	29590	986	61302
9/24-10/22/85	1893	22480	24520	0	48893
8/22-9/24/85	193	22300	24180	11	46684
7/25-8/22/85	0	15870	17110	5	32985
6/26-7/25/85	0	9900	10750	4	20654
5/28-6/26/85	545	17920	19450	374	38269
4/26-5/28/85	915	22810	24960	1232	48917
3/27-4/26/85	3351	27010	29660	1978	61999
2/26-3/27/85	5469	33150	36480	2919	78018
1/25-2/26/85	7066	39740	43800	3016	93622
12/26/84-1/25/85	6911	35680	39290	3400	85281
11/23/84-12/26/84	5287	32880	36050	3321	77538
TOTAL USAGE:	35,216	306,880	335,840	17,246	695,182

USEFUL LOAD ANALYSIS SUMMARY

Peak (mmbtuh)	Chandler Dir Fired (85% Eff)	Plant Meters 1 & 2 Boiler (65% Eff)	Windsor Boiler (65% Eff)	Total MRC Facilities	MRC Facilities To Dist. Htg.
Space Heating:	0.92	8.52	1.26	10.7	8.52
Internal:	0.00	0.00	0.00	0	0
Total:	0.92	8.52	1.26	10.7	8.52
Annual Loads (mmbtuh)					
Space Heating:	1,501	18,749	2,346	22,596	18,749
Internal:	0	0	0	0	0
Total:	1,501	18,749	2,346	22,596	18,749

Note: (1) Windsor Street Building to be closed.

(2) Chandler Street Building (Warehouse) not to be interconnect

LOAD ANALYSIS
for
MRC BEARING (MAIN PLANT)

YEAR: 1985/1984
HEATING SEASON HDD: 6130
DAYS IN SEASON: 303
AVG. OUTSIDE TEMP (DEG. F): 44.8
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 120
COMFORT SETTING (DEG. F): 68
INTERNAL TEMP GAIN (DEG. F): 5
VENTILATION (CFM): 0

SET-BACK HOURS PER WEEK: 48
COMFORT SETTING (DEG. F): 68
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0

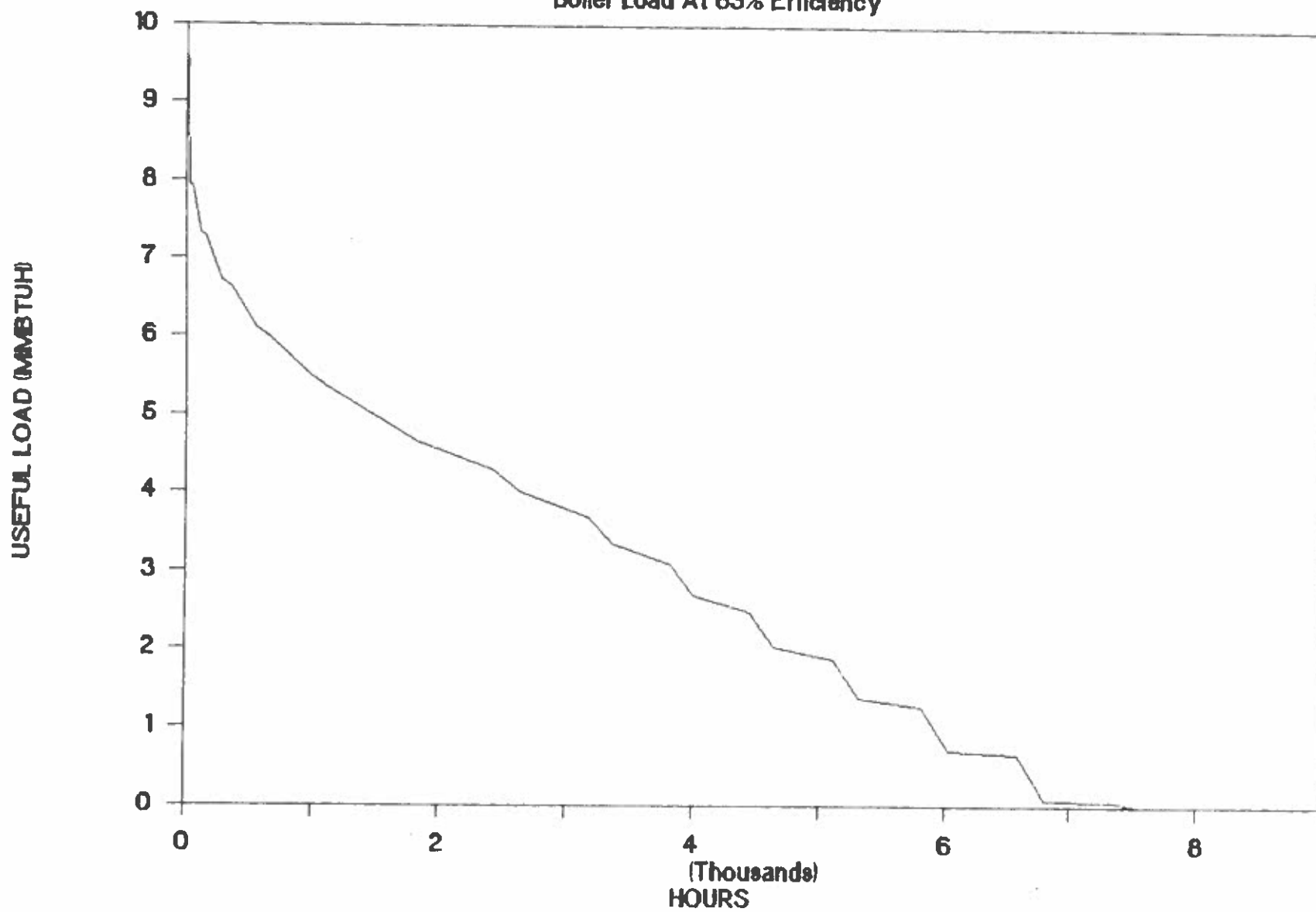
ESTIMATED BOILER EFF: 65%
% INTERNAL USE TO DH: 0%

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,354	74,970	7,684.4	31	247.9
FEB.	1,120	63,270	8,535.2	29	294.3
MAR.	902	69,630	7,137.1	31	230.2
APR.	476	56,670	5,808.7	30	193.6
MAY.	196	47,770	4,896.4	31	157.9
*JUNE	95	37,370	3,830.4	30	127.7
*JULY	8	20,650	2,116.6	31	68.3
*AUG.	12	32,980	3,380.5	31	109.0
SEP.	114	46,480	4,764.2	30	158.8
OCT.	378	47,000	4,817.5	31	155.4
NOV.	685	56,730	5,814.8	30	193.8
1984 DEC.	905	68,930	7,065.3	31	227.9
TOTAL	6,245	642,450	65,851.1	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.00
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	0.00
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	7.87	8.52	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	12,419.29	6,330.15	18,749.43
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	12,419.29	6,330.15	18,749.43
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	7.87	8.52	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	7.87	8.52	N/A

MRC BEARING MAIN PLANT LOAD PROFILE

Boller Load At 65% Efficiency



WEBBER KNAPP OVERALL USEFUL LOAD ANALYSIS SUMMARY

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MONTH	GAL #6 OIL	MMBTU #6 OIL	GAL #2 OIL	MMBTU #2 OIL	OIL TOTAL MMBTU	OIL	ACTUAL	ACTUAL	TOTAL EQUIV CCF	PERCENT ACTUAL GAS	ACTUAL		ESTIM. BOILER PORTION	ESTIM. DIR FIRED PORTION	TOTAL		C.C.F DIR FIRED PLANT	C.C.F DIR FIRED OFFICE
						TOTAL EQUIV CCF GAS	CCF NATURAL GAS	MMBTU NATURAL GAS			GAS FIRED CCF PER HDD	HDD			ESTIMATED EQUIV CCF BOILER	CCF DIR FIRED PLANT		
JAN 86	20572	3086	0	0	3086	30105	24287	2489	54392	4.6%	1,215	19.9	0	24287	30105	14479	9808	
FEB 86	17099	2565	0	0	2565	25023	23190	2377	48213	4.9%	1,128	20.5	0	23190	25023	13715	9475	
MAR 86	13202	1980	10260	1421	3401	33184	19914	2041	53098	3.8%	885	22.4	0	19914	33184	15180	4734	
APR 86	0	0	14071	1949	1949	19013	10758	1103	29771	3.7%	519	20.6	0	10758	19013	6108	4650	
MAY 86	0	0	2127	295	295	2874	14289	1465	17163	8.5%	197	72.2	8937	5352	11812	1460	3892	
JUN 86	0	0	9480	1313	1313	12810	5929	608	18739	3.2%	80	73.2	3326	2603	16136	440	2163	
JUL 86	4162	624	5584	773	1398	13636	723	74	14359	0.5%	4	162.3	0	723	13636	277	446	
AUG 86	9567	1435	0	0	1435	14000	700	72	14700	0.5%	42	14.9	0	700	14000	98	602	
SEP 86	7021	1053	0	0	1053	10275	1651	169	11926	1.4%	137	11.5	0	1651	10275	765	886	
OCT 86	19951	2993	0	0	2993	29197	4144	425	33341	1.3%	430	9.5	0	4144	29197	3485	659	
NOV 86	11563	1734	0	0	1734	16921	19128	1961	36049	5.4%	811	23.5	0	19128	16921	10688	8440	
DEC 86	22338	3351	0	0	3351	32690	23621	2421	56311	4.3%	1,169	20.1	0	23621	32690	15121	8500	
TOTALS	125,475	18,821.3	41,522	5,751	24,572	239,727	148,334	15,204	388,061	3.9%			12,264	136,070	251,991	81,816	54,254	

WEBBER KNAPP OVERALL USEFUL LOAD ANALYSIS SUMMARY

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	LOADS OFF BOILERS (70% EFF)			DIRECT FIRED LOADS (88% EFF)			GRAND TOTAL LOADS		
	HEATING	PROCESS	TOTAL	HEATING	PROCESS	TOTAL	HEATING	PROCESS	TOTAL
PEAK (MMBTUH)									
PLANT	3.11	2.46	5.57	8.79	0.09	8.88	11.90	2.55	14.45
OFFICE	0.00	0.00	0.00	3.20	0.53	3.73	3.20	0.53	3.73
TOTAL	3.11	2.46	5.57	11.99	0.62	12.61	15.10	3.08	18.18
ANNUAL (MMBTU)									
PLANT	6,807	11,273	18,080	7,344	204	7,548	14,151	11,477	25,628
OFFICE	0	0	0	3,617	1,110	4,727	3,617	1,110	4,727

LOAD ANALYSIS
for
WEBBER KNAPP (PLANT)

YEAR: 1986
HEATING SEASON HDD: 6157
DAYS IN SEASON: 212
AVG. OUTSIDE TEMP (DEG. F): 36.0
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 88
COMFORT SETTING (DEG. F): 70
INTERNAL TEMP GAIN (DEG. F): 5
VENTILATION (CFM): 0

SET-BACK HOURS PER WEEK: 80
COMFORT SETTING (DEG. F): 60
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0

ESTIMATED BOILER EFF : 70%
% INTERNAL USE TO DH: 100%

BILLING MONTH	HEATING DEG. DAYS	NAT GAS EQUIV (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,215	30105.4	3,085.8	31	99.5
FEB.	1,128	25022.9	2,564.9	28	91.6
MAR.	885	33183.5	3,401.3	31	109.7
APR.	519	19013.0	1,948.8	30	65.0
*MAY.	197	11811.5	1,210.7	31	39.1
*JUNE	80	16136.0	1,653.9	30	55.1
*JULY	4	13635.9	1,397.7	31	45.1
*AUG.	42	14000.5	1,435.0	31	46.3
*SEP.	137	10274.6	1,053.2	30	35.1
OCT.	430	29196.6	2,992.7	31	96.5
NOV.	811	16921.5	1,734.5	30	57.8
DEC. EST	1,169	32689.8	3,350.7	31	108.1
TOTAL	6,617	251,991	25,829.1	365	

DISTRICT HEATING LOADS

	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	30.88
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	11,272.90
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	3.11	2.86	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	3,884.26	2,923.21	6,807.47
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	3,884.26	2,923.21	6,807.47
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	3.11	2.86	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	5.57	2.86	N/A

LOAD ANALYSIS
for
WEBBER KNAFF (OFFICE DIRECT FIRED)

YEAR: 1986
HEATING SEASON HDD: 6491
DAYS IN SEASON: 273
AVG. OUTSIDE TEMP (DEG. F): 41.2
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 40
COMFORT SETTING (DEG. F): 70
INTERNAL TEMP GAIN (DEG. F): 5
VENTILATION (CFM): 30,000

SET-BACK HOURS PER WEEK: 128
COMFORT SETTING (DEG. F): 60
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0

ESTIMATED DF EFFICIENCY: 85%
% INTERNAL USE TO DH: 100%

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS EQUIV (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,215	9808	1,005.3	31	32.4
FEB.	1,128	9475	971.2	28	34.7
MAR.	885	4734	485.2	31	15.7
APR.	519	4650	476.6	30	15.9
MAY.	197	3892	398.9	31	12.9
JUNE	80	2163	221.7	30	7.4
*JULY	4	446	45.7	31	1.5
*AUG.	42	602	61.7	31	2.0
*SEP.	137	886	90.8	30	3.0
OCT.	430	659	67.5	31	2.2
NOV.	811	8440	865.1	30	28.8
DEC. EST	1,169	8500	871.2	31	28.1
TOTAL	6,617	54,254	5,561.0	365	
DISTRICT HEATING LOADS			NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):			N/A	N/A	3.04
ANNUAL INTERNAL USE (MMBTU):			N/A	N/A	1,109.77
PEAK VENTILATION LOAD (MMBTU/HR):			2.17	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):			1,454.48	0.00	1,454.48
PEAK ENVELOPE LOSSES (MMBTU/HR):			1.02	0.94	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):			613.15	1,549.48	2,162.63
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):			2,067.64	1,549.48	3,617.12
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):			3.20	0.94	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):			3.73	0.94	N/A

LOAD ANALYSIS
for
WEBBER KNAPP (PLANT DIRECT FIRED)

YEAR: 1986
HEATING SEASON HDD: 6571
DAYS IN SEASON: 303
AVG. OUTSIDE TEMP (DEG. F): 43.3
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 47.5
COMFORT SETTING (DEG. F): 70
INTERNAL TEMP GAIN (DEG. F): 5
VENTILATION (CFM): 120,000

SET-BACK HOURS PER WEEK: 120.5
COMFORT SETTING (DEG. F): 60
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0

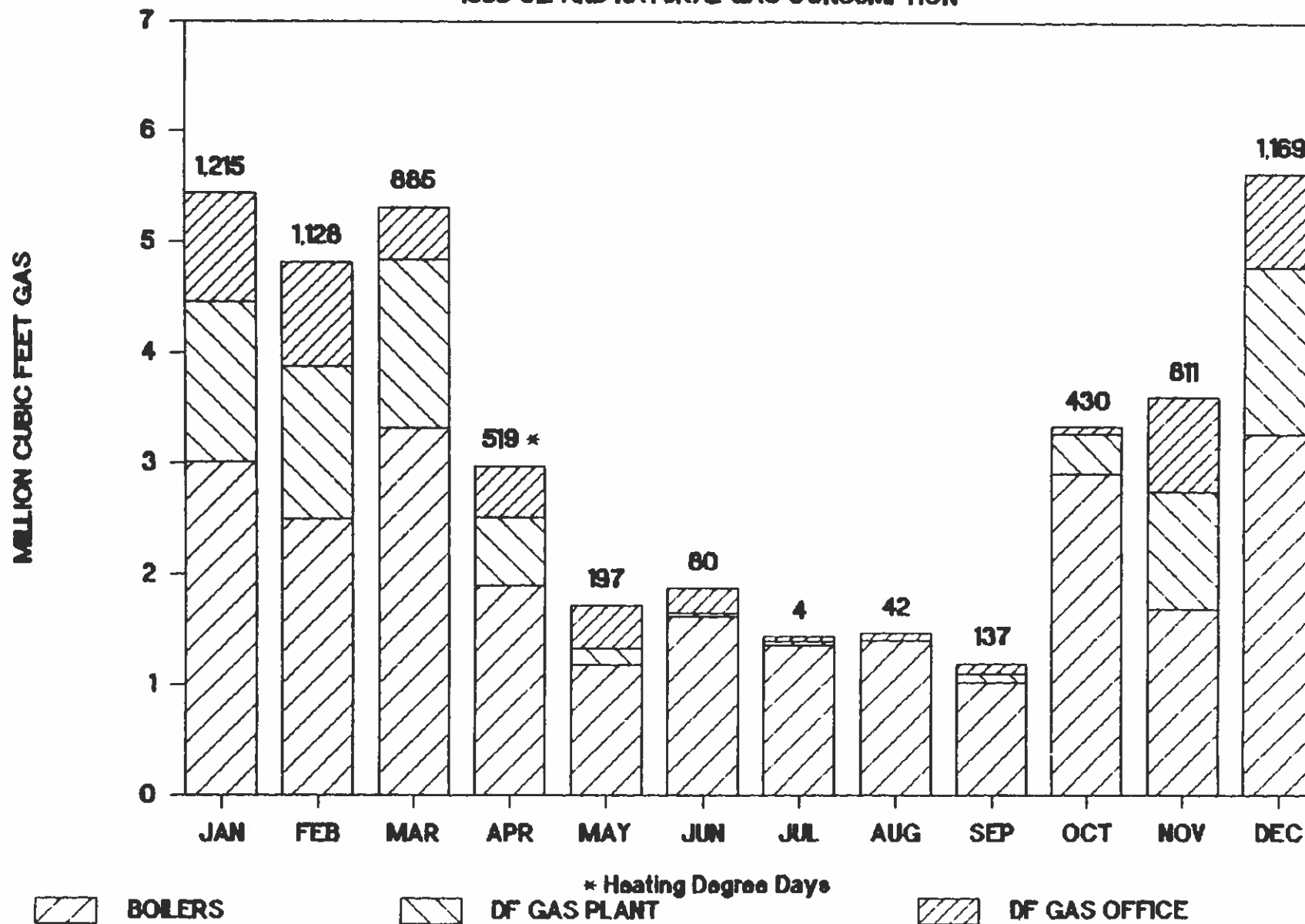
ESTIMATED DF EFFICIENCY: 90%
% INTERNAL USE TO DH: 100%

-----CURRENT ENERGY USAGE-----						
BILLING MONTH	HEATING DEG. DAYS	NAT GAS EQUIV (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)	
JAN.	1,215	14479	1,484.1	31	47.9	
FEB.	1,128	13715	1,405.8	28	50.2	
MAR.	885	15180	1,555.9	31	50.2	
APR.	519	6108	626.1	30	20.9	
MAY.	197	1460	149.6	31	4.8	
JUNE	80	440	45.1	30	1.5	
*JULY	4	277	28.4	31	0.9	
*AUG.	42	98	10.0	31	0.3	
SEP.	137	765	78.4	30	2.6	
OCT.	430	3485	357.2	31	11.5	
NOV.	811	10688	1,095.5	30	36.5	
DEC. EST	1,169	15121	1,549.9	31	50.0	
TOTAL	6,617	81,816	8,386.1	365		

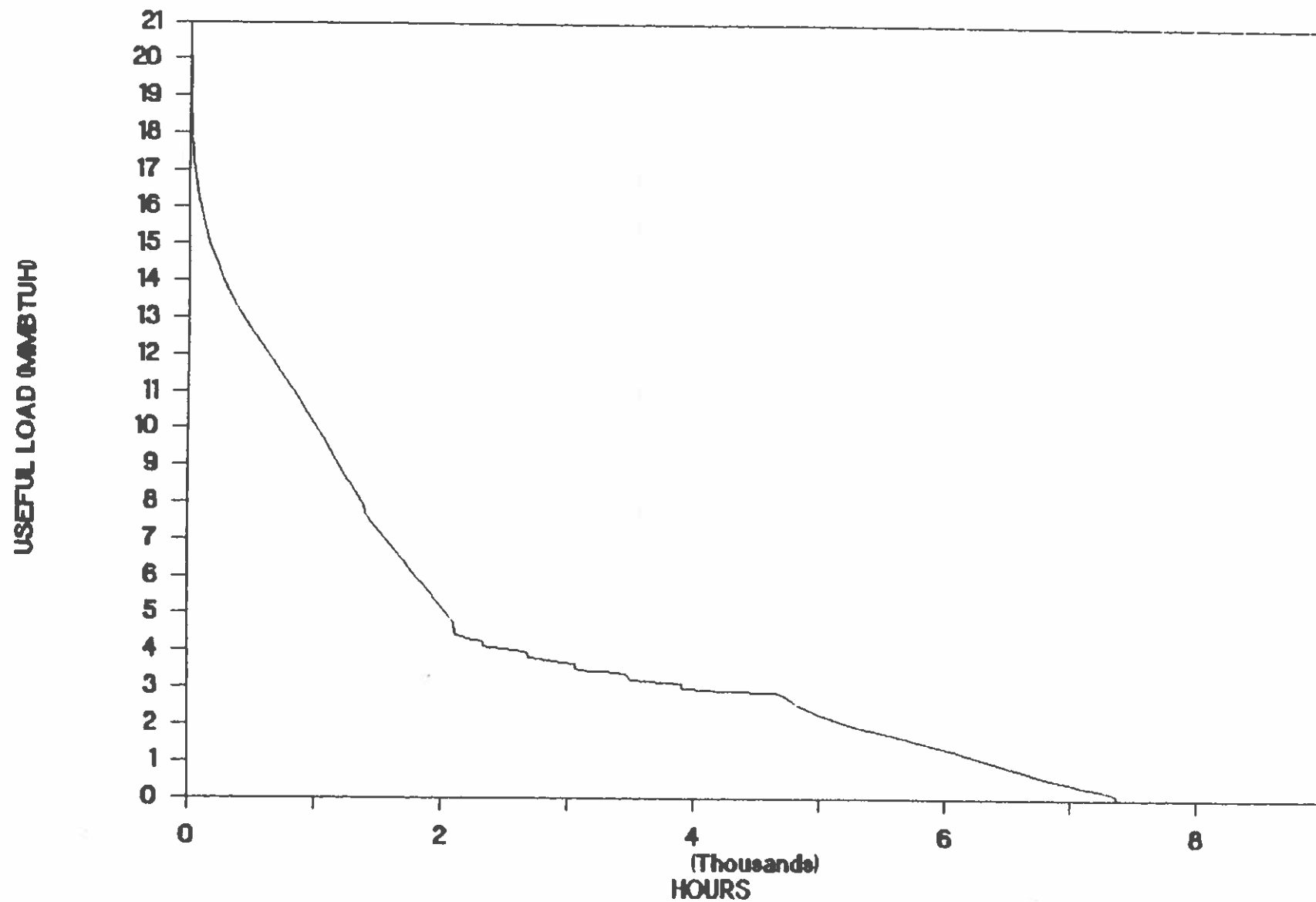
DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.56
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	203.66
PEAK VENTILATION LOAD (MMBTU/HR):	8.68	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	7,111.06	0.00	7,111.06
PEAK ENVELOPE LOSSES (MMBTU/HR):	0.11	0.10	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	78.87	153.94	232.81
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	7,189.93	153.94	7,343.87
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	8.79	0.10	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	8.88	0.10	N/A

WEBBER KNAPP EQUIVALENT NATURAL GAS USE

1966 OIL AND NATURAL GAS CONSUMPTION



WEBER KNAPP USEFUL LOAD PROFILE



CRAWFORD FURNITURE GAS USAGE BREAKDOWN
(All Usages in Hundred Cubic Feet)

MONTH	YEAR	SHOWROOM 1005 ALLEN (BOILER)	FACTORY/ OFFICE * 1061 ALLEN (ROOF DF)	FACTORY 1061 ALLEN (BOILER)	WAREHOUSE & OFFICE 1021 ALLEN (ROOF DF)	TOTAL
JAN	1987	3865	981	6972	5991	17,809
FEB	1986	3523	156	5947	5791	15,417
MAR	1986	3543	227	4344	4117	12,231
APR	1986	1915	57	1961	1904	5,837
MAY	1986	1024	2593	2983	390	6,990
JUN	1986	34	24	51	27	136
JUL	1986	35	14	37	23	109
AUG	1986	19	14	35	21	89
SEP	1986	19	63	128	65	275
OCT	1986	582	50	1128	1078	2,838
NOV	1986	1398	113	3187	3074	7,772
DEC	1986	2641	192	5389	5991	14,213
Total Usage:		18,598	4,484	32,162	28,472	83,716

* Not To Be Considered For District Heating

USEFUL LOAD ANALYSIS SUMMARY

Peak Loads (mmbtuh)	1005 Allen Boiler (70% EFF)	1021 Allen Dir Fired (88% EFF)	1061 Allen Boiler (65% EFF)	Total Crawford Facilities
Internal:	0.01	0.01	0.02	0.04
Space Heating:	0.62	1.08	0.90	2.60
Total	0.63	1.09	0.92	2.64
Annual Loads (mbtu)				
Internal:	23	25	33	81
Space Heating:	1,311	2,543	1,931	5,786
Total	1,334	2,568	1,964	5,866

LOAD ANALYSIS
for
CRAWFORD FURNITURE - 1005 ALLEN (Boiler)

YEAR: 1986 (JAN 87)
 HEATING SEASON HDD: 6298
 DAYS IN SEASON: 243
 AVG. OUTSIDE TEMP (DEG. F): 39.1
 OUTSIDE DESIGN TEMP (DEG. F): 3

 NORMAL HOURS PER WEEK: 55
 COMFORT SETTING (DEG. F): 66
 INTERNAL TEMP GAIN (DEG. F): 3
 VENTILATION (CFM): 0 ESTIMATED

 SET-BACK HOURS PER WEEK: 113
 COMFORT SETTING (DEG. F): 60
 INTERNAL TEMP GAIN (DEG. F): 0
 VENTILATION (CFM): 0 ESTIMATED

 ESTIMATED Boiler EFF: 70%
 % INTERNAL USE TO DH: 100%

-----CURRENT ENERGY USAGE-----						
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)	
JAN.	1,159	3865	396.2	31	12.8	
FEB.	1,128	3523	361.1	28	12.9	
MAR.	985	3543	363.2	31	11.7	
APR.	519	1915	196.3	30	6.5	
MAY.	197	1024	105.0	31	3.4	
*JUNE	80	34	3.5	30	0.1	
*JULY	4	35	3.6	31	0.1	
*AUG.	42	19	1.9	31	0.1	
*SEP.	137	19	1.9	30	0.1	
OCT.	430	582	59.7	31	1.9	
NOV.	811	1398	143.3	30	4.8	
DEC.	1,169	2641	270.7	31	8.7	
TOTAL	6,561	18,598	1,906.3	365		

DISTRICT HEATING LOADS

	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.06
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	22.97
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	0.62	0.59	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	468.90	842.54	1,311.44
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	468.90	842.54	1,311.44
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	0.62	0.59	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	0.62	0.59	N/A

LOAD ANALYSIS
for
CRAWFORD FURNITURE - 1061 ALLEN (Boiler)

YEAR:	1986 (JAN 87)	
HEATING SEASON HDD:	6435	
DAYS IN SEASON:	273	
AVG. OUTSIDE TEMP (DEG. F):	41.4	
OUTSIDE DESIGN TEMP (DEG. F):	3	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	63	
INTERNAL TEMP GAIN (DEG. F):	3	
VENTILATION (CFM):	0	ESTIMATED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	60	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ESTIMATED
ESTIMATED Boiler EFF:	65%	
% INTERNAL USE TO DH:	100%	

BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	CURRENT ENERGY USAGE QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN. (87)	1,159	6972	714.6	31	23.1
FEB.	1,128	5947	609.6	28	21.8
MAR.	885	4344	445.3	31	14.4
APR.	519	1961	201.0	30	6.7
MAY.	197	298	30.5	31	1.0
*JUNE	80	51	5.2	30	0.2
*JULY	4	37	3.8	31	0.1
*AUG.	42	35	3.6	31	0.1
SEP.	137	128	13.1	30	0.4
OCT.	430	1128	115.6	31	3.7
NOV.	811	3187	326.7	30	10.9
DEC.	1,169	5389	552.4	31	17.8
TOTAL	6,561	29,477	3,021.4	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.09
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	32.51
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	0.90	0.90	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	459.86	1,471.54	1,931.39
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	459.86	1,471.54	1,931.39
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	0.90	0.90	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	0.92	0.90	N/A

LOAD ANALYSIS
for
CRAWFORD FURNITURE - 1021 ALLEN - DIRECT FIRED

YEAR: 1986 (JAN 87)
 HEATING SEASON HDD: 6435
 DAYS IN SEASON: 273
 AVG. OUTSIDE TEMP (DEG. F): 41.4
 OUTSIDE DESIGN TEMP (DEG. F): 3

 NORMAL HOURS PER WEEK: 40
 COMFORT SETTING (DEG. F): 68
 INTERNAL TEMP GAIN (DEG. F): 5
 VENTILATION (CFM): 0 ESTIMATED

 SET-BACK HOURS PER WEEK: 128
 COMFORT SETTING (DEG. F): 63
 INTERNAL TEMP GAIN (DEG. F): 0
 VENTILATION (CFM): 0 ESTIMATED

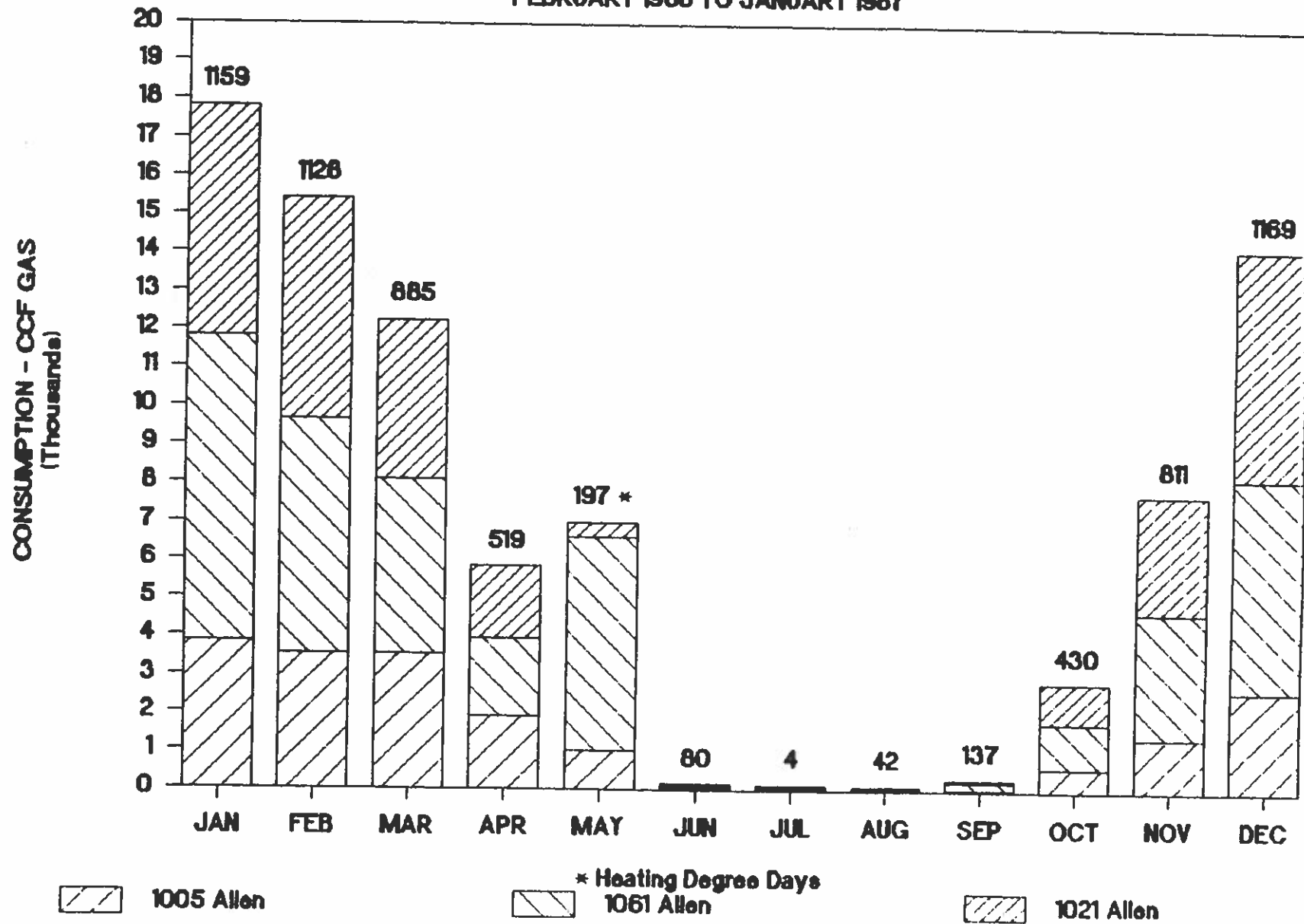
 ESTIMATED DF EFF: 88%
 % INTERNAL USE TO DH: 100%

BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	CURRENT ENERGY USAGE QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN. (87)	1,159	5991	614.1	31	19.8
FEB.	1,128	5791	593.6	28	21.2
MAR.	885	4117	422.0	31	13.6
APR.	519	1904	195.2	30	6.5
MAY.	197	390	40.0	31	1.3
*JUNE	80	27	2.8	30	0.1
*JULY	4	23	2.4	31	0.1
*AUG.	42	21	2.2	31	0.1
SEP.	137	65	6.7	30	0.2
OCT.	430	1078	110.5	31	3.6
NOV.	811	3074	315.1	30	10.5
DEC.	1,169	5991	614.1	31	19.8
TOTAL	6,561	28,472	2,918.4	365	

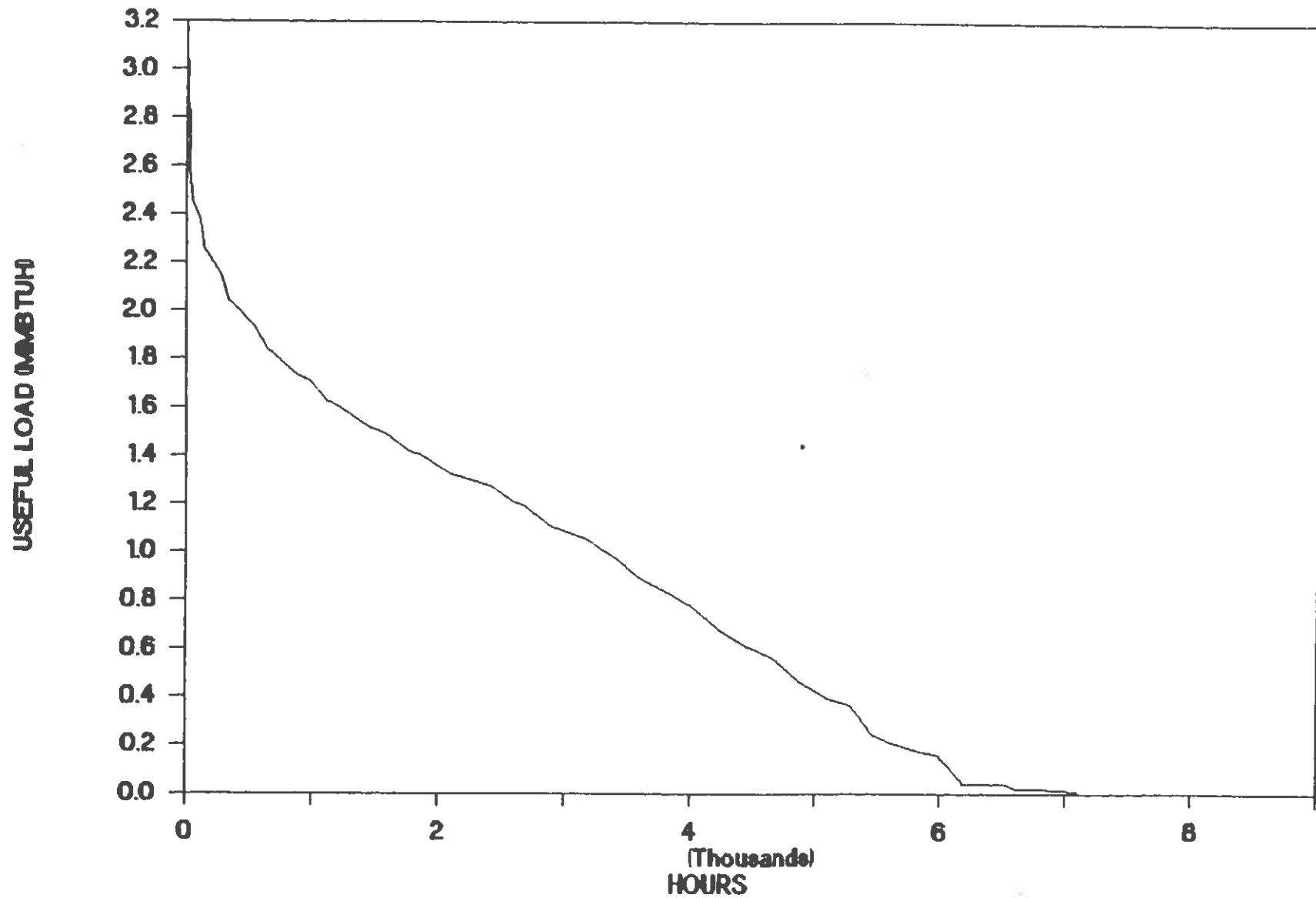
DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.07
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	25.41
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	1.08	1.08	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	605.42	1,937.35	2,542.77
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	605.42	1,937.35	2,542.77
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	1.08	1.08	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	1.09	1.08	N/A

CRAWFORD FURNITURE GAS USAGE

FEBRUARY 1986 TO JANUARY 1987



CRAWFORD FURNITURE USEFUL LOAD PROFILE



DAHLSTROM MANUFACTURING
GAS USAGE (CCF) HISTORY

MONTH	BOILER	DIRECT FIRED *	TOTAL
JAN 87	92,626	Not Avail.	Not Avail.
FEB 87	99,299	"	"
MAR 87	77,489	"	"
APR 87	56,676	"	"
MAY 87	28,854	"	"
JUN 87	18,917	"	"
JUL 86	13,255	"	"
AUG 86	16,730	"	"
SEP 86	25,438	"	"
OCT 86	46,156	"	"
NOV 86	73,816	"	"
DEC 86	99,085	"	"
Total Usage:	648,341	92,018	740,359

USEFUL LOAD ANALYSIS SUMMARY
(At 65% Boiler Efficiency)

Peak (mmbtuh)	1986/1987
Space Heating (Boiler):	12.30
Internal:	6.21
Total:	18.51

Annual (mmbtu)	
Space Heating (Boiler):	30,269
Internal:	12,926
Total:	43,195

* Ovens (non-convertible)

LOAD ANALYSIS
for
DAHLSTROM MANUFACTURING

YEAR: July 86/June 1987

HEATING SEASON HDD: 6338
DAYS IN SEASON: 273
AVG. OUTSIDE TEMP (DEG. F): 41.7
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 40
COMFORT SETTING (DEG. F): 70
INTERNAL TEMP GAIN (DEG. F): 5
VENTILATION (CFM): 0

SET-BACK HOURS PER WEEK: 128
COMFORT SETTING (DEG. F): 65
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0

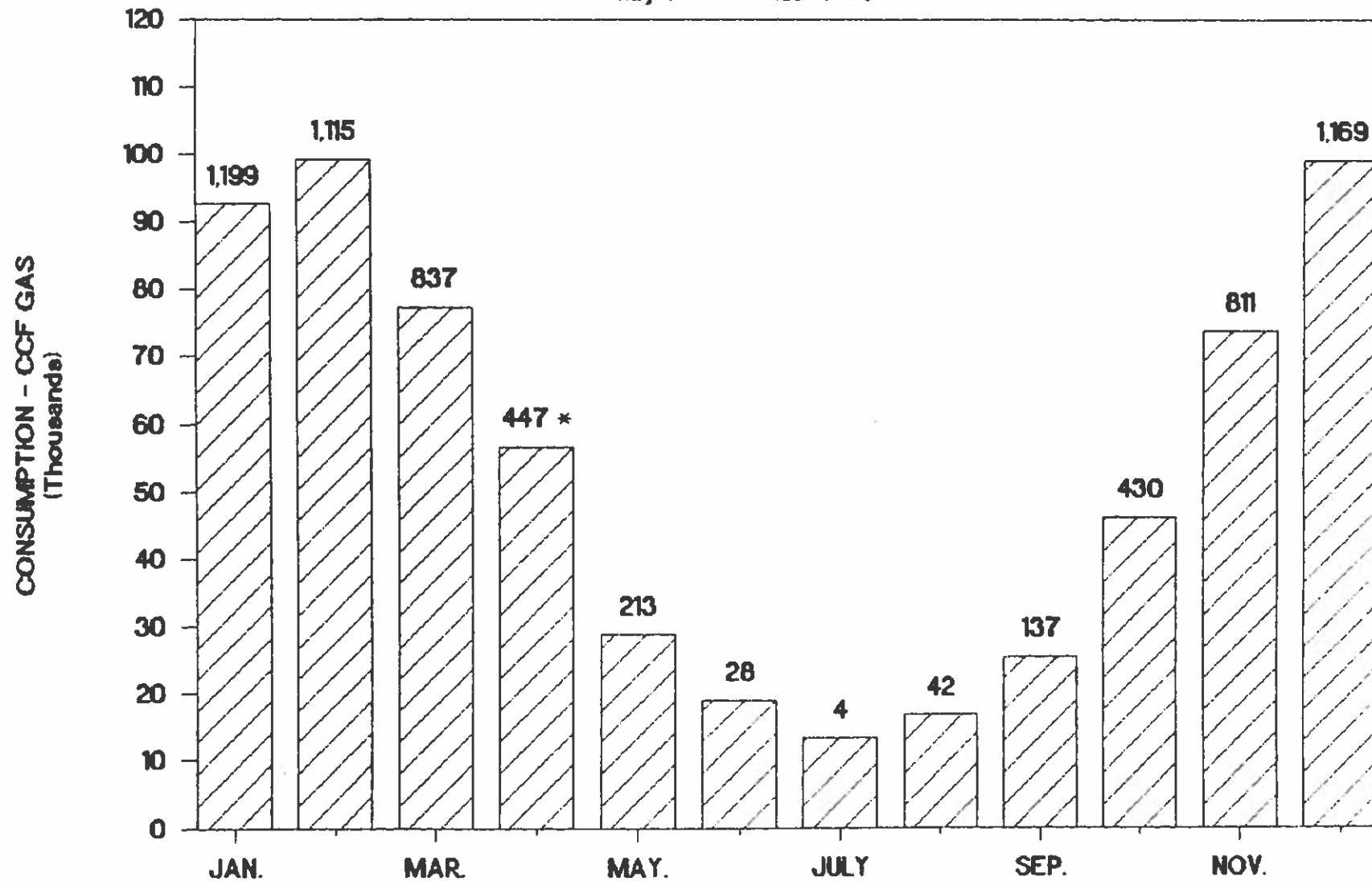
ESTIMATED BOILER EFF : 65%
% INTERNAL USE TO DH: 100%

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,199	92,626	9,494.2	31	306.3
FEB.	1,115	99,299	10,178.1	28	363.5
MAR.	837	77,489	7,942.6	31	256.2
APR.	447	56,676	5,809.3	30	193.6
MAY.	213	28,854	2,957.5	31	95.4
*JUNE	28	18,917	1,939.0	30	64.6
*JULY	4	13,255	1,358.6	31	43.8
*AUG.	42	16,730	1,714.8	31	55.3
SEP.	137	25,438	2,607.4	30	86.9
OCT.	430	46,156	4,731.0	31	152.6
NOV.	811	73,816	7,566.1	30	252.2
DEC.	1,169	99,085	10,156.2	31	327.6
TOTAL	6,432	648,341	66,455.0	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	35.41
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	12,926.14
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	12.30	12.30	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	7,207.04	23,062.54	30,269.58
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	7,207.04	23,062.54	30,269.58
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	12.30	12.30	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	18.51	12.30	N/A

DAHLSTROM GAS USAGE (Including Ovens)

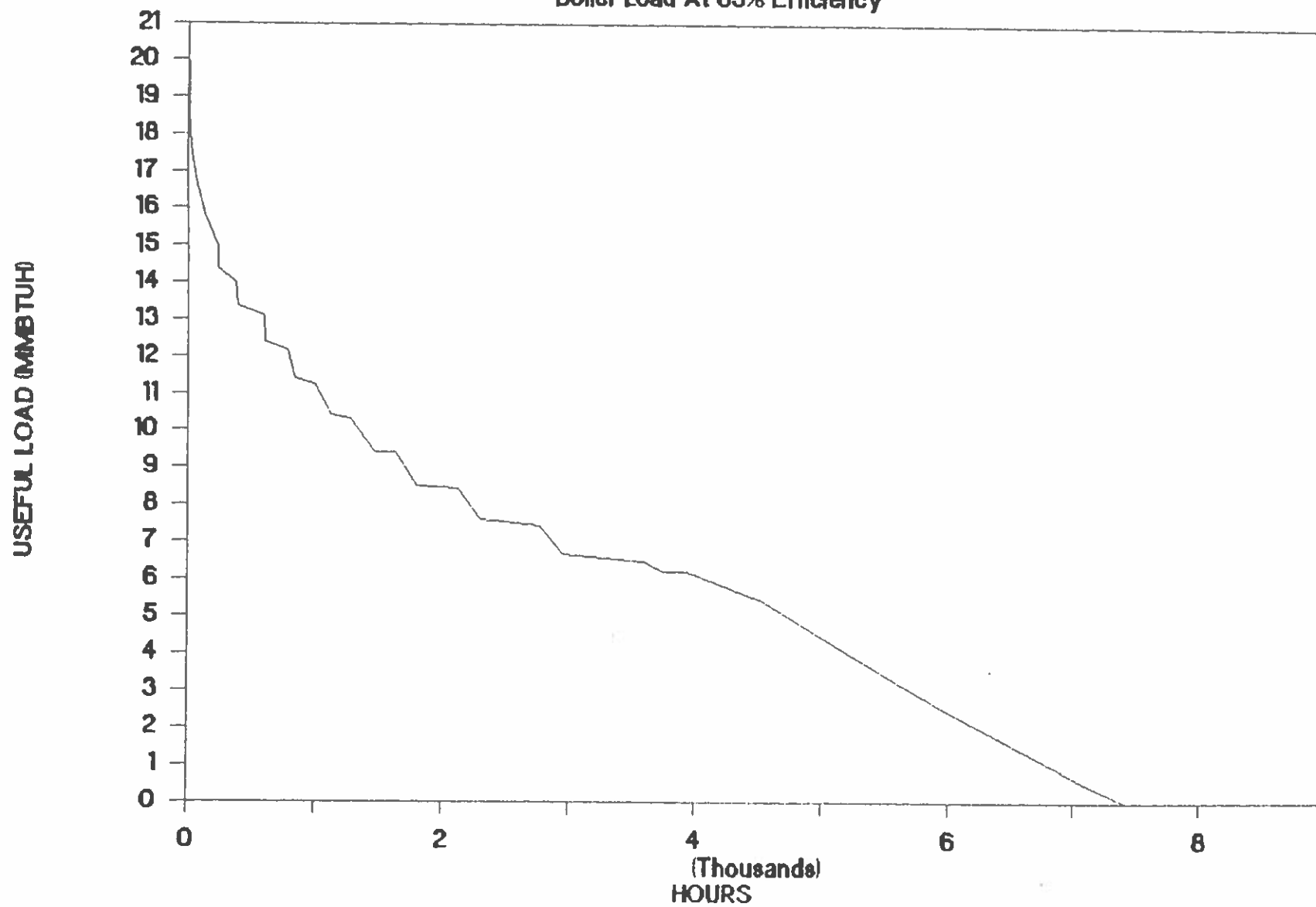
July 1986 to June 1987



* Heating Degree Days

DAHLSTROM MANUFACTURING LOAD PROFILE

Boiler Load At 65% Efficiency



ESSEX SPEC. PRODUCTS GAS CONSUMPTION 1986 - CCF

BUILDING NO. 5 (ROOF TOP DF)	126 HOPKINS BOILER	TOTAL
8031	12070	20101
7896	10470	18366
1990	7660	9650
991	4330	5321
37	600	637
38	40	78
33	40	73
38	30	68
11	100	111
344	1170	1514
1878	5580	7458
3597	10160	13757
24884	52250	77134

LOAD ANALYSIS SUMMARY

	PEAK LOAD (MMBTUH)	ANNUAL LOAD (MMBTU)
SPACE HEATING		
126 HOPKINS	1.56	2,196
125 BLACKSTONE	1.62	3,452
TOTAL	3.18	5,648
INTERNAL		
126 HOPKINS	0.09	34
125 BLACKSTONE	0.02	29
TOTAL	0.11	63
OVERALL TOTAL	3.29	5,711

LOAD ANALYSIS
for
ESSEX PAINT - 125 BLACKSTONE

YEAR:	1986	
HEATING SEASON HDD:	6491	
DAYS IN SEASON:	273	
AVG. OUTSIDE TEMP (DEG. F):	41.2	
OUTSIDE DESIGN TEMP (DEG. F):	3	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	68	
INTERNAL TEMP GAIN (DEG. F):	5	
VENTILATION (CFM):	0	ESTIMATED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	60	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ESTIMATED
ESTIMATED BOILER EFF:	65%	
% INTERNAL USE TO DH:	100%	

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,215	12070	1,237.2	31	39.9
FEB.	1,128	10470	1,073.2	28	38.3
MAR.	985	7660	785.2	31	25.3
APR.	519	4330	443.8	30	14.8
MAY.	197	600	61.5	31	2.0
*JUNE	80	40	4.1	30	0.1
*JULY	4	40	4.1	31	0.1
*AUG.	42	30	3.1	31	0.1
SEP.	137	100	10.3	30	0.3
OCT.	430	1170	119.9	31	3.9
NOV.	811	5580	571.9	30	19.1
DEC.	1,169	10160	1,041.4	31	33.6
TOTAL	6,617	52,250	5,355.6	365	

DISTRICT HEATING LOADS

	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.08
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	29.08
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	1.62	1.54	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	918.31	2,533.77	3,452.08
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	918.31	2,533.77	3,452.08
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	1.62	1.54	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	1.64	1.54	N/A

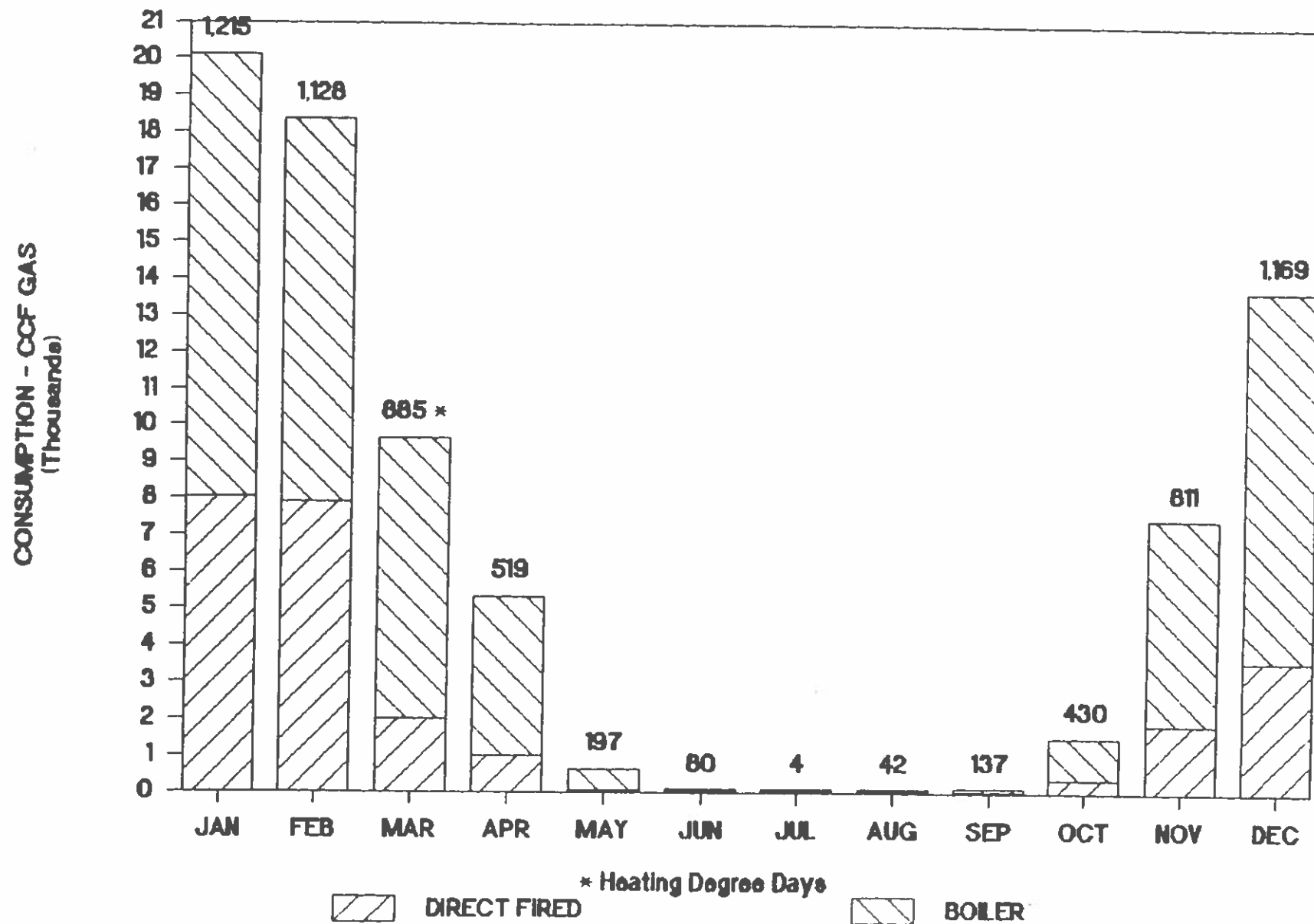
LOAD ANALYSIS
for
ESSEX PAINT - 126 HOPKINS

YEAR:	1986	
HEATING SEASON HDD:	6157	
DAYS IN SEASON:	212	
AVG. OUTSIDE TEMP (DEG. F):	36.0	
OUTSIDE DESIGN TEMP (DEG. F):	0	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	55	
INTERNAL TEMP GAIN (DEG. F):	5	
VENTILATION (CFM):	2500	ESTIMATED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	50	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ESTIMATED
ESTIMATED DIR. FIRE EFF:	88%	
% INTERNAL USE TO DH:	100%	

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,215	8031	823.2	31	26.6
FEB.	1,128	7896	809.3	28	28.9
MAR.	885	1990	204.0	31	6.6
APR.	519	991	101.6	30	3.4
*MAY.	197	37	3.8	31	0.1
*JUNE	80	38	3.9	30	0.1
*JULY	4	33	3.4	31	0.1
*AUG.	42	38	3.9	31	0.1
*SEP.	137	11	1.1	30	0.0
OCT.	430	344	35.3	31	1.1
NOV.	811	1878	192.5	30	6.4
DEC.	1,169	3597	368.7	31	11.9
TOTAL	6,617	24,864	2,550.6	365	

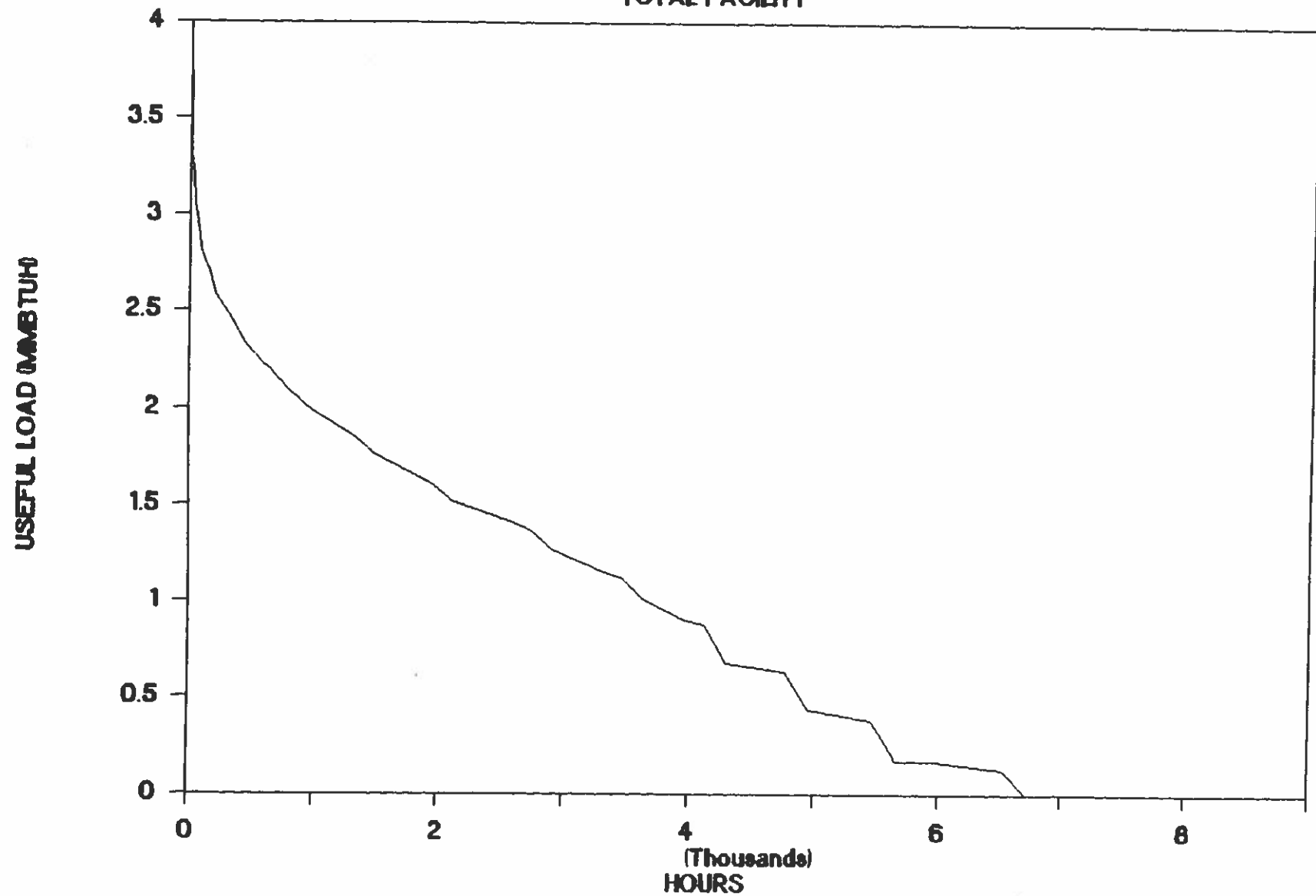
DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.09
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	33.78
PEAK VENTILATION LOAD (MMBTU/HR):	0.21	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	144.06	0.00	144.06
PEAK ENVELOPE LOSSES (MMBTU/HR):	1.35	1.35	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	488.64	1,563.65	2,052.29
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	632.70	1,563.65	2,196.35
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	1.56	1.35	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	1.57	1.35	N/A

ESSEX PAINT GAS USAGE - 1986



ESSEX PAINT USEFUL LOAD PROFILE

TOTAL FACILITY



HOPES WINDOWS 1986 GAS USAGE BREAKDOWN
(All Usages in Hundred Cubic Feet-Excludes Paint Shop Ovens)

MONTH	PLANT 1 Office & Dir Fired Unit Htrs	PLANT 1 (Boilers)	PLANT 2 (Dir Fired)	PLANT 3 (Dir Fired)	PLANT 3 (Boilers)	Dist. Heat Conversion Total
JANUARY	30,491	1,871	8,792	11,002	13,663	65,819
FEBRUARY	30,330	1,784	8,117	11,426	14,436	66,093
MARCH	17,671	1,199	5,397	7,021	11,215	42,503
APRIL	9,166	713	2,954	3,654	9,253	25,740
MAY	1,168	173	600	636	6,756	9,333
JUNE	0	15	8	15	4,924	4,962
JULY	0	8	0	3	5,038	5,049
AUGUST	0	25	65	17	5,410	5,517
SEPTEMBER	914	152	896	521	6,508	8,991
OCTOBER	7,958	498	2,108	2,634	8,726	21,924
NOVEMBER	19,326	1,225	5,358	7,276	12,702	45,887
DECEMBER	26,577	1,420	6,398	8,289	23,042	65,726
TOTAL USAGE:	143,601	9,083	40,693	52,494	121,673	367,544

USEFUL LOAD ANALYSIS SUMMARY

Peak (mmbtuh)	PLANT 1 Office & Dir Fired Unit Htrs (88% Eff)	PLANT 1 Boilers (70% Eff)	PLANT 2 Dir Fired (88% Eff)	PLANT 3 Dir Fired (88% Eff)	PLANT 3 Boilers (65% Eff)	Total
Space Heating:	11.59	0.27	1.52	1.97	1.70	17.05
Internal:	0.00	0.01	0.02	0.01	1.95	1.99
Total:	11.59	0.28	1.54	1.98	3.65	19.04
Annual (mmbtu)						
Space Heating:	12,953	638	3,624	4,696	4,043	25,953
Internal:	0	14	26	12	4,063	4,115
Total:	12,953	652	3,650	4,708	8,106	30,069

LOAD ANALYSIS
for
HOFES WINDOWS PLANT 2 DIR. FIRED

YEAR:	1986	
HEATING SEASON HDD:	6491	
DAYS IN SEASON:	273	
AVG. OUTSIDE TEMP (DEG. F):	41.2	
OUTSIDE DESIGN TEMP (DEG. F):	3	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	68	
INTERNAL TEMP GAIN (DEG. F):	5	
VENTILATION (CFM):	0	ASSUMED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	63	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ASSUMED
ESTIMATED BOILER EFF :	88%	
% INTERNAL USE TO DH:	100%	

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,215	8,792	901.2	31	29.1
FEB.	1,128	8,117	832.0	28	29.7
MAR.	885	5,397	553.2	31	17.8
APR.	519	2,954	302.8	30	10.1
MAY.	197	600	61.5	31	2.0
*JUNE	80	8	0.8	30	0.0
*JULY	4	0	0.0	31	0.0
*AUG.	42	65	6.7	31	0.2
SEP.	137	896	91.8	30	3.1
OCT.	430	2,108	216.1	31	7.0
NOV.	811	5,358	549.2	30	18.3
DEC. EST	1,169	6,398	655.8	31	21.2
TOTAL	6,617	40,693	4,171.0	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.07
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	25.98
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	1.52	1.52	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	862.78	2,760.90	3,623.68
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	862.78	2,760.90	3,623.68
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	1.52	1.52	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	1.54	1.52	N/A

LOAD ANALYSIS
for
HOPES WINDOWS PLANT 1 DIRECT FIRED

YEAR:	1986	
HEATING SEASON HDD:	6491	
DAYS IN SEASON:	273	
AVG. OUTSIDE TEMP (DEG. F):	41.2	
OUTSIDE DESIGN TEMP (DEG. F):	3	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	68	
INTERNAL TEMP GAIN (DEG. F):	5	
VENTILATION (CFM):	120,000	ASSUMED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	63	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ASSUMED
ESTIMATED BOILER EFF :	88%	
% INTERNAL USE TO DH:	100%	

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,215	30,491	3,125.3	31	100.8
FEB.	1,128	30,330	3,108.8	28	111.0
MAR.	885	17,671	1,811.3	31	58.4
APR.	519	9,166	939.5	30	31.3
MAY.	197	1,168	119.7	31	3.9
*JUNE	80	0	0.0	30	0.0
*JULY	4	0	0.0	31	0.0
*AUG.	42	0	0.0	31	0.0
SEP.	137	914	93.7	30	3.1
OCT.	430	7,958	815.7	31	26.3
NOV.	811	19,326	1,980.9	30	66.0
DEC. EST	1,169	26,577	2,724.1	31	87.9
TOTAL	6,617	143,601	14,719.1	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.00
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	0.00
PEAK VENTILATION LOAD (MMBTU/HR):	8.42	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	5,413.58	0.00	5,413.58
PEAK ENVELOPE LOSSES (MMBTU/HR):	3.17	3.17	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	1,795.06	5,744.18	7,539.23
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	7,208.63	5,744.18	12,952.81
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	11.59	3.17	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	11.59	3.17	N/A

LOAD ANALYSIS
for
HOPES WINDOWS PLANT 1 BOILERS

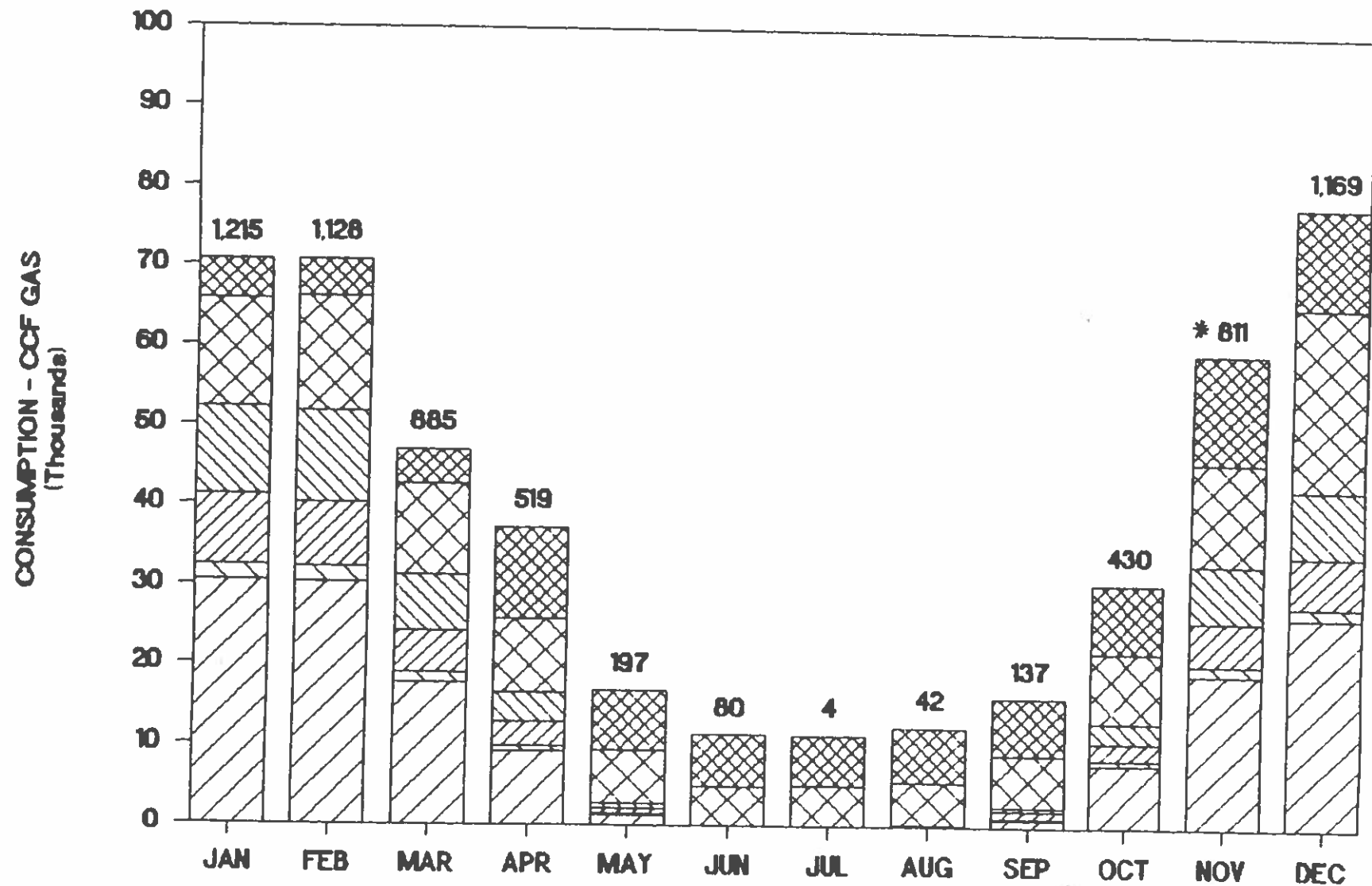
YEAR:	1986	
HEATING SEASON HDD:	6491	
DAYS IN SEASON:	273	
AVG. OUTSIDE TEMP (DEG. F):	41.2	
OUTSIDE DESIGN TEMP (DEG. F):	3	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	68	
INTERNAL TEMP GAIN (DEG. F):	5	
VENTILATION (CFM):	0	ASSUMED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	63	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ASSUMED
ESTIMATED BOILER EFF :	70%	
% INTERNAL USE TO DH:	100%	

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,215	1,871	191.8	31	6.2
FEB.	1,128	1,784	182.9	28	6.5
MAR.	885	1,199	122.9	31	4.0
APR.	519	713	73.1	30	2.4
MAY.	197	173	17.7	31	0.6
*JUNE	80	15	1.5	30	0.1
*JULY	4	8	0.8	31	0.0
*AUG.	42	25	2.6	31	0.1
SEP.	137	152	15.6	30	0.5
OCT.	430	498	51.0	31	1.6
NOV.	811	1,225	125.6	30	4.2
DEC. EST	1,169	1,420	145.5	31	4.7
TOTAL	6,617	9,083	931.0	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL

DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	0.04
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	17.66
PEAK VENTILATION LOAD (MMBTU/HR):	0.00	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	0.00	0.00	0.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	0.27	0.27	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	151.91	486.13	638.04
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	151.91	486.13	638.04
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	0.27	0.27	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	0.27	0.27	N/A

HOPE'S WINDOWS 1986 GAS USAGE BREAKDOWN



PLT1-BLR

PLT2-DF

PLT1-DF

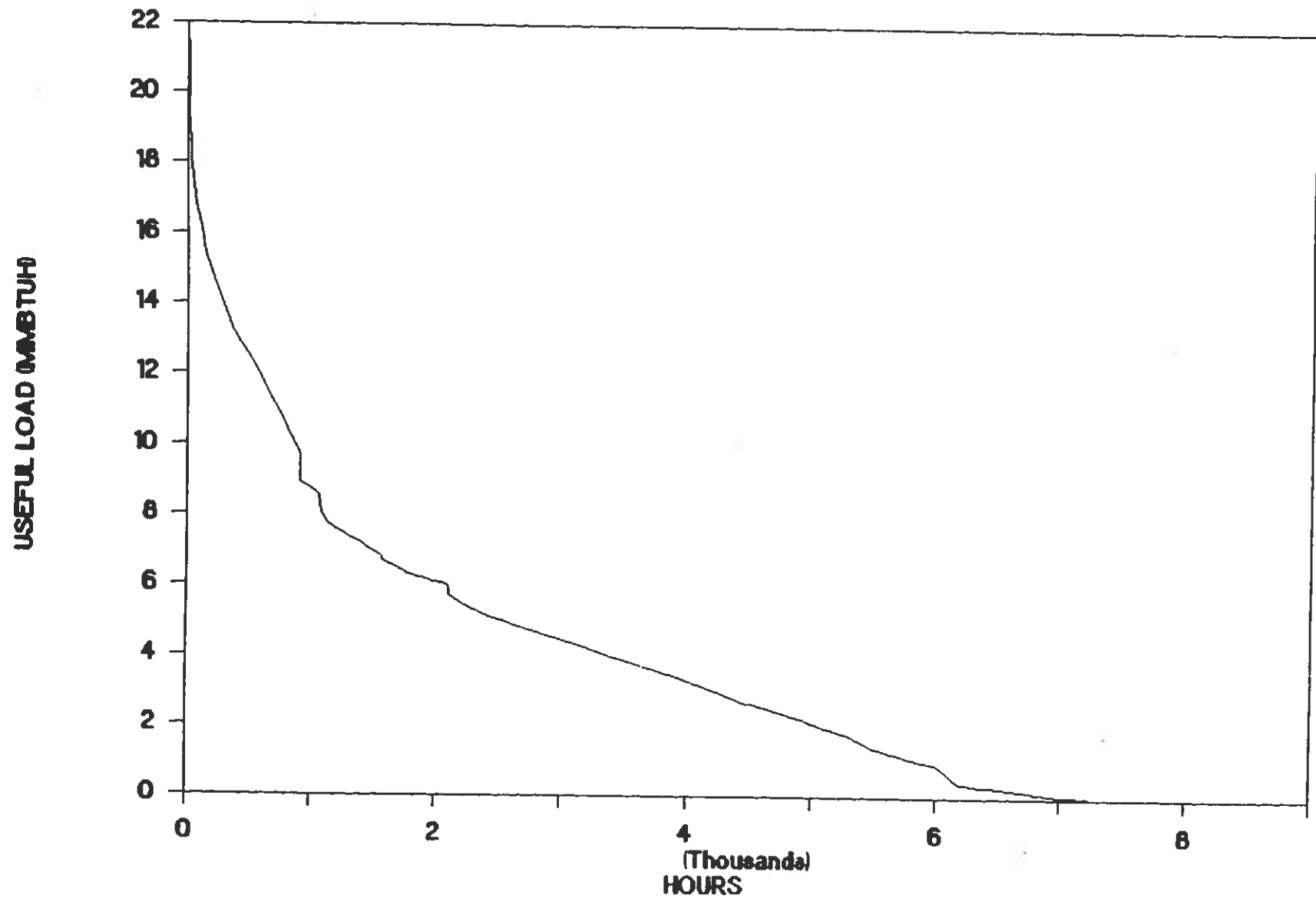
* Heating Degree Days

PLT3-DF

OVENS

PLT3-BLR

HOPES WINDOWS USEFUL LOAD PROFILE



JAMESTOWN METAL MANUFACTURING
GAS USAGE (CCF) HISTORY

MONTH	1983	1984	1985 *
JAN	19,280	17,720	21,550
FEB	19,190	16,000	23,350
MAR	16,710	17,470	19,940
APR	16,600	12,930	15,310
MAY	12,620	10,580	11,720
JUN	11,280	10,510	11,580
JUL	5,460	5,920	6,240
AUG	8,840	10,830	10,120
SEP	10,640	8,980	11,750
OCT	11,360	11,180	10,650
NOV	13,510	16,080	17,530
DEC	16,200	16,930	18,790
Total Usage:	161,690	155,130	174,580

USEFUL LOAD ANALYSIS SUMMARY
(At 65% Boiler Efficiency, 88% Direct Fired Efficiency)

Peak (mmbtuh)	1983	1984	1985 *
Space Heating (Boiler):	2.03	1.15	1.37
Makeup Air (Dir. Fired):	0.42	0.42	0.42
Internal:	1.80	2.39	3.62
Total:	4.25	3.96	4.41
Annual (mmbtu)			
Space Heating (Boiler):	4,750	2,549	3,110
Makeup Air (Dir. Fired):	509	425	431
Internal:	5,609	7,412	8,171
Total:	10,868	10,385	11,712

* Used in District System Analysis

LOAD ANALYSIS
for
JAMESTOWN METAL MFG.

YEAR: 1985
HEATING SEASON HDD: 6130
DAYS IN SEASON: 212
AVG. OUTSIDE TEMP (DEG. F): 36.1
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 60
COMFORT SETTING (DEG. F): 70
INTERNAL TEMP GAIN (DEG. F): 5
VENTILATION (CFM): 5,000

SET-BACK HOURS PER WEEK: 108
COMFORT SETTING (DEG. F): 63
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0

ESTIMATED BOILER EFF : 65%
% INTERNAL USE TO DH: 100%

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,354	21,550	2,208.9	31	71.3
FEB.	1,120	23,350	2,393.4	28	85.5
MAR.	902	19,940	2,043.9	31	65.9
APR.	476	15,310	1,569.3	30	52.3
*MAY.	196	11,720	1,201.3	31	38.8
*JUNE	95	11,580	1,186.9	30	39.6
*JULY	8	6,240	639.6	31	20.6
*AUG.	12	10,120	1,037.3	31	33.5
*SEP.	114	11,750	1,204.4	30	40.1
OCT.	378	10,650	1,091.6	31	35.2
NOV.	685	13,580	1,391.9	30	46.4
DEC.	1,215	18,790	1,926.0	31	62.1
TOTAL	6,555	174,580	17,894.5	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	22.39
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	8,171.21
PEAK VENT. LOAD-DIR. FIRED (MMBTU/HR):	0.42	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	430.92	0.00	430.92
PEAK ENVELOPE LOSSES (MMBTU/HR):	1.37	1.33	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	1,162.42	1,947.64	3,110.06
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	1,593.34	1,947.64	3,540.98
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	1.79	1.33	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	4.41	1.33	N/A

LOAD ANALYSIS
for
JAMESTOWN METAL MFG.

YEAR: 1984
HEATING SEASON HDD: 6002
DAYS IN SEASON: 212
AVG. OUTSIDE TEMP (DEG. F): 36.7
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 60
COMFORT SETTING (DEG. F): 70
INTERNAL TEMP GAIN (DEG. F): 5
VENTILATION (CFM): 5,000

SET-BACK HOURS PER WEEK: 108
COMFORT SETTING (DEG. F): 63
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0

ESTIMATED BOILER EFF : 65%
% INTERNAL USE TO DH: 100%

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,378	17,720	1,816.3	31	58.6
FEB.	899	16,000	1,640.0	28	58.6
MAR.	1,167	17,470	1,790.7	31	57.8
APR.	519	12,930	1,325.3	30	44.2
*MAY.	385	10,580	1,084.4	31	35.0
*JUNE	35	10,510	1,077.3	30	35.9
*JULY	11	5,920	606.8	31	19.6
*AUG.	22	10,830	1,110.1	31	35.8
*SEP.	210	8,980	920.4	30	30.7
OCT.	360	11,180	1,145.9	31	37.0
NOV.	774	16,080	1,648.2	30	54.9
DEC.	905	16,930	1,735.3	31	56.0
TOTAL	6,665	155,130	15,900.8	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	20.39
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	7,441.66
PEAK VENT. LOAD DIRECT FIRED (MMBTU/HR):	0.42	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	425.00	0.00	425.00
PEAK ENVELOPE LOSSES (MMBTU/HR):	1.15	1.11	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	953.50	1,595.06	2,548.56
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	1,378.50	1,595.06	2,973.56
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	1.56	1.11	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	3.95	1.11	N/A

LOAD ANALYSIS
for
JAMESTOWN METAL MFG.

YEAR: 1983
HEATING SEASON HDD: 6449
DAYS IN SEASON: 303
AVG. OUTSIDE TEMP (DEG. F): 43.7
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 60
COMFORT SETTING (DEG. F): 70
INTERNAL TEMP GAIN (DEG. F): 5
VENTILATION (CFM): 5,000

SET-BACK HOURS PER WEEK: 108
COMFORT SETTING (DEG. F): 63
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0

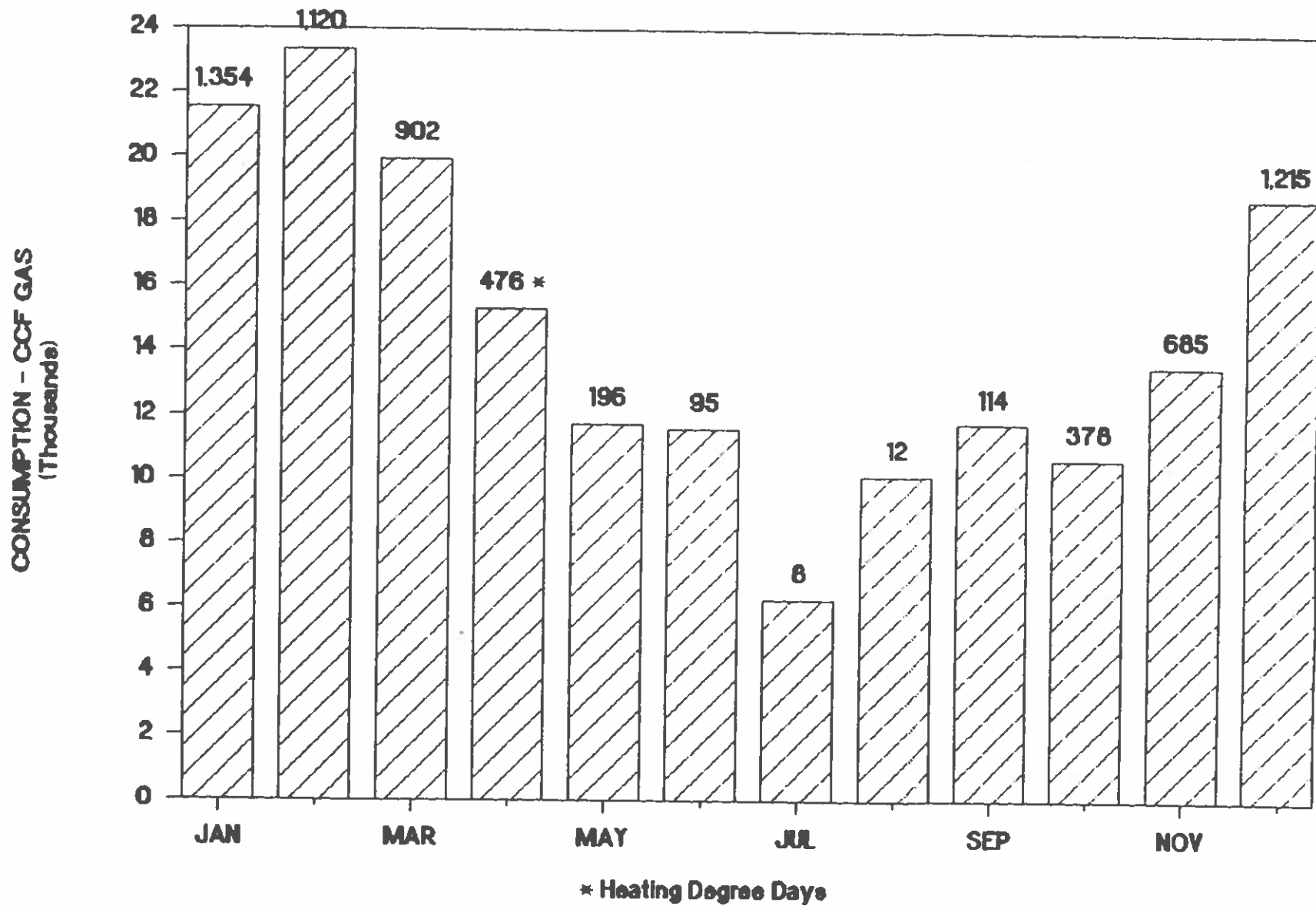
ESTIMATED BOILER EFF : 65%
% INTERNAL USE TO DH: 100%

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,172	19,280	1,976.2	31	63.7
FEB.	987	19,190	1,967.0	28	70.2
MAR.	868	16,710	1,712.8	31	55.3
APR.	636	16,600	1,701.5	30	56.7
MAY.	342	12,620	1,293.6	31	41.7
JUNE	71	11,280	1,156.2	30	38.5
*JULY	5	5,460	559.7	31	18.1
*AUG.	10	8,840	906.1	31	27.2
SEP.	125	10,640	1,090.6	30	36.4
OCT.	418	11,360	1,164.4	31	37.6
NOV.	722	13,510	1,384.8	30	46.2
DEC.	1,304	16,200	1,660.5	31	53.6
TOTAL	6,660	161,690	16,573.2	365	

DISTRICT HEATING LOADS

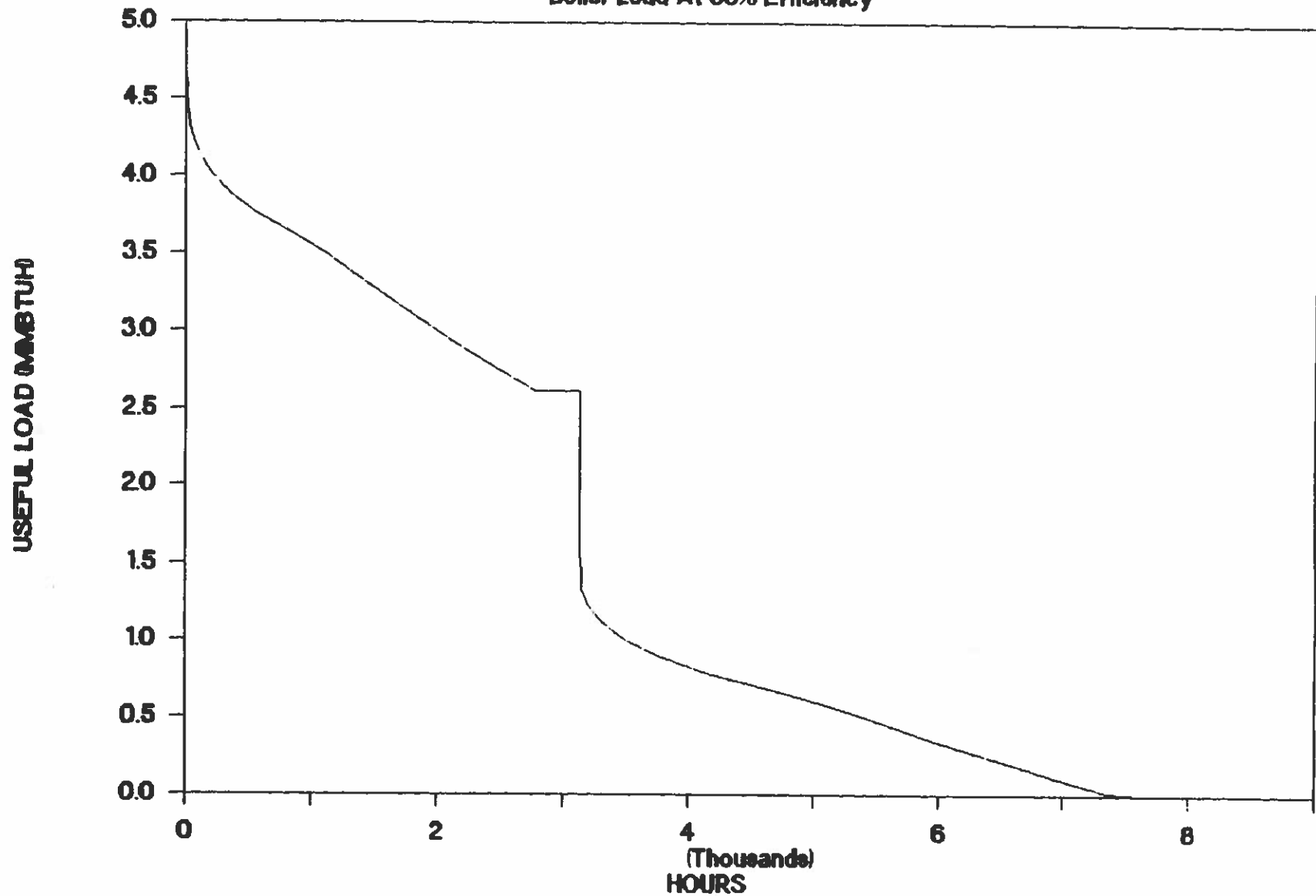
	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	15.37
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	5,608.86
PEAK VENT. LOAD DIRECT FIRED (MMBTU/HR):	0.42	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	508.87	0.00	508.87
PEAK ENVELOPE LOSSES (MMBTU/HR):	2.03	1.96	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	1,805.60	2,944.68	4,750.29
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	2,314.47	2,944.68	5,259.15
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	2.44	1.96	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	4.24	1.96	N/A

JAMESTOWN METAL MFG. 1985 GAS USE



JAMESTOWN METAL MFG. LOAD PROFILE

Boller Load At 65% Efficiency



JAMESTOWN METAL PRODUCTS-GAS USAGE (CCF) HISTORY

	1986	1985 *	1984
JAN	17,241	15,314	15,944
FEB	17,099	17,398	13,050
MAR	12,106	13,385	14,220
APR	9,329	8,516	9,574
MAY	5,038	6,829	6,049
JUN	3,843	5,203	3,877
JUL	3,027	3,840	2,825
AUG	2,290	4,482	3,420
SEP	4,877	7,991	4,107
OCT	10,040	7,991	5,737
NOV	14,552	10,367	11,071
DEC	16,324	16,727	13,050
TOTAL	115,766	118,043	102,924

LOAD ANALYSIS SUMMARY (65% Boiler Eff) (Note: 10% of Annual Usage Assumed to be Bake Ovens)

Peak (mmbtuh)	1986	1985 *	1984
Internal:	0.79	1.34	0.96
Space Heating:	2.33	1.92	1.83
Total:	3.12	3.26	2.79
Annual Load (mmbtu)			
Internal:	1,656	2,795	1,995
Space Heating:	5,306	4,303	4,197
Total:	6,962	7,098	6,192

* Used In District System Analysis

LOAD ANALYSIS
for
JAMESTOWN METAL PRODUCTS
(ASSUMED 10% OF USAGE IS IN BAKE OVEN)

YEAR:	1986	
HEATING SEASON HDD:	6491	
DAYS IN SEASON:	273	
AVG. OUTSIDE TEMP (DEG. F):	41.2	
OUTSIDE DESIGN TEMP (DEG. F):	3	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	68	
INTERNAL TEMP GAIN (DEG. F):	5	
VENTILATION (CFM):	2000	ESTIMATED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	63	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ESTIMATED
ESTIMATED BOILER EFF:	65%	
% INTERNAL USE TO DH:	100%	

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,215	16276	1,668.3	31	53.8
FEB.	1,128	16134	1,653.8	28	59.1
MAR.	885	11141	1,142.0	31	36.8
APR.	519	8364	857.3	30	28.6
MAY.	197	4073	417.5	31	13.5
*JUNE	80	2878	295.0	30	9.8
*JULY	4	2062	211.4	31	6.8
*AUG.	42	1325	135.8	31	4.4
SEP.	137	3912	401.0	30	13.4
OCT.	430	9075	930.2	31	30.0
NOV.	811	13587	1,392.7	30	46.4
DEC.	1,169	15359	1,574.3	31	50.8
TOTAL	6,617	104,189	10,679.4	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	4.54
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	1,656.24
PEAK VENTILATION LOAD (MMBTU/HR):	0.14	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	110.30	0.00	110.30
PEAK ENVELOPE LOSSES (MMBTU/HR):	2.18	2.18	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	1,237.09	3,958.68	5,195.76
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	1,347.39	3,958.68	5,306.06
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	2.33	2.18	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	3.12	2.18	N/A

LOAD ANALYSIS
for
JAMESTOWN METAL PRODUCTS
(ASSUMED 10% OF USAGE IS IN BAKE OVEN)

YEAR:	1985	
HEATING SEASON HDD:	6440	
DAYS IN SEASON:	273	
AVG. OUTSIDE TEMP (DEG. F):	41.4	
OUTSIDE DESIGN TEMP (DEG. F):	3	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	68	
INTERNAL TEMP GAIN (DEG. F):	5	
VENTILATION (CFM):	2000	ESTIMATED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	63	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ESTIMATED
ESTIMATED BOILER EFF:	65%	
% INTERNAL USE TO DH:	100%	

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,354	14330	1,468.9	31	47.4
FEB.	1,120	16414	1,682.5	28	60.1
MAR.	902	12401	1,271.1	31	41.0
APR.	476	7532	772.1	30	25.7
MAY.	196	5845	599.1	31	19.3
*JUNE	95	4219	432.5	30	14.4
*JULY	8	2856	292.8	31	9.4
*AUG.	12	3498	358.6	31	11.6
SEP.	114	7007	718.2	30	23.9
OCT.	378	7007	718.2	31	23.2
NOV.	685	9383	961.8	30	32.1
DEC.	1,215	15743	1,613.7	31	52.1
TOTAL	6,555	106,239	10,889.5	365	

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	7.66
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	2,794.98
PEAK VENTILATION LOAD (MMBTU/HR):	0.14	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	109.77	0.00	109.77
PEAK ENVELOPE LOSSES (MMBTU/HR):	1.78	1.78	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	998.57	3,195.42	4,193.99
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	1,108.34	3,195.42	4,303.76
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	1.92	1.78	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	3.26	1.78	N/A

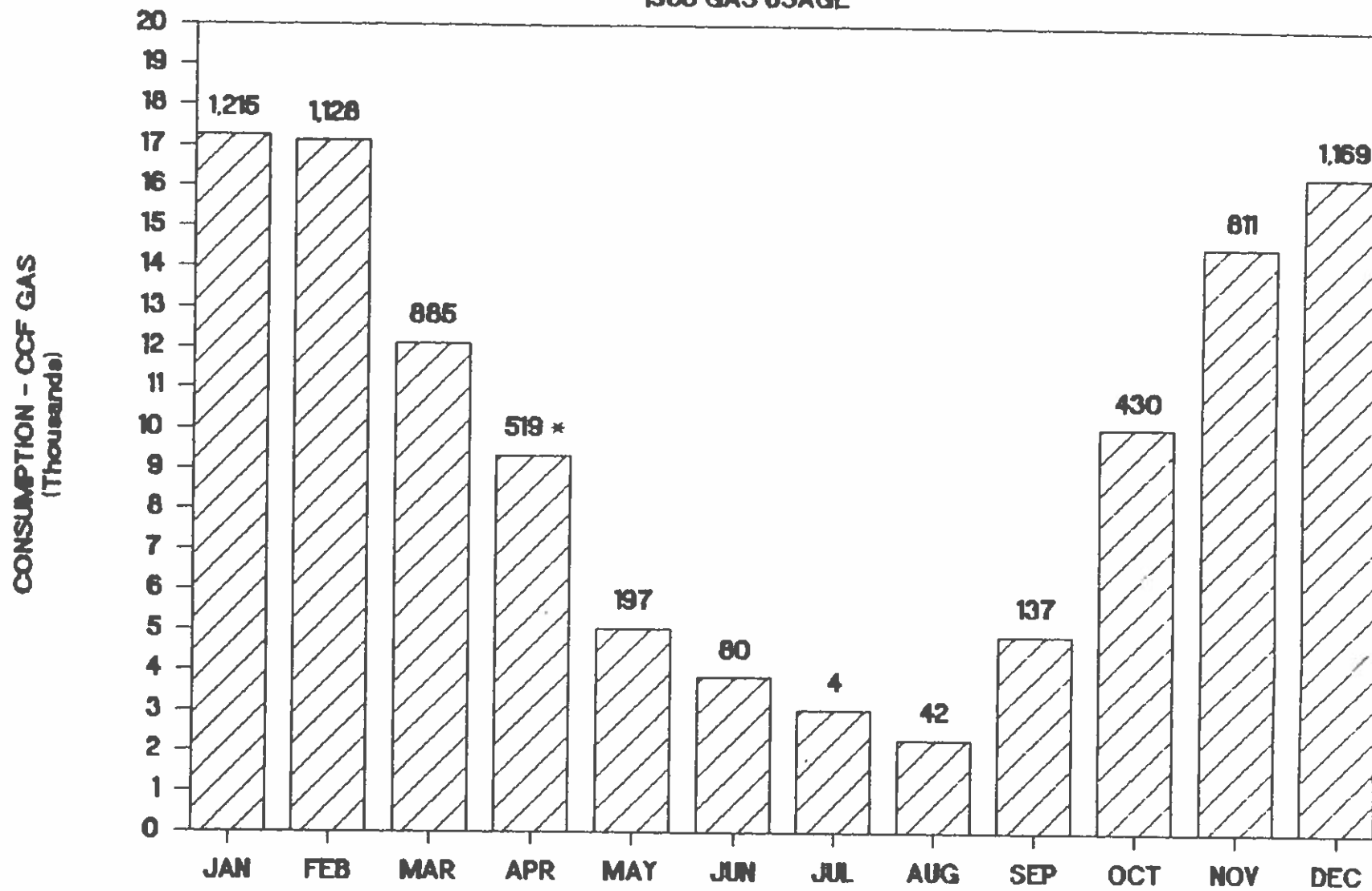
LOAD ANALYSIS
for
JAMESTOWN METAL PRODUCTS
(ASSUMED 10% OF USAGE IS IN BAKE OVEN)

YEAR:	1984	
HEATING SEASON HDD:	6597	
DAYS IN SEASON:	273	
AVG. OUTSIDE TEMP (DEG. F):	40.8	
OUTSIDE DESIGN TEMP (DEG. F):	3	
NORMAL HOURS PER WEEK:	40	
COMFORT SETTING (DEG. F):	68	
INTERNAL TEMP GAIN (DEG. F):	5	
VENTILATION (CFM):	2000	ESTIMATED
SET-BACK HOURS PER WEEK:	128	
COMFORT SETTING (DEG. F):	63	
INTERNAL TEMP GAIN (DEG. F):	0	
VENTILATION (CFM):	0	ESTIMATED
ESTIMATED BOILER EFF:	65%	
% INTERNAL USE TO DH:	100%	

-----CURRENT ENERGY USAGE-----					
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)
JAN.	1,378	15086	1,546.3	31	49.9
FEB.	899	12192	1,249.7	28	44.6
MAR.	1,167	13362	1,369.6	31	44.2
APR.	519	8716	893.4	30	29.8
MAY.	385	5191	532.1	31	17.2
*JUNE	35	3019	309.5	30	10.3
*JULY	11	1967	201.6	31	6.5
*AUG.	22	2562	262.6	31	8.5
SEP.	210	3249	333.1	30	11.1
OCT.	360	4879	500.1	31	16.1
NOV.	774	10213	1,046.9	30	34.9
DEC.	905	12192	1,249.7	31	40.3
TOTAL	6,665	92,632	9,494.7	365	
DISTRICT HEATING LOADS			NORMAL	SETBACK	TOTAL
-----			-----	-----	-----
DAILY INTERNAL USE (MMBTU/DAY):			N/A	N/A	5.47
ANNUAL INTERNAL USE (MMBTU):			N/A	N/A	1,995.38
PEAK VENTILATION LOAD (MMBTU/HR):			0.14	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):			111.40	0.00	111.40
PEAK ENVELOPE LOSSES (MMBTU/HR):			1.69	1.69	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):			972.78	3,112.90	4,085.68
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):			1,084.18	3,112.90	4,197.09
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):			1.83	1.69	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):			2.79	1.69	N/A

JAMESTOWN METAL PRODUCTS

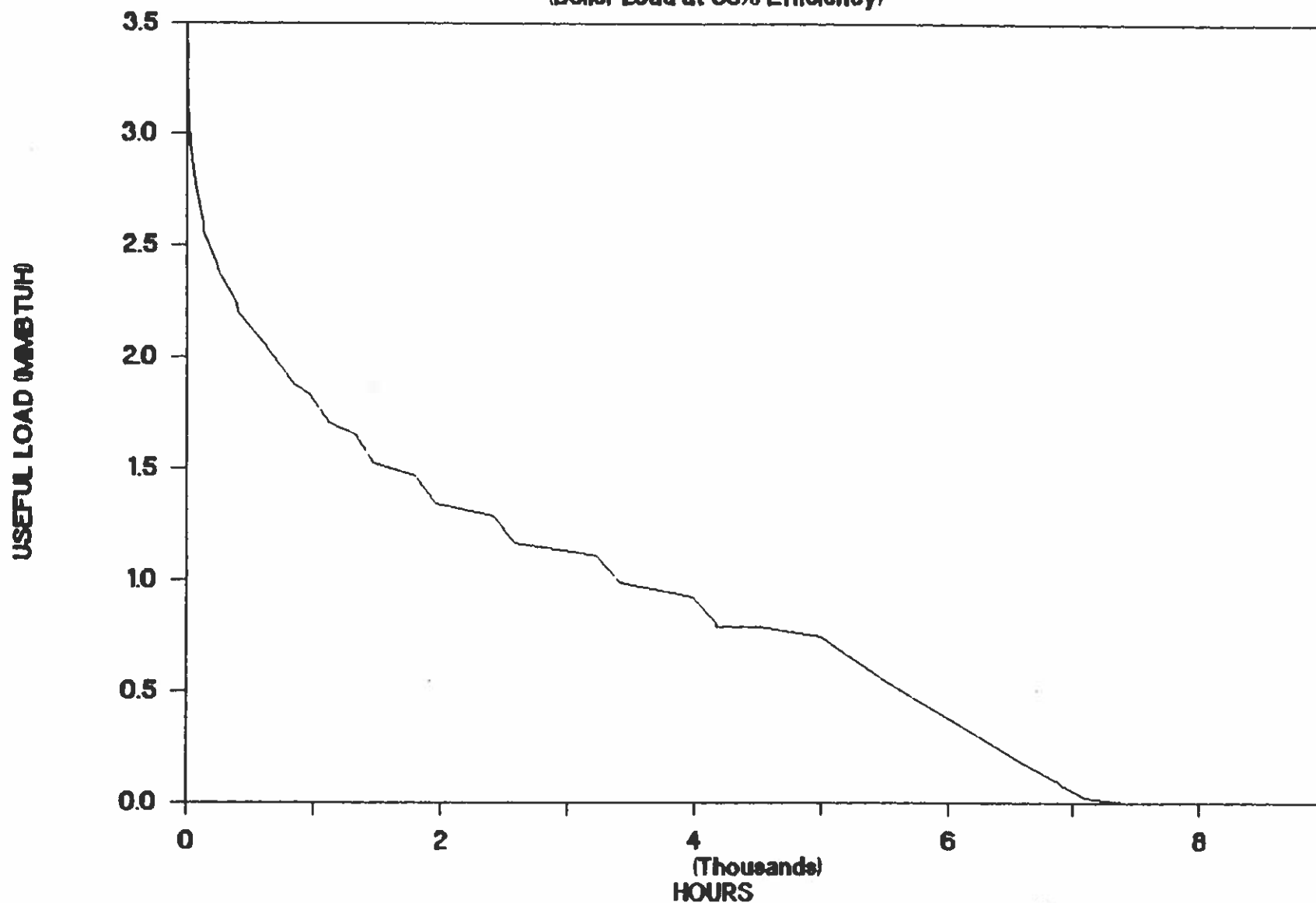
1986 GAS USAGE



* Heating Degree Days

JAMESTOWN METAL PRODUCTS LOAD PROFILE

(Boiler Load at 65% Efficiency)



BLACKSTONE GAS USAGE BREAKDOWN
(All Usages in Hundred Cubic Feet)

PERIOD	TOTAL GAS CONSUMPTION	OVENS ESTIMATE	TOTAL PROCESS	CONVERTIBLE PROCESS	HEATING
JAN 86	350,370	75,000	153,080	78,080	197,290
FEB 86	361,150	75,000	144,500	69,500	216,650
MAR 86	302,520	75,000	168,690	93,690	133,830
APR 86	225,640	75,000	140,800	65,800	84,840
MAY 86	182,790	75,000	148,620	73,620	34,170
JUN 86	159,690	75,000	148,920	73,920	10,770
JUL 85	153,420	75,000	153,420	78,420	0
AUG 85	116,840	75,000	116,000	41,000	840
SEP 85	184,870	75,000	167,870	92,870	17,000
OCT 85	228,880	75,000	181,240	106,240	47,640
NOV 85	233,480	75,000	119,180	44,180	114,300
DEC 85	375,330	75,000	149,920	74,920	225,410
Total Usage:	2,874,980	900,000	1,792,240	892,240	1,082,740

USEFUL LOAD ANALYSIS SUMMARY
(At 65% Boiler Efficiency, 88% Direct Fired Efficiency)

	Peak Load (mmbtuh)	Annual Load (mmbtu)
Makeup Air (Direct Fired):	33.26	69,871
Space Heating (Direct Fired):	11.66	27,942
Internal Process (Boiler):	9.65	54,174
Totals:	54.57	151,987

LOAD ANALYSIS
for
BLACKSTONE MANUFACTURING

YEAR: 1985/1986
HEATING SEASON HDD: 6388
DAYS IN SEASON: 273
AVG. OUTSIDE TEMP (DEG. F): 41.6
OUTSIDE DESIGN TEMP (DEG. F): 3

NORMAL HOURS PER WEEK: 108
COMFORT SETTING (DEG. F): 70
INTERNAL TEMP GAIN (DEG. F): 5
O.A. VENTILATION (CFM): 587,000

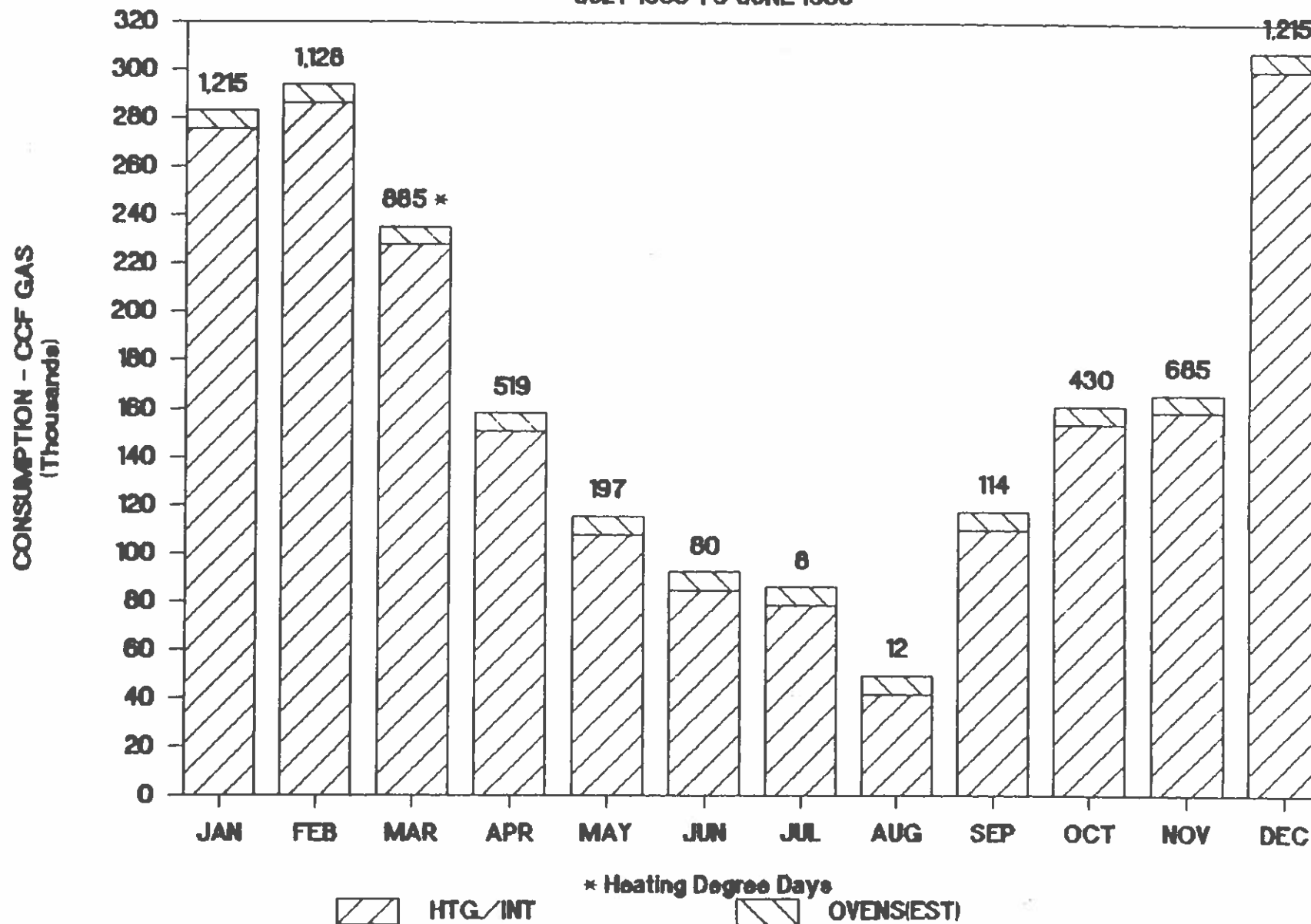
SET-BACK HOURS PER WEEK: 60
COMFORT SETTING (DEG. F): 63
INTERNAL TEMP GAIN (DEG. F): 0
VENTILATION (CFM): 0
ESTIMATED PROCESS BOILER EFF: 65%
ESTIMATED DIRECT FIRE EFF: 88%
% INTERNAL USE TO DH: 100%

-----CURRENT ENERGY USAGE-----						
BILLING MONTH	HEATING DEG. DAYS	NAT GAS (CCF)	QUANTITY (MMBTU)	BILLING DAYS	AVG. DAILY USE (MMBTU)	
JAN.	1,215	275,370	28,225.4	31	910.5	
FEB.	1,128	286,150	29,330.4	28	1047.5	
MAR.	885	227,520	23,320.8	31	752.3	
APR.	519	150,640	15,440.6	30	514.7	
MAY.	197	107,790	11,048.5	31	356.4	
*JUNE	80	84,690	8,680.7	30	289.4	
* 1985 JULY	8	78,420	8,038.0	31	259.3	
* 1985 AUG.	12	41,840	4,288.6	31	138.3	
1985 SEP.	114	109,870	11,261.7	30	375.4	
1985 OCT.	430	153,880	15,772.7	31	508.8	
1985 NOV.	685	158,480	16,244.2	30	541.5	
1985 DEC.	1,215	300,330	30,783.8	31	993.0	
TOTAL	6,488	1,974,980	202,435.4	365		

DISTRICT HEATING LOADS	NORMAL	SETBACK	TOTAL
DAILY INTERNAL USE (MMBTU/DAY):	N/A	N/A	148.42
ANNUAL INTERNAL USE (MMBTU):	N/A	N/A	54,173.91
PEAK VENTILATION LOAD-RECIRC. (MMBTU/H):	10.10		
PEAK VENTILATION LOAD-100% O.A (MMBTU/HR):	33.26	0.00	N/A
ANNUAL VENTILATION LOAD (MMBTU):	69,870.69	0.00	69,870.69
PEAK ENVELOPE LOSSES (MMBTU/HR):	11.66	11.28	N/A
ANNUAL ENVELOPE LOSSES (MMBTU):	18,528.50	9,413.79	27,942.29
TOTAL ANNUAL COMFORT HEAT (VENTILATION & ENVELOPE) (MMBTU):	88,399.20	9,413.79	97,812.99
PEAK COMFORT HEAT LOAD (VENTILATION & ENVELOPE) (MMBTU/HR):	44.92	11.28	N/A
PEAK DISTRICT HEATING LOAD (COMFORT HEAT & INTERNAL) (MMBTU/HR):	54.57	11.28	N/A

BLACKSTONE MFG. GAS USAGE

JULY 1985 TO JUNE 1986



There are four main types of BTU meters available on the market today. Each type has its own advantages in terms of reliability, accuracy, first cost, and rangeability. The type which has the lowest first cost is not the most accurate. The most accurate types are more complex and reliability and maintainability often suffers. Generally, as a meter is made to be more accurate it usually does so over a smaller range. When a prospective customer applies for a district heating service connection a meter must be selected and sized for the load characteristics. This meter should be capable of accurately measuring the customers' peak and off-peak loads. However, if the customer primarily uses district energy for heating purposes then the summer time load will be very small if any. Depending on the size of the load to be measured all types of flow meters will not provide an acceptable registration flow measuring capability, when operating below 10 to 15 percent of maximum rated capacity. When the customer is operating under light load or in the 10 to 15 percent range, flow meters have been found to read low in the customers favor.

This can be a major problem for the system owner. During the early fall and late spring the customers have a low demand at the same time when the district system is running at its lowest efficiency. Thus, the systems' least efficient time of operation parallels the time of least accurate meter readings. On a large system this could amount to a sizeable amount of lost revenue. A common solution for this problem is to install two meters, one for peak load and a second one for low load condition. If, due to process or steam absorption chiller load, the customer has a steady load that remains within the accurate operating range of one meter size then two meters would not be necessary.

A new problem then exists as to when and how each meter is placed in operation. For example, during periods of transition from low to high load the need for low load meter during the daytime (when the sun is out) is often displaced by the need for the high load meter during the night when it is colder. Since the meters are property of the district system owner the switching of one to another should be done by authorized personnel only. A typical industrial user does not

have a dedicated, 24 hour boiler man. A maintenance man will spend 20% of his time on the entire heating system and the rest will be spent on repair of machinery and related items in the plant. As a district heating customer the business' maintenance department cannot be asked to spend more time on the heating system than they presently spend.

An electronic transferring device can solve the problem of how to automatically switch from low to high demand and vice versa without requiring any manpower. A pressure differential switch is set through a time delay device to trigger a switching mechanism. The purpose of the delay device is to avoid minor fluctuations from affecting the switching device. Once it is determined that the high demand meter should be activated, the time delay device intercepts the signal to slow the transfer action thus causing the high demand valve to slowly open in a safe, quiet manner. This same signal is used to tell the low load valve to close. It can even be set up so that if the high demand meter setpoint is exceeded the low demand unit could run parallel to the high demand unit to give an even higher flow metering capability.

The low demand meter is not generally needed during the winter months unless an extremely warm day occurs. The savings realized through previously un-metered energy usage will predominantly occur during June, July, August and September. A test situation was developed by the Boston Edison Steam Heat Group and Spence Engineering Co., Inc. Approximately 11.7% steam used previously unmetered was observed in November, 1984 for one customer. This data, when extrapolated for the four summer months in mind, would have resulted in 1,521 MMBtu unmetered steam use. At a rate of \$5.00/MMBtu this amounts to \$7,600. This amount spread out over several customers would justify a one to two year payback for the extra money spent on a low load meter with its electronic transfer device.

Two alternatives for connecting each customer were considered in this study. Figure 8-1 showed the Direct Steam Fed System makes it necessary to provide a steam flow meter(s) to register the steam usage and, since the customers

existing steam piping would be utilized, a condensate flowmeter would also be necessary. The purpose of the second meter is to account for steam losses within the building either due to faulty steam traps or actual live steam usage. These steam losses will increase the amount of cold water make-up to the districts' heat generator and fuel usage since the makeup water has to be heated over a greater temperature difference.

Figure 8-1 also showed an indirect steam system using a Steam-to-Steam Converter. In this case there is no possibility of the customer losing the districts' steam so a condensate meter will be all that is needed. This type of meter is more accurate and less expensive than a comparable steam unit.

In both cases however, the need to install high and low load metering arrangements would require detailed evaluation prior to implementation.

APPENDIX D

SYSTEM ECONOMIC ANALYSIS

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES

LEADING DATE 3 71 45.607

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES

Start of Evaluation	1985	Case MS1									
Unit Costs	1985	Escalation	Heat Source -		Boilers/ST Cogen		Econ. Life - yrs				
			Avg. Heat Rate - Btu/KWh		12.475		Income Tax Rate - %				
			Peak Electric Output - KW		8,140 (2 Units)		Tax Credit - %				
			Boiler Efficiency - %		85.0%		Tax Life - yrs				
			Cogen Capacity Factor		90%		Accel. Tax Deprac.				
							Property Tax - %				
							Insurance Rate - %				
							Cost of Capital - %				
Year	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	
A. Annual Quantities											
1. District Heat - Mbtu/yr	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051	
2. Heated Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0	
3. Power Generated - MWh/yr	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	
4. Auxiliary Power - MWh/yr	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0	
6. Power Sold - MWh/yr	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	
7. Power Purchased - MWh/yr	285	285	285	285	285	285	285	285	285	285	
8. O&M Labor - Man/yr	9	9	9	9	9	9	9	9	9	9	
9. O&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	
10. Fuel - Mbtu/yr	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	
B. Unit Costs											
1. Power Purchased - \$/MWh	48.12	48.07	49.95	51.95	54.03	56.19	58.44	60.77	63.21	65.77	
2. Power Sold - \$/MWh	48.12	48.07	49.95	51.95	54.03	56.19	58.44	60.77	63.21	65.77	
3. O&M Labor - \$1000/Man/yr	38	40	42	47	45	47	49	51	53	55	
4. Fuel - \$/Mbtu	4.17	4.34	4.51	4.69	4.85	5.08	5.25	5.49	5.71	5.94	
5. Carrying Charges - \$1000/yr	1066	1028	1010	987	955	928	900	877	848	819	
C. Operating Expenses - \$1000											
1. Power Purchased	13	14	14	15	15	16	17	17	18	19	
2. O&M	670	655	681	705	727	766	797	829	862	896	
3. Fuel Cost	3532	3673	3820	3973	4131	4297	4469	4647	4830	5018	
Sub- Total	4174	4341	4515	4696	4884	5079	5282	5493	5710	5940	
6. Power Sold - \$1000/yr	2413	2509	2609	2714	2822	2935	3053	3175	3302	3434	
7. Required Revenues- \$1000/yr	2627	2870	2916	2985	3017	3072	3130	3191	3257	3326	
D. Unit Cost of Heat - \$/Mbtu											
1. Fixed Expenses	\$1.84	\$1.77	\$1.71	\$1.64	\$1.58	\$1.52	\$1.46	\$1.40	\$1.35	\$1.29	
2. O & M Expenses	\$1.11	\$1.14	\$1.18	\$1.21	\$1.25	\$1.28	\$1.32	\$1.36	\$1.40	\$1.44	
3. Fuel	\$6.11	\$6.28	\$6.46	\$6.65	\$6.84	\$7.04	\$7.25	\$7.47	\$7.69	\$7.92	
Total	\$9.06	\$9.20	\$9.35	\$9.50	\$9.67	\$9.84	\$10.03	\$10.23	\$10.44	\$10.66	

LEVELIZED RATE @ 7%

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES

Phase	Year Investment		Economic Factors				Case #31			
1	1989	1989	Preferred Stock Ratio	0	Book Life - yrs	20				
2	1990	1990	Return on Preferred Stock - %	0	Income Tax Rate - %	0				
3	1991	1991	Common Stock Ratio	0	Tax Credit - %	0				
4	1992	0	Return on Common Stock - %	0	Tax Life - yrs	15				
			Debt Ratio	1	Accelerated Tax Depreciation	0				
			Debt Cost - %	7	Property Tax - %	0				
			Weighted Cost of Capital - %	7	Insurance Rate - %	1.75				

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1766	7400	11495	11092	10696	10395	9912	9516	9125	8771
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	133	515	504	776	749	721	694	666	637	611
Book Depreciation	26	249	393	393	393	393	393	393	393	393
Tax Depreciation	17630	17630	17630	17630	17630	17630	17630	17630	17630	17630
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	56	85	86	88	88	88	88	88	88
Annual Carrying Charges	218	823	1286	1252	1271	1203	1175	1145	1121	1090

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	8706	7945	7552	7159	6765	6372	5979	5585	5192	4799
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	564	556	529	501	474	446	419	391	363	336
Book Depreciation	393	393	393	393	393	393	393	393	393	393
Tax Depreciation	17630	17630	17630	17630	17630	17630	17630	17630	17630	17630
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	86	88	86	88	88	88	88	86	86	86
Annual Carrying Charges	1066	1038	1010	983	955	926	900	873	845	816

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES

Investment	1	Phase 1	Economic Factors: Case M51		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$1,625	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	0
AFDC - \$1000	65	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	1966			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1966	1901	1835	1769	1704	1638	1573	1507	1442	1376
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	138	133	128	124	119	115	110	106	101	96
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	218	213	209	204	200	195	190	186	181	177

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1311	1245	1180	1114	1049	983	918	852	786	721
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	92	87	83	78	73	69	64	60	55	50
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	172	167	163	158	154	149	145	140	135	131

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES

Investment	2	Phase 2	Economic Factors	Case MS1	
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1989	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	44,915	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	401	Debt Ratio	1	Accelerated Tax Depreciation	0
AFDC - \$1000	187	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	5499			Insurance Rate - %	1.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	5499	5315	5132	4949	4766	4583	4399	4216	4032
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	355	372	359	346	334	321	308	295	282
Book Depreciation	0	187	183	183	183	183	183	183	183	183
Tax Depreciation	0	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	0	589	557	554	571	552	545	533	520	507

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3849	3666	3482	3300	3116	2932	2750	2566	2383	2200
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	269	257	244	231	218	205	192	180	167	154
Book Depreciation	183	187	183	183	183	183	183	183	183	183
Tax Depreciation	10080	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	41	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	494	481	468	456	443	430	417	404	391	378

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES

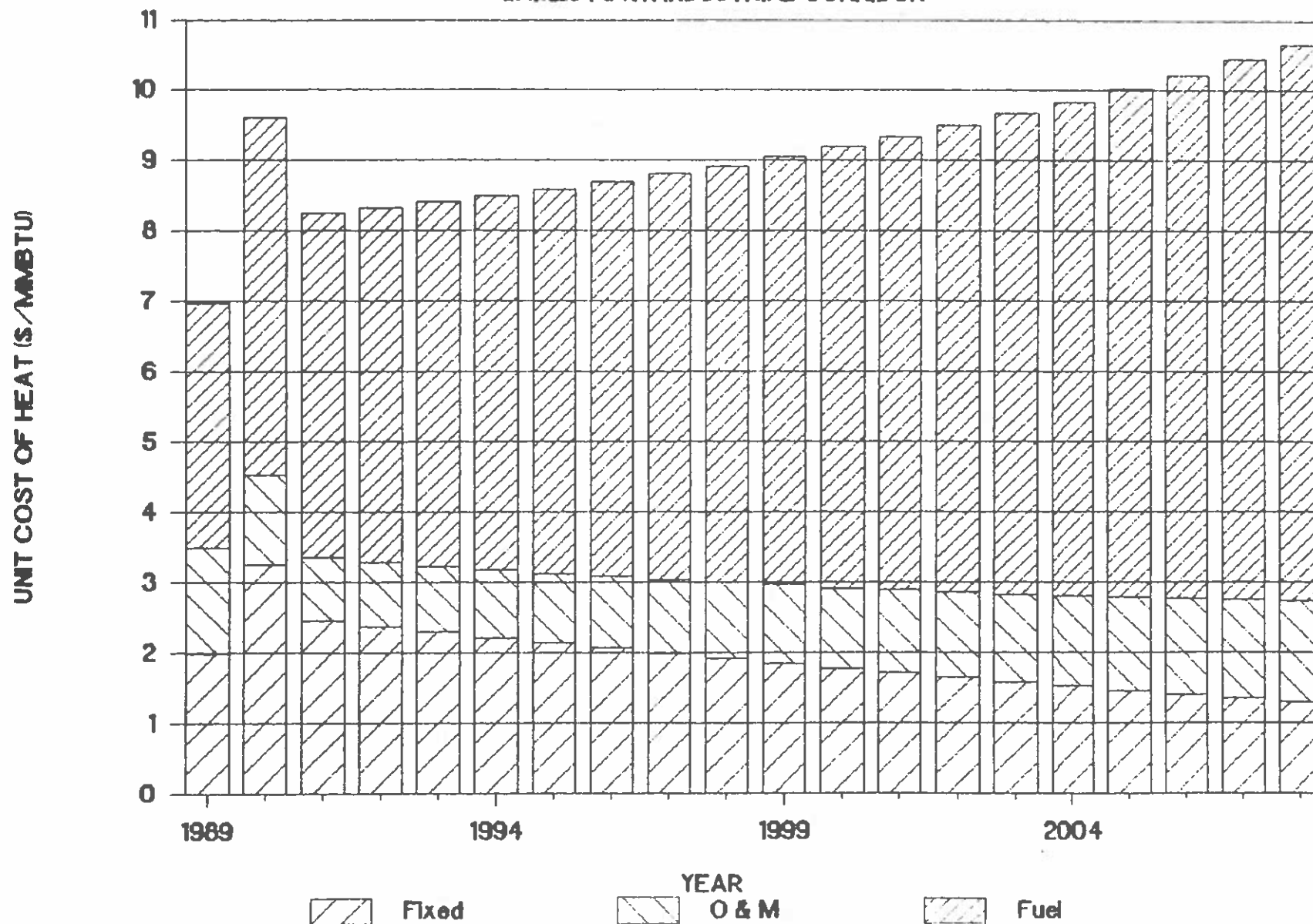
Investment	3	Phase 3	Economic Factors	Case MS1	
Initial Operation	1991	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$3,725	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	465	Debt Ratio	1	Accelerated Tax Depreciation	0
AFSC - \$1000	144	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	4334			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	0	4334	4190	4045	3901	3756	3612	3467	3322
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	0	302	293	283	273	263	253	243	232
Book Depreciation	0	0	144	144	144	144	144	144	144	144
Tax Depreciation	0	0	6261	6261	6261	6261	6261	6261	6261	6261
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	0	33	33	33	33	33	33	33	33
Annual Carrying Charges	0	0	480	470	460	450	440	430	420	410

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3178	3034	2889	2745	2600	2456	2311	2167	2023	1878
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	222	212	202	192	182	172	162	152	142	131
Book Depreciation	144	144	144	144	144	144	144	144	144	144
Tax Depreciation	6261	6261	6261	6261	6261	6261	6261	6261	6261	6261
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	33	33	33	33	33	33	33	33	33	33
Annual Carrying Charges	399	389	379	369	359	349	339	329	319	308

UNIT COST OF DISTRICT HEAT - CASEMS1

JAMESTOWN INDUSTRIAL CORRIDOR



**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

MUNICIPAL OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

Start of Evaluation 1989

Case #52

Unit Costs	1989	Escalation	Heat Source -	Boilers/GT Cogen	Boiler Life - yrs
Dist. Purch. - \$/MWh	20.00	4.0	Avg. Heat Rate - Btu/kWh	12,475	Income Tax Rate - %
Elect. Sold - \$/MWh	20.00	4.0	Peak Electric Output - kW	4,070	Tax Credit - %
O&M Labor - \$/Man-yr	25,000	4.0	Boiling/Backup Boiler Eff. - %	85.0%	Tax Life - yrs
O&M Materials - % Cost	1.7	4.0	Cogen Capacity Factor	50%	Accel. Tax Deprec.
Property Taxes - %	0	2.5			Property Tax - %
Fuel - \$/MBtu	2.71	4.0			Insurance Rate - %
					Cost of Capital - %

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
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A. Annual Quantities

1. District Heat - Mbtu/yr	110,359	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546
4. Auxiliary Power - MWh/yr	105	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069
7. Power Purchased - MWh/yr	100	148	148	148	148	148	148	148	148	148
8. O&M Labor - Man/yr	5	7	7	7	7	7	7	7	7	7
9. O&M Materials - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	179,315	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688

B. Unit Costs

1. Power Purchased - \$/MWh	21.20	22.45	23.75	25.10	26.50	27.96	29.46	31.00	32.59	34.21
2. Power Sold - \$/MWh	21.20	22.45	23.75	25.10	26.50	27.96	29.46	31.00	32.59	34.21
3. O&M Labor - \$/1000 Man-yr	25	27	28	29	30	32	33	34	36	37
4. Fuel - \$/MBtu	2.71	2.93	3.05	3.17	3.30	3.43	3.57	3.71	3.86	4.01

D. Carrying Charges - \$1000/yr	218	822	805	768	771	753	735	718	701	683
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C. Operating Expenses - \$1000/yr

1. Power Purchased	3	5	5	5	5	6	6	6	6	7
2. O&M	163	318	330	343	357	371	386	402	418	435
3. Fuel Cost	264	1286	1337	1391	1446	1504	1564	1627	1692	1759
Sub-Total	551	1608	1673	1739	1809	1881	1957	2035	2116	2201

E. Power Sold - \$1000/yr	0	846	880	915	951	990	1029	1070	1113	1158
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F. Required Revenues - \$1000/yr	769	1585	1558	1612	1628	1645	1663	1683	1704	1727
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G. Unit Cost of Heat - \$/MBtu

1. Fixed Expenses	\$1.77	\$3.25	\$3.15	\$3.05	\$2.95	\$2.85	\$2.76	\$2.66	\$2.57	\$2.48
2. O & M Expenses	\$1.51	\$1.27	\$1.31	\$1.35	\$1.39	\$1.43	\$1.47	\$1.51	\$1.56	\$1.60
3. Fuel	\$3.48	\$5.08	\$5.23	\$5.38	\$5.54	\$5.70	\$5.86	\$6.03	\$6.21	\$6.39
Total	\$6.77	\$9.61	\$9.69	\$9.78	\$9.87	\$9.98	\$10.09	\$10.21	\$10.33	\$10.47

LEVELIZED RATE @ 7%: \$10.252

ECONOMIC ANALYSIS OF DISTRICT HEATING FOR JAMESTOWN INDUSTRIAL CORRIDOR

MUNICIPAL OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

Start of Evaluation		1989		Case #32						
Unit Costs	1988	Evaluation	Heat Source -	Boilers/GT Cogen	Boiler/GT Cogen	Boiler/GT Cogen	Boiler/GT Cogen	Boiler/GT Cogen	Boiler/GT Cogen	Boiler/GT Cogen
			Avg. Heat Rate - Btu/KWh	17,473	17,473	17,473	17,473	17,473	17,473	17,473
Elect. Purch. - \$/MWh	20.00	4.0	Peak Electric Output - kW	4,070	4,070	4,070	4,070	4,070	4,070	4,070
Elect. Sold - \$/MWh	20.00	4.0	Feeding Back to Boiler Eff. - %	59.0%	59.0%	59.0%	59.0%	59.0%	59.0%	59.0%
O&M Labor - \$/Man/yr	25,000	4.0	Cogen Capacity Factor	50%	50%	50%	50%	50%	50%	50%
O&M Materials Cost	1.7	4.0								
Property Taxes - %	0	1.5								
Fuel - \$/MBtu	2.71	4.0								
Year	1988	2000	2001	2002	2003	2004	2005	2006	2007	2008
A. Annual Quantities										
1. District Heat - Mbtu/yr	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546
4. Auxiliary Power - MWh/yr	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
5. Peaking Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069
7. Power Purchased - MWh/yr	146	146	146	146	146	146	146	146	146	146
8. O&M Labor - Man/yr	7	7	7	7	7	7	7	7	7	7
9. O&M Materials Invest.	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
10. Fuel - Mbtu/yr	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688
B. Unit Costs										
1. Power Purchased - \$/MWh	46.18	46.07	46.05	46.05	46.07	46.19	46.44	46.77	47.21	47.77
2. Power Sold - \$/MWh	46.18	46.07	46.05	46.05	46.05	46.19	46.44	46.77	47.21	47.77
3. O&M Labor - \$/1000/Man/yr	35	40	42	43	45	47	49	51	53	55
4. Fuel - \$/MBtu	4.17	4.04	4.01	4.01	4.08	4.06	4.23	4.49	4.71	4.94
C. Lanning Charges - \$/1000/yr										
	600	646	651	654	676	679	682	644	627	614
D. Operating Expenses - \$/1000										
1. Power Purchased	7	7	7	8	8	8	8	9	9	10
2. O&M	452	470	489	506	529	550	571	595	619	647
3. Fuel Cost	1870	1903	1960	2059	2141	2227	2316	2406	2505	2605
Sub- Total	2289	2380	2476	2575	2676	2785	2896	3012	3137	3258
E. Power Sold - \$/1000/yr										
	1204	1252	1302	1354	1408	1465	1523	1584	1646	1714
F. Required Revenues - \$/1000/yr										
	1751	1777	1805	1834	1866	1899	1934	1972	2012	2054
G. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$2.39	\$2.31	\$2.32	\$2.14	\$2.06	\$1.98	\$1.90	\$1.83	\$1.76	\$1.68
2. O & M Expenses	\$1.65	\$1.70	\$1.75	\$1.80	\$1.85	\$1.91	\$1.97	\$2.03	\$2.09	\$2.16
3. Fuel	\$6.56	\$6.77	\$6.97	\$7.18	\$7.40	\$7.62	\$7.85	\$8.10	\$8.35	\$8.61
Total	\$10.61	\$10.78	\$11.04	\$11.12	\$11.31	\$11.51	\$11.73	\$11.98	\$12.20	\$12.45

LEVELIZED RATE @ 7%:

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

Phase	Year Investment	Economic Factors		Case #52
1	1989	1750	Preferred Stock Ratio	0
2	1990	5475	Return on Preferred Stock - %	0
3	1991	0	Common Stock Ratio	0
4	1992	0	Return on Common Stock - %	0
			Debt Ratio	1
			Debt Cost - %	7
			Weighted Cost of Capital - %	7
			Book Life - yrs	7
			Income Tax Rate - %	1
			Tax Credit - %	1
			Tax Life - yrs	1
			Accelerated Tax Depreciation	1
			Property Tax - %	1
			Insurance Rate - %	1.75

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1750	7400	7151	6902	6657	6404	6156	5907	5658	5409
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	175	515	501	487	466	445	421	417	396	375
Book Depreciation	0	249	249	249	249	249	249	249	249	249
Tax Depreciation	11369	11369	11369	11369	11369	11369	11369	11369	11369	11369
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	56	56	56	56	56	56	56	56	56
Annual Carrying Charges	215	623	605	588	571	553	536	518	501	482

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	5160	4911	4662	4414	4165	3916	3667	3418	3169	2921
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	361	244	326	309	292	274	257	239	221	204
Book Depreciation	249	249	249	249	249	249	249	249	249	249
Tax Depreciation	11369	11369	11369	11369	11369	11369	11369	11369	11369	11369
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	56	56	56	56	56	56	56	56	56	56
Annual Carrying Charges	666	649	631	614	596	579	562	544	527	509

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR
ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

Investment	1	Phase 1	Economic Factors: Case MS2		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	20
Cost Basis	1986	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$1,628	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.02	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	0
AFDC - \$1000	65	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	1966			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1966	1901	1835	1769	1704	1638	1573	1507	1442	1376
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	138	133	128	124	119	115	110	106	101	96
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	213	213	209	204	200	195	190	186	181	177

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1311	1245	1180	1114	1049	983	918	852	786	721
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	92	87	83	78	73	69	64	60	55	50
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	172	167	163	158	154	149	145	140	135	131

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

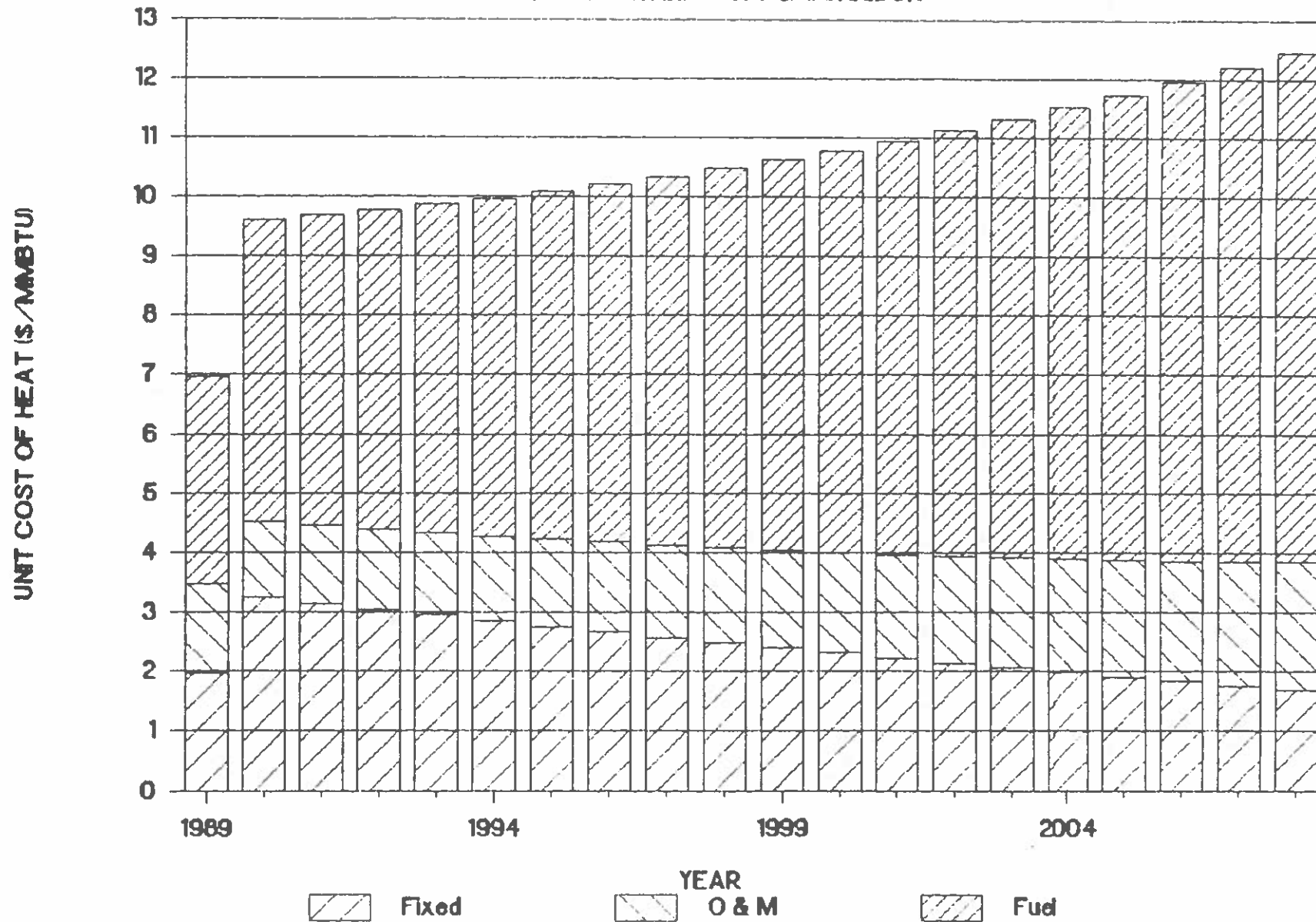
Investment	2	Phase 2	Economic Factors	Case #81	
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - Yrs	7
Cost Basis	1990	Return on Preferred Stock - %	0	Income Tax Rate - %	1
Capital Cost - \$1000	24,545	Common Stock Ratio	0	Tax Credit - %	1
Gen. Escalation -	4.00	Return on Common Stock - %	0	Tax Life - Yrs	1
Escalation - \$1000	401	Debt Ratio	1	Accelerated Tax Depreciation	0
APCC - \$1000	157	Debt Cost - %	7	Property Tax - %	1
Total Cost - \$1000	5499			Insurance Rate - %	1
Start of Evaluation	1999	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	5499	5316	5133	4949	4766	4582	4399	4216	4033
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	335	372	399	346	334	321	305	295	281
Book Depreciation	0	157	157	157	157	157	157	153	157	157
Tax Depreciation	0	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	0	609	597	584	571	558	545	533	520	507

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3849	3666	3482	3300	3116	2933	2750	2566	2382	2200
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	269	257	244	231	219	205	192	180	167	154
Book Depreciation	183	183	183	183	183	183	183	183	183	183
Tax Depreciation	10080	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	41	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	494	481	465	456	442	430	417	404	391	375

UNIT COST OF DISTRICT HEAT - CASE MS2

JAMESTOWN INDUSTRIAL CORRIDOR



LEVELLED RATE @ 7%: \$7.421

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

MUNICIPAL OWNERSHIP - THREE PHASES/BOILERS ONLY

Start of Evaluation	1989	Case M57								
Unit Costs	1988	Escalation	Heat Source -	BOILERS	Boiler Life - yrs	Income Tax Rate - %				
			Avg. Heat Rate - Btu/kWh	NA	NA	(Boiler Unit)	Tax Credit - %			
			Peak Electric Output - MW	NA	95.0%	NA	Tax Life - yrs			
			Boiler Efficiency - %	NA			Accel. Tax Deprec.			
			Boiler Capacity Factor	NA			Property Tax - %	Insurance Rate - %		
							Cost of Capital - %			
Year	1989	2000	2001	2002	2003	2004	2005	2006	2007	2008
A. Annual Quantities										
1. District Heat - MBtu/yr	312,501	312,501	312,501	312,501	312,501	312,501	312,501	312,501	312,501	312,501
2. Chilled Water - MBtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	0	0	0	0	0	0	0	0	0
4. Auxiliary Power - MWh/yr	267	267	267	267	267	267	267	267	267	267
5. Cooling Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	0	0	0	0	0	0	0	0	0
7. Power Purchased - MWh/yr	267	267	267	267	267	267	267	267	267	267
8. O&M Labor - Man/yr	7	7	7	7	7	7	7	7	7	7
9. O&M Material-Int. Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	386,031	386,031	386,031	386,031	386,031	386,031	386,031	386,031	386,031	386,031
B. Unit Costs										
1. Power Purchased - \$/MWh	46.18	46.63	49.95	51.95	54.03	56.19	58.44	60.77	63.21	65.73
2. Power Sold - \$/MWh	46.18	46.63	49.95	51.95	54.03	56.19	58.44	60.77	63.21	65.73
3. O&M Labor - \$1000/Man-yr	35	40	42	40	45	47	49	51	53	55
4. Fuel - \$/MBtu	4.17	4.34	4.51	4.65	4.86	5.06	5.28	5.49	5.71	5.94
5. Learning Charges - \$1000/yr	390	369	370	360	350	339	329	319	309	299
C. Operating Expenses - \$1000/yr										
1. Power Purchased	13	14	14	15	15	16	17	17	18	19
2. O&M	376	391	407	423	440	452	476	495	515	536
3. Fuel Cost	1610	1675	1742	1812	1884	1955	2038	2119	2204	2292
Sub-Total	2000	2080	2163	2250	2340	2433	2531	2632	2737	2847
6. Power Sold - \$1000/yr	0	0	0	0	0	0	0	0	0	0
8. Required Revenues- \$1000/yr	2790	2460	2533	2609	2689	2773	2860	2951	3046	3145
D. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$1.25	\$1.22	\$1.16	\$1.15	\$1.12	\$1.09	\$1.05	\$1.02	\$0.99	\$0.96
2. O & M Expenses	\$1.25	\$1.30	\$1.35	\$1.40	\$1.46	\$1.52	\$1.58	\$1.64	\$1.71	\$1.77
3. Fuel	\$5.15	\$5.36	\$5.57	\$5.80	\$6.03	\$6.27	\$6.52	\$6.78	\$7.05	\$7.34
Total	\$7.65	\$7.87	\$8.11	\$8.35	\$8.61	\$8.87	\$9.15	\$9.44	\$9.75	\$10.06

ECONOMIC ANALYSIS OF DISTRICT HEATING FOR

JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - THREE PHASES/BOILERS ONLY

Phase	Year Investment		Economic Factors				Case #33			
1	1989	1990	Preferred Stock Ratio	0	Book Life - Yrs	10				
2	1990	1991	Return on Preferred Stock - %	0	Income Tax Rate - %	1				
3	1991	1992	Common Stock Ratio	0	Tax Credit - %	1				
4	1992		Return on Common Stock - %	0	Tax Life - Yrs	10				
			Debt Ratio	1	Accelerated Tax Depreciation	0				
			Debt Cost - %	7	Property Tax - %	1				
			Weighted Cost of Capital - %	7	Insurance Rate - %	1.75				

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1980	3456	4192	4047	3501	3755	3609	3463	3317	3171
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	138	242	243	267	270	267	253	242	232	222
Book Depreciation	66	117	146	146	146	146	146	146	146	146
Tax Depreciation	1269	1195	2336	2336	2336	2336	2336	2336	2336	2336
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	36	37	33	33	33	37	37	37	37
Annual Carrying Charges	218	386	472	461	452	441	431	421	411	401

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3028	2880	2774	2688	2442	2296	2151	2005	1859	1717
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	212	202	191	181	171	161	151	140	130	120
Book Depreciation	146	146	146	146	146	146	146	146	146	146
Tax Depreciation	2336	2336	2336	2336	2336	2336	2336	2336	2336	2336
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	33	33	37	33	33	33	33	33	33	37
Annual Carrying Charges	390	380	370	360	350	339	329	319	309	299

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - THREE PHASES/BOILERS ONLY

Investment	1	Phase 1	Economic Factors: Case MSJ		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$1.828	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	15
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	0
AFDC - \$1000	65	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	1986			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1966	1901	1835	1769	1704	1638	1573	1507	1442	1376
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	138	133	128	124	119	115	110	106	101	96
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Acc. Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	218	213	209	204	200	195	190	186	181	177

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1311	1245	1180	1114	1049	983	918	852	786	721
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	92	87	83	78	73	69	64	60	55	50
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Acc. Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	172	167	163	158	154	149	145	140	135	131

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - THREE PHASES/BOILERS ONLY

Investment	1	Phase 2	Economic Factors	Case M2	
Initial Iteration	1990	Preferred Stock Ratio	0	Book Life - yrs	20
Cost Basis	1995	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$1,791	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - yrs	15
Escalation - \$1000	113	Debt Ratio	1	Accelerated Tax Depreciation	0
AFSC - \$1000	52	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	1555			Insurance Rate - %	0.75
Start of Evaluation	1999	Weighted Cost of Capital - %	7.00		

Year	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999
Remaining Book Value	1	1555	1504	1452	1400	1348	1296	1244	1192	1140
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	109	105	102	96	94	91	87	87	80
Book Depreciation	0	52	52	52	52	52	52	52	52	52
Tax Depreciation	0	806	806	806	806	806	806	806	806	806
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	0	172	165	165	162	158	154	151	147	140

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1069	1037	985	933	881	830	778	726	674	622
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	76	73	65	65	62	58	54	51	47	44
Book Depreciation	52	52	52	52	52	52	52	52	52	52
Tax Depreciation	806	806	806	806	806	806	806	806	806	806
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	12	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	140	136	132	129	125	122	118	114	111	107

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - THREE PHASES/BOILERS ONLY

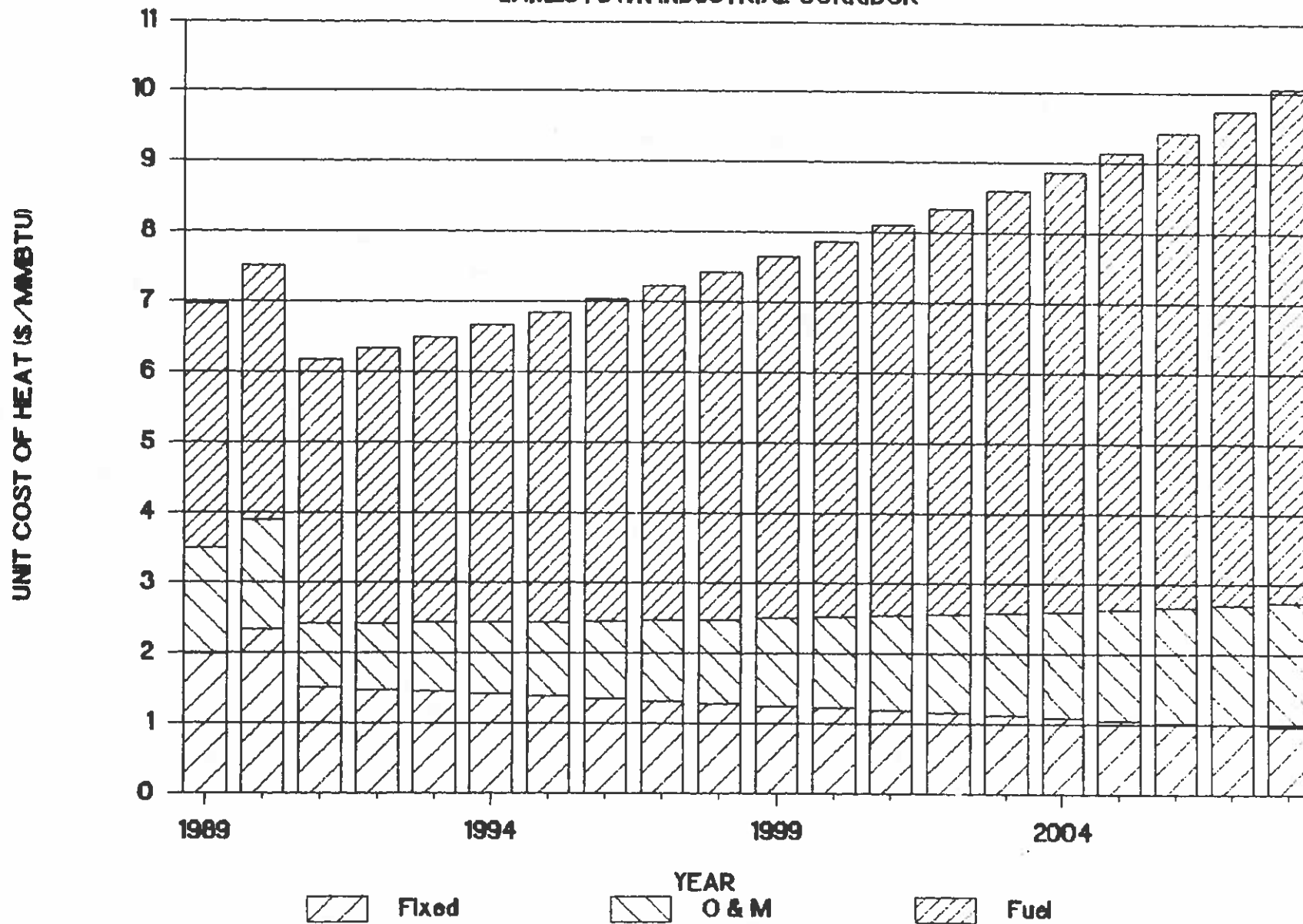
Investment	3	Phase 3	Economic Factors	Case M53	
Initial Operation	1991	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$734	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	92	Debt Ratio	1	Accelerated Tax Depreciation	0
FFC - \$1000	28	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	854			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	0	854	825	797	768	740	712	683	655
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	0	60	58	56	54	52	50	48	46
Book Depreciation	0	0	28	28	28	28	28	28	28	28
Tax Depreciation	0	0	243	243	243	243	243	243	243	243
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	0	6	6	6	6	6	6	6	6
Annual Carrying Charges	0	0	95	93	91	89	87	85	83	81

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	626	598	569	541	512	484	455	427	398	370
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	44	42	40	38	36	34	32	30	28	26
Book Depreciation	28	28	28	28	28	28	28	28	26	26
Tax Depreciation	243	243	243	243	243	243	243	243	243	243
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	6	6	6	6	6	6	6	6	6	6
Annual Carrying Charges	79	77	75	73	71	69	67	65	63	61

UNIT COST OF DISTRICT HEAT - CASE MS3

JAMESTOWN INDUSTRIAL CORRIDOR



**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - COGEN POWER \$1.00
Kv

Start of Evaluation	1988				Case M04	
Unit Costs	1988	Escalation	Heat Source -	Boilers, BT Cogen	Boiler Life - yrs	20
			Avg. Heat Rate - Btu/kWh	12,475	Income Tax Rate - %	1
Elect. Purch. - \$/MWh	35.40	4.0	Peak Electric Output - kW	8,140	Tax Credit - %	1
Elect. Sold - \$/MWh	35.40	4.0	Boiler Efficiency - %	85.00	Tax Life - yrs	15
O&M Labor - \$/Mannr	25.000	4.0	Cogen Capacity Factor	90%	Accel. Tax Deprec.	0
O&M Materials - % Cost	1.7	4.0			Property Tax - %	1
Procent. Taxes - %		2.5			Insurance Rate - %	0.75
Fuel - \$/Mbtu	2.71	4.0			Cost of Capital - %	10.00

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
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A. Annual Quantities

1. District Heat - Mbtu/yr	110,359	164,804	212,051	212,051	212,051	212,051	212,051	212,051	212,051	212,051
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	27,542	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092
4. Auxiliary Power - MWh/yr	100	1,477	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	25,065	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237
7. Power Purchased - MWh/yr	100	148	285	285	285	285	285	285	285	285
8. O&M Labor - Mannr/yr	5	7	9	9	9	9	9	9	9	9
9. O&M Material - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - Mbtu/yr	130,115	436,655	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502

B. Unit Costs

1. Power Purchased - \$/MWh	36.40	37.86	39.37	40.85	42.52	44.29	46.06	47.90	49.81	51.81
2. Power Sold - \$/MWh	36.40	37.86	39.37	40.85	42.52	44.29	46.06	47.90	49.81	51.81
3. O&M Labor - \$/Mannr	26	27	28	29	30	32	33	34	36	37
4. Fuel - \$/Mbtu	2.62	2.67	2.65	2.67	2.70	2.73	2.77	2.81	2.86	2.91

C. Carrying Charges - \$1000/yr

	218	627	1036	1258	1231	1293	1176	1148	1121	1090
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D. Operating Expenses - \$1000/yr

1. Power Purchased	4	6	11	12	12	13	13	14	14	15
2. O&M	163	318	469	479	493	518	538	560	562	606
3. Fuel Cost	384	1286	2580	2454	2791	2603	3019	3140	3265	3396
Sub- Total	551	1609	3051	3174	3301	3403	3570	3717	3862	4016

E. Power Sold - \$1000/yr

	0	987	2057	2139	2224	2313	2406	2502	2602	2706
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F. Required Revenues - \$1000/yr

	769	1445	2261	2293	2707	2323	2340	2359	2360	2402
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G. Unit Cost of Heat - \$/Mbtu

1. Fixed Expenses	\$1.67	\$2.96	\$2.17	\$2.09	\$2.01	\$1.97	\$1.86	\$1.75	\$1.72	\$1.65
2. O & M Expenses	\$1.51	\$1.16	\$0.79	\$0.81	\$0.93	\$0.85	\$0.87	\$0.89	\$0.91	\$0.92
3. Fuel	\$0.48	\$4.67	\$4.35	\$4.45	\$4.55	\$4.66	\$4.77	\$4.86	\$5.00	\$5.10
Total	\$6.97	\$8.76	\$7.31	\$7.35	\$7.39	\$7.44	\$7.50	\$7.56	\$7.63	\$7.70

LEVELIZED RATE @ 7%: **\$7.782**

ECONOMIC ANALYSIS OF DISTRICT HEATING FOR JAMESTOWN INDUSTRIAL CORRIDOR

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - COGEN POWER

Start of Evaluation 1999

Case M34

Unit Costs	1999	Escalation	Heat Source -	Boilers/ST Cogen	Boiler Life - yrs
			Avg. Heat Rate - Btu/kWh	12,473	Income Tax Rate - %
Elect. Purch. - \$/MWh	55.00	4.0	Peak Electric Output - kW	8,140 (2 units)	Tax Credit - %
Elect. Sold - \$/MWh	55.00	4.0	Boiler Efficiency - %	85.0%	Tax Life - yrs
O&M Labor - \$/MWh	18.000	4.0	Cogen Capacity Factor	90%	Accel. Tax Deprec.
O&M Materials - % Cost	1.7	4.0			Property Tax - %
Property Taxes - %	0	2.5			Insurance Rate - %
Fuel - \$/MBtu	2.71	4.0			Cost of Capital - %

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
A. Annual Quantities										
1. District Heat - MBtu/yr	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051
2. Chilled Water - MBtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092
4. Auxiliary Power - MWh/yr	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237
7. Power Purchased - MWh/yr	285	285	285	285	285	285	285	285	285	285
8. O&M Labor - MWh/yr	9	9	9	9	9	9	9	9	9	9
9. O&M Material - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502
B. Unit Costs										
1. Power Purchased - \$/MWh	55.00	56.04	56.28	56.61	57.03	57.55	58.18	58.90	59.74	60.69
2. Power Sold - \$/MWh	55.00	56.04	56.28	56.61	57.03	57.55	58.18	58.90	59.74	60.69
3. O&M Labor - \$/1000 MWh	78	80	82	83	85	87	89	91	93	95
4. Fuel - \$/MBtu	4.17	4.34	4.51	4.69	4.86	5.06	5.28	5.49	5.71	5.94
C. Operating Expenses - \$1000/yr										
1. Power Purchased	15	16	17	17	18	19	19	20	21	22
2. O&M	630	655	661	708	737	766	797	829	860	892
3. Fuel Cost	3532	3673	3820	3973	4131	4297	4469	4647	4830	5020
Sub-Total	4177	4344	4517	4698	4886	5082	5285	5496	5716	5945
D. Power Sold - \$1000/yr										
1. Power Sold	2815	2927	3044	3166	3293	3424	3561	3704	3852	4005
E. Required Revenues - \$1000/yr										
1. Required Revenues	1428	1455	1484	1515	1549	1585	1624	1665	1709	1755
F. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$1.58	\$1.52	\$1.45	\$1.39	\$1.34	\$1.28	\$1.22	\$1.17	\$1.12	\$1.07
2. O & M Expenses	\$0.96	\$0.98	\$1.00	\$1.03	\$1.06	\$1.08	\$1.11	\$1.14	\$1.17	\$1.20
3. Fuel	\$5.24	\$5.37	\$5.50	\$5.64	\$5.78	\$5.92	\$6.07	\$6.23	\$6.40	\$6.57
Total	\$7.78	\$7.87	\$7.95	\$8.06	\$8.17	\$8.28	\$8.41	\$8.54	\$8.68	\$8.84

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP -- IMPLEMENT ALL THREE PHASES --COGEN POWER #.01
KV

Phase	Year Investment		Economic Factors		Case #14
1	1987	1988	Preferred Stock Ratio	0	Stock Life - yrs
2	1989	1990	Return on Preferred Stock - %	0	Income Tax Rate - %
3	1991	1992	Common Stock Ratio	0	Tax Credit - %
4	1993	1994	Return on Common Stock - %	0	Tax Life - yrs
			Debt Ratio	1	Accelerated Tax Depreciation
			Debt Cost - %	7	Property Tax - %
			Weighted Cost of Capital - %	7	Insurance Rate - %

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Stock Value	1788	7401	11435	11092	10678	10295	9912	9518	9125	8732	8339
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0	0
Interest	178	518	804	776	748	721	694	668	639	611	584
Stock Depreciation	0	249	793	393	393	393	393	393	393	393	393
Tax Depreciation	1289	1136	17630	17630	17630	17630	17630	17630	17630	17630	17630
Income Taxes	0	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0	0
Insurance	15	51	86	86	88	88	88	88	88	88	88
Annual Carrying Charges	213	827	1261	1258	1231	1203	1175	1148	1121	1093	1066

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Stock Value	8732	7948	7551	7159	6765	6372	5979	5585	5191	4798
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	584	551	529	501	474	446	419	391	363	335
Stock Depreciation	393	393	393	393	393	393	393	393	393	393
Tax Depreciation	17630	17630	17630	17630	17630	17630	17630	17630	17630	17630
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	88	88	88	88	88	88	88	88	88	88
Annual Carrying Charges	1066	1038	1010	983	955	928	900	873	845	818

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - COGEN POWER \$1.035

Investment	1	Phase 1	Economic Factors: Case M54		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	20
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$1.828	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	0
AFEC - \$1000	65	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	1966			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1966	1901	1835	1769	1704	1638	1573	1507	1442	1376
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	138	133	128	124	119	115	110	106	101	96
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	218	213	209	204	200	195	190	186	181	177

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1311	1245	1180	1114	1049	983	918	852	786	721
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	92	87	83	78	73	69	64	60	55	50
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	172	167	163	158	154	149	145	140	135	131

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - COGEN POWER \$1.07
KW

Investment	2	Phase 2	Economic Factors	Case 184
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - yrs
Cost Year	1990	Return on Preferred Stock - %	0	Income Tax Rate - %
Initial Cost - \$1000	\$1,415	Common Stock Ratio	0	Tax Credit - %
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - yrs
Escalation - \$1000	401	Debt Ratio	1	Accelerated Tax Depreciation
AFPC - \$1000	183	Debt Cost - %	7	Property Tax - %
Total Cost - \$1000	5499			Insurance Rate - %
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00	

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	5499	5016	5173	4949	4766	4583	4399	4216	4033
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	185	271	359	346	334	321	308	295	282
Book Depreciation	0	183	183	183	183	183	183	183	183	183
Tax Depreciation	0	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	0	595	597	564	571	558	545	532	520	507

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3849	3666	3483	3300	3118	2933	2750	2566	2383	2200
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	267	257	244	231	218	205	192	180	167	154
Book Depreciation	183	183	183	183	183	183	183	183	183	183
Tax Depreciation	10080	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	41	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	494	481	468	456	443	430	417	404	391	379

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - COGEN POWER \$.035/

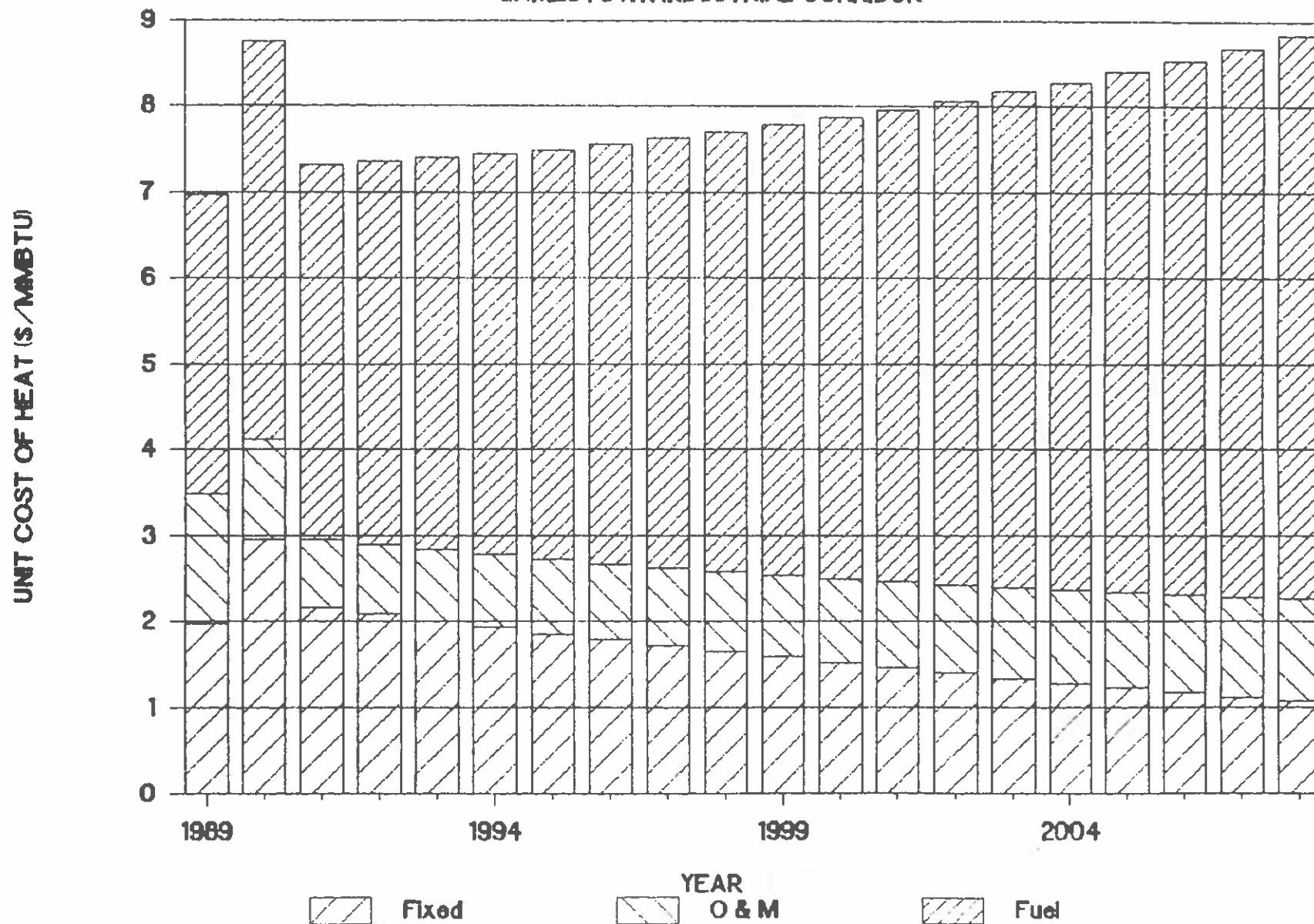
Investment	3	Phase 3	Economic Factors	Case MS4	
Initial Operation	1991	Preferred Stock Ratio	0	Book Life - Yrs	34
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$3,725	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	465	Debt Ratio	1	Accelerated Tax Depreciation	0
AFDC - \$1000	144	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	4334			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	0	4334	4190	4045	3901	3756	3612	3467	3323
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	0	303	293	283	273	263	253	243	233
Book Depreciation	0	0	144	144	144	144	144	144	144	144
Tax Depreciation	0	0	6261	6261	6261	6261	6261	6261	6261	6261
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	0	33	33	33	33	33	33	33	33
Annual Carrying Charges	0	0	481	476	460	450	440	430	420	410

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3178	3034	2889	2745	2600	2456	2311	2167	2023	1879
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	222	212	202	192	182	172	162	152	142	131
Book Depreciation	144	144	144	144	144	144	144	144	144	144
Tax Depreciation	6261	6261	6261	6261	6261	6261	6261	6261	6261	6261
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	33	33	33	33	33	33	33	33	33	33
Annual Carrying Charges	399	389	379	369	359	349	339	329	319	309

UNIT COST OF DISTRICT HEAT - CASE MS4

JAMESTOWN INDUSTRIAL CORRIDOR



**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

MUNICIPAL OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$.035/KWH

Start of Evaluation	1989		Case #55							
Unit Costs	1986	Escalation	Heat Source -	Boilers/Cogen						
			Avg. Heat Rate - Btu/KWh	12,475						
			Peak Electric Output - kW	4,070						
			Boiler Efficiency - %	85.0%						
			Cogen Capacity Factor	90%						
Elect. Purch. - \$/MWh	35.00	4.0			Boor Life - yrs					
Elect. Sold - \$/MWh	35.00	4.0			Income Tax Rate - %					
O&M Labor - \$/MWhr	25.000	4.0			Tax Credit - %					
O&M Materials - % Cost	1.7	4.0			Tax Life - yrs					
Property Taxes - %	0	2.5			Accel. Tax Deprec.					
Fuel - \$/MBtu	2.71	4.0			Property Tax - %					
					Insurance Rate - %					
					Cost of Capital - %					

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
A. Annual Quantities										
1. District Heat - Mbtu/yr	110,353	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546
4. Auxiliary Power - MWh/yr	100	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069
7. Power Purchased - MWh/yr	100	148	148	148	148	148	148	148	148	148
8. O&M Labor - Man/yr	5	7	7	7	7	7	7	7	7	7
9. O&M Materials - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - Mbtu/yr	126,728	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688
B. Unit Costs										
1. Power Purchased - \$/MWh	35.00	37.86	39.37	40.95	42.58	44.29	46.06	47.90	49.82	51.81
2. Power Sold - \$/MWh	35.00	37.86	39.37	40.95	42.58	44.29	46.06	47.90	49.82	51.81
3. O&M Labor - \$/MWhr	25	27	28	29	30	32	33	34	36	37
4. Fuel - \$/MBtu	2.71	2.90	3.05	3.17	3.30	3.43	3.57	3.71	3.86	4.01
C. Carrying Charges - \$1000/yr										
	318	623	805	788	771	753	736	718	701	683
D. Operating Expenses - \$1000/yr										
1. Power Purchased	4	6	6	6	6	7	7	7	7	8
2. O&M	123	318	330	343	357	371	386	402	418	435
3. Fuel Cost	384	1286	1337	1391	1446	1504	1564	1627	1692	1760
Sub-Total	551	1609	1673	1740	1810	1882	1958	2036	2117	2202
E. Power Sold - \$1000/yr										
	0	987	1026	1067	1110	1154	1201	1249	1299	1351
F. Required Revenues - \$1000/yr										
	769	1445	1452	1461	1470	1481	1493	1505	1520	1535
G. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$1.97	\$2.96	\$2.86	\$2.76	\$2.66	\$2.57	\$2.47	\$2.38	\$2.29	\$2.20
2. O & M Expenses	\$1.51	\$1.16	\$1.19	\$1.22	\$1.26	\$1.29	\$1.32	\$1.36	\$1.39	\$1.43
3. Fuel	\$3.48	\$4.63	\$4.75	\$4.87	\$5.00	\$5.13	\$5.26	\$5.39	\$5.53	\$5.68
Total	\$6.97	\$8.76	\$8.81	\$8.86	\$8.92	\$8.98	\$8.95	\$8.93	\$8.91	\$8.91

LEVELIZED RATE @ 7%: \$9.184

MUNICIPAL OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$.075/KWH

Year	1995	2000	2001	2002	2003	2004	2015	2016	2017	2018
A. Annual Quantities										
1. District Heat - MMBtu/yr	164,504	164,504	164,504	164,504	164,504	164,504	164,504	164,504	164,504	164,504
2. Chilled Water - MMBtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546
4. Auxiliary Power - MWh/yr	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
5. Purchasing Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069
7. Power Purchased - MWh/yr	148	148	148	148	148	148	148	148	148	148
8. O & M Labor - Man/yr	7	7	7	7	7	7	7	7	7	7
9. O & M Material - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MMBtu/yr	436,686	436,686	436,686	436,686	436,686	436,686	436,686	436,686	436,686	436,686
B. Unit Costs										
1. Power Purchased - \$/MWh	\$7.36	\$6.64	\$6.26	\$6.61	\$7.07	\$6.55	\$6.16	\$6.50	\$7.74	\$6.69
2. Power Sold - \$/MWh	\$7.36	\$6.64	\$6.26	\$6.61	\$7.07	\$6.55	\$6.16	\$6.50	\$7.74	\$6.69
3. O & M Labor - \$/1000 Man/yr	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$6
4. Fuel - \$/MMBtu	4.17	4.34	4.51	4.69	4.86	5.03	5.23	5.49	5.71	5.94
5. Carrying Charges - \$/1000/yr	\$66	\$69	\$71	\$74	\$76	\$79	\$81	\$84	\$87	\$89
C. Operating Expenses - \$/1000										
1. Power Purchased	6	6	9	9	9	10	10	10	11	11
2. O & M	451	476	489	503	509	550	570	595	619	642
3. Fuel Cost	1670	1907	1986	2059	2141	2227	2316	2406	2505	2605
Sub-Total	2290	2382	2477	2576	2679	2786	2896	3014	3134	3258
D. Power Sold - \$/1000/yr										
1405	1461	1519	1580	1643	1709	1777	1848	1922	1999	
E. Required Revenues- \$/1000/yr										
1552	1579	1539	1610	1622	1656	1682	1709	1739	1770	
G. Unit Cost of Heat - \$/MMBtu										
1. Fixed Expenses	\$1.12	\$1.04	\$1.56	\$1.56	\$1.50	\$1.73	\$1.66	\$1.59	\$1.50	\$1.45
2. O & M Expenses	\$1.46	\$1.50	\$1.54	\$1.58	\$1.57	\$1.67	\$1.72	\$1.76	\$1.81	\$1.86
3. Fuel	\$5.82	\$5.96	\$6.14	\$6.50	\$6.47	\$6.65	\$6.87	\$7.00	\$7.21	\$7.42
Total	\$9.41	\$9.51	\$9.64	\$9.76	\$9.55	\$10.04	\$10.25	\$10.37	\$10.54	\$10.73

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

COMPOSITE ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$.035/KWH

Phase			Economic Factors			Case M05				
Year	1988	1990	1991	1992	1993	1994	1995	1996	1997	1998
1	1988	1990	Preferred Stock Ratio	0	Book Life - yrs	10				
2	1991	1992	Return on Preferred Stock - %	0	Income Tax Rate - %	0				
3	1993	0	Common Stock Ratio	0	Tax Credit - %	0				
4	1992	0	Return on Common Stock - %	0	Tax Life - yrs	10				
			Debt Ratio	1	Accelerated Tax Depreciation	0				
			Debt Cost - %	7	Property Tax - %	0				
			Weighted Cost of Capital - %	7	Insurance Rate - %	0.75				
Year	1988	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1560	7400	7151	6902	6653	6404	6156	5907	5658	5409
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	108	516	501	483	466	446	431	413	396	379
Book Depreciation	0	249	249	249	249	249	249	249	249	249
Tax Depreciation	11369	11369	11369	11369	11369	11369	11369	11369	11369	11369
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	56	56	56	56	56	56	56	56	56
Annual Carrying Charges	216	627	605	586	571	553	536	518	501	483
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	5160	4911	4662	4414	4165	3916	3667	3418	3169	2921
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	361	344	326	309	292	274	257	239	222	204
Book Depreciation	249	249	249	249	249	249	249	249	249	249
Tax Depreciation	11369	11369	11369	11369	11369	11369	11369	11369	11369	11369
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	56	56	56	56	56	56	56	56	56	56
Annual Carrying Charges	666	649	631	614	596	579	562	544	527	509

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$.035/KWH

Investment	1	Phase 1	Economic Factors: Case MS5		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	30
Net Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$1,828	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	0
WDD - \$1000	65	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	1966			Insurance Rate - %	6.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1966	1901	1835	1769	1704	1638	1572	1507	1442	1376
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	138	137	128	124	119	115	110	106	101	96
Book Depreciation	66	66	66	66	66	66	66	66	66	66
% Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Preferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	218	217	205	204	200	195	190	186	181	177

Year	1989	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1311	1245	1180	1114	1049	987	919	852	786	721
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	91	87	82	76	73	69	64	60	55	50
Book Depreciation	66	66	66	66	66	66	66	66	66	66
% Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Preferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	172	167	162	158	154	149	145	140	135	131

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$1.035/KWH

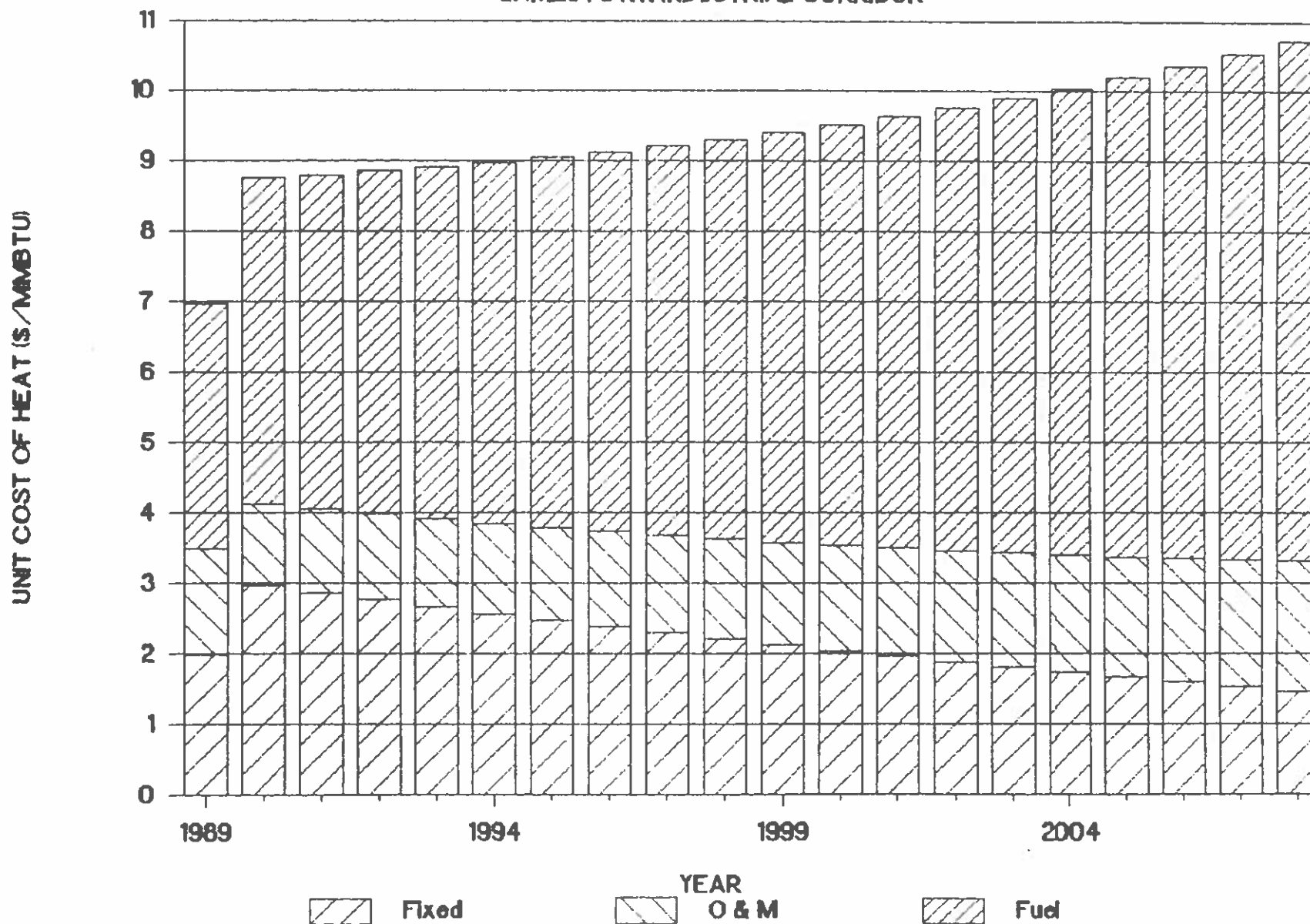
Investment	2	Phase 1	Economic Factors	Case #25
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - yrs
Cost Basis	1990	Return on Preferred Stock - %	0	Income Tax Rate - %
Capital Cost - \$1000	14,713	Common Stock Ratio	0	Tax Credit - %
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - yrs
Escalation - \$1000	461	Debt Ratio	1	Accelerated Tax Depreciation
AFPC - \$1000	157	Debt Cost - %	7	Property Tax - %
Total Cost - \$1000	5499			Insurance Rate - %
Start of Evaluation	1999	Weighted Cost of Capital - %	7.09	

Year	1999	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	5499	5316	5133	4949	4766	4583	4399	4216	4033
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	125	172	219	266	314	321	368	295	262
Book Depreciation	0	157	157	157	157	157	157	157	157	157
Tax Depreciation	0	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	0	605	597	584	571	558	545	533	520	507

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3547	3666	3483	3300	3116	2933	2750	2566	2383	2200
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	265	257	244	231	218	205	192	180	167	154
Book Depreciation	157	157	157	157	157	157	157	157	157	157
Tax Depreciation	10080	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	41	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	494	481	468	456	443	430	417	404	391	379

UNIT COST OF DISTRICT HEAT - CASE MS5

JAMESTOWN INDUSTRIAL CORRIDOR



MUNICIPAL OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

Plant for Evaluation			Base MS									
Unit Costs	1988	Escalation	Heat Source -		BOILER		Econ. Life - yrs					
			Avg. Heat Rate - Btu/kwh		NA		Income Tax Rate - %					
			Peak Electric Output - Mw		NA		Tax Credit - %					
			Boiler Efficiency - %		85.0%		Tax Life - yrs					
			Cogen Capacity Factor		NA		Accel. Tax Deprec.					
							Property Tax - %					
							Insurance Rate - %					
							Cost of Capital - %					
Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998		
A. Annual Quantities												
1. District Heat - MMBtu/yr	164,753	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904		
2. Chilled Water - MMBtu/yr	0	0	0	0	0	0	0	0	0	0		
3. Power Generated - Mwh/yr	0	0	0	0	0	0	0	0	0	0		
4. Auxiliary Power - Mwh/yr	149	149	149	149	149	149	149	149	149	149		
5. Peaking Power - Mwh/yr	0	0	0	0	0	0	0	0	0	0		
6. Power Sold - Mwh/yr	0	0	0	0	0	0	0	0	0	0		
7. Power Purchased - Mwh/yr	100	149	149	149	149	149	149	149	149	149		
8. OM Labor - Mwh/yr	5	7	7	7	7	7	7	7	7	7		
9. OM Material-& Cost	1,701	1,701	1,701	1,701	1,701	1,701	1,701	1,701	1,701	1,701		
10. Fuel - MMBtu/yr	118,006	263,705	263,705	263,705	263,705	263,705	263,705	263,705	263,705	263,705		
B. Unit Costs												
1. Power Purchased - \$/MWh	31.30	32.45	33.75	35.10	36.50	37.96	39.48	41.06	42.70	44.41		
2. Power Sold - \$/MWh	31.30	32.45	33.75	35.10	36.50	37.96	39.48	41.06	42.70	44.41		
3. OM Labor - \$/MWh-yr	26	27	28	29	30	32	33	34	36	37		
4. Fuel - \$/MBtu	1.62	1.67	1.68	1.67	1.63	1.47	1.37	1.31	1.26	1.21		
C. Carrying Charges - \$1000/yr	318	326	337	349	361	373	385	396	408	420		
D. Operating Expenses - \$1000/yr												
1. Power Purchased	3	5	5	5	5	6	6	6	6	6		
2. OM	167	250	261	271	282	293	305	317	330	343		
3. Fuel Cost	384	397	421	446	472	499	526	556	586	617		
Sub-Total	551	652	687	722	759	797	837	879	922	967		
E. Power Sold - \$1000/yr	0	0	0	0	0	0	0	0	0	0		
F. Required Revenues- \$1000/yr	769	1238	1254	1291	1320	1350	1382	1415	1450	1487		
G. Unit Cost of Heat - \$/MBtu												
1. Fixed Expenses	\$1.57	\$2.24	\$2.29	\$2.34	\$2.39	\$2.44	\$2.49	\$2.54	\$2.59	\$2.64		
2. O & M Expenses	\$1.51	\$1.55	\$1.61	\$1.67	\$1.74	\$1.81	\$1.88	\$1.96	\$2.04	\$2.12		
3. Fuel	\$3.48	\$3.62	\$3.77	\$3.92	\$4.07	\$4.24	\$4.41	\$4.58	\$4.76	\$4.96		
Total	\$6.57	\$7.51	\$7.67	\$7.93	\$8.20	\$8.49	\$8.75	\$9.08	\$9.39	\$9.71		
LEVELIZED RATE @ 7%: \$8.628												

ECONOMIC ANALYSIS OF DISTRICT HEATING FOR JAMESTOWN INDUSTRIAL CORRIDOR

MUNICIPAL OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

Start of Escalation	1989	Case No.									
Unit Costs	1989	Escalation	Heat Source -				BOILERS	Boiler Life - yrs			
			Avg. Heat Rate - Btu/MWh				NA	Income Tax Rate - %			
			Peak Electric Output - kW				NA	Tax Credit - %			
			Boiler Efficiency - %				95.0%	Tax Life - yrs			
			Design Capacity Factor				NA	Accel. Tax Deprat.			
								Property Tax - %			
								Insurance Rate - %			
								Cost of Capital - %			
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
A. Annual Quantities											
1. District Heat - Mbtu/yr	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0	
3. Power Generated - MWh/yr	0	0	0	0	0	0	0	0	0	0	
4. Auxiliary Power - MWh/yr	149	149	149	149	149	149	149	149	149	149	
5. Purchasing Power - MWh/yr	0	0	0	0	0	0	0	0	0	0	
6. Power Sold - MWh/yr	0	0	0	0	0	0	0	0	0	0	
7. Power Purchased - MWh/yr	149	149	149	149	149	149	149	149	149	149	
8. D&M Labor - Man/yr	7	7	7	7	7	7	7	7	7	7	
9. D&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	
10. Fuel - Mbtu/yr	203,705	203,705	203,705	203,705	203,705	203,705	203,705	203,705	203,705	203,705	
B. Unit Costs											
1. Power Purchased - \$/MWh	46.18	46.07	45.96	45.85	45.73	45.61	45.44	45.27	45.11	44.97	
2. Power Sold - \$/MWh	46.18	45.83	45.53	45.23	44.93	44.63	44.34	44.07	43.81	43.57	
3. D&M Labor - \$1000/Man-yr	38	40	42	43	45	47	49	51	53	55	
4. Fuel - \$/Mbtu	4.17	4.24	4.31	4.38	4.45	4.53	4.60	4.68	4.75	4.83	
C. Operating Expenses - \$1000/yr											
1. Power Purchased	7	7	7	8	8	8	9	9	9	10	
2. D&M	357	371	386	401	417	434	451	468	485	502	
3. Fuel Cost	550	884	919	956	994	1034	1075	1116	1160	1207	
Sub-Total	1213	1262	1312	1365	1419	1476	1535	1597	1660	1727	
D. Power Sold - \$1000/yr											
1	0	0	0	0	0	0	0	0	0	0	
E. Required Revenues- \$1000/yr											
1525	1565	1608	1652	1698	1747	1798	1851	1906	1965	2025	
F. Unit Cost of Heat - \$/Mbtu											
1. Fixed Expenses	\$1.35	\$1.34	\$1.33	\$1.32	\$1.31	\$1.30	\$1.29	\$1.28	\$1.27	\$1.26	
2. D & M Expenses	\$2.20	\$2.29	\$2.35	\$2.42	\$2.50	\$2.58	\$2.67	\$2.76	\$2.86	\$2.96	
3. Fuel	\$5.15	\$5.36	\$5.57	\$5.80	\$6.03	\$6.27	\$6.52	\$6.78	\$7.05	\$7.34	
Total	\$8.70	\$9.00	\$9.25	\$9.54	\$9.84	\$10.15	\$10.47	\$10.80	\$11.14	\$11.56	

ECONOMIC ANALYSIS OF DISTRICT HEATING FOR

JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

Figure	Year Investment		Economic Factors				Case Mix			
1	1989	1990	Preferred Stock Ratio	0			Boor. Life - yrs			20
2	1990	1990	Return on Preferred Stock - %	0			Income Tax Rate - %			0
3	1991	0	Common Stock Ratio	0			Tax Credit - %			0
4	1992	0	Return on Common Stock - %	0			Tax Life - yrs			15
			Debt Ratio	0			Accelerated Tax Depreciation			0
			Debt Cost - %	0			Property Tax - %			0
			Weighted Cost of Capital - %	7			Insurance Rate - %			1.75

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Boor. Value	1500	3450	3705	3921	4104	4260	4399	4521	4624	4717
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	175	242	274	305	337	369	401	433	464	496
Boor. Depreciation	0	117	117	117	117	117	117	117	117	117
Tax Depreciation	1237	2095	2095	2095	2095	2095	2095	2095	2095	2095
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	26	26	26	26	26	26	26	26	26
Annual Carrying Charges	215	326	377	365	361	357	345	336	328	321

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Boor. Value	2400	2280	2165	2047	1930	1812	1695	1576	1457	1340
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	165	160	152	143	135	127	119	110	102	94
Boor. Depreciation	117	117	117	117	117	117	117	117	117	117
Tax Depreciation	2095	2095	2095	2095	2095	2095	2095	2095	2095	2095
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	26	26	26	26	26	26	26	26	26	26
Annual Carrying Charges	311	304	295	287	279	271	262	254	246	238

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

Investment	1	Phase 1	Economic Factors: Case MS6		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1985	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$1,826	Common Stock Ratio	0	Tax Credit - %	0
Ann. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	0
WACC - \$1000	65	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	1966			Insurance Rate - %	0.75
Point of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1966	1901	1835	1769	1704	1638	1573	1507	1442	1376
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	136	133	128	124	119	115	110	106	101	96
Depreciation	66	66	66	66	66	66	66	66	66	66
Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	216	213	209	204	200	195	190	186	181	177

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1311	1245	1180	1114	1049	983	916	852	788	724
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	92	87	83	78	73	69	64	60	55	50
Depreciation	66	66	66	66	66	66	66	66	66	66
Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	172	167	163	158	154	149	145	140	135	131

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

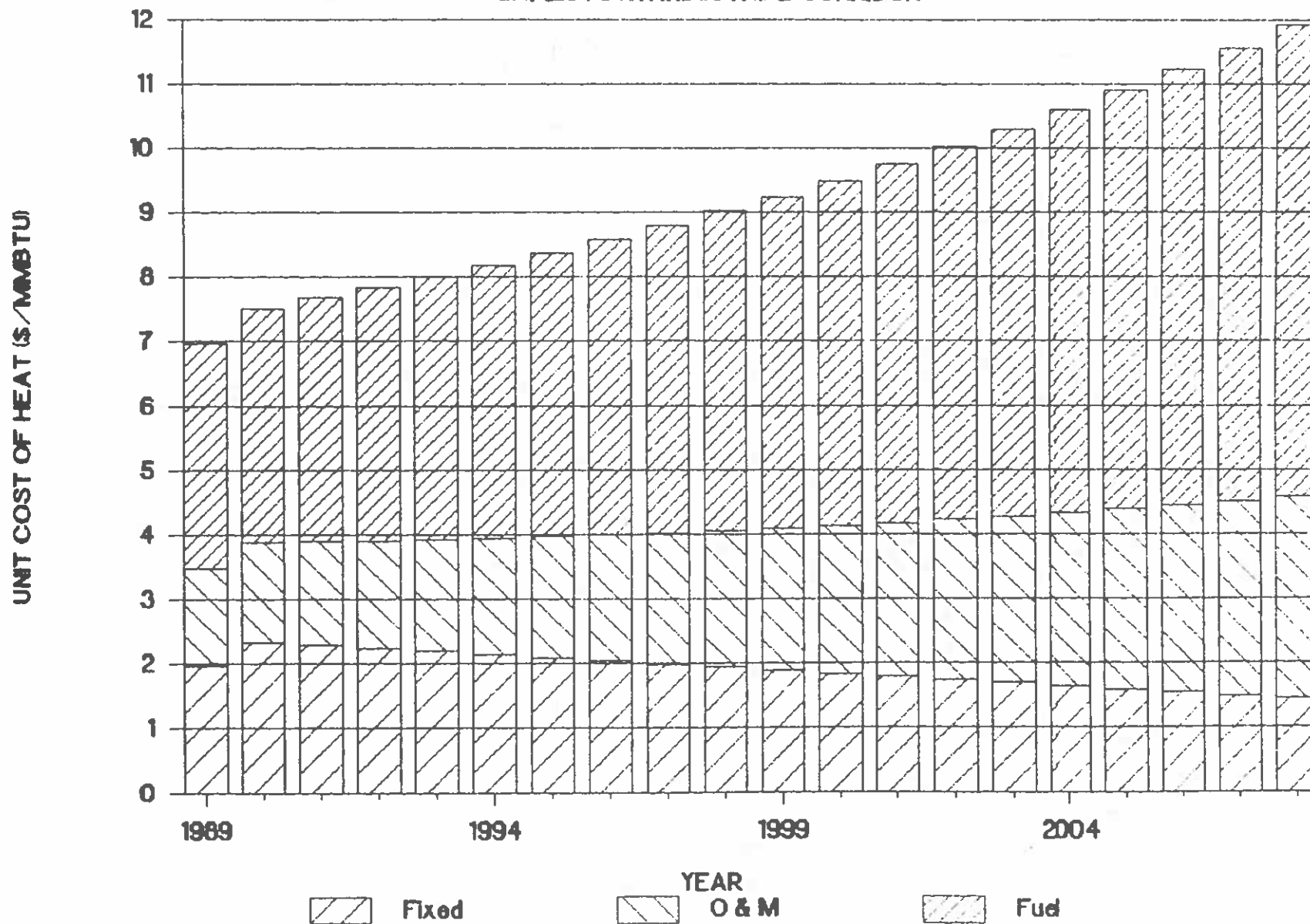
Investment	2	Phase 2	Economic Factors	Case Mix	
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - yrs	20
Cost Basis	1989	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$/hr	11,000	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - yrs	15
Escalation - \$/hr	110	Debt Ratio	1	Accelerated Tax Depreciation	0
AFSC - \$/hr	50	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$/hr	1655			Insurance Rate - %	6.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.30		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	1555	1504	1450	1400	1348	1296	1244	1192	1141
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	109	105	102	98	94	91	87	83	80
Book Depreciation	0	52	52	52	52	52	52	52	52	52
Tax Depreciation	0	506	506	506	506	506	506	506	506	506
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	0	172	169	165	162	158	154	151	147	147

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1085	1037	985	933	881	830	778	726	674	622
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	76	73	69	65	62	58	54	51	47	44
Book Depreciation	52	52	52	52	52	52	52	52	52	52
Tax Depreciation	506	506	506	506	506	506	506	506	506	506
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	12	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	140	138	132	129	125	122	118	114	111	107

UNIT COST OF DISTRICT HEAT - CASE MS6

JAMESTOWN INDUSTRIAL CORRIDOR



MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL C

Start of Evaluation 1989

Case MS7

Unit Costs	1989	Escalation	Heat Source -	Boilers/ST Cogen	Boat Life - yrs	
Elect. Purch. - \$/MWh	20.00	4.0	Avg. Heat Rate - Btu/MWh	13,479	Income Tax Rate - %	
Elect. Sold - \$/MWh	21.00	4.0	Peak Electric Output - kW	3,140 (12 Units)	Tax Credit - %	
SG&M Labor - \$/Man-hr	25.00%	4.0	Boiler Efficiency - %	85.0%	Tax Life - yrs	15
SG&M Materials-L Cost	1.7	4.0	Cogen Capacity Factor	90%	Accel. Tax Deered.	
Percent. Taxes - %	0	2.5			Property Tax - %	0
Fuel - \$/MBtu	2.50	4.0			Insurance Rate - %	0.75
					Cost of Capital - %	7.00

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
------	------	------	------	------	------	------	------	------	------	------

3. Approx. Quantities

[illegible]

1. 45: 1000

1. Power Purchased - \$/Mwh	31.20	32.45	33.75	35.10	36.50	37.95	39.48	41.06	42.70	44.41
2. Power Sold - \$/Mwh	31.20	32.45	33.75	35.10	36.50	37.95	39.48	41.06	42.70	44.41
3. O&M Labor - \$/1000Mwhr	26	27	28	29	30	32	33	34	36	37
4. Fuel - \$/Mbtu	2.40	2.45	2.50	2.60	2.60	2.91	3.03	3.15	3.28	3.41

C. Garrido Charges - 1994-95

6. Operating Expenses - \$1000.00

	3	5	10	10	10	11	11	12	12	13
1. Power Purchased										
2. GWh	167	318	460	479	498	518	538	560	582	606
3. Fuel Cost	327	1093	2193	2261	2372	2467	2566	2659	2775	2886
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Sub- Total	493	1415	2683	2770	2860	2995	3116	3240	3370	3585

E. Power Fold - 4100/yr

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423
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2. Required Revenue: \$1000/yr

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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5. Unit Cost of Heat - \$/MBtu

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
1. Fixed Expenses	\$1.97	\$2.10	\$2.25	\$2.20	\$2.11	\$2.03	\$1.96	\$1.88	\$1.81	\$1.74
2. G & M Expenses	\$1.51	\$1.22	\$0.83	\$0.85	\$0.87	\$0.89	\$0.91	\$0.94	\$0.96	\$0.98
3. Fuel	\$2.95	\$4.12	\$3.25	\$3.96	\$4.08	\$4.17	\$4.27	\$4.37	\$4.48	\$4.58
Total	\$6.44	\$7.44	\$6.33	\$7.02	\$7.06	\$7.10	\$7.14	\$7.19	\$7.24	\$7.30

APPROVED DATE 4-7-1958 17.378

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL CC

Start of Evaluation		1989	Case #57							
Unit Costs		1988	Evaluation	Heat Source -		Boilers/ST Cogen		Boil. Life - Yrs		70
				Avg. Heat Rate - Btu/lb		13,475		Income Tax Rate - %		1
				Peak Electric Output - kW		5,146 (2 Units)		Tax Credit - %		
				Boiler Efficiency - %		85.5%		Tax Life - Yrs		15
				Cogen Capacity Factor		90%		Accel. Tax Sched.		
								Property Tax - %		5
								Insurance Rate - %		1.75
								Cost of Capital - %		7.0%
Elect. Purch. - \$/MWh		21.22	4.0							
Elect. Sold - \$/MWh		10.00	4.0							
O&M Labor - \$/MWh		15.00	4.0							
O&M Materials - % Cost		1.7	4.0							
Property Taxes - %		0	2.5							
Fuel - \$/MBtu		2.30	4.0							

Year	1989	2000	2001	2002	2003	2004	2005	2006	2007	2008
4. Annual Quantities										
1. District Heat - Mbtu/yr	712,051	712,051	712,051	712,051	712,051	712,051	712,051	712,051	712,051	712,051
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092
4. Auxiliary Power - MWh/yr	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237
7. Power Purchased - MWh/yr	285	285	285	285	285	285	285	285	285	285
8. O&M Labor - MWh/yr	9	9	9	9	9	9	9	9	9	9
9. O&M Material - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - Mbtu/yr	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502
5. Unit Costs										
1. Power Purchased - \$/MWh	46.18	48.97	49.95	51.95	54.07	56.19	58.44	60.77	63.21	65.77
2. Power Sold - \$/MWh	46.18	48.97	49.95	51.95	54.07	56.19	58.44	60.77	63.21	65.77
3. O&M Labor - \$1000/MWh	38	40	42	43	45	47	49	51	53	55
4. Fuel - \$/MBtu	2.55	2.69	2.84	2.99	3.15	3.31	3.48	3.67	3.85	4.05
6. Operating Expenses - \$1000/yr										
1. Power Purchased	13	14	14	15	15	16	17	17	18	19
2. O&M	630	655	661	708	737	766	797	825	862	896
3. Fuel Cost	2002	2122	2147	2377	2512	2652	2798	2950	3108	3277
Sub- Total	2645	2791	2842	3100	3264	3434	3612	3796	3988	4192
7. Power Sold - \$1000/yr										
2413	2509	2609	2714	2822	2935	3053	3175	3302	3434	
8. Required Revenues - \$1000/yr										
2298	2319	2343	2369	2397	2427	2459	2494	2532	2572	
9. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$1.67	\$1.60	\$1.53	\$1.47	\$1.41	\$1.35	\$1.29	\$1.27	\$1.18	\$1.12
2. O & M Expenses	\$1.01	\$1.07	\$1.05	\$1.08	\$1.11	\$1.13	\$1.16	\$1.19	\$1.22	\$1.26
3. Fuel	\$4.69	\$4.81	\$4.92	\$5.04	\$5.17	\$5.30	\$5.43	\$5.57	\$5.71	\$5.86
Total	\$7.38	\$7.47	\$7.51	\$7.59	\$7.68	\$7.78	\$7.88	\$7.99	\$8.11	\$8.24

LEVELIZED RATE @ 7%

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL

Phase	Year	Investment	Economic Factors		Case M5T	
1	1989	1960	Preferred Stock Ratio	0	Book Life - yrs	20
2	1990	5461	Return on Preferred Stock - %	0	Income Tax Rate - %	0
3	1991	4374	Common Stock Ratio	0	Tax Credit - %	0
4	1992	0	Return on Common Stock - %	0	Tax Life - yrs	15
			Debt Ratio	1	Accelerated Tax Depreciation	1
			Debt Cost - %	7	Property Tax - %	0
			Weighted Cost of Capital - %	7	Insurance Rate - %	6.75

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1760	7400	11485	11050	10698	10305	9911	9518	9125	8732
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	102	518	804	775	749	721	694	666	639	611
Book Depreciation	56	249	397	393	393	393	392	391	393	393
Tax Depreciation	1259	11369	17670	17630	17630	17630	17630	17630	17630	17630
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	56	55	55	55	55	55	55	55	55
Annual Carrying Charges	215	820	1258	1258	1231	1203	1176	1148	1121	1093

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	8302	7945	7552	7155	6765	6371	5979	5585	5191	4799
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	584	556	529	501	474	446	419	391	363	335
Book Depreciation	393	353	353	393	393	393	392	391	393	393
Tax Depreciation	17630	17630	17630	17630	17630	17630	17630	17630	17630	17630
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	55	55	55	55	55	55	55	55	55	55
Annual Carrying Charges	1066	1038	1010	983	955	928	900	873	845	818

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL COS

Investment	1	Phase 1	Economic Factors: Case MS7		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	20
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	4
Capital Cost - \$1000	\$1.625	Common Stock Ratio	0	Tax Credit - %	0
Serv. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	77	Debt Ratio	1	Accelerated Tax Depreciation	0
FDC - \$1000	65	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	1988			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1966	1901	1835	1769	1704	1638	1573	1507	1442	1376
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	128	133	128	124	119	115	110	106	101	96
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	218	217	209	204	200	195	190	186	181	177

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1311	1245	1180	1114	1049	983	918	852	786	721
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	92	87	87	78	77	69	64	50	55	50
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	1289	1289	1289	1289	1289	1289	1289	1289	1289	1289
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	172	167	160	152	154	149	145	140	135	131

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL COST

Investment	0	Phase 1	Economic Factors	Case "B"	
Initial Operation	1990	Preferred Stock Ratio	0	Root Life - yrs	0
Cost Basis	1990	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	14,910	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - yrs	15
Escalation - \$1000	4.1	Debt Ratio	1	Accelerated Tax Depreciation	0
AFSC - \$1000	180	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	5499			Insurance Rate - %	0.75
Start of Evaluation	1999	Weighted Cost of Capital - %	7.00		

Year	1999	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	5499	5316	5170	4949	4766	4583	4399	4216	4033
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	365	372	359	346	334	321	308	295	282
Book Depreciation	0	163	183	183	183	183	183	183	183	183
Tax Depreciation	0	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	0	509	597	584	571	558	545	531	520	510

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3649	3666	3483	3300	3116	2933	2750	2566	2383	2200
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	269	257	244	231	218	205	192	180	167	154
Book Depreciation	163	183	183	183	183	183	183	183	183	183
Tax Depreciation	10960	10080	10080	10080	10080	10080	10080	10080	10080	10080
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	41	41	41	41	41	41	41	41	41	41
Annual Carrying Charges	494	481	468	456	443	430	417	404	391	379

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL COS

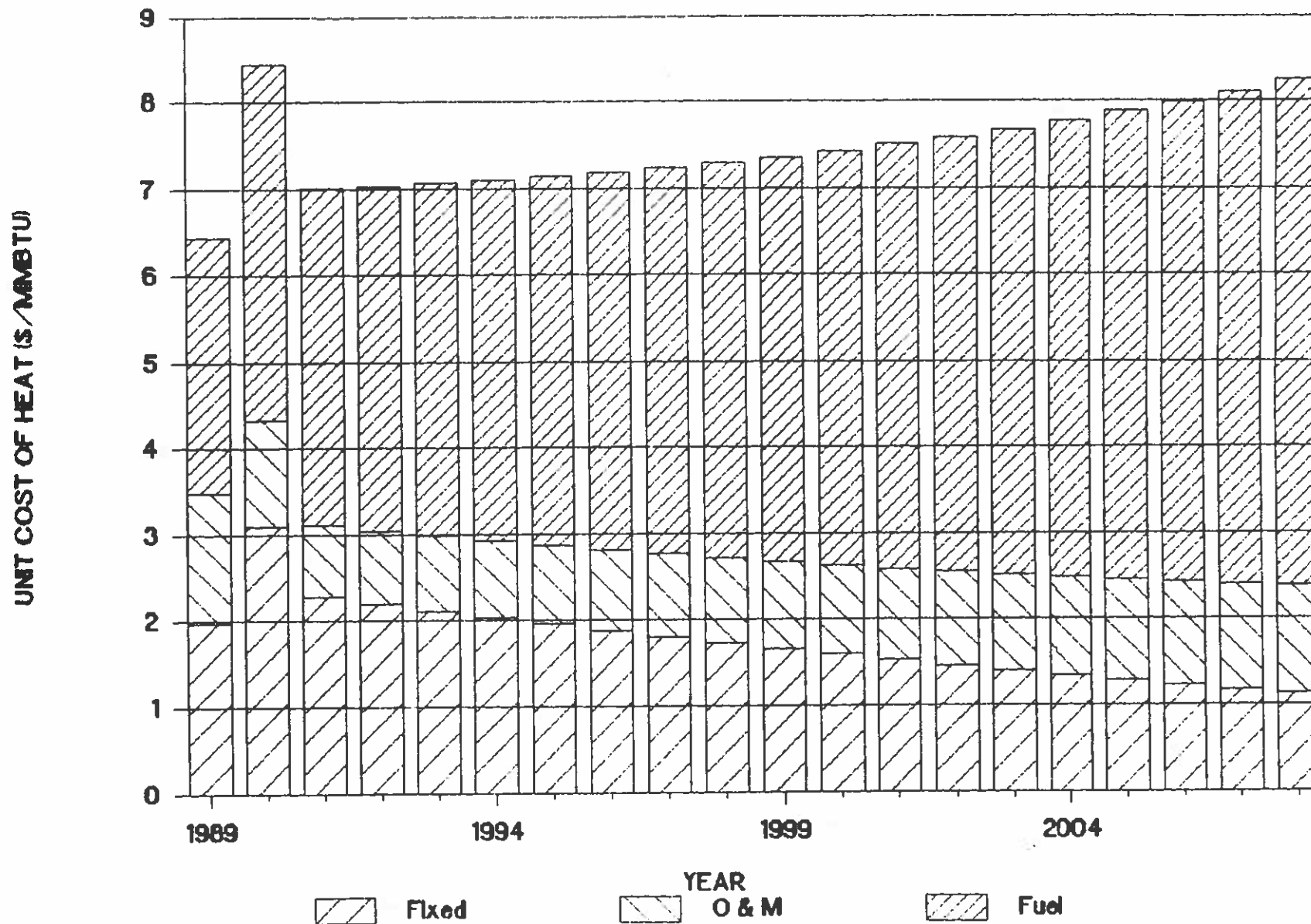
Investment	3	Phase 3	Economic Factors	Case M57	
Initial Operation	1991	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1985	Return on Preferred Stock - %	0	Income Tax Rate - %	0
Capital Cost - \$1000	\$7.725	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	10
Escalation - \$1000	465	Debt Ratio	1	Accelerated Tax Depreciation	1
WFO - \$1000	144	Debt Cost - %	7	Property Tax - %	0
Total Cost - \$1000	4334			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	0	4334	4190	4045	3901	3756	3612	3467	3323
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	0	303	293	283	273	263	253	243	233
Book Depreciation	0	0	144	144	144	144	144	144	144	144
Acc Depreciation	0	0	6261	6261	6261	6261	6261	6261	6261	6261
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	0	0	33	33	33	33	33	33	33	33
Annual Carrying Charges	0	0	460	470	480	490	440	430	420	410

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3176	3034	2889	2745	2600	2456	2311	2167	2023	1876
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	222	212	202	192	182	172	162	152	142	131
Book Depreciation	144	144	144	144	144	144	144	144	144	144
Acc Depreciation	6261	6261	6261	6261	6261	6261	6261	6261	6261	6261
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	33	33	33	33	33	33	33	33	33	33
Annual Carrying Charges	399	389	379	369	359	349	339	329	319	308

UNIT COST OF DISTRICT HEAT - CASE MS7

JAMESTOWN INDUSTRIAL CORRIDOR



ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

MUNICIPAL OWNERSHIP - TWO PHASES: POILERS ONLY - WITHOUT SOME DF LOAD

[illegible]

Year	1987	1990	1991	1992	1993	1994	1995	1996	1997	1998
A. Annual Quantities										
1. District Heat - MMBtu/yr	175,760	175,760	175,760	175,760	175,760	175,760	175,761	175,760	175,760	175,761
2. Chilled Water - MMBtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	0	0	0	0	0	0	0	0	0
4. Auxiliary Power - MWh/yr	219	219	219	219	219	219	219	219	219	219
5. Purchasing Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	0	0	0	0	0	0	0	0	0
7. Power Purchased - MMBtu/yr	100	219	219	219	219	219	219	219	219	219
8. O&M Labor - MWh/yr	4	5	5	5	5	5	5	5	5	5
9. O&M Material - \$ Invest.	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
10. Fuel - MMBtu/yr	217,115	217,115	217,115	217,115	217,115	217,115	217,115	217,115	217,115	217,115
B. Unit Costs										
1. Power Purchased - \$/MWh	21.10	22.45	22.75	22.10	22.50	22.96	22.48	21.96	21.70	22.41
2. Power Sold - \$/MWh	21.10	22.45	22.75	22.10	22.50	22.96	22.48	21.96	21.70	22.41
3. O&M Labor - \$/1000 MWh/yr	16	27	28	29	30	32	33	34	36	37
4. Fuel - \$/MMBtu	2.50	2.97	2.65	2.47	2.30	2.47	2.57	2.71	2.66	2.41
5. Carrying Charges - \$/1000/yr	150	324	318	311	304	297	290	283	276	269
C. Operating Expenses - \$/1000/yr										
1. Power Purchased	0	7	7	5	5	6	4	4	4	11
2. O&M	107	210	211	201	240	250	260	270	281	282
3. Fuel Cost	280	636	662	668	716	744	774	805	807	871
Sub-Total	410	857	881	877	964	1002	1040	1084	1128	1177
6. Power Sold - \$/1000/yr	0	0	0	0	0	0	0	0	0	0
7. Required Revenues - \$/1000/yr	560	1181	1265	1237	1268	1299	1337	1367	1404	1440
D. Unit Cost of Heat - \$/MMBtu										
1. Fixed Expenses	\$1.87	\$1.85	\$1.81	\$1.77	\$1.73	\$1.69	\$1.65	\$1.61	\$1.57	\$1.57
2. O & M Expenses	\$1.61	\$1.25	\$1.30	\$1.36	\$1.41	\$1.47	\$1.53	\$1.59	\$1.65	\$1.70
3. Fuel	\$7.48	\$7.62	\$7.77	\$7.82	\$4.07	\$4.24	\$4.41	\$4.56	\$4.76	\$4.96
Total	\$10.97	\$10.72	\$10.88	\$10.94	\$7.21	\$7.39	\$7.58	\$7.78	\$7.98	\$8.23
1998-1999 RATE \$/TWh				48.086						

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

MUNICIPAL OWNERSHIP - TWO PHASES/BOILERS ONLY - WITHOUT SOME OF LOAD

Start of Evaluation	1988	Data 1988								
Unit Costs	1988	Evaluation	Heat Source -			Boiler Load - 1988				
Elect. Purchase - \$/MWh	11.00	4.0	Dist. Heat Rate - Btu/MWh			Income Tax Rate - %				
Elect. Sold - \$/MWh	7.00	4.0	Peak Electric Output - MW			Boiler Unit/yr Credit - %				
OH Labor - \$/MWh	25.00	4.0	Boiler Efficiency - %			Tax Line - %				
OH Material's Cost	1.0	4.0	Load Capacity Factor			Accel. Tax Deprac.				
Property Taxes - %	0	2.0				Property Tax - %				
Fuel - \$/Mtu	2.71	4.0				Insurance Rate - %				
						Cost of Capital - %				

Year	1989	2000	2001	2002	2003	2004	2005	2006	2007	2008
A. Annual Quantities										
1. District Heat - Mtu/yr	175,760	175,760	175,760	175,760	175,760	175,760	175,760	175,760	175,760	175,760
2. Chilled Water - Mtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	0	0	0	0	0	0	0	0	0
4. Auxiliary Power - MWh/yr	219	219	219	219	219	219	219	219	219	219
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	0	0	0	0	0	0	0	0	0
7. Power Purchased - MWh/yr	219	219	219	219	219	219	219	219	219	219
8. OH Labor - MWh/yr	0	0	0	0	0	0	0	0	0	0
9. OH Material's Invest.	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700
10. Fuel - Mtu/yr	217,115	217,115	217,115	217,115	217,115	217,115	217,115	217,115	217,115	217,115
B. Unit Costs										
1. Power Purchased - \$/MWh	42.16	43.07	43.95	44.95	44.00	46.19	46.44	46.77	47.21	45.77
2. Power Sold - \$/MWh	42.16	43.07	43.95	44.95	44.00	46.19	46.44	46.77	47.21	45.77
3. OH Labor - \$1000/MWh/yr	25	40	40	40	45	47	49	51	52	55
4. Fuel - \$/Mtu	4.17	4.34	4.51	4.65	4.85	5.05	5.25	5.49	5.71	5.94
5. Carrying Charges - \$1000/yr	260	265	249	242	235	228	221	214	207	200
C. Operating Expenses - \$1000										
1. Power Purchased	10	10	11	11	12	12	13	13	14	14
2. OH	274	316	329	342	355	379	384	400	416	432
3. Fuel Cost	906	942	980	1019	1060	1102	1145	1192	1240	1259
Sub-Total	1220	1268	1319	1372	1427	1484	1540	1605	1669	1706
D. Power Sold - \$1000/yr	0	0	0	0	0	0	0	0	0	0
E. Required Revenues - \$1000/yr	1482	1524	1565	1614	1662	1712	1764	1819	1876	1976
5. Unit Cost of Heat - \$/Mtu										
1. Fixed Expenses	\$1.45	\$1.45	\$1.41	\$1.38	\$1.34	\$1.30	\$1.26	\$1.22	\$1.18	\$1.14
2. O & M Expenses	\$1.75	\$1.86	\$1.93	\$2.01	\$2.09	\$2.17	\$2.25	\$2.35	\$2.44	\$2.54
3. Fuel	\$5.15	\$5.36	\$5.57	\$5.80	\$6.02	\$6.27	\$6.52	\$6.76	\$7.05	\$7.24
Total	\$8.40	\$8.67	\$8.92	\$9.18	\$9.45	\$9.74	\$10.04	\$10.35	\$10.68	\$11.02

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

COMPOSITE ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - TWO PHASES/BOILERS ONLY - WITHOUT SOME OF LOAD

Phase	Year of Investment		Economic Factors		Case #03
1	1989	1995	Preferred Stock Ratio	0	Stock Life - 10 yrs
2	1990	1996	Return on Preferred Stock - %	0	Income Tax Rate - %
-	1991	1997	Common Stock Ratio	0	Tax Credit - %
-	1992	1998	Return on Common Stock - %	0	Tax Life - 10 yrs
			Debt Ratio	1	Accelerated Tax Depreciation
			Debt Cost - %	7	Property Tax - %
			Weighted Cost of Capital - %	-	Insurance Rate - %

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Stock Value	1755	1911	2012	2114	2215	2317	2418	2519	2621	2722
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	35	104	137	169	187	175	164	162	155	149
Stock Depreciation	35	35	35	35	35	35	35	35	35	35
Tax Depreciation	111	1466	1466	1466	1466	1466	1466	1466	1466	1466
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	10	21	22	22	22	22	22	22	22	22
Annual Carrying Charges	150	324	318	311	304	297	290	283	275	268

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Stock Value	2824	1925	1827	1729	1630	1531	1433	1334	1235	1137
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	140	175	123	121	114	107	100	97	87	81
Stock Depreciation	39	39	35	35	35	35	35	35	35	35
Tax Depreciation	1466	1466	1466	1466	1466	1466	1466	1466	1466	1466
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	22	22	22	22	22	22	22	22	22	22
Annual Carrying Charges	262	255	245	242	235	228	221	214	207	200

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - TWO PHASES/BOILERS ONLY - WITHOUT SOME OF LOAD

Investment	1	Phase 1	Economic Factors: Case M08	
Initial Investment	1989	Preferred Stock Ratio	0	Stock Life - yrs
Cost Basis	1989	Return on Preferred Stock - %	0	Income Tax Rate - %
Debt Cost - \$1000	\$1,000	Common Stock Ratio	0	Tax Credit - %
Per. Capitalization -	4.00	Return on Common Stock - %	0	Tax Life - yrs
Depreciation - \$1,000	50	Debt Ratio	1	Accelerated Tax Depreciation
WACC - %	45	Debt Cost - %	7	Property Tax - %
Total Cost - \$1000	1000			Insurance Rate - %
Start of Evaluation	1989	Weighted Cost of Capital - %	7.00	

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Residual Stock Value	1785	1710	1635	1560	1485	1410	1335	1260	1185	1110
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	45	45	45	45	45	45	45	45	45	45
Stock Depreciation	45	45	45	45	45	45	45	45	45	45
Tax Depreciation	612	612	612	612	612	612	612	612	612	612
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	10	10	10	10	10	10	10	10	10	10
Annual Carrying Charges	150	147	144	141	138	134	131	128	125	122

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Residual Stock Value	907	858	817	768	723	677	631	585	541	497
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	45	45	45	45	45	45	45	45	45	45
Stock Depreciation	45	45	45	45	45	45	45	45	45	45
Tax Depreciation	612	612	612	612	612	612	612	612	612	612
Income Taxes	0	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0	0
Insurance	10	10	10	10	10	10	10	10	10	10
Annual Carrying Charges	113	115	112	109	106	103	100	96	93	90

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

MUNICIPAL OWNERSHIP - TWO PHASES/BOILERS ONLY - WITHOUT SOME OF LOAD

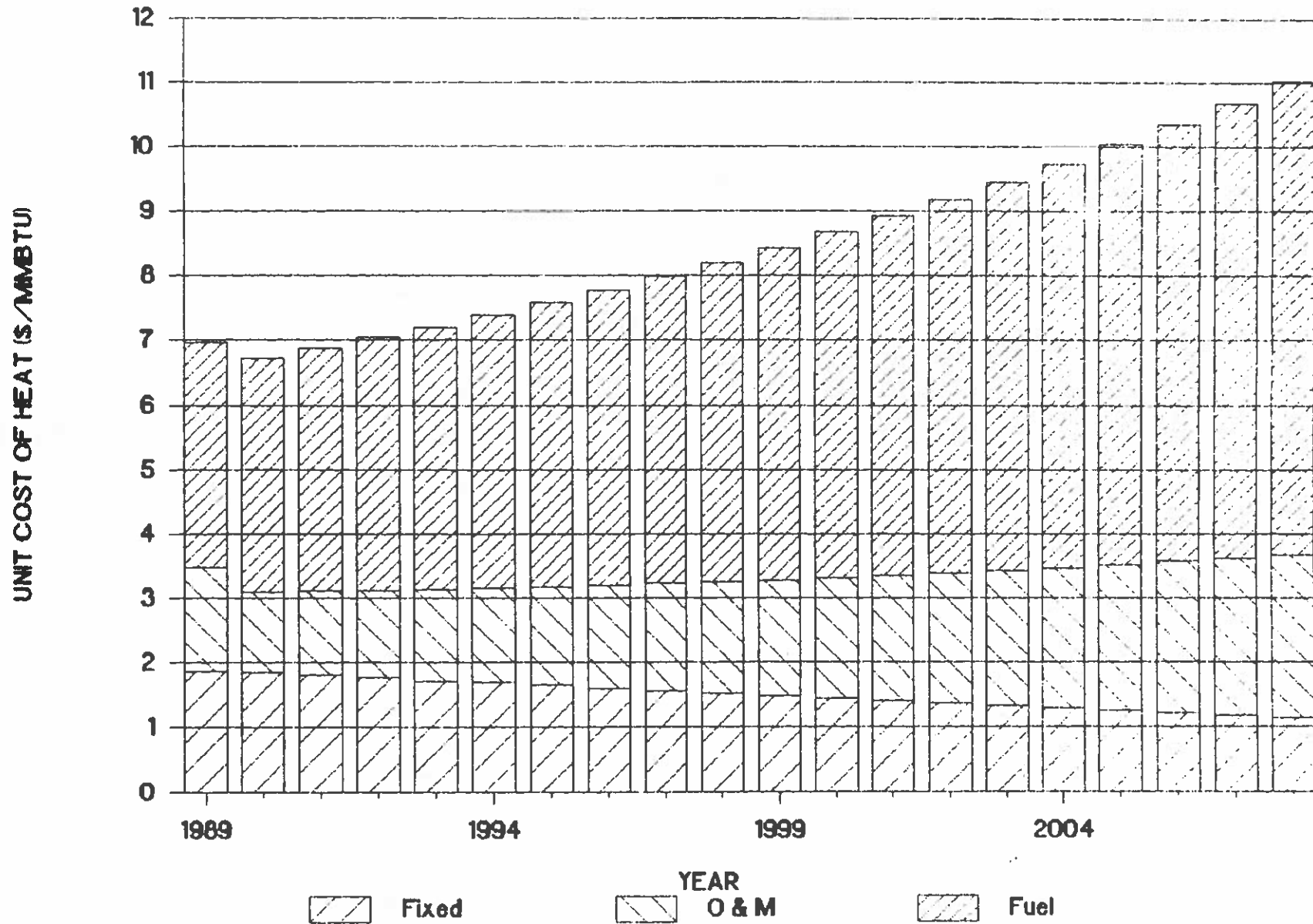
Investment	2	Phase 1	Discount Factors	Case #68
Initial Operation	1980	Preferred Stock Ratio	1	Book Life - yrs
Cost Data	1980	Return on Preferred Stock - %	7	Income Tax Rate - %
Facility Cost - \$1,400	11,400	Common Stock Ratio	100	Tax Credit - %
Gen. Escalation	4.0%	Return on Common Stock - %	8	Tax Life - yrs
Depreciation - \$100	100	Test Ratio	1	Accelerated Tax Depreciation
AFSC - \$100	50	Test Cost - %	7	Property Tax - %
Total Cost - \$10,000	10,000			Insurance Rate - %
Start of Evaluation	1980	Weighted Cost of Capital - %	7.36	

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988
Remaining Book Value	0	1001	1546	1494	1441	1388	1334	1281	1227
Return on Preferred Stock	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0
Interest	0	112	103	105	101	97	93	88	82
Book Depreciation	0	57	57	57	57	57	57	57	57
Tax Depreciation	0	254	254	254	254	254	254	254	254
Income Taxes	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0
Insurance	0	12	12	12	12	12	12	12	12
Annual Carrying Charges	0	157	174	170	166	161	157	153	148

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997
Remaining Book Value	1121	1067	1014	961	907	854	801	747	694
Return on Preferred Stock	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0
Interest	78	75	71	67	64	60	56	52	48
Book Depreciation	57	57	57	57	57	57	57	57	57
Tax Depreciation	254	254	254	254	254	254	254	254	254
Income Taxes	0	0	0	0	0	0	0	0	0
Deferred Taxes	0	0	0	0	0	0	0	0	0
Property Tax	0	0	0	0	0	0	0	0	0
Insurance	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	144	140	136	132	128	125	121	118	114

UNIT COST OF DISTRICT HEAT - CASE MS8

JAMESTOWN INDUSTRIAL CORRIDOR



**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES

Start of Evaluation	1989	Case #61				
Unit Costs	1988	Escalation	Heat Source -	Boilers/GT Cogen	Boat Life - Yrs	10
			Avg. Heat Rate - Btu/kWh	10,475	Income Tax Rate - %	40
Elect. Purch. - \$/MWh	20.00	4.0	Peak Electric Output - KW	8,140 (2 Units)	Tax Credit - %	1
Elect. Sold - \$/MWh	30.00	4.0	Boiler Efficiency - %	85.0%	Tax Life - Yrs	15
O&M Labor - \$/MWh	15.000	4.0	Cogen Capacity Factor	90%	Accel. Tax Decond.	1
O&M Materials - % Cost	1.7	4.0			Property Tax - %	1.5
Property Taxes - %	1.5	2.5			Insurance Rate - %	1.75
Fuel - \$/MBtu	2.71	4.0			Cost of Capital - %	9.50

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
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A. Annual Quantities

1. District Heat - MBtu/yr	110,359	164,804	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051
2. Chilled Water - MBtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	27,846	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092
4. Auxiliary Power - MWh/yr	100	1,477	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	26,069	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237
7. Power Purchased - MWh/yr	100	146	285	285	285	285	285	285	285	285
8. O&M Labor - Man/yr	5	7	9	9	9	9	9	9	9	9
9. O&M Material - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	136,726	438,666	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502

B. Unit Costs

1. Power Purchased - \$/MWh	31.20	31.45	33.75	35.10	36.50	37.96	39.46	41.06	42.70	44.41
2. Power Sold - \$/MWh	31.20	31.45	33.75	35.10	36.50	37.96	39.46	41.06	42.70	44.41
3. O&M Labor - \$/MWh	26	27	28	29	30	32	33	34	36	37
4. Fuel - \$/MBtu (w/5% Tax)	2.99	3.11	3.23	3.36	3.49	3.63	3.78	3.93	4.09	4.25

C. Earning Charges - \$1000/yr

	700	1171	1764	1709	1649	1590	1540	1489	1441	1396
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D. Operating Expenses - \$1000/yr

1. Power Purchased	7	5	10	10	10	11	11	12	12	13
2. O&M	154	319	453	481	500	520	541	563	585	609
3. Fuel Cost	407	1363	2735	2845	2958	3077	3200	3326	3461	3599
Sub-Total	574	1687	3207	3336	3469	3608	3752	3902	4058	4221

E. Power Sold - \$1000/yr

	0	846	1763	1833	1907	1983	2062	2145	2231	2320
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F. Required Revenues - \$1000/yr

	874	1973	3208	3212	3212	3218	3230	3247	3269	3297
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G. Unit Cost of Heat - \$/MBtu

1. Fixed Expenses	\$2.72	\$4.81	\$3.65	\$3.49	\$3.32	\$3.16	\$3.01	\$2.87	\$2.75	\$2.63
2. O & M Expenses	\$1.51	\$1.37	\$0.98	\$1.00	\$1.03	\$1.05	\$1.08	\$1.11	\$1.14	\$1.17
3. Fuel	\$3.69	\$5.79	\$5.66	\$5.80	\$5.95	\$6.10	\$6.26	\$6.42	\$6.59	\$6.77
Total	\$7.92	\$11.97	\$10.28	\$10.29	\$10.29	\$10.31	\$10.35	\$10.41	\$10.46	\$10.57

LEVELIZED RATE @ 7%: \$10.684

ECONOMIC ANALYSIS OF DISTRICT HEATING FOR JAMESTOWN INDUSTRIAL CORRIDOR

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES

Start of Evaluation	1985	Case PSI									
Unit Costs	1988	Escalation	Heat Source -		Boilers: 07 Cogen		Boor Life - yrs				
			Avg. Heat Rate - Btu/MWh		13.479		Income Tax Rate - %		40		
Elect. Purch. - \$/MWh	30.00	4.0	Peak Electric Output - KW		5,140 (2 Units)		Tax Credit - %		10		
Elect. Sold - \$/MWh	30.00	4.0	Boiler Efficiency - %		85.0%		Tax Life - yrs		19		
O&M Labor - \$/Man/yr	25.000	4.0	Cogen Capacity Factor		90%		Accel. Tax Deprac.		1		
O&M Materials-% Cost	1.7	4.0					Property Tax - %		1.5		
Procent. Taxes - %	1.5	2.5					Insurance Rate - %		0.75		
Fuel - \$/MBtu	2.71	4.0					Cost of Capital - %		5.5%		
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
A. Annual Quantities											
1. District Heat - Mbtu/yr	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051	312,051	
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0	
3. Power Generated - MWh/yr	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	
4. Auxiliary Power - MWh/yr	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0	
6. Power Sold - MWh/yr	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	
7. Power Purchased - MWh/yr	285	285	285	285	285	285	285	285	285	285	
8. O&M Labor - Man/yr	9	9	9	9	9	9	9	9	9	9	
9. O&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	
10. Fuel - MBtu/yr	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	846,502	
B. Unit Costs											
1. Power Purchased - \$/MWh	45.18	46.03	46.95	47.95	49.03	50.19	51.44	52.77	54.18	55.67	
2. Power Sold - \$/MWh	45.18	46.03	46.95	47.95	49.03	50.19	51.44	52.77	54.18	55.67	
3. O&M Labor - \$1000/Man/yr	28	40	42	43	45	47	49	51	53	55	
4. Fuel - \$/MBtu (w/6% Tax)	4.42	4.60	4.76	4.97	5.17	5.38	5.60	5.82	6.05	6.29	
5. Carrying Charges - \$1000/yr	1253	1310	1269	1227	1185	1143	1102	1060	1018	976	
C. Operating Expenses - \$1000/yr											
1. Power Purchased	13	14	14	15	15	16	17	17	18	19	
2. O&M	633	656	685	712	741	770	801	833	866	901	
3. Fuel Cost	3743	3893	4049	4211	4379	4554	4737	4926	5123	5328	
Sub- Total	4390	4565	4748	4938	5135	5341	5554	5776	6008	6246	
D. Power Sold - \$1000/yr	2413	2509	2609	2714	2822	2935	3053	3175	3302	3434	
F. Required Revenues- \$1000/yr	3330	3367	3407	3451	3498	3549	3603	3662	3724	3791	
G. Unit Cost of Heat - \$/MBtu											
1. Fixed Expenses	\$2.51	\$2.41	\$2.30	\$2.20	\$2.10	\$2.01	\$1.91	\$1.82	\$1.73	\$1.64	
2. O & M Expenses	\$1.20	\$1.23	\$1.27	\$1.30	\$1.34	\$1.38	\$1.42	\$1.46	\$1.50	\$1.55	
3. Fuel	\$6.96	\$7.15	\$7.35	\$7.55	\$7.77	\$7.99	\$8.22	\$8.46	\$8.70	\$8.96	
Total	\$10.67	\$10.79	\$10.92	\$11.06	\$11.21	\$11.37	\$11.55	\$11.73	\$11.93	\$12.15	

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES

Phase	Year Investment		Economic Factors		Case FSI	
1	1989	1989	Preferred Stock Ratio	0	Book Life - Yrs	20
2	1990	5567	Return on Preferred Stock - %	0	Income Tax Rate - %	40
3	1991	4364	Common Stock Ratio	0	Tax Credit - %	0
4	1992	0	Return on Common Stock - %	0	Tax Life - Yrs	15
			Debt Ratio	1	Accelerated Tax Depreciation	1
			Debt Cost - %	9.5	Property Tax - %	1.5
			Weighted Cost of Capital - %	9.5	Insurance Rate - %	0.75

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1989	7479	11549	10977	10348	9754	9192	8661	8158	7650
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	139	710	1097	1043	987	927	873	823	775	730
Book Depreciation	66	252	398	398	398	398	398	398	398	398
Tax Depreciation	64	409	830	976	986	807	731	661	599	549
Income Taxes	-3	-65	-174	-201	-196	-163	-133	-105	-80	-60
Deferred Taxes	7	63	174	201	196	163	133	105	80	60
Property Tax	30	113	179	179	179	179	179	179	179	179
Insurance	15	57	90	90	90	90	90	90	90	90
Annual Carrying Charges	300	1132	1764	1709	1649	1593	1540	1485	1441	1396

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	7222	6777	6338	5899	5460	5020	4581	4142	3702	3260
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	156	644	602	560	519	477	435	393	352	310
Book Depreciation	398	398	398	398	398	398	398	398	398	398
Tax Depreciation	514	501	501	501	501	501	501	501	501	501
Income Taxes	-47	-41	-41	-41	-41	-41	-41	-41	-41	-41
Deferred Taxes	47	41	41	41	41	41	41	41	41	41
Property Tax	179	179	179	179	179	179	179	179	179	179
Insurance	90	90	90	90	90	90	90	90	90	90
Annual Carrying Charges	1353	1310	1269	1227	1185	1143	1102	1060	1018	976

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES

Investment	1	Phase 1	Economic Factors: Case PSI		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$1,828	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	15
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	1
AFDC - \$1000	88	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	1989			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1989	1916	1806	1703	1605	1512	1425	1342	1263	1188
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	129	152	172	161	152	144	135	128	120	112
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	175	159	145	131	119	107	97	90	84
Income Taxes	-7	-47	-37	-32	-26	-21	-16	-12	-9	-7
Deferred Taxes	7	47	37	32	26	21	16	12	9	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	300	290	287	273	260	255	246	239	231	224

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1115	1041	966	895	822	749	675	602	529	456
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	106	95	92	85	78	71	64	57	50	42
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	84	84	84	84	84	84	84	84	84
Income Taxes	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Deferred Taxes	7	7	7	7	7	7	7	7	7	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	217	210	203	196	189	182	175	168	161	154

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES

Investment	2	Phase 2	Economic Factors	Case P01	
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - Yrs	20
Cost Basis	1990	Return on Preferred Stock - %	0	Income Tax Rate - %	41
Capital Cost - \$1000	14,915	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	15
Escalation - \$1000	401	Debt Ratio	1	Accelerated Tax Depreciation	1
AFDC - \$1000	247	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	5563			Insurance Rate - %	0.75
Start of Evaluation	1999	Weighted Cost of Capital - %	9.56		

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	0	5567	5059	5051	4762	4498	4230	3965	3754	3504
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	526	509	480	452	426	402	379	357	336
Book Depreciation	0	185	185	185	185	185	185	185	185	185
Tax Depreciation	0	234	490	445	406	367	334	300	273	250
Income Taxes	0	-19	-122	-104	-88	-73	-59	-46	-35	-26
Deferred Taxes	0	19	122	104	88	73	59	46	35	26
Property Tax	0	83	83	83	83	83	83	83	83	83
Insurance	0	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	0	629	626	790	763	737	712	689	667	646

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	7322	7118	2913	2708	2503	2299	2094	1889	1684	1480
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	316	296	277	257	236	218	199	179	160	141
Book Depreciation	185	185	185	185	185	185	185	185	185	185
Tax Depreciation	234	234	234	234	234	234	234	234	234	234
Income Taxes	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
Deferred Taxes	19	19	19	19	19	19	19	19	19	19
Property Tax	83	83	83	83	83	83	83	83	83	83
Insurance	42	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	626	607	587	568	548	529	510	490	471	451

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES

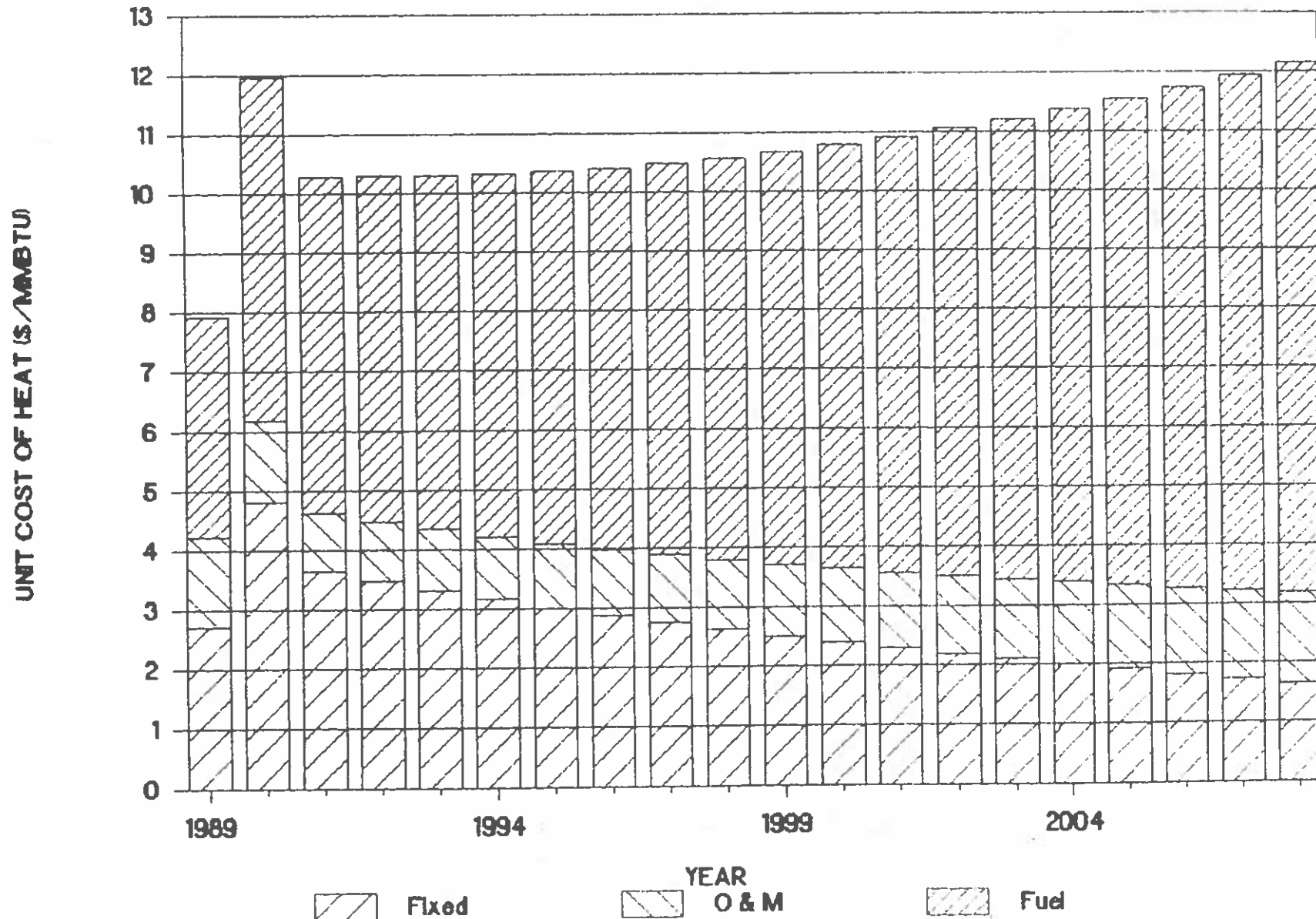
Investment	Phase 3	Economic Factors	Case F91
Initial Operation 1991	Preferred Stock Ratio 0	Book Life - Yrs 31	
Cost Basis 1989	Return on Preferred Stock - % 0	Income Tax Rate - % 41	
Capital Cost - \$1000 \$3,725	Common Stock Ratio 0	Tax Credit - % 0	
Gen. Escalation - 4.0%	Return on Common Stock - % 0	Tax Life - Yrs 15	
Escalation - \$1000 465	Debt Ratio 1	Accelerated Tax Depreciation 1	
AFID - \$1000 195	Debt Cost - % 9.5	Property Tax - % 1.5	
Total Cost - \$1000 4384		Insurance Rate - % 0.75	
Start of Evaluation 1989	Weighted Cost of Capital - % 9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	0	4384	4223	3981	3753	3537	3334	3141	2959
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	0	417	401	378	357	336	317	298	281
Book Depreciation	0	0	146	146	146	146	146	146	146	146
Tax Depreciation	0	0	184	184	184	184	184	184	184	184
Income Taxes	0	0	-15	-96	-82	-70	-57	-47	-36	-27
Deferred Taxes	0	0	15	96	82	70	57	47	36	27
Property Tax	0	0	66	66	66	66	66	66	66	66
Insurance	0	0	33	33	33	33	33	33	33	33
Annual Carrying Charges	0	0	661	646	623	601	581	562	543	526

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	2785	2618	2457	2296	2134	1973	1812	1650	1489	1329
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	265	249	233	218	203	187	172	157	141	126
Book Depreciation	146	146	146	146	146	146	146	146	146	146
Tax Depreciation	197	184	184	184	184	184	184	184	184	184
Income Taxes	-20	-15	-15	-15	-15	-15	-15	-15	-15	-15
Deferred Taxes	20	15	15	15	15	15	15	15	15	15
Property Tax	66	66	66	66	66	66	66	66	66	66
Insurance	33	33	33	33	33	33	33	33	33	33
Annual Carrying Charges	509	494	478	463	448	432	417	402	386	371

UNIT COST OF DISTRICT HEAT - CASE PS1

JAMESTOWN INDUSTRIAL CORRIDOR



**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

PRIVATE OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

Start of Evaluation 1989

Case F52

Unit Costs	1988	Escalation	Heat Source -	Boilers/ST Cogen	Book Life - yrs
			Avg. Heat Rate - Btu/kWh	13.479	Income Tax Rate - %
Elect. Purch. - \$/MWh	30.00	4.0	Peak Electric Output - MW	4.070	Tax Credit - %
Elect. Sold - \$/MWh	30.00	4.0	Peaking/Backup Boiler Eff. - %	85.0%	Tax Life - yrs
O&M Labor - \$/Man/yr	25.000	4.0	Cogen Capacity Factor	90%	Accel. Tax Deprec.
O&M Materials-% Cost	1.7	4.0			Property Tax - %
Property Taxes - %	1.5	2.5			Insurance Rate - %
Fuel - \$/MBtu	2.71	4.0			Cost of Capital - %

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
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A. Annual Quantities

1. District Heat - MBtu/yr	110,359	134,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904
2. Chilled Water - MBtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546
4. Auxiliary Power - MWh/yr	100	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069
7. Power Purchased - MWh/yr	100	148	148	148	148	148	148	148	148	148
8. O&M Labor - Man/yr	5	7	7	7	7	7	7	7	7	7
9. O&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	176,326	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688

B. Unit Costs

1. Power Purchased - \$/MWh	31.20	32.45	33.75	35.10	36.50	37.96	39.48	41.06	42.70	44.41
2. Power Sold - \$/MWh	31.20	32.45	33.75	35.10	36.50	37.96	39.46	41.06	42.70	44.41
3. O&M Labor - \$1000/Man/yr	26	27	28	29	30	32	33	34	36	37
4. Fuel - \$/MBtu (w/Tax)	2.99	3.11	3.23	3.36	3.49	3.63	3.78	3.93	4.09	4.25

C. Carrying Charges - \$1000/yr

	300	1132	1102	1063	1026	992	959	928	898	870
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D. Operating Expenses - \$1000/yr

1. Power Purchased	3	5	5	5	5	6	6	6	6	7
2. O&M	164	319	332	345	359	373	388	404	420	437
3. Fuel Cost	407	1363	1418	1474	1533	1595	1658	1725	1794	1865
Sub- Total	574	1687	1754	1824	1897	1973	2052	2134	2220	2309

E. Power Sold - \$1000/yr

	0	846	880	915	951	990	1029	1070	1113	1158
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F. Required Revenues- \$1000/yr

	874	1973	1977	1973	1972	1975	1982	1992	2005	2021
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G. Unit Cost of Heat - \$/MBtu

1. Fixed Expenses	\$2.72	\$4.81	\$4.63	\$4.40	\$4.20	\$4.01	\$3.83	\$3.66	\$3.50	\$3.36
2. O & M Expenses	\$1.51	\$1.37	\$1.41	\$1.45	\$1.49	\$1.53	\$1.57	\$1.62	\$1.66	\$1.71
3. Fuel	\$3.69	\$5.79	\$5.95	\$6.11	\$6.27	\$6.44	\$6.62	\$6.80	\$6.99	\$7.19
Total	\$7.92	\$11.97	\$11.99	\$11.96	\$11.96	\$11.98	\$12.02	\$12.08	\$12.16	\$12.26

LEVELIZED RATE @ 7%: \$12.118

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

PRIVATE OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

Start of Evaluation		1989	Case P2							
Unit Costs	1988	Escalation	Heat Source -	Boilers GT Cogen	Boilers GT Cogen	Boilers GT Cogen	Boilers GT Cogen	Boilers GT Cogen	Boilers GT Cogen	Boilers GT Cogen
			Avg. Heat Rate - Btu/Kwh	17,479	17,479	17,479	17,479	17,479	17,479	17,479
Elect. Purch. - \$/Mwh	20.00	4.0	Peak Electric Output - KW	4,070	4,070	4,070	4,070	4,070	4,070	4,070
Elect. Sold - \$/Mwh	20.00	4.0	Peaking/Backup Boiler Eff. - %	85.00	85.00	85.00	85.00	85.00	85.00	85.00
O&M Labor - \$/Man/yr	25.000	4.0	Cogen Capacity Factor	90%	90%	90%	90%	90%	90%	90%
O&M Materials-% Cost	1.7	4.0								
Property Taxes - %	1.5	2.5								
Fuel - \$/MBtu	2.71	4.0								
Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
A. Annual Quantities										
1. District Heat - MBtu/yr	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904
2. Chilled Water - MBtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546
4. Auxiliary Power - MWh/yr	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069
7. Power Purchased - MWh/yr	146	146	146	146	146	146	146	146	146	146
8. O&M Labor - Man/yr	7	7	7	7	7	7	7	7	7	7
9. O&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688	438,688
B. Unit Costs										
1. Power Purchased - \$/MWh	46.16	46.03	45.95	51.65	54.93	55.19	58.44	60.77	63.21	65.77
2. Power Sold - \$/MWh	46.16	46.03	45.95	51.65	54.93	55.19	58.44	60.77	63.21	65.77
3. O&M Labor - \$1000/Man/yr	25	40	42	45	45	47	49	51	53	55
4. Fuel - \$/MBtu (w/Tax)	4.42	4.50	4.73	4.97	5.17	5.38	5.60	5.82	6.05	6.29
C. Carrying Charges - \$1000/yr										
	640	617	799	764	738	711	685	658	632	606
D. Operating Expenses - \$1000/yr										
1. Power Purchased	7	7	7	8	8	8	9	9	9	10
2. O&M	454	472	491	511	531	552	575	598	621	646
3. Fuel Cost	1940	2018	2098	2182	2270	2360	2455	2553	2655	2761
Sub- Total	2401	2497	2597	2701	2809	2921	3038	3159	3286	3417
E. Power Sold - \$1000/yr										
	1204	1252	1302	1354	1406	1465	1523	1584	1648	1714
F. Required Revenues - \$1000/yr										
	2640	2662	2685	2710	2738	2767	2799	2833	2870	2909
G. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$3.22	\$3.08	\$2.95	\$2.82	\$2.70	\$2.57	\$2.45	\$2.34	\$2.22	\$2.11
2. O & M Expenses	\$1.75	\$1.81	\$1.86	\$1.91	\$1.97	\$2.03	\$2.09	\$2.15	\$2.22	\$2.28
3. Fuel	\$7.40	\$7.61	\$7.87	\$8.06	\$8.30	\$8.54	\$8.79	\$9.06	\$9.33	\$9.61
Total	\$12.37	\$12.50	\$12.68	\$12.80	\$12.96	\$13.14	\$13.34	\$13.54	\$13.77	\$14.00

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

Phase	Year Investment		Economic Factors				Case F52			
1	1989	1989	Preferred Stock Ratio	0	Book Life - Yrs	20				
2	1990	1990	Return on Preferred Stock - %	0	Income Tax Rate - %	40				
3	1991	0	Common Stock Ratio	0	Tax Credit - %	0				
4	1992	0	Return on Common Stock - %	0	Tax Life - Yrs	19				
			Debt Ratio	1	Accelerated Tax Depreciation	1				
			Debt Cost - %	9.5	Property Tax - %	11.5				
			Weighted Cost of Capital - %	9.5	Insurance Rate - %	0.75				

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1989	7179	7184	6754	6367	6001	5655	5328	5017	4721
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	189	716	651	642	605	579	537	506	477	449
Book Depreciation	66	252	252	252	252	252	252	252	252	252
Tax Depreciation	84	409	649	990	537	426	441	396	362	334
Income Taxes	-7	-63	-159	-135	-114	-94	-76	-58	-44	-33
Deferred Taxes	7	63	159	135	114	94	76	58	44	33
Property Tax	30	113	113	113	113	113	113	113	113	113
Insurance	15	57	57	57	57	57	57	57	57	57
Annual Carrying Charges	300	1132	1102	1063	1026	992	959	926	892	870

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	4437	4159	3881	3603	3325	3047	2769	2491	2214	1936
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	422	395	369	342	316	289	263	237	210	184
Book Depreciation	252	252	252	252	252	252	252	252	252	252
Tax Depreciation	317	317	317	317	317	317	317	317	317	317
Income Taxes	-26	-26	-26	-26	-26	-26	-26	-26	-26	-26
Deferred Taxes	26	26	26	26	26	26	26	26	26	26
Property Tax	113	113	113	113	113	113	113	113	113	113
Insurance	57	57	57	57	57	57	57	57	57	57
Annual Carrying Charges	843	817	790	764	738	711	685	658	632	606

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

Investment	1	Phase 1	Economic Factors: Case P52		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1989	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$1,828	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	77	Debt Ratio	1	Accelerated Tax Depreciation	1
AFUD - \$1000	88	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	1989			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1989	1918	1806	1707	1605	1512	1425	1342	1267	1188
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	189	182	172	162	152	144	135	126	120	117
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	175	159	145	131	119	107	97	80	64
Income Taxes	-7	-43	-37	-32	-26	-21	-16	-12	-9	-7
Deferred Taxes	7	43	37	32	26	21	16	12	9	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	300	293	280	273	263	255	246	237	231	224

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1115	1041	966	895	822	749	675	602	528	450
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	106	99	92	85	78	71	64	57	50	43
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	84	84	84	84	84	84	84	84	84
Income Taxes	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Deferred Taxes	7	7	7	7	7	7	7	7	7	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	217	210	203	196	189	182	175	168	161	154

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENTING PHASE 1 AND 2 ONLY

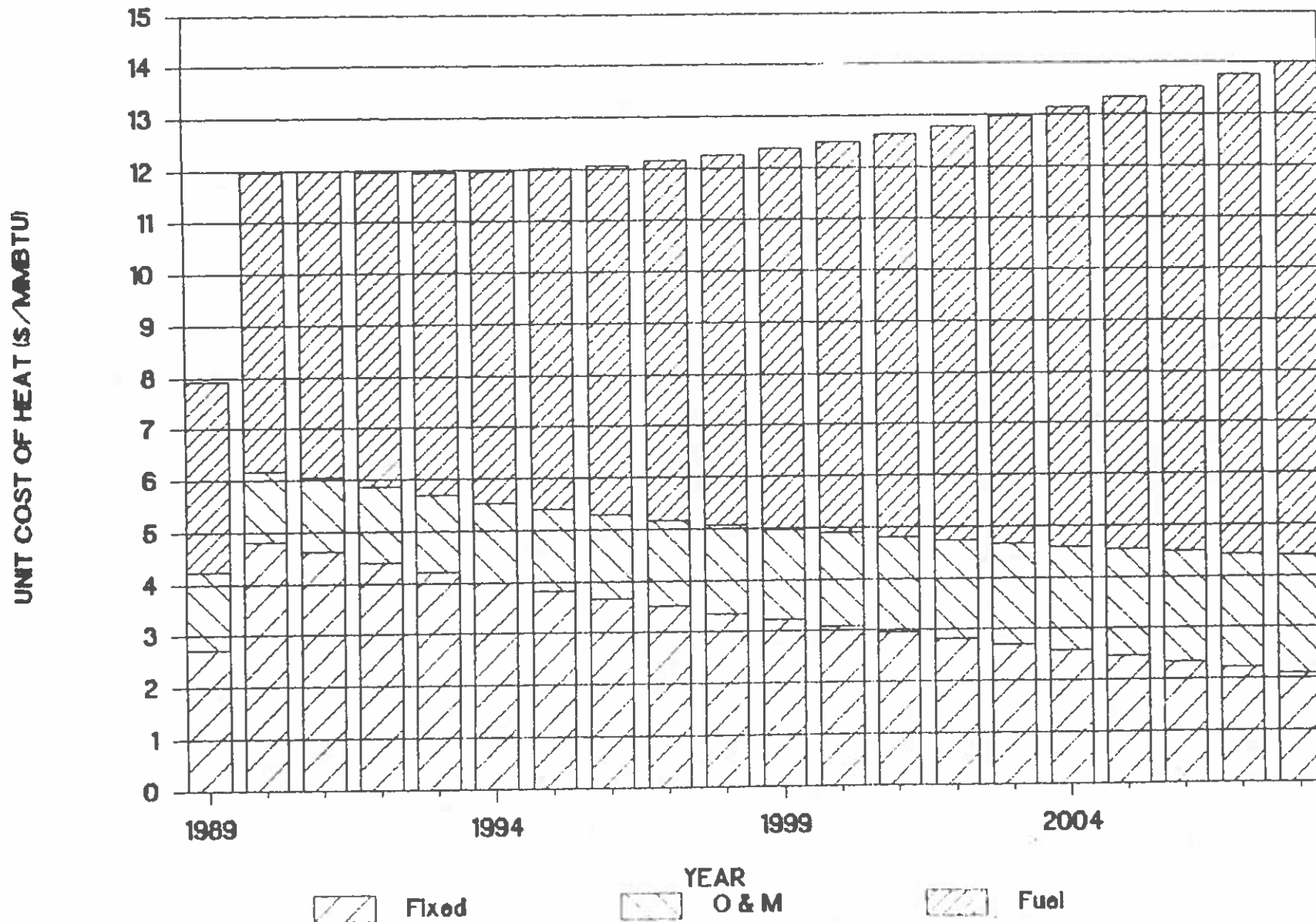
Investment	2	Phase 2	Economic Factors	Case #62	
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - yrs	20
Cost Basis	1958	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$4,515	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - yrs	15
Escalation - \$1000	401	Debt Ratio	1	Accelerated Tax Depreciation	1
RFDC - \$1000	247	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	5563			Insurance Rate - %	0.75
Start of Evaluation	1959	Weighted Cost of Capital - %	9.50		

Year	1999	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	5563	5358	5051	4762	4468	4230	3985	3754	3524
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	528	509	480	452	426	402	379	357	335
Book Depreciation	0	185	185	185	185	185	185	185	185	185
Tax Depreciation	0	234	490	445	406	367	334	300	273	250
Income Taxes	0	-19	-122	-104	-88	-73	-59	-45	-35	-26
Deferred Taxes	0	19	122	104	88	73	59	45	35	26
Property Tax	0	83	83	83	83	83	83	83	83	83
Insurance	0	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	0	839	820	790	763	737	712	689	667	646

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3322	3118	2913	2708	2503	2299	2094	1889	1684	1460
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	316	296	277	257	238	218	199	179	160	141
Book Depreciation	185	185	185	185	185	185	185	185	185	185
Tax Depreciation	234	234	234	234	234	234	234	234	234	234
Income Taxes	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
Deferred Taxes	19	19	19	19	19	19	19	19	19	19
Property Tax	83	83	83	83	83	83	83	83	83	83
Insurance	42	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	626	607	587	568	548	529	510	490	471	451

UNIT COST OF DISTRICT HEAT - CASE PS2

JAMESTOWN INDUSTRIAL CORRIDOR



ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

PRIVATE OWNERSHIP - THREE PHASES/BOILERS ONLY

Start of Evaluation	1989	Case 137									
Unit Costs	1989	Escalation	Heat Source -	BOILERS	Boiler Life - Yrs	0					
			Exp. Heat Rate - Btu/kWh	NA	Income Tax Rate - %	40					
			Peak Electric Output - kW	NA	Cost of Unit Tax Credit - %	0					
			Boiler Efficiency - %	85.0%	Tax Life - Yrs	19					
			Open Inventory Factor	NA	Accel. % Deprec.	1					
					Property Tax - %	1.5					
					Insurance Rate - %	0.75					
					Cost of Capital - %	8.0%					
Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
A. Annual Substitutes											
1. District Heat - \$/MWh	212.051	212.051	212.051	212.051	212.051	212.051	212.051	212.051	212.051	212.051	
2. Chilled Water - \$/MWh	0	0	0	0	0	0	0	0	0	0	
3. Power Generated - \$/MWh	0	0	0	0	0	0	0	0	0	0	
4. Auxiliary Power - \$/MWh	183	183	183	183	183	183	183	183	183	183	
5. Pumping Power - \$/MWh	0	0	0	0	0	0	0	0	0	0	
6. Power Sold - \$/MWh	0	0	0	0	0	0	0	0	0	0	
7. Power Purchased - \$/MWh	183	183	183	183	183	183	183	183	183	183	
8. O&M Labor - \$/MWh	7	7	7	7	7	7	7	7	7	7	
9. O&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	
10. Fuel - \$/MWh	355.475	355.475	355.475	355.475	355.475	355.475	355.475	355.475	355.475	355.475	
B. Unit Costs											
1. Power Purchased - \$/MWh	46.19	46.37	46.95	47.95	49.07	50.19	50.44	50.77	51.11	51.77	
2. Power Sold - \$/MWh	46.19	46.03	45.95	45.95	45.03	44.19	43.44	42.77	42.11	41.77	
3. O&M Labor - \$/MWh	38	40	42	47	48	47	46	45	44	43	
4. Fuel - \$/MWh	4.42	4.59	4.75	4.97	5.17	5.36	5.59	5.82	6.15	6.17	
C. Carrying Charges - \$/1000/yr	494	475	467	446	432	417	401	386	371	355	
D. Operating Expenses - \$/1000/yr											
1. Power Purchased	13	14	14	15	15	16	17	17	18	19	
2. O&M	376	393	408	425	440	459	478	497	517	537	
3. Fuel Cost	1705	1773	1844	1918	1994	2074	2157	2243	2333	2416	
Sub-Total	2095	2179	2266	2357	2451	2549	2651	2757	2866	2962	
E. Power Sold - \$/1000/yr	0	0	0	0	0	0	0	0	0	0	
F. Required Revenues- \$/1000/yr	2590	2656	2730	2805	2884	2966	3053	3143	3238	3337	
G. Unit Cost of Heat - \$/MWh											
1. Fixed Expenses	\$1.56	\$1.53	\$1.48	\$1.44	\$1.39	\$1.34	\$1.29	\$1.24	\$1.19	\$1.14	
2. O & M Expenses	\$1.25	\$1.30	\$1.35	\$1.41	\$1.46	\$1.52	\$1.58	\$1.65	\$1.71	\$1.76	
3. Fuel	\$5.46	\$5.62	\$5.91	\$6.14	\$6.39	\$6.65	\$6.91	\$7.19	\$7.46	\$7.75	
Total	\$8.20	\$8.52	\$8.75	\$8.99	\$9.24	\$9.51	\$9.78	\$10.07	\$10.36	\$10.65	

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR
COMPOSITE ANNUAL CARRYING CHARGES
PRIVATE OWNERSHIP - THREE PHASES/BOILERS ONLY

Phase	Year Investment		Economic Factors		Case #10	
1	1989	1989	Preferred Stock Ratio	0	Book Life - yrs	20
2	1990	1990	Return on Preferred Stock - %	0	Income Tax Rate - %	40
3	1991	1991	Common Stock Ratio	0	Tax Credit - %	0
4	1992	1992	Return on Common Stock - %	0	Tax Life - yrs	15
			Debt Ratio	1	Accelerated Tax Depreciation	1
			Debt Cost - %	9.5	Property Tax - %	1.5
			Weighted Cost of Capital - %	9.5	Insurance Rate - %	1.75

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1989	3489	4185	3967	3735	3521	3315	3125	2944	2770
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	189	371	388	377	355	335	315	297	280	263
Book Depreciation	56	119	146	146	146	146	146	146	146	146
Tax Depreciation	84	241	374	347	315	286	259	234	213	197
Income Taxes	-7	-49	-75	-90	-67	-55	-45	-35	-26	-16
Deferred Taxes	7	49	75	90	67	55	45	35	26	16
Property Tax	20	53	66	66	66	66	66	66	66	66
Insurance	15	33	33	33	33	33	33	33	33	33
Annual Carrying Charges	300	530	645	624	602	582	562	544	527	510

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	2603	2439	2276	2113	1950	1787	1625	1462	1299	1136
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	247	232	216	201	185	170	154	139	123	108
Book Depreciation	148	148	148	148	148	148	148	148	148	148
Tax Depreciation	188	186	186	186	186	186	186	186	186	186
Income Taxes	-16	-15	-15	-15	-15	-15	-15	-15	-15	-15
Deferred Taxes	16	15	15	15	15	15	15	15	15	15
Property Tax	66	66	66	66	66	66	66	66	66	66
Insurance	33	33	33	33	33	33	33	33	33	33
Annual Carrying Charges	494	479	463	448	432	417	401	386	371	355

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - THREE PHASES/BOILERS ONLY

Investment	2	Phase 2	Economic Factors	Case P50	
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - Yrs	21
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	41
Capital Cost - \$1000	\$1,750	Common Stock Ratio	0	Tax Credit - %	-
Gen. Escalation -	4.7%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	112	Debt Ratio	1	Accelerated Tax Depreciation	-
AFCC - \$1000	70	Debt Cost - %	9.5	Property Tax - %	1.8
Total Cost - \$1000	572			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	1577	1515	1429	1347	1269	1196	1127	1060	999
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	149	144	136	128	121	114	107	101	95
Book Depreciation	0	52	52	52	52	52	52	52	52	52
Tax Depreciation	0	66	106	126	115	104	94	85	77	71
Income Taxes	0	-5	-74	-29	-25	-21	-17	-13	-10	-7
Deferred Taxes	0	5	34	39	25	21	17	13	10	7
Property Tax	0	24	24	24	24	24	24	24	24	24
Insurance	0	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	0	237	232	224	216	209	202	195	189	183

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	940	882	824	766	708	650	592	534	476	419
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	89	84	78	73	67	62	56	51	45	40
Book Depreciation	52	52	52	52	52	52	52	52	52	52
Tax Depreciation	66	66	66	66	66	66	66	66	66	66
Income Taxes	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
Deferred Taxes	5	5	5	5	5	5	5	5	5	5
Property Tax	24	24	24	24	24	24	24	24	24	24
Insurance	12	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	177	172	166	161	155	150	144	139	133	128

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - THREE PHASES/BOILERS ONLY

Investment	1	Phase 1	Economic Factors: Case P83		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$1,528	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	15
Escalation - \$1000	77	Debt Ratio	1	Accelerated Tax Depreciation	1
AFDC - \$1000	88	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	1589			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1589	1916	1806	1700	1605	1512	1425	1342	1267	1188
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	189	182	172	162	152	144	135	126	120	117
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	175	159	145	131	119	107	97	90	84
Income Taxes	-7	-43	-37	-32	-26	-21	-16	-12	-9	-7
Deferred Taxes	7	47	37	32	26	21	16	12	9	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	300	292	283	273	263	255	246	239	231	224

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1115	1041	968	895	822	749	675	602	529	456
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	108	99	92	85	78	71	64	57	50	42
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	84	84	84	84	84	84	84	84	84
Income Taxes	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Deferred Taxes	7	7	7	7	7	7	7	7	7	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	217	210	202	196	189	182	175	168	161	154

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - THREE PHASES/BOILERS ONLY

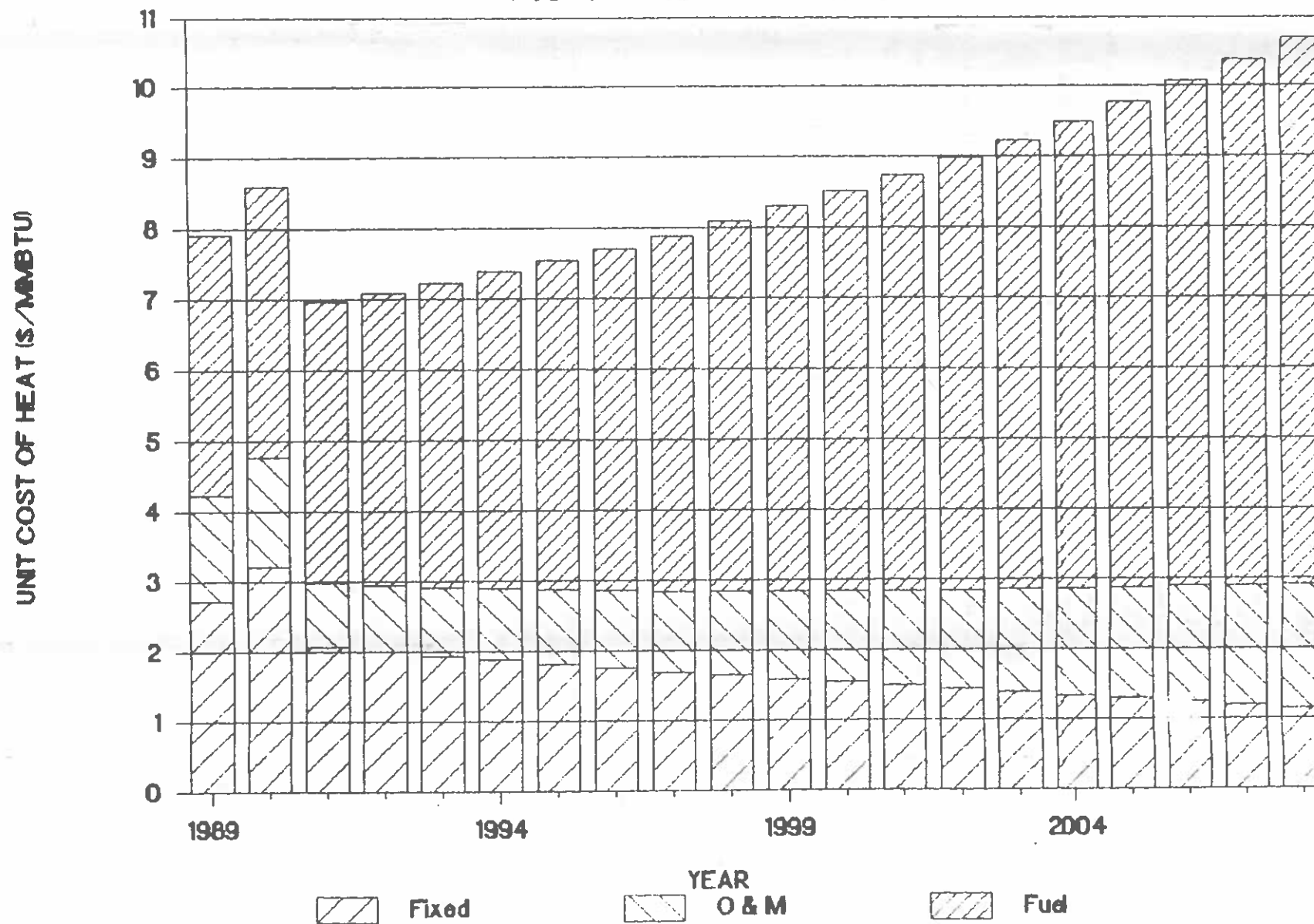
Investment	3	Phase 3	Economic Factors	Case PS3	
Initial Operation	1991	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$734	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	92	Debt Ratio	1	Accelerated Tax Depreciation	1
AFDC - \$1000	38	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	864			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	0	864	832	784	739	697	657	619	583
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	0	82	79	75	70	66	62	59	55
Book Depreciation	0	0	29	29	29	29	29	29	29	29
Tax Depreciation	0	0	36	76	69	63	57	52	47	42
Income Taxes	0	0	-3	-19	-16	-14	-11	-9	-7	-5
Deferred Taxes	0	0	3	19	16	14	11	9	7	5
Property Tax	0	0	13	13	13	13	13	13	13	13
Insurance	0	0	6	6	6	6	6	6	6	6
Annual Carrying Charges	0	0	130	127	123	118	114	111	107	104

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	549	516	484	452	420	389	357	325	293	262
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	52	49	46	43	40	37	34	31	28	25
Book Depreciation	29	29	29	29	29	29	29	29	29	29
Tax Depreciation	39	36	36	36	36	36	36	36	36	36
Income Taxes	-4	-3	-3	-3	-3	-3	-3	-3	-3	-3
Deferred Taxes	4	3	3	3	3	3	3	3	3	3
Property Tax	13	13	13	13	13	13	13	13	13	13
Insurance	6	6	6	6	6	6	6	6	6	6
Annual Carrying Charges	100	97	94	91	88	85	82	79	76	73

UNIT COST OF DISTRICT HEAT - CASE PS3

JAMESTOWN INDUSTRIAL CORRIDOR



ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES -COGEN POWER \$1.075/MBtu

Start of Evaluation	1989	1999-2014								
Unit Costs	1988	Evaluation	Heat Source -		Boilers @ Cogen		Cogen		Cogen	
			Avg. Heat Rate - Btu/kWh		13,477		13,477		13,477	
			Peak Electrical Output - kW		50,000		50,000		50,000	
Electr. Purch. - \$/MWh	75.00	4.0	Boiler Efficiency - %		85.00		85.00		85.00	
Electr. Sold - \$/MWh	75.00	4.0	Cogen Capacity Factor		50%		50%		50%	
O&M Labor - \$/Man/yr	25,000	4.0								
O&M Materials - %	1.7	4.0								
Property Taxes - %	1.5	0.5								
Fuel - \$/MBtu	2.75	4.0								

Year	1989	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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A. Annual Quantities

1. District Heat - MBtu/yr	710,051	710,051	710,051	710,051	710,051	710,051	710,051	710,051	710,051	710,051	710,051
2. Chilled Water - MBtu/yr	0	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000
4. Auxiliary Power - MWh/yr	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
7. Power Purchased - MWh/yr	225	225	225	225	225	225	225	225	225	225	225
8. O&M Labor - Man/yr	0	0	0	0	0	0	0	0	0	0	0
9. O&M Materials - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	346,502	346,502	346,502	346,502	346,502	346,502	346,502	346,502	346,502	346,502	346,502

B. Unit Costs

1. Power Purchased - \$/MWh	50.56	56.04	58.23	60.81	63.03	65.55	68.18	70.90	73.74	76.67	79.67
2. Power Sold - \$/MWh	50.56	56.04	58.23	60.81	63.03	65.55	68.18	70.90	73.74	76.67	79.67
3. O&M Labor - \$1000/Man/yr	38	40	42	43	45	47	48	51	53	55	58
4. Fuel - \$/MBtu (4/Ton)	4.42	4.60	4.78	4.97	5.17	5.38	5.60	5.82	6.05	6.29	6.53

C. Carrying Charges - \$1000/yr

	1357	1710	1265	1227	1185	1140	1102	1060	1023	979	939
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D. Operating Expenses - \$1000/yr

1. Power Purchased	15	16	17	17	18	19	19	20	21	22	23
2. O&M	633	658	685	712	741	770	801	833	866	901	938
3. Fuel Cost	3743	3893	4049	4211	4379	4554	4737	4926	5127	5325	5525
Sub-Total	4392	4568	4750	4940	5138	5343	5557	5779	6011	6251	6501

E. Power Sold - \$1000/yr

	2815	2927	3044	3166	3292	3424	3561	3704	3852	4006	4166
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F. Required Revenues - \$1000/yr

	2930	2951	2975	3001	3030	3062	3097	3135	3177	3221	3269
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G. Unit Cost of Heat - \$/MBtu

1. Fixed Expenses	\$2.21	\$2.11	\$2.01	\$1.91	\$1.82	\$1.73	\$1.64	\$1.56	\$1.47	\$1.39	\$1.31
2. O & M Expenses	\$1.06	\$1.08	\$1.11	\$1.14	\$1.16	\$1.19	\$1.22	\$1.25	\$1.29	\$1.32	\$1.35
3. Fuel	\$6.12	\$6.20	\$6.41	\$6.57	\$6.73	\$6.89	\$7.06	\$7.24	\$7.42	\$7.61	\$7.81
Total	\$9.39	\$9.46	\$9.52	\$9.62	\$9.71	\$9.81	\$9.93	\$10.05	\$10.18	\$10.32	\$10.47

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES - COGEN POWER \$1,075,777

Phase	Year Investment		Economic Factors		Case #34
1	1988	1989	Preferred Stock Ratio	0	Book Life - yrs
2	1990	1991	Return on Preferred Stock - %	0	Income Tax Rate - %
3	1992	1993	Common Stock Ratio	0	Tax Credit - %
4	1994	1995	Return on Common Stock - %	0	Tax Life - yrs
			Debt Ratio	1	Accelerated Tax Depreciation
			Debt Cost - %	9.5	Property Tax - %
			Weighted Cost of Capital - %	9.5	Insurance Rate - %

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1459	7479	11548	10977	10746	8734	8191	8401	8123	7101	7101
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0	0
Interest	139	710	1057	1047	953	827	877	827	775	775	775
Book Depreciation	50	252	398	398	398	398	398	398	398	398	398
Tax Depreciation	34	405	533	976	583	307	701	501	599	547	547
Income Taxes	-7	-63	-174	-201	-196	-183	-133	-115	-60	-60	-60
Deferred Taxes	7	63	174	201	196	183	133	115	60	60	60
Property Tax	30	113	179	179	179	179	179	179	179	179	179
Insurance	15	57	90	90	90	90	90	90	90	90	90
Annual Carrying Charges	300	1132	1794	1799	1649	1393	1540	1469	1441	1271	1271

Year	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	7212	5777	5700	5399	5450	5020	4581	4140	3711	3281
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	526	644	502	550	519	477	425	393	351	310
Book Depreciation	398	398	398	398	398	398	398	398	398	398
Tax Depreciation	514	501	501	501	501	501	501	501	501	501
Income Taxes	-47	-41	-41	-41	-41	-41	-41	-41	-41	-41
Deferred Taxes	47	41	41	41	41	41	41	41	41	41
Property Tax	179	179	179	179	179	179	179	179	179	179
Insurance	90	90	90	90	90	90	90	90	90	90
Annual Carrying Charges	1353	1310	1259	1227	1185	1143	1102	1060	1018	976

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES - COGEN POWER 4.035/MW

Investment	1	Phase 2	Discount Factors	Case 10%	
Initial Operation	1990	Preferred Stock Ratio	0	Stock Life = yrs	20
Cost Basis	1990	Return on Preferred Stock = %	0	Income Tax Rate = %	30
Capital Cost = \$1000	\$4,315	Common Stock Ratio	1	Tax Credit = %	0
Gen. Depreciation =	4.0%	Return on Common Stock = %	0	Tax Life = yrs	15
Depreciation = \$1000	401	Debt Ratio	1	Accelerated Tax Depreciation	0
AFPC = \$1000	147	Cost Cost = %	9.5	Property Tax = %	1.5
Total Cost = \$1000	5563			Insurance Rate = %	0.75
Start of Evaluation	1999	Weighted Cost of Capital = %	9.50		

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	0	5567	5083	4591	4062	3489	2870	2218	1534	854
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	508	508	480	452	421	402	379	357	336
Book Depreciation	0	185	185	185	185	185	185	185	185	185
Tax Depreciation	0	234	234	234	234	234	234	234	234	234
Income Taxes	0	-19	-19	-19	-19	-19	-19	-19	-19	-19
Deferred Taxes	0	19	19	19	19	19	19	19	19	19
Property Tax	0	83	83	83	83	83	83	83	83	83
Insurance	0	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	0	839	830	790	763	737	712	688	667	646

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3721	3115	2912	2708	2500	2259	2094	1885	1684	1480
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	316	296	277	257	238	218	199	179	159	141
Book Depreciation	185	185	185	185	185	185	185	185	185	185
Tax Depreciation	234	234	234	234	234	234	234	234	234	234
Income Taxes	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
Deferred Taxes	19	19	19	19	19	19	19	19	19	19
Property Tax	83	83	83	83	83	83	83	83	83	83
Insurance	42	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	616	607	587	568	548	529	510	490	471	451

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES -COGEN POWER \$.035/K

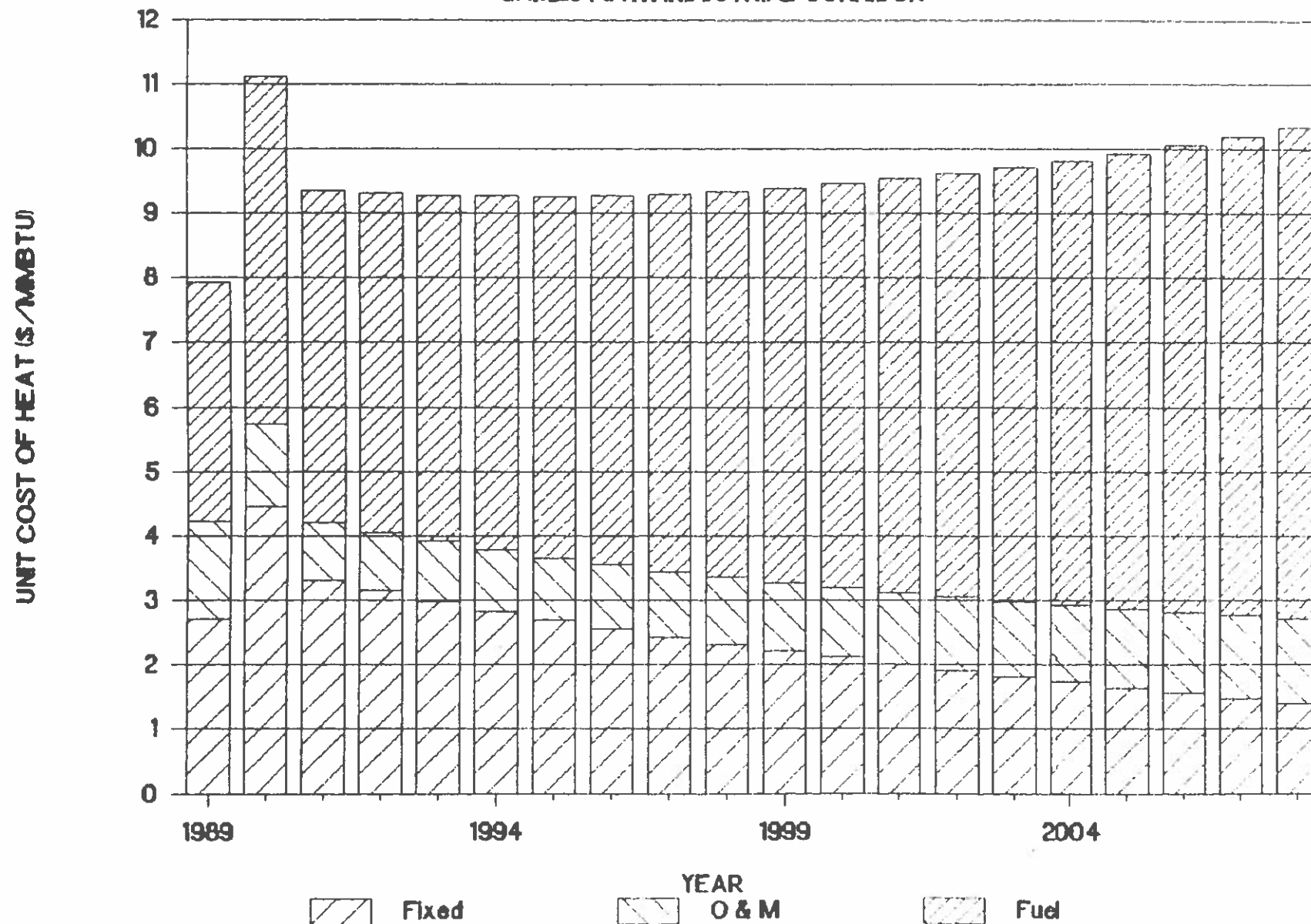
Investment	3	Phase 3	Economic Factors	Case PS4	
Initial Operation	1991	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$3.725	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	465	Debt Ratio	1	Accelerated Tax Depreciation	1
AFDC - \$1000	195	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	4384			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	0	4384	4223	3981	3753	3537	3324	3141	2959
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	0	417	401	378	357	336	317	298	281
Book Depreciation	0	0	146	146	146	146	146	146	146	146
Tax Depreciation	0	0	184	386	351	320	289	263	237	215
Income Taxes	0	0	-15	-96	-82	-70	-57	-47	-36	-27
Deferred Taxes	0	0	15	96	82	70	57	47	36	27
Property Tax	0	0	66	66	66	66	66	66	66	66
Insurance	0	0	33	33	33	33	33	33	33	33
Annual Carrying Charges	0	0	661	646	623	601	581	562	543	526

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	2785	2618	2457	2296	2134	1973	1812	1650	1489	1328
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	265	249	233	218	203	187	172	157	141	126
Book Depreciation	146	146	146	146	146	146	146	146	146	146
Tax Depreciation	197	184	184	184	184	184	184	184	184	184
Income Taxes	-20	-15	-15	-15	-15	-15	-15	-15	-15	-15
Deferred Taxes	20	15	15	15	15	15	15	15	15	15
Property Tax	66	66	66	66	66	66	66	66	66	66
Insurance	33	33	33	33	33	33	33	33	33	33
Annual Carrying Charges	509	494	478	463	448	432	417	402	386	371

UNIT COST OF DISTRICT HEAT - CASE PS4

JAMESTOWN INDUSTRIAL CORRIDOR



**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

PRIVATE OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$.035/KWH

Start of Evaluation	1989		Case P85							
Unit Costs	1988	Escalation	Heat Source -	Boilers/67 Cogen	Book Life - yrs	Income Tax Rate - %	Tax Credit - %	Tax Life - yrs	Accel. Tax Deprct.	Property Tax - %
			Avg. Heat Rate - Btu/kWh	12,475						
Electr. Purch. - \$/MWh	35.00	4.0	Peak Electric Output - kW	4,070						
Electr. Sold - \$/MWh	35.00	4.0	Boiler Efficiency - %	85.0%						
O&M Labor - \$/MWhr	25.000	4.0	Cogen Capacity Factor	90%						
O&M Materials-% Cost	1.7	4.0								
Procedury Taxes - %	1.5	2.5								
Fuel - \$/MBtu	2.71	4.0								

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
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A. Annual Quantities										
1. District Heat - Mbtu/yr	110,759	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546
4. Auxiliary Power - MWh/yr	100	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069
7. Power Purchased - MWh/yr	100	148	148	148	148	148	148	148	148	148
8. O&M Labor - MWh/yr	5	7	7	7	7	7	7	7	7	7
9. O&M Materials-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - Mbtu/yr	176,126	476,688	476,688	476,688	476,688	476,688	476,688	476,688	476,688	476,688

B. Unit Costs										
1. Power Purchased - \$/MWh	35.40	37.86	39.37	40.95	42.58	44.29	46.06	47.90	49.81	51.81
2. Power Sold - \$/MWh	35.40	37.86	39.37	40.95	42.58	44.29	46.06	47.90	49.81	51.81
3. O&M Labor - \$1000/MWhr	26	27	28	29	30	32	33	34	36	37
4. Fuel - \$/MBtu (w/ Taxes)	2.89	3.11	3.23	3.36	3.49	3.62	3.75	3.90	4.09	4.25

C. Carrying Charges - \$1000/yr	700	1101	1102	1063	1026	992	959	928	898	870
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D. Operating Expenses - \$1000/yr										
1. Power Purchased	4	6	6	6	6	7	7	7	7	8
2. O&M	134	319	332	345	359	373	388	404	420	437
3. Fuel Cost	407	1363	1418	1474	1533	1595	1658	1725	1794	1865
Sub- Total	575	1688	1755	1825	1898	1974	2053	2135	2221	2310

E. Power Sold - \$1000/yr	0	987	1026	1067	1110	1154	1201	1249	1299	1351
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F. Required Revenues- \$1000/yr	875	1833	1831	1821	1815	1812	1811	1814	1820	1829
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G. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$2.22	\$4.46	\$4.28	\$4.07	\$3.86	\$3.67	\$3.50	\$3.33	\$3.18	\$3.04
2. O & M Expenses	\$1.52	\$1.28	\$1.31	\$1.34	\$1.37	\$1.41	\$1.44	\$1.48	\$1.51	\$1.55
3. Fuel	\$3.69	\$5.37	\$5.51	\$5.64	\$5.77	\$5.91	\$6.05	\$6.20	\$6.35	\$6.51
Total	\$7.93	\$11.11	\$11.10	\$11.04	\$11.00	\$10.99	\$10.98	\$11.00	\$11.04	\$11.09

LEVELIZED RATE @ 7%: **\$11.043**

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

PRIVATE OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$.035/KWH

Start of Evaluation	1989		Case #55							
Unit Costs	1988	Escalation	Heat Source -		Boilers at Cogen		Book Life - Yrs			
			Avg. Heat Rate - Btu/kWh		17,475		Income Tax Rate - %		40	
Elect. Purch. - \$/MWh	75.00	4.0	Peak Electric Output - kW		4,070		Tax Credit - %		0	
Elect. Sold - \$/MWh	75.00	4.0	Boiler Efficiency - %		85.0%		Tax Life - Yrs		14	
O&M Labor - \$/Man/yr	25,000	4.0	Cogen Capacity Factor		90%		Accel. Tax Deprec.		1	
O&M Materials - % Cost	1.7	4.0					Property Tax - %		1.5	
Property Taxes - %	1.5	1.5					Insurance Rate - %		1.75	
Fuel - \$/MBtu	5.71	4.0					Cost of Capital - %		9.5	
Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
A. Annual Quantities										
1. District Heat - Mbtu/yr	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904	164,904
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546	27,546
4. Auxiliary Power - MWh/yr	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477	1,477
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069	26,069
7. Power Purchased - MWh/yr	148	148	148	148	148	148	148	148	148	148
8. O&M Labor - Man/yr	7	7	7	7	7	7	7	7	7	7
9. O&M Material - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	438,668	438,668	438,668	438,668	438,668	438,668	438,668	438,668	438,668	438,668
B. Unit Costs										
1. Power Purchased - \$/MWh	57.69	58.04	58.28	58.51	58.73	58.95	59.16	59.36	59.56	59.77
2. Power Sold - \$/MWh	57.65	58.04	58.28	58.51	58.73	58.95	59.16	59.36	59.56	59.77
3. O&M Labor - \$1000/Man/yr	52	40	42	43	45	47	49	51	53	55
4. Fuel - \$/MBtu (w/Tax)	4.42	4.60	4.73	4.87	5.17	5.39	5.60	5.82	6.05	6.27
C. Carrying Charges - \$1000/yr										
	843	817	790	764	738	711	685	658	632	606
D. Operating Expenses - \$1000/yr										
1. Power Purchased	8	8	9	9	9	10	10	10	11	11
2. O&M	454	472	491	511	531	552	575	596	621	646
3. Fuel Cost	1940	2018	2098	2182	2270	2360	2455	2553	2655	2761
Sub- Total	2402	2498	2598	2702	2810	2922	3039	3161	3287	3418
E. Power Sold - \$1000/yr										
	1405	1461	1519	1580	1643	1709	1777	1848	1922	1999
F. Required Revenues - \$1000/yr										
	1841	1854	1869	1886	1904	1925	1947	1971	1997	2025
G. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$2.90	\$2.77	\$2.64	\$2.52	\$2.40	\$2.28	\$2.17	\$2.06	\$1.95	\$1.85
2. O & M Expenses	\$1.59	\$1.63	\$1.67	\$1.71	\$1.75	\$1.81	\$1.85	\$1.90	\$1.95	\$2.01
3. Fuel	\$6.67	\$6.24	\$5.92	\$5.62	\$5.39	\$5.15	\$4.93	\$4.72	\$4.50	\$4.29
Total	\$11.16	\$11.24	\$11.33	\$11.44	\$11.55	\$11.67	\$11.81	\$11.95	\$12.11	\$12.28

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$.035/KWH

Phase	Year Investment		Economic Factors		Case #55	
1	1989	1990	Preferred Stock Ratio	0	Book Life - yrs	20
2	1990	2000	Return on Preferred Stock - %	0	Income Tax Rate - %	40
3	1991	0	Common Stock Ratio	0	Tax Credit - %	0
4	1992	0	Return on Common Stock - %	0	Tax Life - yrs	20
			Debt Ratio	1	Accelerated Tax Depreciation	1
			Debt Cost - %	8.5	Property Tax - %	1.5
			Weighted Cost of Capital - %	8.5	Insurance Rate - %	1.5

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1908	2479	3104	3754	4367	4961	5555	6128	6697	7261
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	129	210	251	242	205	170	137	106	77	48
Book Depreciation	56	252	252	252	252	252	252	252	252	252
Tax Depreciation	34	408	449	590	577	456	441	395	332	274
Income Taxes	-7	-63	-138	-175	-114	-94	-75	-58	-44	-37
Deferred Taxes	7	57	158	175	114	94	75	58	44	37
Property Tax	30	117	117	117	113	113	113	113	113	113
Insurance	15	57	57	57	57	57	57	57	57	57
Annual Carrying Charges	200	1122	1102	1063	1026	981	959	923	895	870

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	4437	4159	3881	3603	3325	3047	2769	2491	2214	1936
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	412	395	369	342	316	289	267	247	210	184
Book Depreciation	252	252	252	252	252	252	252	252	252	252
Tax Depreciation	317	317	317	317	317	317	317	317	317	317
Income Taxes	-26	-26	-26	-26	-26	-26	-26	-26	-26	-26
Deferred Taxes	26	26	26	26	26	26	26	26	26	26
Property Tax	113	113	113	113	113	113	113	113	113	113
Insurance	57	57	57	57	57	57	57	57	57	57
Annual Carrying Charges	843	817	790	764	738	711	685	658	632	606

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$.005/KWH

Investment	1	Phase 1	Economic Factors: Case F55		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	20
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$1,828	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	1
AFUD - \$1000	88	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	1989			Insurance Rate - %	1.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1989	1916	1806	1703	1605	1512	1425	1342	1263	1186
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	169	182	172	162	152	144	135	128	120	113
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	175	159	145	131	119	107	97	90	84
Income Taxes	-7	-43	-37	-32	-26	-21	-16	-12	-9	-7
Deferred Taxes	7	43	37	32	26	21	16	12	9	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	300	293	283	273	263	255	246	239	231	224

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1115	1041	968	895	822	749	675	602	529	456
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	106	99	92	85	78	71	64	57	50	43
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	84	84	84	84	84	84	84	84	84
Income Taxes	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Deferred Taxes	7	7	7	7	7	7	7	7	7	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	217	210	203	196	189	182	175	168	161	154

ECONOMIC ANALYSIS OF DISTRICT HEATING FOR JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - PHASE 1 AND 2 ONLY - COGEN POWER \$1.035/FWH

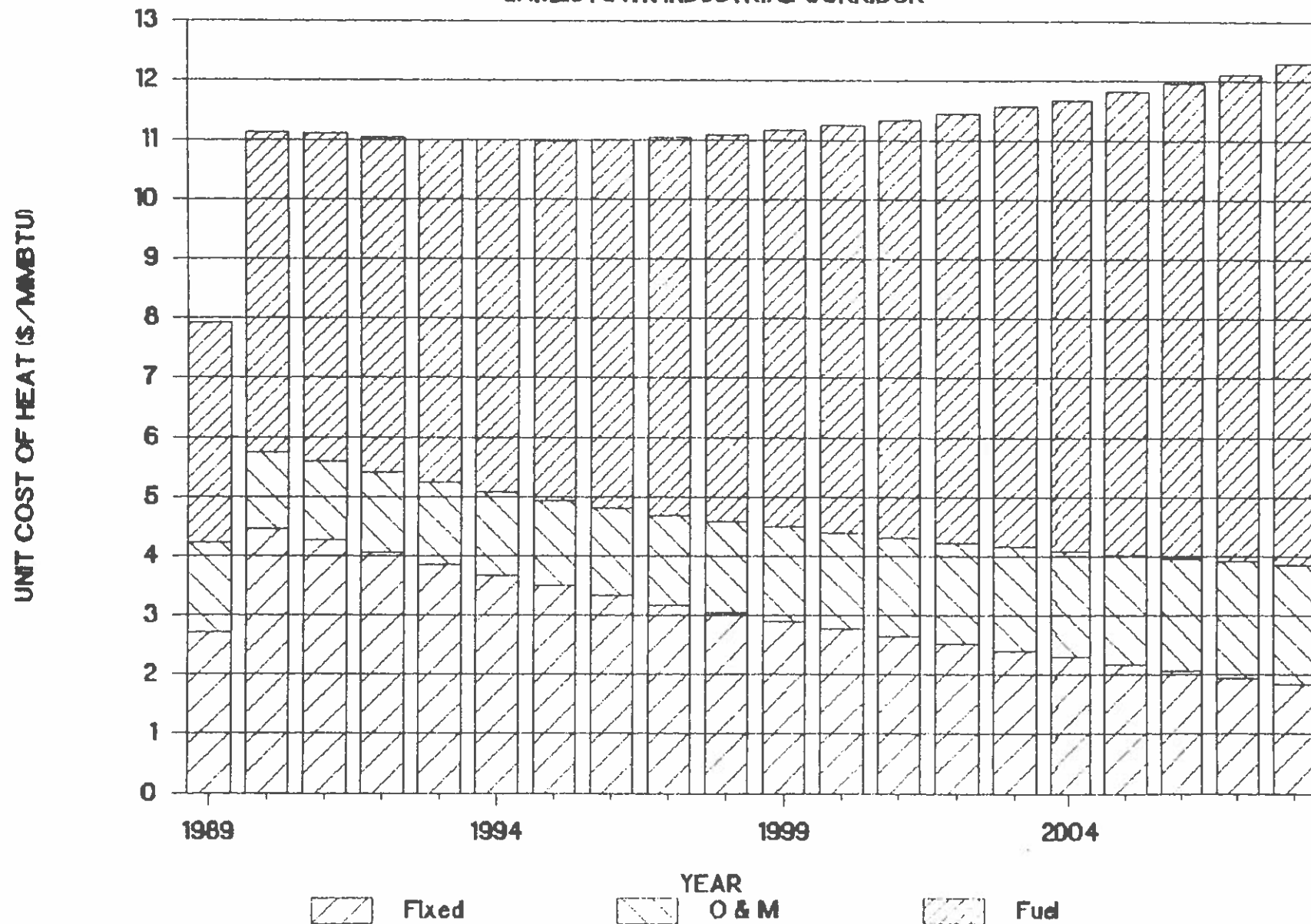
Investment	1	Phase 1	Economic Factors	Case FCB
Initial Operation	1990	Preferred Stock Ratio	1	Book Life - yrs
Cost Basis	1990	Return on Preferred Stock = 1	1	Income Tax Rate = 1
Capital Cost = \$1000	\$4,715	Common Stock Ratio	9	Tax Credit = 1
Gen. Depreciation =	4.0%	Return on Common Stock = 9	9	Tax Life - yrs
Depreciation = \$1000	401	Debt Ratio	1	Accelerated Tax Depreciation
AFSC = \$1000	247	Debt Cost = 5	5.5	Property Tax = 1
Total Cost = \$1000	5563			Insurance Rate = 1
Start of Evaluation	1990	Weighted Cost of Capital = 5	5.50	

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	0	5567	5058	5051	4762	4466	4270	3985	3754	3574
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	528	504	480	452	426	402	379	357	334
Book Depreciation	0	185	185	185	185	185	185	185	185	185
Tax Depreciation	0	234	234	234	234	234	234	234	234	234
Income Taxes	0	-19	-19	-19	-19	-19	-19	-19	-19	-19
Deferred Taxes	0	19	19	19	19	19	19	19	19	19
Property Tax	0	83	83	83	83	83	83	83	83	83
Insurance	0	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	0	829	820	790	767	737	712	689	667	646

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3322	3118	2913	2708	2502	2299	2094	1889	1684	1480
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	316	296	277	257	238	218	199	179	159	141
Book Depreciation	185	185	185	185	185	185	185	185	185	185
Tax Depreciation	234	234	234	234	234	234	234	234	234	234
Income Taxes	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
Deferred Taxes	19	19	19	19	19	19	19	19	19	19
Property Tax	83	83	83	83	83	83	83	83	83	83
Insurance	42	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	626	607	587	568	548	529	510	490	471	451

UNIT COST OF DISTRICT HEAT - CASE PS5

JAMESTOWN INDUSTRIAL CORRIDOR



**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

PRIVATE OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

Start of Evaluation	1989						1989-2006				
Unit Costs	1988	Escalation	Heat Source -			100%GE	Boiler Life - yrs				
			Avg. Heat Rate - Btu/kWh			40	Income Tax Rate - %				40
			Peak Electric Output - kW			40	Tax Credit - %				0
			Boiler Efficiency - %			85.0%	Tax Life - yrs				15
			Design Capacity Factor			40	Accel. Tax Deprec.				0
							Property Tax - %				1.5
							Insurance Rate - %				0.75
							Cost of Capital - %				5.5%
Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
A. Annual Quantities											
1. District Heat - MBtu/yr	110,759	164,504	164,504	164,504	164,504	164,504	164,504	164,504	164,504	164,504	
2. Chilled Water - MBtu/yr	0	0	0	0	0	0	0	0	0	0	
3. Power Generated - MWh/yr	0	0	0	0	0	0	0	0	0	0	
4. Auxiliary Power - MWh/yr	100	149	149	149	149	149	149	149	149	149	
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0	
6. Power Sold - MWh/yr	0	0	0	0	0	0	0	0	0	0	
7. Power Purchased - MWh/yr	100	149	149	149	149	149	149	149	149	149	
8. O&M Labor - Man/yr	5	7	7	7	7	7	7	7	7	7	
9. O&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	
10. Fuel - MBtu/yr	136,326	203,795	203,795	203,795	203,795	203,795	203,795	203,795	203,795	203,795	
B. Unit Costs											
1. Power Purchased - \$/MWh	31.20	32.45	33.75	35.10	36.50	37.96	39.48	41.06	42.70	44.41	
2. Power Sold - \$/MWh	31.20	32.45	33.75	35.10	36.50	37.96	39.48	41.06	42.70	44.41	
3. O&M Labor - \$1000/Man/yr	26	27	28	29	30	32	33	34	36	37	
4. Fuel - \$/MBtu (w/Tax)	2.89	3.11	3.23	3.36	3.49	3.62	3.76	3.90	4.03	4.25	
5. Carrying Charges - \$1000/yr	300	570	514	496	479	463	448	433	420	407	
D. Operating Expenses - \$1000/yr											
1. Power Purchased	3	5	5	5	5	6	6	6	6	7	
2. O&M	164	251	261	272	283	294	306	318	331	344	
3. Fuel Cost	407	633	658	685	712	740	770	801	833	866	
Sub- Total	574	889	925	961	1000	1040	1082	1125	1170	1217	
E. Power Sold - \$1000/yr											
	0	0	0	0	0	0	0	0	0	0	
F. Required Revenues- \$1000/yr											
	874	1419	1439	1458	1479	1503	1529	1558	1590	1627	
G. Unit Cost of Heat - \$/MBtu											
1. Fixed Expenses	\$2.72	\$3.22	\$3.12	\$3.01	\$2.91	\$2.81	\$2.72	\$2.63	\$2.55	\$2.47	
2. O & M Expenses	\$1.51	\$1.55	\$1.61	\$1.68	\$1.75	\$1.82	\$1.89	\$1.96	\$2.04	\$2.12	
3. Fuel	\$3.69	\$3.84	\$3.99	\$4.15	\$4.32	\$4.49	\$4.67	\$4.86	\$5.05	\$5.25	
Total	\$7.92	\$8.61	\$8.73	\$8.84	\$8.97	\$9.12	\$9.27	\$9.45	\$9.64	\$9.84	
LEVELIZED RATE @ 7%:											
				\$9.721							

**ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR**

PRIVATE OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

Start of Evaluation	1989	Case #3c									
Unit Costs	1988	Escalation	Heat Source -		BOILERS		Book Life - yrs				
			Avg. Heat Rate - Btu/kWh		NA		Income Tax Rate - %				
			Peak Electric Output - kW		NA		Tax Credit - %				
Elect. Purch. - \$/MWh	30.00	4.0	Boiler Efficiency - %		85.0%		Tax Life - yrs				
Elect. Sold - \$/MWh	30.00	4.0	Cogen Capacity Factor		NA		Retel. Tax Deprec.				
O&M Labor - \$/Man/yr	25.000	4.0					Property Tax - %				
O&M Materials-% Cost	1.7	4.0					Insurance Rate - %				
Property Taxes - %	1.5	1.5					Cost of Capital - %				
Fuel - \$/Mbtu	2.71	4.0									
Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
A. Annual Quantities											
1. District Heat - Mbtu/yr	164,504	164,504	164,504	164,504	164,504	164,504	164,504	164,504	164,504	164,504	
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0	
3. Power Generated - MWh/yr	0	0	0	0	0	0	0	0	0	0	
4. Auxiliary Power - MWh/yr	149	149	149	149	149	149	149	149	149	149	
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0	
6. Power Sold - MWh/yr	0	0	0	0	0	0	0	0	0	0	
7. Power Purchased - MWh/yr	149	149	149	149	149	149	149	149	149	149	
8. O&M Labor - Man/yr	7	7	7	7	7	7	7	7	7	7	
9. O&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	
10. Fuel - Mbtu/yr	203,705	203,705	203,705	203,705	203,705	203,705	203,705	203,705	203,705	203,705	
B. Unit Costs											
1. Power Purchased - \$/MWh	46.18	48.03	49.95	51.85	54.03	56.19	58.44	60.77	63.21	65.77	
2. Power Sold - \$/MWh	46.18	48.03	49.95	51.85	54.03	56.19	58.44	60.77	63.21	65.77	
3. O&M Labor - \$1000/Man/yr	38	40	42	43	45	47	49	51	53	55	
4. Fuel - \$/Mbtu (w/Tax)	4.42	4.60	4.78	4.97	5.17	5.38	5.50	5.82	6.05	6.29	
5. Carrying Charges - \$1000/yr	394	382	369	357	344	332	319	307	294	281	
C. Operating Expenses - \$1000/yr											
1. Power Purchased	7	7	7	8	8	8	9	9	9	10	
2. O&M	358	372	387	402	418	435	452	470	489	509	
3. Fuel Cost	901	937	974	1013	1054	1096	1140	1185	1233	1282	
Sub- Total	1265	1316	1369	1423	1480	1539	1601	1665	1732	1801	
E. Power Sold - \$1000/yr	0	0	0	0	0	0	0	0	0	0	
F. Required Revenues- \$1000/yr	1659	1697	1738	1780	1824	1871	1920	1972	2026	2083	
G. Unit Cost of Heat - \$/Mbtu											
1. Fixed Expenses	\$2.39	\$2.31	\$2.24	\$2.16	\$2.09	\$2.01	\$1.94	\$1.86	\$1.79	\$1.71	
2. O & M Expenses	\$2.21	\$2.30	\$2.39	\$2.49	\$2.59	\$2.69	\$2.80	\$2.91	\$3.02	\$3.15	
3. Fuel	\$5.46	\$5.68	\$5.91	\$6.14	\$6.39	\$6.65	\$6.91	\$7.19	\$7.48	\$7.78	
Total	\$10.06	\$10.29	\$10.54	\$10.79	\$11.06	\$11.35	\$11.64	\$11.96	\$12.29	\$12.63	

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

Phase	Year Investment		Economic Factors		Case File	
1	1989	1989	Preferred Stock Ratio	0	Book Life - yrs	20
2	1990	1990	Return on Preferred Stock - %	0	Income Tax Rate - %	40
3	1991	0	Common Stock Ratio	0	Tax Credit - %	0
4	1992	0	Return on Common Stock - %	0	Tax Life - yrs	14
			Debt Ratio	1	Accelerated Tax Depreciation	1
			Debt Cost - %	9.5	Property Tax - %	1.5
			Weighted Cost of Capital - %	9.5	Insurance Rate - %	1.75

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1789	1429	3021	3101	2952	2782	2621	2469	2325	2187
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	189	231	316	297	280	264	249	235	221	208
Book Depreciation	86	119	119	119	119	119	119	119	119	119
Tax Depreciation	84	241	298	271	246	223	202	182	167	154
Income Taxes	-7	-49	-72	-61	-51	-42	-33	-25	-19	-14
Deferred Taxes	7	49	72	61	51	42	33	25	19	14
Property Tax	30	53	53	53	53	53	53	53	53	53
Insurance	15	27	27	27	27	27	27	27	27	27
Annual Carrying Charges	300	530	514	496	479	463	446	430	410	397

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	2154	1923	1792	1661	1530	1399	1268	1137	1005	874
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	195	183	170	159	145	133	120	108	96	87
Book Depreciation	119	119	119	119	119	119	119	119	119	119
Tax Depreciation	150	150	150	150	150	150	150	150	150	150
Income Taxes	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12
Deferred Taxes	12	12	12	12	12	12	12	12	12	12
Property Tax	53	53	53	53	53	53	53	53	53	53
Insurance	27	27	27	27	27	27	27	27	27	27
Annual Carrying Charges	394	382	369	357	344	332	319	307	294	282

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

Investment	1	Phase 1	Economic Factors: Case #56		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	20
Cost Basis	1368	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$1,328	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	15
Escalation - \$1000	73	Debt Ratio	1	Accelerated Tax Depreciation	1
AFDC - \$1000	88	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	1989			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1989	1916	1806	1703	1605	1512	1425	1342	1267	1188
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	129	132	173	162	152	144	135	128	120	113
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	175	159	145	131	119	107	97	90	84
Income Taxes	-7	-43	-37	-32	-26	-21	-16	-12	-9	-7
Deferred Taxes	7	43	37	32	26	21	16	12	9	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	300	293	283	273	263	255	246	239	231	224

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1115	1041	968	895	822	749	675	602	529	456
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	106	99	92	85	78	71	64	57	50	43
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	84	84	84	84	84	84	84	84	84
Income Taxes	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Deferred Taxes	7	7	7	7	7	7	7	7	7	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	217	210	203	196	189	182	175	168	161	154

ECONOMIC ANALYSIS OF DISTRICT HEATING FOR JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - PHASES 1 & 2 ONLY/BOILERS ONLY

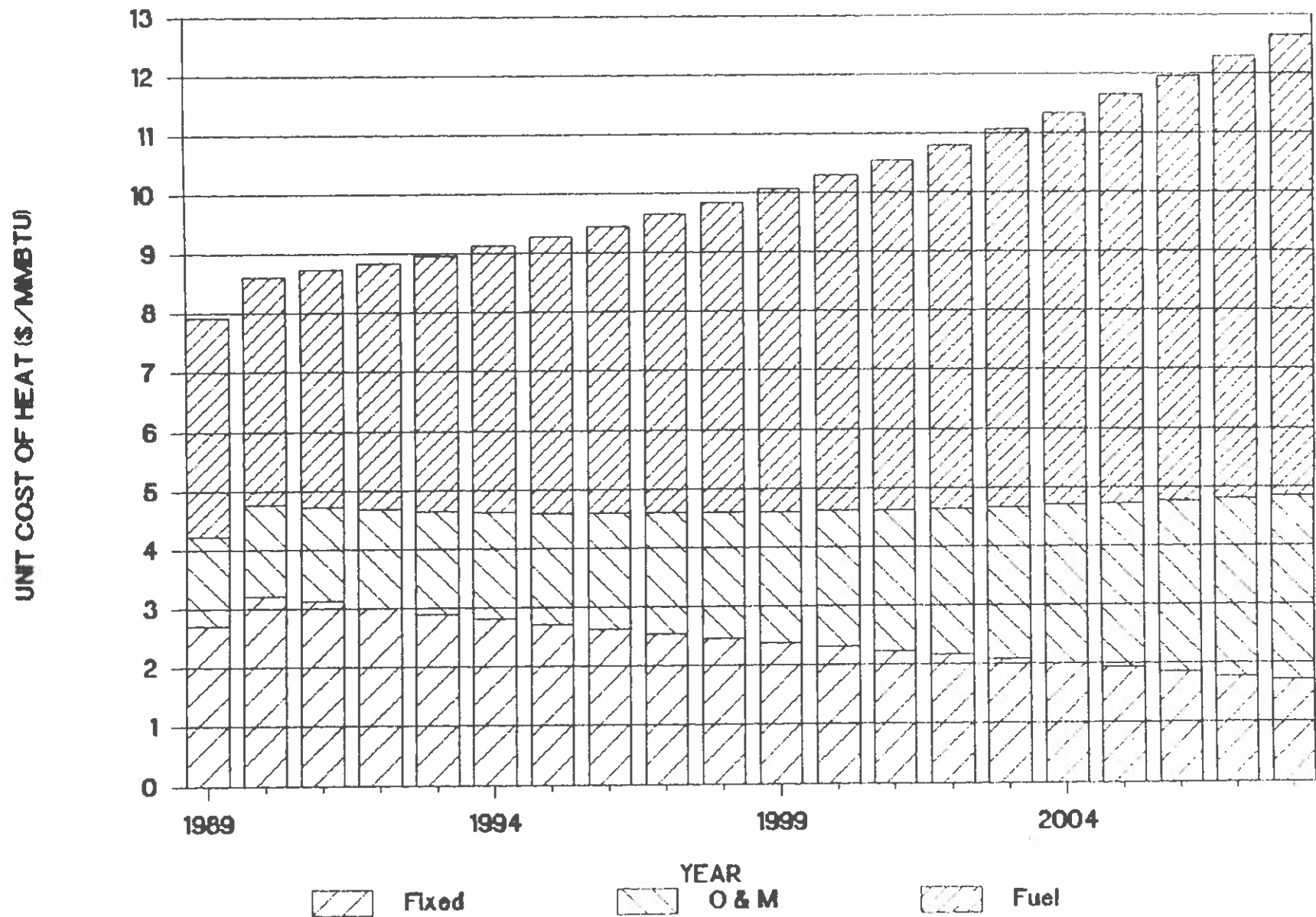
Investment:	1	Phase 2	Economic Factors	Case #66	
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - yrs	70
Cost Basis	1990	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	11,750	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Escalation - \$1000	117	Debt Ratio	1	Accelerated Tax Depreciation	1
AFDC - \$1000	79	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	1570			Insurance Rate - %	0.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	1570	1516	1429	1347	1269	1196	1127	1062	999
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	146	144	136	128	121	114	107	101	95
Book Depreciation	0	52	52	52	52	52	52	52	52	52
Tax Depreciation	0	66	108	126	119	104	84	65	47	31
Income Taxes	0	-5	-34	-39	-25	-21	-17	-13	-10	-7
Deferred Taxes	0	5	74	29	25	21	17	13	10	7
Property Tax	0	24	24	24	24	24	24	24	24	24
Insurance	0	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	0	237	232	224	216	208	202	195	189	187

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	940	882	824	766	708	650	592	534	476	418
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	89	84	78	73	67	62	56	51	45	40
Book Depreciation	52	52	52	52	52	52	52	52	52	52
Tax Depreciation	66	66	66	66	66	66	66	66	66	66
Income Taxes	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5
Deferred Taxes	5	5	5	5	5	5	5	5	5	5
Property Tax	24	24	24	24	24	24	24	24	24	24
Insurance	12	12	12	12	12	12	12	12	12	12
Annual Carrying Charges	177	172	166	161	155	150	144	139	133	128

UNIT COST OF DISTRICT HEAT - CASE PS6

JAMESTOWN INDUSTRIAL CORRIDOR



ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL COST

Start of Evaluation 1985

Page 7

Unit Costs	1985	Escalation	Heat Source -	Boilers or Cogeneration	Boiler Life - yrs
			Avg. Heat Rate - Btu/lb	81,479	Decree Tax Rate - %
Elect. Purch. - \$/MWh	31.20	4.0	Peak Electric Output - kW	5,120 Units	Tax Credit - %
Elect. Sold - \$/MWh	31.20	4.0	Boiler Efficiency - %	85.0%	Tax Life - yrs
O&M Labor - \$/MWh	18.100	4.0	Boiler Escalation Factor	80%	Accel. Tax Deprec.
O&M Materials - % Cost	1.7	4.0			Property Tax - %
Property Taxes - %	1.5	2.5			Insurance Rate - %
Fuel - \$/MBtu	2.50	4.0			Cost of Capital - %

Year	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
------	------	------	------	------	------	------	------	------	------	------

A. Annual Quantities										
1. District Heat - MWh/yr	210,753	194,504	212,051	211,051	212,051	211,051	212,051	212,051	212,051	212,051
2. Chilled Water - MWh/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	0	37,546	35,092	35,092	35,092	35,092	35,142	35,142	35,142	35,142
4. Auxiliary Power - MWh/yr	100	1,477	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	0	26,069	32,037	32,037	32,037	32,037	32,037	32,037	32,037	32,037
7. Power Purchased - MWh/yr	100	148	185	185	185	185	185	185	185	185
8. O&M Labor - Man/yr	5	7	9	9	9	9	9	9	9	9
9. O&M Material - % Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	176,723	159,638	146,502	146,502	146,502	146,502	146,502	146,502	146,502	146,502

B. Unit Costs										
1. Power Purchased - \$/MWh	31.20	32.45	32.75	35.10	35.50	37.96	39.48	41.06	42.70	44.41
2. Power Sold - \$/MWh	31.20	32.45	32.75	35.10	35.50	37.96	39.48	41.06	42.70	44.41
3. O&M Labor - \$1000/man/yr	18	27	28	29	30	32	33	34	36	37
4. Fuel - \$/MBtu w/1% Tax	2.54	2.64	2.75	2.96	2.97	3.09	3.21	3.34	3.46	3.61

C. Carrying Charges - \$1000/yr	300	1132	1764	1709	1649	1593	1540	1489	1441	1396
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D. Operating Expenses - \$1000/yr										
1. Power Purchased	3	5	10	10	10	11	11	12	12	13
2. O&M	184	319	463	461	500	520	541	563	585	609
3. Fuel Cost	146	1159	2325	2418	2515	2615	2720	2829	2942	3060
Sub-Total	513	1482	2797	2909	3025	3146	3272	3403	3536	3681

E. Power Sold - \$1000/yr	0	846	1763	1633	1907	1983	2062	2145	2231	2320
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F. Required Revenues - \$1000/yr	513	1769	2798	2785	2768	2757	2750	2748	2750	2757
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G. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$2.72	\$4.64	\$3.47	\$3.30	\$3.13	\$2.97	\$2.82	\$2.66	\$2.55	\$2.47
2. O & M Expenses	\$1.51	\$1.33	\$0.93	\$0.95	\$0.97	\$0.99	\$1.01	\$1.03	\$1.06	\$1.10
3. Fuel	\$2.14	\$4.75	\$4.57	\$4.67	\$4.77	\$4.87	\$4.96	\$5.06	\$5.21	\$5.31
Total	\$7.37	\$10.73	\$8.97	\$8.92	\$8.87	\$8.83	\$8.81	\$8.81	\$8.81	\$8.88

LEVELLED RATE @ 7%: \$9.904

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL CO

Start of Evaluation 1989

Case #1

Unit Costs	1988	Escalation	Heat Source -	Boilers/ST Input	Book Life - yrs
			Avg. Heat Rate - Btu/MWh	12,479	Income Tax Rate - %
Elect. Purch. - \$/MWh	20.90	4.0	Peak Electric Output - MW	5,149 12 Units	Tax Credit - %
Elect. Sold - \$/MWh	20.90	4.0	Boiler Efficiency - %	85.00	Tax Life - yrs
O&M Labor - \$/ManYr	25.000	4.0	Design Capacity Factor	90%	Accel. Tax Deprec.
O&M Materials-% Cost	1.7	4.0			Property Tax - %
Property Taxes - %	1.5	2.5			Insurance Rate - %
Fuel - \$/MBtu	2.35	4.0			Cost of Capital - %

Year	1989	2000	2001	2002	2003	2004	2005	2006	2007	2008
A. Annual Quantities										
1. District Heat - Mbtu/yr	712,051	712,051	712,051	712,051	712,051	712,051	712,051	712,051	712,051	712,051
2. Chilled Water - Mbtu/yr	0	0	0	0	0	0	0	0	0	0
3. Power Generated - MWh/yr	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092	55,092
4. Auxiliary Power - MWh/yr	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855	2,855
5. Pumping Power - MWh/yr	0	0	0	0	0	0	0	0	0	0
6. Power Sold - MWh/yr	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237	52,237
7. Power Purchased - MWh/yr	285	285	285	285	285	285	285	285	285	285
8. O&M Labor - Man/yr	9	9	9	9	9	9	9	9	9	9
9. O&M Material-% Invest.	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
10. Fuel - MBtu/yr	546,502	546,502	546,502	546,502	546,502	546,502	546,502	546,502	546,502	546,502
B. Unit Costs										
1. Power Purchased - \$/MWh	46.18	46.03	45.95	51.95	54.03	56.19	55.44	60.77	60.21	65.77
2. Power Sold - \$/MWh	46.18	46.03	45.95	51.95	54.03	56.19	55.44	60.77	60.21	65.77
3. O&M Labor - \$1000/ManYr	38	40	42	43	45	47	47	51	52	55
4. Fuel - \$/MBtu (incl. Tax)	2.76	3.91	4.07	4.23	4.40	4.57	4.76	4.95	5.14	5.35
C. Carrying Charges - \$1000/yr										
	1753	1710	1269	1227	1185	1143	1102	1060	1018	976
D. Operating Expenses - \$1000/yr										
1. Power Purchased	13	14	14	15	15	16	17	17	18	19
2. O&M	633	658	685	712	741	770	801	833	866	901
3. Fuel Cost	3182	3309	3442	3579	3722	3871	4026	4187	4355	4529
Sub- Total	3828	3981	4141	4306	4478	4658	4844	5078	5239	5449
E. Power Sold - \$1000/yr										
	2413	2599	2609	2714	2822	2935	3053	3175	3302	3474
F. Required Revenues- \$1000/yr										
	2768	2783	2800	2819	2841	2866	2893	2923	2956	2991
G. Unit Cost of Heat - \$/MBtu										
1. Fixed Expenses	\$2.32	\$2.31	\$2.10	\$2.00	\$1.91	\$1.81	\$1.72	\$1.63	\$1.54	\$1.46
2. O & M Expenses	\$1.11	\$1.13	\$1.16	\$1.19	\$1.22	\$1.24	\$1.27	\$1.31	\$1.34	\$1.37
3. Fuel	\$5.45	\$5.58	\$5.71	\$5.84	\$5.98	\$6.13	\$6.28	\$6.47	\$6.59	\$6.75
Total	\$8.87	\$8.92	\$8.97	\$9.03	\$9.10	\$9.16	\$9.27	\$9.37	\$9.47	\$9.58

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

COMPOSITE ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL COST

Phase	Year Investment				Economic Factors		Case #57				
1	1989	1,789	Preferred Stock Ratio	0	Book Life - Yrs	20					
2	1990	5567	Return on Preferred Stock - %	0	Income Tax Rate - %	40					
3	1991	4784	Common Stock Ratio	0	Tax Credit - %	0					
4	1992	0	Return on Common Stock - %	0	Tax Life - Yrs	19					
			Debt Ratio	1	Accelerated Tax Depreciation	1					
			Debt Cost - %	9.5	Property Tax - %	1.5					
			Weighted Cost of Capital - %	9.5	Insurance Rate - %	1.75					
Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	
Remaining Book Value	1989	7479	11549	10577	10048	9054	8192	6161	6155	7681	
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0	
Return on Common Stock	0	0	0	0	0	0	0	0	0	0	
Interest	199	710	1097	1040	980	927	873	607	775	771	
Book Depreciation	66	252	338	398	398	398	398	398	398	398	
Tax Depreciation	54	409	572	976	936	807	701	661	544	549	
Income Taxes	-7	-27	-174	-231	-176	-167	-173	-133	-60	-60	
Deferred Taxes	7	60	174	231	176	167	173	133	60	60	
Property Tax	76	117	179	179	179	179	179	179	179	179	
Insurance	15	57	90	90	90	90	90	90	90	90	
Annual Carrying Charges	300	1122	1764	1709	1649	1597	1540	1439	1441	1716	
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Remaining Book Value	7122	6777	6738	5699	5460	5020	4581	4142	3702	7253	
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0	
Return on Common Stock	0	0	0	0	0	0	0	0	0	0	
Interest	686	644	602	560	519	477	435	393	352	310	
Book Depreciation	398	398	398	398	398	398	398	398	398	398	
Tax Depreciation	514	501	501	501	501	501	501	501	501	501	
Income Taxes	-47	-41	-41	-41	-41	-41	-41	-41	-41	-41	
Deferred Taxes	47	41	41	41	41	41	41	41	41	41	
Property Tax	179	179	179	179	179	179	179	179	179	179	
Insurance	90	90	90	90	90	90	90	90	90	90	
Annual Carrying Charges	1353	1310	1269	1227	1185	1143	1102	1060	1018	976	

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL COST

Investment	1	Phase 1	Economic Factors: Case #37		
Initial Operation	1989	Preferred Stock Ratio	0	Book Life - Yrs	30
Cost Basis	1728	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$1,528	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - Yrs	19
Installation - \$1000	37	Debt Ratio	1	Accelerated Tax Depreciation	1
FGC - \$1000	38	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	1765			Insurance Rate - %	1.15
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	1728	1716	1696	1700	1695	1612	1425	1242	1067	1168
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	183	182	172	162	152	144	135	128	120	117
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	175	159	145	131	119	107	97	90	84
Income Taxes	-7	-43	-37	-32	-26	-21	-16	-12	-9	-7
Deferred Taxes	7	43	37	32	26	21	16	12	9	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	239	293	283	277	267	255	246	239	231	224

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	1115	1041	968	895	822	749	675	602	529	456
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	106	99	92	85	78	71	64	57	50	43
Book Depreciation	66	66	66	66	66	66	66	66	66	66
Tax Depreciation	84	84	84	84	84	84	84	84	84	84
Income Taxes	-7	-7	-7	-7	-7	-7	-7	-7	-7	-7
Deferred Taxes	7	7	7	7	7	7	7	7	7	7
Property Tax	30	30	30	30	30	30	30	30	30	30
Insurance	15	15	15	15	15	15	15	15	15	15
Annual Carrying Charges	217	210	200	196	189	182	175	168	161	154

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL COST

Investment	2	Phase 2	Economic Factors	Case #7	
Initial Operation	1990	Preferred Stock Ratio	0	Book Life - yrs	20
Cost Basis	1988	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$4,915	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - yrs	19
Escalation - \$1000	401	Debt Ratio	1	Accelerated Tax Depreciation	1
AFPC - \$1000	347	Debt Cost - %	5.5	Property Tax - %	1.5
Total Cost - \$1000	5567			Insurance Rate - %	1.75
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	5567	5358	5051	4762	4488	4229	3985	3754	3524
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	526	509	480	452	426	402	379	357	336
Book Depreciation	0	185	185	185	185	185	185	185	185	185
Tax Depreciation	0	234	234	234	234	234	234	234	234	234
Income Taxes	0	-19	-122	-104	-38	-70	-59	-46	-35	-24
Deferred Taxes	0	19	122	104	86	70	59	46	35	24
Property Tax	0	83	83	83	83	83	83	83	83	83
Insurance	0	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	0	939	920	790	763	737	712	689	667	646

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	3322	3116	2913	2708	2503	2299	2094	1889	1684	1480
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	316	296	277	257	238	218	199	179	160	141
Book Depreciation	185	185	185	185	185	185	185	185	185	185
Tax Depreciation	234	234	234	234	234	234	234	234	234	234
Income Taxes	-19	-19	-19	-19	-19	-19	-19	-19	-19	-19
Deferred Taxes	19	19	19	19	19	19	19	19	19	19
Property Tax	83	83	83	83	83	83	83	83	83	83
Insurance	42	42	42	42	42	42	42	42	42	42
Annual Carrying Charges	626	607	587	568	548	529	510	490	471	451

ECONOMIC ANALYSIS OF DISTRICT HEATING
FOR
JAMESTOWN INDUSTRIAL CORRIDOR

ANNUAL CARRYING CHARGES

PRIVATE OWNERSHIP - IMPLEMENT ALL THREE PHASES - 15% LOWER FUEL COST

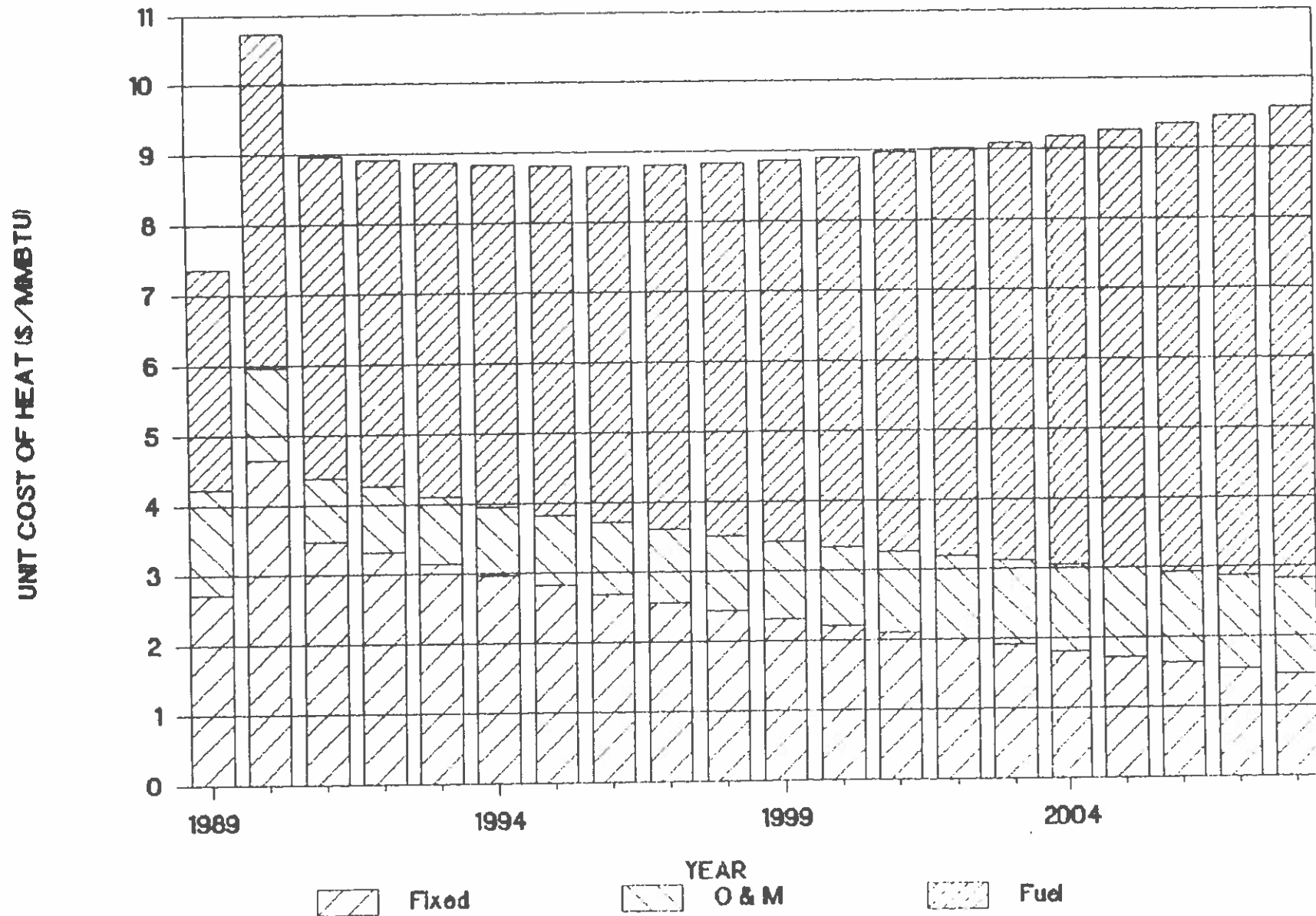
Investment	2	Phase 3	Economic Factors	Case P37	
Initial Operation	1981	Preferred Stock Ratio	0	Stock Life - yrs	20
Cost Basis	1983	Return on Preferred Stock - %	0	Income Tax Rate - %	40
Capital Cost - \$1000	\$7,725	Common Stock Ratio	0	Tax Credit - %	0
Gen. Escalation -	4.0%	Return on Common Stock - %	0	Tax Life - yrs	15
Escalation - \$1000	4-5	Debt Ratio	1	Accelerated Tax Depreciation	1
ROC - \$1000	195	Debt Cost - %	9.5	Property Tax - %	1.5
Total Cost - \$1000	4784			Insurance Rate - %	1.5
Start of Evaluation	1989	Weighted Cost of Capital - %	9.50		

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Remaining Book Value	0	0	4784	4227	3551	2757	2577	2224	2141	2185
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	0	0	417	401	375	357	336	317	298	281
Book Depreciation	0	0	146	146	146	146	146	146	146	146
Tax Depreciation	0	0	184	184	184	184	184	184	184	184
Income Taxes	0	0	-15	-15	-15	-20	-27	-37	-47	-57
Deferred Taxes	0	0	15	15	22	20	37	47	56	66
Property Tax	0	0	66	66	66	66	66	66	66	66
Insurance	0	0	33	33	33	33	33	33	33	33
Annual Carrying Charges	0	0	561	546	527	501	531	562	543	526

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Remaining Book Value	2785	2618	2457	2296	2174	1977	1812	1650	1489	1328
Return on Preferred Stock	0	0	0	0	0	0	0	0	0	0
Return on Common Stock	0	0	0	0	0	0	0	0	0	0
Interest	265	249	233	218	203	187	172	157	141	126
Book Depreciation	146	146	146	146	146	146	146	146	146	146
Tax Depreciation	197	184	184	184	184	184	184	184	184	184
Income Taxes	-20	-15	-15	-15	-15	-15	-15	-15	-15	-15
Deferred Taxes	20	15	15	15	15	15	15	15	15	15
Property Tax	66	66	66	66	66	66	66	66	66	66
Insurance	33	33	33	33	33	33	33	33	33	33
Annual Carrying Charges	599	494	478	463	448	432	417	402	386	371

UNIT COST OF DISTRICT HEAT - CASE PS7

JAMESTOWN INDUSTRIAL CORRIDOR



APPENDIX E

CUSTOMER PRESENT OPERATING COSTS

CUSTOMER BOILER REPLACEMENT AND OPERATING COST ANALYSIS

	WEBER KNAPP	MRC BEARING	CRAWFORD FURNITURE	DAHLSTROM	ESSEX SPEC. PRODUCTS	HOPES WINDOWS	JAMESTOWN METAL MFG.	BLACKSTONE	JAMESTOWN METAL PRODUCTS
OVERALL GAS TO DH									
CCF	388.061	330.912	79.232	648,341	77.134	367.544	174.580	1,974,960	166.239
MMBTU	39,582	33,753	8,082	66,131	7,868	37,489	17,807	201,448	19,636
USEFUEL LOAD, MMBTU									
OVERALL	30,354	18,749	5,866	43,195	5,711	30,068	11,712	151,987	7,098
BOILER	18,080	18,749	3,297	43,195	2,230	8,758	11,291	54,173	7,098
BOILER STEAM LOADS									
MMBTU/HR	5.57	8.52	1.55	18.51	1.65	3.93	3.99	9.65	3.26
ANNUAL MMLB	18.08	18.75	3.30	43.20	2.23	8.76	11.28	54.17	7.10
CHEMICAL AND WATER COSTS									
TSP	\$5,695	\$5,906	\$1,039	\$13,606	\$702	\$2,759	\$3,554	\$17,064	\$2,076
NUETRALIZER	\$181	\$187	\$33	\$432	\$22	\$88	\$113	\$542	\$71
OXYGEN SCAVENGER	\$72	\$75	\$13	\$173	\$9	\$35	\$45	\$217	\$29
TOTAL CHEMICAL & WATER	\$5,948	\$6,168	\$1,085	\$14,211	\$734	\$2,881	\$3,711	\$17,823	\$2,336
OTHER BOILER COSTS									
BURNER ADJUSTMENT	\$2,000	\$1,000	\$1,000	\$2,000	\$1,000	\$5,000	\$3,000	\$1,000	\$2,000
MAINT. & OPERATION LABOR									
ANNUAL HOURS	280	300	208	1092	130	375	416	520	250
ANNUAL COST	\$7,000	\$7,500	\$5,200	\$27,300	\$3,250	\$9,375	\$10,400	\$13,000	\$6,250
INSURANCE COSTS	\$1,925	\$700	\$700	\$2,100	\$700	\$1,400	\$2,100	\$700	\$1,400
TOTAL NON-FUEL COSTS	\$16,873	\$15,368	\$7,985	\$45,611	\$5,684	\$18,656	\$19,211	\$32,523	\$11,985

* Weighted Average of Boiler
And Direct Fired Loads As Applicable

NON FUEL COST PARAMETERS

CHEMICAL COST:

TSP	\$315.00 PER MMLB STEAM
NUETRALIZER	\$10.00 PER MMLB STEAM
OXYGEN SCAVENGER	\$4.00 PER MMLB STEAM

ANNUAL EFFICIENCY TEST & BURNER ADJ:	\$1,000 PER BOILER
OPERATOR & MAINT. LABOR:	\$25.00 PER MANHOUR

CUSTOMER BOILER REPLACEMENT AND OPERATING COST ANALYSIS

	WEBER KNAPP	MRC BEARING	CRAWFORD FURNITURE	DAHLSTROM	ESSEX SPEC. PRODUCTS	HOPES WINDOWS	JAMESTOWN METAL MFG.	BLACKSTONE	JAMESTOWN METAL PRODUCTS
NUMBER OF BOILERS (REPLACED)	2	1	1	2	1	5	3	1	2
Boiler #1									
Horsepower	300	150	30	300	200	150	150	125	150
Year Installed	1960	1970	1985	1949	1952	1968	1965	1974	1984
Replacement-End of Year	1990	2000	2015	1989	1989	1998	1995	2004	2014
Replacement Cost (Rep Year)	\$63,555	\$43,125	\$41,682	\$61,110	\$46,725	\$39,872	\$35,446	\$48,113	\$23,350
Insurance Cost 1988	\$1,050	\$700	\$700	\$1,050	\$700	\$700	\$700	\$700	\$700
Prereplacement Sinking Fund:	\$6,437	\$2,789	\$822	\$6,922	\$5,293	\$3,245	\$4,420	\$2,118	\$491
Replacement 15-Yr Amortiz.:	\$6,437	\$0	\$0	\$6,922	\$5,293	\$0	\$0	\$0	\$0
Subsequent Sinking Fund:									
Start Year	2006	2001	2016	2005	2005	1999	1996	2005	2015
Amount	\$11,156	\$3,818	\$6,645	\$10,315	\$7,887	\$3,263	\$2,579	\$4,983	\$3,580
Boiler #2									
Horsepower	250	150	0	300	0	30	150	0	150
Year Installed	1971	0	0	1949	0	1984	1953	0	196
Replacement Year	2001	0	0	1989	0	2014	1989	0	199
Replacement Cost (Rep Year)	\$84,333	\$0	\$0	\$61,110	\$0	\$40,079	\$28,013	\$0	\$38,338
Insurance Cost 1988	\$875	\$0	\$0	\$1,050	\$0	\$700	\$700	\$0	\$70
Prereplacement Sinking Fund:	\$4,915	\$0	\$0	\$6,922	\$0	\$843	\$3,173	\$0	\$3,54
Replacement 15-Yr Amortiz.:	\$0	\$0	\$0	\$6,922	\$0	\$0	\$3,173	\$0	\$0
Subsequent Sinking Fund:									
Start Year	2002	0	0	2005	0	2015	2005	0	199
Amount	\$7,764	\$0	\$0	\$10,315	\$0	\$6,144	\$4,728	\$0	\$2,017
Boiler #3									
Horsepower	0	0	0	0	0	0	150	0	0
Year Installed	0	0	0	0	0	0	1952	0	
Replacement Year	0	0	0	0	0	0	1989	0	
1987 Replacement Cost	\$0	\$0	\$0	\$0	\$0	\$0	\$28,013	\$0	\$0
Insurance Cost 1988	\$0	\$0	\$0	\$0	\$0	\$0	\$700	\$0	\$0
Prereplacement Sinking Fund:	\$0	\$0	\$0	\$0	\$0	\$0	\$3,173	\$0	\$0
Replacement 15-Yr Amortiz.:	\$0	\$0	\$0	\$0	\$0	\$0	\$3,173	\$0	\$0
Subsequent Sinking Fund:									
Start Year	0	0	0	0	0	0	2005	0	
Amount	\$0	\$0	\$0	\$0	\$0	\$0	\$4,728	\$0	\$0

ECONOMIC FACTORS - 1988

SINKING FUND PERCENTAGE:	4.50%
AMORTIZATION PERCENTAGE:	9.50%
GENERAL ESCALATION PERCENTAGE:	4.00%

CUSTOMER BOILER REPLACEMENT AND OPERATING COST ANALYSIS

	WEBER KNAPP	MRC BEARING	CRAWFORD FURNITURE	DAHLSTROM	ESSEX SPEC. PRODUCTS	HOPES WINDOWS	JAMESTOWN METAL MFG.	BLACKSTONE	JAMESTOWN METAL PRODUCTS
FUEL COSTS (1988)	\$142,654	\$115,564	\$31,953	\$261,468	\$31,107	\$131,536	\$70,406	\$706,800	\$42,845
TOTAL OPERATING COST (1988)	\$159,528	\$130,932	\$39,938	\$307,079	\$36,791	\$150,192	\$89,617	\$739,323	\$54,830

Total Annual Boiler Replacement Costs

	1989	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$10,766	\$2,118	\$4,040
	1990	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$10,766	\$2,118	\$4,040
	1991	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$10,766	\$2,118	\$4,040
	1992	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$10,766	\$2,118	\$4,040
	1993	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$10,766	\$2,118	\$4,040
	1994	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$10,766	\$2,118	\$4,040
	1995	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$10,766	\$2,118	\$4,040
	1996	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$8,925	\$2,118	\$4,040
	1997	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$8,925	\$2,118	\$4,040
	1998	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,087	\$8,925	\$2,118	\$3,508
	1999	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,106	\$8,925	\$2,118	\$3,508
	2000	\$11,352	\$2,789	\$822	\$13,844	\$5,293	\$4,106	\$8,925	\$2,118	\$3,508
	2001	\$11,352	\$3,818	\$822	\$13,844	\$5,293	\$4,106	\$8,925	\$2,118	\$3,508
	2002	\$14,201	\$3,818	\$822	\$13,844	\$5,293	\$4,106	\$8,925	\$2,118	\$3,508
	2003	\$14,201	\$3,818	\$822	\$13,844	\$5,293	\$4,106	\$8,925	\$2,118	\$3,508
	2004	\$14,201	\$3,818	\$822	\$13,844	\$5,293	\$4,106	\$8,925	\$2,118	\$3,508
	2005	\$14,201	\$3,818	\$822	\$20,629	\$7,887	\$4,106	\$9,457	\$4,983	\$3,508
	2006	\$18,920	\$3,818	\$822	\$20,629	\$7,887	\$4,106	\$9,457	\$4,983	\$3,508
	2007	\$18,920	\$3,818	\$822	\$20,629	\$7,887	\$4,106	\$9,457	\$4,983	\$3,508
	2008	\$18,920	\$3,818	\$822	\$20,629	\$7,887	\$4,106	\$9,457	\$4,983	\$3,508
UNIT COST OF USEFUL HEAT (1989)		13,057	7,673	822	15,201	5,812	4,097	9,676	2,691	3,747
REPLACEMENT COSTS		\$0.37	\$0.15	\$0.14	\$0.32	\$0.93	\$0.14	\$0.92	\$0.01	\$0.57
O & M COSTS		\$0.58	\$0.85	\$1.42	\$1.10	\$1.04	\$0.65	\$1.71	\$0.22	\$1.76
FUEL COSTS		\$4.89	\$6.41	\$5.66	\$6.30	\$5.66	\$4.55	\$6.25	\$4.84	\$6.28
TOTAL UNIT COST:	1989	\$5.84	\$7.41	\$7.22	\$7.71	\$7.63	\$5.33	\$8.88	\$5.07	\$8.60
	1990	\$6.06	\$7.70	\$7.50	\$8.01	\$7.89	\$5.54	\$9.20	\$5.28	\$8.92
	1991	\$6.29	\$8.00	\$7.80	\$8.32	\$8.17	\$5.75	\$9.53	\$5.49	\$9.26
	1992	\$6.52	\$8.32	\$8.10	\$8.64	\$8.46	\$5.98	\$9.87	\$5.70	\$9.61
	1993	\$6.77	\$8.65	\$8.42	\$8.97	\$8.76	\$6.21	\$10.23	\$5.93	\$9.97
	1994	\$7.02	\$8.98	\$8.75	\$9.32	\$9.08	\$6.46	\$10.60	\$6.17	\$10.34
	1995	\$7.29	\$9.34	\$9.10	\$9.68	\$9.40	\$6.71	\$10.99	\$6.42	\$10.73
	1996	\$7.57	\$9.71	\$9.46	\$10.05	\$9.74	\$6.97	\$11.23	\$6.67	\$11.14
	1997	\$7.85	\$10.09	\$9.83	\$10.44	\$10.10	\$7.25	\$11.65	\$6.94	\$11.56
	1998	\$8.15	\$10.49	\$10.22	\$10.84	\$10.46	\$7.53	\$12.09	\$7.21	\$11.93
	1999	\$8.46	\$10.90	\$10.62	\$11.26	\$10.84	\$7.83	\$12.54	\$7.50	\$12.39
	2000	\$8.79	\$11.33	\$11.04	\$11.70	\$11.24	\$8.13	\$13.01	\$7.80	\$12.86
	2001	\$9.12	\$11.83	\$11.48	\$12.16	\$11.65	\$8.45	\$13.50	\$8.11	\$13.36
	2002	\$9.57	\$12.30	\$11.93	\$12.63	\$12.08	\$8.79	\$14.01	\$8.44	\$13.87
	2003	\$9.93	\$12.78	\$12.40	\$13.12	\$12.53	\$9.13	\$14.54	\$8.77	\$14.41
	2004	\$10.31	\$13.28	\$12.89	\$13.64	\$12.99	\$9.49	\$15.09	\$9.12	\$14.96
	2005	\$10.71	\$13.81	\$13.40	\$14.33	\$13.93	\$9.87	\$15.71	\$9.51	\$15.54
	2006	\$11.27	\$14.35	\$13.93	\$14.88	\$14.43	\$10.26	\$16.31	\$9.89	\$16.14
	2007	\$11.70	\$14.92	\$14.48	\$15.46	\$14.95	\$10.66	\$16.93	\$10.28	\$16.77
	2008	\$12.14	\$15.51	\$15.06	\$16.05	\$15.50	\$11.08	\$17.57	\$10.69	\$17.42

APPENDIX F

CUSTOMER PAYBACK ANALYSIS

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MS3

MRC BEARING PAYS BACK IN 4 YEARS

SCHEDULE----->	PRESENT YEAR:	1988	-->	CONSTRUCTION:	1989	-->	HOOKUP YEAR:	1990
CONVERSION COST----->	PRESENT YEAR:	\$9,200	-->	ESCALATION (%/YR):	4.00%	-->	HOOKUP YEAR:	\$9,951
FINANCING CONDITIONS---	% FINANCED:	100%	-->	INTEREST RATE:	9.50%	-->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0	-->	ANNUAL PAYMENT:	\$1,271	-->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40%	-->	DEPREC (YEARS):	5	-->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS	-->	SECONDARY FUEL:	-	-->	PIPING:	STM
CONSUMPTION (MMBTU)----->	PRIMARY FUEL:	33,949	-->	SECONDARY FUEL:	0	-->	TOTAL ENERGY DEMAND:	22,067
GAS/OIL RATE (\$/MMBTU)-->	PRIMARY FUEL:	3.42	-->	SECONDARY FUEL:	0.00	-->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG.:	65%	-->	PIPING LOSS:	0%	-->	TOTAL:	65%
FUEL RATE (\$/MMBTU)----->	PRIMARY FUEL:	5.27	-->	SECONDARY FUEL:	0.00	-->	TOTAL:	5.27
CURRENT O&M EXPENSE----->	ANNUAL (\$):	15,400	-->	RATE (\$/MMBTU):	0.70	-->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$2,800 1989-2000 \$3,800 2002-2008

I----- CURRENT SYSTEM -----I			I----- DISTRICT HEATING CONVERSION -----I			I----- COMPARISON -----I			I----- PAYBACK -----I						
YEAR	FUEL RATE	O&O RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION PRINC.	INTEREST	TOTAL COSTS	ENERGY SAVINGS	TAX EFFECTS	TOTAL SAVINGS	CUMULATIVE SAVINGS	UNPAID PRINCIPAL	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1990	5.70	0.88	6.58	145,132	\$7.51	165,683	326	945	166,954	(20,551)	9,195	(12,626)	(12,626)	9,625	1990 .
1991	5.93	0.92	6.85	151,090	\$6.19	136,530	357	914	137,801	14,560	(4,583)	8,706	(3,920)	9,268	1991 .
1992	6.16	0.95	7.11	156,828	\$6.34	139,937	391	880	141,208	16,891	(5,568)	10,051	6,131	8,877	1992 .
1993	6.41	0.98	7.39	163,006	\$6.50	143,509	428	843	144,780	19,498	(6,626)	11,601	17,732	8,450	1993 ***
1994	6.66	1.01	7.67	169,185	\$6.67	147,252	468	803	148,523	21,933	(7,616)	13,046	30,778	7,981	1994 .
1995	6.93	1.05	7.98	176,026	\$6.85	151,174	513	758	152,446	24,851	(9,637)	13,943	44,721	7,468	1995 .
1996	7.21	1.09	8.30	183,087	\$7.04	155,282	562	709	156,553	27,805	(10,838)	15,696	60,416	6,907	1996 .
1997	7.50	1.12	8.62	190,149	\$7.23	159,583	615	656	160,854	30,565	(11,964)	17,331	77,747	6,292	1997 .
1998	7.80	1.16	8.96	197,652	\$7.44	164,085	673	598	165,356	33,566	(13,187)	19,108	96,855	5,618	1998 .
1999	8.11	1.20	9.31	205,375	\$7.65	168,796	737	534	170,067	36,579	(14,418)	20,890	117,744	4,881	1999 .
2000	8.43	1.25	9.68	213,540	\$7.87	173,724	807	464	174,995	39,816	(15,741)	22,804	140,548	4,073	2000 .
2001	8.77	1.29	10.06	221,925	\$8.11	178,878	884	387	180,149	43,047	(17,064)	24,712	165,260	3,189	2001 .
2002	9.12	1.38	10.50	231,752	\$8.35	184,267	968	303	185,538	47,485	(18,873)	27,341	192,601	2,221	2002 .
2003	9.49	1.43	10.92	241,020	\$8.61	189,901	1,060	211	191,172	51,120	(20,363)	29,485	222,086	1,161	2003 .
2004	9.87	1.48	11.35	250,509	\$8.87	195,788	1,161	110	197,059	54,721	(21,844)	31,605	253,692	0	2004 .
2005	10.26	1.53	11.79	260,219	\$9.15	201,940	0	0	201,940	58,278	(23,311)	34,967	288,659	0	2005 .
2006	10.67	1.58	12.25	270,369	\$9.44	208,367	0	0	208,367	62,002	(24,801)	37,201	325,860	0	2006 .
2007	11.10	1.64	12.74	281,182	\$9.75	215,080	0	0	215,080	66,102	(26,441)	39,661	365,521	0	2007 .
2008	11.54	1.70	13.24	292,216	\$10.06	222,090	0	0	222,090	70,126	(28,050)	42,075	407,597	0	2008 .
2009	12.00	1.76	13.76	303,691	\$10.39	229,329	0	0	229,329	74,362	(29,745)	44,617	452,214	0	2009 .

*** PAYBACK OCCURS IN YEAR 1993 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW 1991

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MS8

MRC BEARING PAYS BACK IN 6 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1990
CONVERSION COST----->	PRESENT YEAR:	\$9,200 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$9,951
FINANCING CONDITIONS--->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$1,271 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	33,949 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	22,067
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.42 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG.:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	5.27 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.27
CURRENT D&M EXPENSE---->	ANNUAL (\$):	15,400 -->	RATE (\$/MMBTU):	0.70 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$2,800 1989-2000 \$3,800 2002-2008

I----- CURRENT SYSTEM -----II-----			DISTRICT HEATING CONVERSION -----I I-----			COMPARISON-----I I-----			PAYBACK-----I I-----						
YEAR	FUEL RATE (\$/MMBTU)	O&O RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1990	5.70	0.88	6.58	145,132	\$6.72	148,320	326	945	149,591	(3,188)	2,250	(2,209)	(2,209)	9,625	1990 .
1991	5.93	0.92	6.85	151,090	\$6.88	151,758	357	914	153,029	(667)	1,508	(430)	(2,639)	9,268	1991 .
1992	6.16	0.95	7.11	156,828	\$7.04	155,367	391	880	156,638	1,460	604	793	(1,846)	8,877	1992 .
1993	6.41	0.98	7.39	163,006	\$7.21	159,156	428	843	160,427	3,850	(367)	2,212	366	8,450	1993 .
1994	6.66	1.01	7.67	169,185	\$7.39	163,131	468	803	164,402	6,054	(1,265)	3,518	3,885	7,981	1994 .
1995	6.93	1.05	7.98	176,026	\$7.58	167,299	513	758	168,570	8,727	(3,187)	4,268	8,153	7,468	1995 ***
1996	7.21	1.09	8.30	183,087	\$7.78	171,669	562	709	172,940	11,418	(4,284)	5,864	14,017	6,907	1996 .
1997	7.50	1.12	8.62	190,149	\$7.99	176,248	615	656	177,519	13,901	(5,298)	7,332	21,348	6,292	1997 .
1998	7.80	1.16	8.96	197,652	\$8.20	181,045	673	598	182,316	16,606	(6,403)	8,932	30,280	5,618	1998 .
1999	8.11	1.20	9.31	205,375	\$8.43	186,069	737	534	187,340	19,306	(7,509)	10,526	40,806	4,881	1999 .
2000	8.43	1.25	9.68	213,540	\$8.67	191,328	807	464	192,599	22,212	(8,699)	12,241	53,048	4,073	2000 .
2001	8.77	1.29	10.06	221,925	\$8.92	196,832	884	387	198,103	25,093	(9,882)	13,939	66,987	3,189	2001 .
2002	9.12	1.38	10.50	231,752	\$9.18	202,591	968	303	203,862	29,161	(11,543)	16,347	83,334	2,221	2002 .
2003	9.49	1.43	10.92	241,020	\$9.45	208,615	1,060	211	209,886	32,405	(12,878)	18,256	101,590	1,161	2003 .
2004	9.87	1.48	11.35	250,509	\$9.74	214,915	1,161	110	216,186	35,594	(14,194)	20,130	121,720	0	2004 .
2005	10.26	1.53	11.79	260,219	\$10.04	221,501	0	0	221,501	38,718	(15,487)	23,231	144,950	0	2005 .
2006	10.67	1.58	12.25	270,369	\$10.35	228,385	0	0	228,385	41,984	(16,794)	25,191	170,141	0	2006 .
2007	11.10	1.64	12.74	281,182	\$10.68	235,579	0	0	235,579	45,603	(18,241)	27,362	197,502	0	2007 .
2008	11.54	1.70	13.24	292,216	\$11.02	243,096	0	0	243,096	49,120	(19,648)	29,472	226,974	0	2008 .
2009	12.00	1.76	13.76	303,691	\$11.37	250,853	0	0	250,853	52,838	(21,135)	31,703	258,677	0	2009 .

*** PAYBACK OCCURS IN YEAR 1995 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MS3

WEBER KNAPP PAYS BACK IN 10 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1990
CONVERSION COST----->	PRESENT YEAR:	\$28,000 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$30,285
FINANCING CONDITIONS--->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$3,869 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	42,566 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	32,478
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.60 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG.:	76% -->	PIPING LOSS:	0% -->	TOTAL:	76%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	4.72 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	4.72
CURRENT O&M EXPENSE---->	ANNUAL (\$):	16,900 -->	RATE (\$/MMBTU):	0.52 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$11,400 1989-2001 \$14,200 2002-2005 \$18,900 2006-2008

I----- CURRENT SYSTEM -----I			II----- DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE (\$/MMBTU)	O&M RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1990	5.11	0.91	6.02	195,550	\$7.51	243,850	992	2,877	247,719	(48,300)	22,288	(29,881)	(29,881)	29,293	1990 .
1991	5.31	0.94	6.25	203,020	\$6.19	200,944	1,086	2,783	204,812	2,076	2,948	1,155	(28,725)	28,207	1991 .
1992	5.53	0.96	6.49	210,815	\$6.34	205,958	1,189	2,680	209,826	4,857	1,673	2,661	(26,064)	27,018	1992 .
1993	5.75	0.98	6.73	218,610	\$6.50	211,215	1,302	2,567	215,083	7,395	613	4,139	(21,925)	25,716	1993 .
1994	5.98	1.01	6.99	227,054	\$6.67	216,725	1,426	2,443	220,593	10,329	(611)	5,850	(16,075)	24,291	1994 .
1995	6.22	1.03	7.25	235,498	\$6.85	222,497	1,561	2,308	226,366	13,001	(4,277)	4,855	(11,220)	22,730	1995 .
1996	6.46	1.06	7.52	244,267	\$7.04	228,543	1,709	2,159	232,412	15,724	(5,426)	6,430	(4,791)	21,020	1996 .
1997	6.72	1.09	7.81	253,686	\$7.23	234,873	1,872	1,997	238,742	18,813	(6,726)	8,218	3,427	19,149	1997 .
1998	6.99	1.12	8.11	263,429	\$7.44	241,499	2,050	1,819	245,368	21,930	(8,044)	10,017	13,444	17,099	1998 .
1999	7.27	1.15	8.42	273,497	\$7.65	248,432	2,244	1,624	252,301	25,065	(9,376)	11,820	25,264	14,855	1999 ***
2000	7.56	1.18	8.74	283,890	\$7.87	255,686	2,458	1,411	259,554	28,205	(10,717)	13,619	38,883	12,397	2000 .
2001	7.86	1.22	9.08	294,933	\$8.11	263,271	2,691	1,178	267,140	31,662	(12,194)	15,599	54,482	9,706	2001 .
2002	8.18	1.25	9.43	306,300	\$8.35	271,203	2,947	922	275,071	35,098	(13,670)	17,559	72,041	6,760	2002 .
2003	8.51	1.38	9.89	321,117	\$8.61	279,494	3,227	642	283,363	41,623	(16,392)	21,362	93,403	3,533	2003 .
2004	8.85	1.41	10.26	333,134	\$8.87	288,159	3,533	336	292,028	44,975	(17,856)	23,250	116,653	0	2004 .
2005	9.20	1.45	10.65	345,800	\$9.15	297,214	0	0	297,214	48,587	(19,435)	29,152	145,806	0	2005 .
2006	9.57	1.49	11.06	359,116	\$9.44	306,673	0	0	306,673	52,444	(20,977)	31,466	177,272	0	2006 .
2007	9.95	1.68	11.63	377,782	\$9.75	316,552	0	0	316,552	61,229	(24,492)	36,738	214,009	0	2007 .
2008	10.35	1.72	12.07	392,072	\$10.06	326,870	0	0	326,870	65,202	(26,081)	39,121	253,131	0	2008 .
2009	10.76	1.77	12.53	407,012	\$10.39	337,524	0	0	337,524	69,489	(27,795)	41,693	294,824	0	2009 .

*** PAYBACK OCCURS IN YEAR 1999 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW

1991

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MSB

WEBER KNAPP (W/O DF) PAYS BACK IN 3 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1990
CONVERSION COST----->	PRESENT YEAR:	\$9,200 -->	ESCALATION (Z/YR):	4.00% -->	HOOKUP YEAR:	\$9,951
FINANCING CONDITIONS---	Z FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$1,271 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)----->	PRIMARY FUEL:	29,267 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	20,750
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.60 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (Z/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG.:	71% -->	PIPING LOSS:	0% -->	TOTAL:	71%
FUEL RATE (\$/MMBTU)----->	PRIMARY FUEL:	5.08 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.08
CURRENT O&M EXPENSE----->	ANNUAL (\$):	16,900 -->	RATE (\$/MMBTU):	0.81 -->	ESCALATION (Z/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$11,400 1989-2001 \$14,200 2002-2005 \$18,900 2006-2008

I----- CURRENT SYSTEM -----I						DISTRICT HEATING CONVERSION -----I				I-----COMPARISON-----I				I-----PAYBACK-----I	
YEAR	FUEL RATE (\$/MMBTU)	O&D RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1990	5.50	1.43	6.93	143,785	\$6.72	139,468	326	945	140,739	4,317	(752)	2,294	2,294	9,625	1990 .
1991	5.72	1.47	7.19	149,180	\$6.88	142,701	357	914	143,972	6,479	(1,350)	3,858	6,152	9,268	1991 .
1992	5.95	1.50	7.45	154,575	\$7.04	146,095	391	880	147,366	8,480	(2,204)	5,005	11,157	8,877	1992 ***
1993	6.18	1.54	7.72	160,178	\$7.21	149,657	428	843	150,928	10,520	(3,035)	6,214	17,371	8,450	1993 .
1994	6.43	1.58	8.01	166,195	\$7.39	153,395	468	803	154,666	12,800	(3,963)	7,566	24,937	7,981	1994 .
1995	6.69	1.62	8.31	172,420	\$7.58	157,314	513	758	158,586	15,106	(5,739)	8,095	33,033	7,468	1995 .
1996	6.96	1.66	8.62	178,853	\$7.78	161,423	562	709	162,695	17,429	(6,688)	9,470	42,503	6,907	1996 .
1997	7.24	1.71	8.95	185,700	\$7.99	165,729	615	656	167,001	19,971	(7,726)	10,974	53,476	6,292	1997 .
1998	7.52	1.76	9.28	192,548	\$8.20	170,240	673	598	171,511	22,307	(8,684)	12,352	65,829	5,618	1998 .
1999	7.83	1.80	9.63	199,810	\$8.43	174,964	737	534	176,235	24,846	(9,725)	13,850	79,679	4,881	1999 .
2000	8.14	1.85	9.99	207,280	\$8.67	179,909	807	464	181,180	27,371	(10,763)	15,337	95,016	4,073	2000 .
2001	8.46	1.91	10.37	215,165	\$8.92	185,085	884	387	186,356	30,080	(11,877)	16,932	111,947	3,189	2001 .
2002	8.80	1.96	10.76	223,258	\$9.18	190,500	968	303	191,771	32,757	(12,982)	18,504	130,452	2,221	2002 .
2003	9.15	2.15	11.30	234,565	\$9.45	196,165	1,060	211	197,436	38,400	(15,276)	21,853	152,305	1,161	2003 .
2004	9.52	2.21	11.73	243,488	\$9.74	202,088	1,161	110	203,359	41,399	(16,516)	23,613	175,918	0	2004 .
2005	9.90	2.27	12.17	252,618	\$10.04	208,281	0	0	208,281	44,336	(17,734)	26,602	202,519	0	2005 .
2006	10.30	2.33	12.63	262,163	\$10.35	214,755	0	0	214,755	47,408	(18,963)	28,445	230,964	0	2006 .
2007	10.71	2.63	13.34	276,823	\$10.68	221,520	0	0	221,520	55,303	(22,121)	33,182	264,146	0	2007 .
2008	11.14	2.69	13.83	286,990	\$11.02	228,588	0	0	228,588	58,402	(23,361)	35,041	299,187	0	2008 .
2009	11.58	2.77	14.35	297,780	\$11.37	235,881	0	0	235,881	61,899	(24,759)	37,139	336,326	0	2009 .

*** PAYBACK OCCURS IN YEAR 1992 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

CRAWFORD FURN. PAYS BACK IN 11 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$60,300 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$62,712
FINANCING CONDITIONS---	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$8,011 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)----->	PRIMARY FUEL:	8,795 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	6,385
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.95 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG.:	73% -->	PIPING LOSS:	0% -->	TOTAL:	73%
FUEL RATE (\$/MMBTU)----->	PRIMARY FUEL:	5.45 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.45
CURRENT O&M EXPENSE----->	ANNUAL (\$):	8,000 -->	RATE (\$/MMBTU):	1.25 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$820 1989-2008

I----- CURRENT SYSTEM -----I					DISTRICT HEATING CONVERSION -----I					I----- COMPARISON-----I			I-----PAYBACK-----I		
YEAR	FUEL RATE (\$/MMBTU)	O&O RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. INTEREST	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR	
1989	5.66	1.43	7.09	45,260	\$6.97	44,473	2,053 5,958	52,484	787	5,831	(1,393)	(1,393)	60,659	1989 .	
1990	5.89	1.49	7.38	47,111	\$7.51	47,940	2,248 5,763	55,951	(828)	8,155	(684)	(2,078)	58,410	1990 .	
1991	6.13	1.54	7.67	48,963	\$6.19	39,504	2,462 5,549	47,516	9,458	3,704	5,151	3,074	55,948	1991 .	
1992	6.37	1.60	7.97	50,878	\$6.34	40,490	2,696 5,315	48,501	10,388	3,239	5,616	8,689	53,252	1992 .	
1993	6.63	1.65	8.28	52,858	\$6.50	41,524	2,952 5,059	49,535	11,334	2,758	6,081	14,770	50,300	1993 .	
1994	6.89	1.72	8.61	54,965	\$6.67	42,607	3,233 4,778	50,618	12,358	(3,032)	1,315	16,085	47,067	1994 .	
1995	7.17	1.78	8.95	57,136	\$6.85	43,742	3,540 4,471	51,753	13,394	(3,569)	1,814	17,899	43,528	1995 .	
1996	7.45	1.84	9.29	59,307	\$7.04	44,930	3,876 4,135	52,941	14,376	(4,096)	2,269	20,168	39,652	1996 .	
1997	7.75	1.91	9.66	61,669	\$7.23	46,175	4,244 3,767	54,186	15,494	(4,691)	2,792	22,960	35,407	1997 .	
1998	8.06	1.98	10.04	64,095	\$7.44	47,477	4,647 3,364	55,488	16,618	(5,302)	3,305	26,265	30,760	1998 .	
1999	8.38	2.06	10.44	66,649	\$7.65	48,840	5,089 2,922	56,852	17,809	(5,955)	3,843	30,108	25,671	1999 ***	
2000	8.72	2.14	10.86	69,331	\$7.87	50,266	5,572 2,439	58,277	19,065	(6,650)	4,403	34,512	20,999	2000 .	
2001	9.07	2.22	11.29	72,077	\$8.11	51,758	6,102 1,909	59,769	20,319	(7,364)	4,944	39,456	13,997	2001 .	
2002	9.43	2.30	11.73	74,886	\$8.35	53,317	6,681 1,330	61,328	21,569	(8,096)	5,462	44,918	7,316	2002 .	
2003	9.81	2.39	12.20	77,887	\$8.61	54,947	7,316 695	62,958	22,940	(8,898)	6,031	50,949	0	2003 .	
2004	10.20	2.48	12.68	80,952	\$8.87	56,651	0 0	56,651	24,301	(9,720)	14,581	65,530	0	2004 .	
2005	10.61	2.57	13.18	84,144	\$9.15	58,431	0 0	58,431	25,714	(10,285)	15,428	80,958	0	2005 .	
2006	11.03	2.67	13.70	87,464	\$9.44	60,290	0 0	60,290	27,174	(10,870)	16,305	97,262	0	2006 .	
2007	11.47	2.77	14.24	90,912	\$9.75	62,233	0 0	62,233	28,680	(11,472)	17,208	114,470	0	2007 .	
2008	11.93	2.88	14.81	94,552	\$10.06	64,261	0 0	64,261	30,291	(12,116)	18,175	132,645	0	2008 .	

*** PAYBACK OCCURS IN YEAR 1999 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW 1991

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MSB

CRAWFORD FURN. (W/O DF) PAYS BACK IN 2 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$7,300 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$7,592
FINANCING CONDITIONS-->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$970 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	5,390 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	3,617
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.95 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG.:	67% -->	PIPING LOSS:	0% -->	TOTAL:	67%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	5.89 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.89
CURRENT O&M EXPENSE---->	ANNUAL (\$):	8,000 -->	RATE (\$/MMBTU):	2.21 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$820 1989-2008

I----- CURRENT SYSTEM -----II-----			DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE (\$/MMBTU)	O&M RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1989	6.13	2.53	8.66	31,311	\$6.97	25,203	249	721	26,173	6,108	(1,699)	3,439	3,439	7,343	1989 .
1990	6.37	2.62	8.99	32,505	\$6.72	24,311	272	698	25,281	8,194	(2,330)	4,894	8,333	7,071	1990 ***
1991	6.63	2.72	9.35	33,807	\$6.88	24,875	298	672	25,844	8,932	(2,667)	5,296	13,629	6,773	1991 .
1992	6.89	2.82	9.71	35,109	\$7.04	25,466	326	643	26,436	9,643	(2,962)	5,711	19,340	6,447	1992 .
1993	7.17	2.92	10.09	36,484	\$7.21	26,087	357	612	27,057	10,396	(3,276)	6,151	25,491	6,089	1993 .
1994	7.46	3.03	10.49	37,930	\$7.39	26,739	391	578	27,709	11,192	(4,245)	5,977	31,467	5,698	1994 .
1995	7.75	3.14	10.89	39,377	\$7.58	27,422	429	541	28,392	11,955	(4,566)	6,420	37,887	5,270	1995 .
1996	8.06	3.26	11.32	40,933	\$7.78	28,138	469	501	29,108	12,794	(4,917)	6,907	44,794	4,800	1996 .
1997	8.39	3.38	11.77	42,560	\$7.99	28,889	514	456	29,859	13,671	(5,286)	7,415	52,209	4,286	1997 .
1998	8.72	3.50	12.22	44,188	\$8.20	29,675	563	407	30,645	14,513	(5,642)	7,901	60,110	3,724	1998 .
1999	9.07	3.63	12.70	45,924	\$8.43	30,499	616	354	31,468	15,425	(6,029)	8,427	68,537	3,108	1999 .
2000	9.43	3.77	13.20	47,732	\$8.67	31,361	675	295	32,330	16,372	(6,431)	8,971	77,508	2,433	2000 .
2001	9.81	3.91	13.72	49,613	\$8.92	32,263	739	231	33,233	17,351	(6,848)	9,533	87,041	1,695	2001 .
2002	10.20	4.06	14.26	51,567	\$9.18	33,207	809	161	34,177	18,360	(7,280)	10,110	97,152	886	2002 .
2003	10.61	4.21	14.82	53,592	\$9.45	34,194	886	84	35,164	19,398	(7,726)	10,703	107,854	0	2003 .
2004	11.04	4.37	15.41	55,726	\$9.74	35,227	0	0	35,227	20,499	(8,200)	12,300	120,154	0	2004 .
2005	11.48	4.54	16.02	57,932	\$10.04	36,306	0	0	36,306	21,626	(8,650)	12,976	133,130	0	2005 .
2006	11.94	4.71	16.65	60,211	\$10.35	37,435	0	0	37,435	22,777	(9,111)	13,666	146,796	0	2006 .
2007	12.41	4.89	17.30	62,562	\$10.68	38,614	0	0	38,614	23,948	(9,579)	14,369	161,165	0	2007 .
2008	12.91	5.08	17.99	65,058	\$11.02	39,846	0	0	39,846	25,212	(10,085)	15,127	176,292	0	2008 .

*** PAYBACK OCCURS IN YEAR 1990 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW 1989

DAHLSTROM PAYS BACK IN 3 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$16,000 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$16,640
FINANCING CONDITIONS-->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$2,126 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)----->	PRIMARY FUEL:	69,622 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	45,254
GAS/OIL RATE (\$/MMBTU)-->	PRIMARY FUEL:	3.42 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)----->	PRIMARY FUEL:	5.27 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.27
CURRENT O&M EXPENSE----->	ANNUAL (\$):	45,600 -->	RATE (\$/MMBTU):	1.01 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$13,840 1989-2004 \$20,629 2005-2008

I----- CURRENT SYSTEM -----II-----			DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE (\$/MMBTU)	O&D RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1989	5.48	1.36	6.84	309,349	\$6.97	315,204	545	1,581	317,330	(5,855)	3,973	(4,008)	(4,008)	16,095	1989 .
1990	5.70	1.40	7.10	321,115	\$7.51	339,775	597	1,529	341,900	(18,660)	9,540	(11,246)	(15,254)	15,499	1990 .
1991	5.93	1.44	7.37	333,333	\$6.19	279,990	653	1,472	282,115	53,343	(19,351)	31,867	16,613	14,845	1991 ***
1992	6.16	1.49	7.65	346,004	\$6.34	286,976	715	1,410	289,102	59,028	(21,649)	35,253	51,866	14,130	1992 .
1993	6.41	1.54	7.95	359,581	\$6.50	294,301	783	1,342	296,427	65,279	(24,177)	38,977	90,843	13,347	1993 .
1994	6.66	1.58	8.24	372,704	\$6.67	301,978	858	1,268	304,104	70,726	(27,783)	40,817	131,660	12,489	1994 .
1995	6.93	1.64	8.57	387,638	\$6.85	310,022	939	1,186	312,147	77,616	(30,572)	44,919	176,579	11,550	1995 .
1996	7.21	1.69	8.90	402,572	\$7.04	318,446	1,028	1,097	320,572	84,126	(33,211)	48,789	225,368	10,521	1996 .
1997	7.50	1.74	9.24	417,958	\$7.23	327,266	1,126	1,000	329,392	90,692	(35,877)	52,689	278,057	9,395	1997 .
1998	7.80	1.80	9.60	434,250	\$7.44	336,499	1,233	893	338,624	97,751	(38,743)	56,882	334,939	8,162	1998 .
1999	8.11	1.86	9.97	450,994	\$7.65	346,159	1,350	775	348,285	104,834	(41,624)	61,085	396,024	6,812	1999 .
2000	8.43	1.92	10.35	468,190	\$7.87	356,266	1,479	647	358,391	111,925	(44,511)	65,288	461,312	5,333	2000 .
2001	8.77	1.99	10.76	486,744	\$8.11	366,835	1,619	507	368,961	119,909	(47,761)	70,022	531,334	3,714	2001 .
2002	9.12	2.05	11.17	505,298	\$8.35	377,887	1,773	353	380,012	127,412	(50,824)	74,462	605,797	1,941	2002 .
2003	9.49	2.12	11.61	525,210	\$8.61	389,440	1,941	184	391,565	135,771	(54,234)	79,410	685,207	0	2003 .
2004	9.87	2.20	12.07	546,027	\$8.87	401,514	0	0	401,514	144,513	(57,805)	86,708	771,915	0	2004 .
2005	10.26	2.42	12.68	573,633	\$9.15	414,130	0	0	414,130	159,503	(63,801)	95,702	867,617	0	2005 .
2006	10.67	2.50	13.17	595,807	\$9.44	427,310	0	0	427,310	168,498	(67,399)	101,099	968,716	0	2006 .
2007	11.10	2.58	13.68	618,887	\$9.75	441,076	0	0	441,076	177,811	(71,124)	106,687	1,075,402	0	2007 .
2008	11.54	2.67	14.21	642,872	\$10.06	455,452	0	0	455,452	187,420	(74,968)	112,452	1,187,854	0	2008 .

*** PAYBACK OCCURS IN YEAR 1991 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW 1991

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MSB

DAHLSTROM PAYS BACK IN 3 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$16,000 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$16,640
FINANCING CONDITIONS--->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$2,126 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	69,622 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	45,254
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.42 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	5.27 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.27
CURRENT O&M EXPENSE--->	ANNUAL (\$):	45,600 -->	RATE (\$/MMBTU):	1.01 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$13,840 1989-2004 \$20,629 2005-2008

I----- CURRENT SYSTEM -----I						DISTRICT HEATING CONVERSION -----I				I-----COMPARISON-----I				I-----PAYBACK-----I	
YEAR	FUEL RATE (\$/MMBTU)	O&O RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1989	5.48	1.36	6.84	309,349	\$6.97	315,326	545	1,581	317,452	(5,977)	4,022	(4,081)	(4,081)	16,095	1989 .
1990	5.70	1.40	7.10	321,115	\$6.72	304,168	597	1,529	306,294	16,946	(4,703)	10,118	6,037	15,499	1990 .
1991	5.93	1.44	7.37	333,333	\$6.88	311,218	653	1,472	313,343	22,115	(6,859)	13,130	19,167	14,845	1991 ***
1992	6.16	1.49	7.65	346,004	\$7.04	318,620	715	1,410	320,746	27,384	(8,992)	16,267	35,434	14,130	1992 .
1993	6.41	1.54	7.95	359,581	\$7.21	326,390	783	1,342	328,515	33,191	(11,342)	19,724	55,157	13,347	1993 .
1994	6.66	1.58	8.24	372,704	\$7.39	334,541	858	1,268	336,667	38,163	(14,758)	21,279	76,437	12,489	1994 .
1995	6.93	1.64	8.57	387,638	\$7.58	343,090	939	1,186	345,215	44,548	(17,345)	25,078	101,515	11,550	1995 .
1996	7.21	1.69	8.90	402,572	\$7.78	352,051	1,028	1,097	354,177	50,521	(19,769)	28,626	130,140	10,521	1996 .
1997	7.50	1.74	9.24	417,958	\$7.99	361,442	1,126	1,000	363,568	56,516	(22,207)	32,184	162,324	9,395	1997 .
1998	7.80	1.80	9.60	434,250	\$8.20	371,280	1,233	893	373,405	62,970	(24,831)	36,013	198,338	8,162	1998 .
1999	8.11	1.86	9.97	450,994	\$8.43	381,582	1,350	775	383,707	69,412	(27,455)	39,832	238,169	6,812	1999 .
2000	8.43	1.92	10.35	468,190	\$8.67	392,367	1,479	647	394,493	75,823	(30,070)	43,627	281,796	5,333	2000 .
2001	8.77	1.99	10.76	486,744	\$8.92	403,655	1,619	507	405,780	83,090	(33,033)	47,931	329,727	3,714	2001 .
2002	9.12	2.05	11.17	505,298	\$9.18	415,465	1,773	353	417,590	89,834	(35,792)	51,916	381,643	1,941	2002 .
2003	9.49	2.12	11.61	525,210	\$9.45	427,818	1,941	184	429,944	97,392	(38,883)	56,383	438,026	0	2003 .
2004	9.87	2.20	12.07	546,027	\$9.74	440,737	0	0	440,737	105,290	(42,116)	63,174	501,200	0	2004 .
2005	10.26	2.42	12.68	573,633	\$10.04	454,244	0	0	454,244	119,389	(47,756)	71,633	572,833	0	2005 .
2006	10.67	2.50	13.17	595,807	\$10.35	468,362	0	0	468,362	127,445	(50,978)	76,467	649,300	0	2006 .
2007	11.10	2.58	13.68	618,887	\$10.68	483,116	0	0	483,116	135,771	(54,309)	81,463	730,763	0	2007 .
2008	11.54	2.67	14.21	642,872	\$11.02	498,530	0	0	498,530	144,341	(57,736)	86,605	817,368	0	2008 .

*** PAYBACK OCCURS IN YEAR 1991 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

ESSEX CHEMICAL PAYS BACK IN 6 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HODKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$32,300 -->	ESCALATION (%/YR):	4.00% -->	HODKUP YEAR:	\$33,592
FINANCING CONDITIONS---->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$4,291 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)----->	PRIMARY FUEL:	10,158 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	7,334
GAS/OIL RATE (\$/MMBTU)-->	PRIMARY FUEL:	3.95 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	72% -->	PIPING LOSS:	0% -->	TOTAL:	72%
FUEL RATE (\$/MMBTU)----->	PRIMARY FUEL:	5.48 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.48
CURRENT O&M EXPENSE---->	ANNUAL (\$):	5,700 -->	RATE (\$/MMBTU):	0.78 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$5,290 1989-2004 \$7,900 2005-2008

I----- CURRENT SYSTEM -----I			I-----DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE	O&D RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION PRINC.	INTEREST	TOTAL COSTS	ENERGY SAVINGS	TAX EFFECTS	TOTAL SAVINGS	CUMULATIVE SAVINGS	UNPAID PRINCIPAL	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1989	5.70	1.53	7.23	53,034	\$6.97	51,083	1,100	3,191	55,374	1,951	2,511	172	172	32,492	1989 .
1990	5.92	1.56	7.48	54,868	\$7.51	55,065	1,204	3,087	59,356	(197)	4,270	(219)	(47)	31,288	1990 .
1991	6.16	1.59	7.75	56,848	\$6.19	45,376	1,319	2,972	49,667	11,472	(578)	6,603	6,556	29,969	1991 .
1992	6.41	1.63	8.04	58,975	\$6.34	46,508	1,444	2,847	50,799	12,467	(1,026)	7,149	13,705	28,525	1992 .
1993	6.66	1.67	8.33	61,102	\$6.50	47,695	1,581	2,710	51,987	13,406	(1,457)	7,658	21,364	26,943	1993 .
1994	6.93	1.70	8.63	63,302	\$6.67	48,940	1,732	2,560	53,231	14,362	(4,721)	5,350	26,714	25,212	1994 ***
1995	7.21	1.74	8.95	65,649	\$6.85	50,243	1,896	2,395	54,534	15,406	(5,204)	5,910	32,624	23,316	1995 .
1996	7.49	1.78	9.27	67,996	\$7.04	51,608	2,076	2,215	55,899	16,387	(5,669)	6,427	39,051	21,240	1996 .
1997	7.79	1.83	9.62	70,563	\$7.23	53,038	2,273	2,018	57,329	17,525	(6,203)	7,031	46,082	18,966	1997 .
1998	8.11	1.87	9.98	73,203	\$7.44	54,534	2,489	1,802	58,825	18,669	(6,747)	7,631	53,713	16,477	1998 .
1999	8.43	1.92	10.35	75,916	\$7.65	56,100	2,726	1,565	60,391	19,817	(7,301)	8,225	61,938	13,751	1999 .
2000	8.77	1.96	10.73	78,703	\$7.87	57,737	2,985	1,306	62,029	20,966	(7,864)	8,811	70,749	10,766	2000 .
2001	9.12	2.01	11.13	81,637	\$8.11	59,450	3,268	1,023	63,742	22,187	(8,465)	9,430	80,179	7,498	2001 .
2002	9.48	2.07	11.55	84,717	\$8.35	61,241	3,579	712	65,533	23,476	(9,105)	10,079	90,258	3,919	2002 .
2003	9.86	2.12	11.98	87,871	\$8.61	63,114	3,919	372	67,405	24,757	(9,754)	10,712	100,970	0	2003 .
2004	10.26	2.18	12.44	91,244	\$8.87	65,071	0	0	65,071	26,174	(10,470)	15,704	116,674	0	2004 .
2005	10.67	2.59	13.26	97,228	\$9.15	67,115	0	0	67,115	30,113	(12,045)	18,068	134,742	0	2005 .
2006	11.09	2.65	13.74	100,748	\$9.44	69,251	0	0	69,251	31,497	(12,599)	18,898	153,641	0	2006 .
2007	11.54	2.72	14.26	104,562	\$9.75	71,482	0	0	71,482	33,080	(13,232)	19,848	173,489	0	2007 .
2008	12.00	2.78	14.78	108,376	\$10.06	73,812	0	0	73,812	34,564	(13,826)	20,738	194,227	0	2008 .

*** PAYBACK OCCURS IN YEAR 1994 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW

1991

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MSB

ESSEX CHEMICAL (w/o DF) PAYS BACK IN 2 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$7,300 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$7,592
FINANCING CONDITIONS--->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$970 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	3,964 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	2,862
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.95 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	72% -->	PIPING LOSS:	0% -->	TOTAL:	72%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	5.48 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.48
CURRENT O&M EXPENSE---->	ANNUAL (\$):	5,700 -->	RATE (\$/MMBTU):	1.99 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$5,290 1989-2004 \$7,900 2005-2008

I----- CURRENT SYSTEM -----I						DISTRICT HEATING CONVERSION -----I				I-----COMPARISON-----I			I-----PAYBACK-----I		
YEAR	FUEL RATE (\$/MMBTU)	O&D RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1989	5.70	3.92	9.62	27,528	\$6.97	19,942	249	721	20,912	7,586	(2,290)	4,326	4,326	7,343	1989 .
1990	5.92	4.00	9.92	28,386	\$6.72	19,237	272	698	20,206	9,150	(2,713)	5,467	9,793	7,071	1990 ***
1991	6.16	4.09	10.25	29,331	\$6.88	19,682	298	672	20,652	9,648	(2,953)	5,726	15,518	6,773	1991 .
1992	6.41	4.18	10.59	30,304	\$7.04	20,151	326	643	21,120	10,153	(3,166)	6,017	21,536	6,447	1992 .
1993	6.66	4.27	10.93	31,277	\$7.21	20,642	357	612	21,612	10,635	(3,371)	6,294	27,830	6,089	1993 .
1994	6.93	4.37	11.30	32,336	\$7.39	21,157	391	578	22,127	11,179	(4,240)	5,969	33,798	5,698	1994 .
1995	7.21	4.47	11.68	33,423	\$7.58	21,698	429	541	22,668	11,725	(4,474)	6,282	40,080	5,270	1995 .
1996	7.49	4.58	12.07	34,540	\$7.78	22,265	469	501	23,235	12,275	(4,710)	6,595	46,676	4,800	1996 .
1997	7.79	4.68	12.47	35,684	\$7.99	22,859	514	456	23,829	12,826	(4,948)	6,908	53,584	4,286	1997 .
1998	8.11	4.80	12.91	36,944	\$8.20	23,481	563	407	24,451	13,463	(5,222)	7,271	60,854	3,724	1998 .
1999	8.43	4.92	13.35	38,203	\$8.43	24,132	616	354	25,102	14,071	(5,487)	7,614	68,468	3,108	1999 .
2000	8.77	5.04	13.81	39,520	\$8.67	24,814	675	295	25,784	14,705	(5,764)	7,971	76,440	2,433	2000 .
2001	9.12	5.17	14.29	40,893	\$8.92	25,528	739	231	26,498	15,365	(6,054)	8,342	84,781	1,695	2001 .
2002	9.48	5.30	14.78	42,296	\$9.18	26,275	809	161	27,245	16,020	(6,344)	8,707	93,488	886	2002 .
2003	9.86	5.44	15.30	43,784	\$9.45	27,057	886	84	28,026	16,727	(6,657)	9,100	102,588	0	2003 .
2004	10.26	5.58	15.84	45,329	\$9.74	27,874	0	0	27,874	17,456	(6,982)	10,473	113,062	0	2004 .
2005	10.67	6.64	17.31	49,542	\$10.04	28,728	0	0	28,728	20,814	(8,326)	12,489	125,550	0	2005 .
2006	11.09	6.79	17.88	51,173	\$10.35	29,621	0	0	29,621	21,553	(8,621)	12,932	138,482	0	2006 .
2007	11.54	6.96	18.50	52,948	\$10.68	30,554	0	0	30,554	22,394	(8,958)	13,437	151,919	0	2007 .
2008	12.00	7.12	19.12	54,722	\$11.02	31,529	0	0	31,529	23,194	(9,277)	13,916	165,835	0	2008 .

*** PAYBACK OCCURS IN YEAR 1990 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

ESSEX CHEMICAL PAYS BACK IN 6 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HODKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$32,300 -->	ESCALATION (Z/YR):	4.00% -->	HODKUP YEAR:	\$33,592
FINANCING CONDITIONS---->	Z FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$4,291 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	10,158 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	7,334
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.95 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (Z/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	72% -->	PIPING LOSS:	0% -->	TOTAL:	72%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	5.48 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.48
CURRENT O&M EXPENSE---->	ANNUAL (\$):	5,700 -->	RATE (\$/MMBTU):	0.78 -->	ESCALATION (Z/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$5,290 1989-2004 \$7,900 2005-2008

I----- CURRENT SYSTEM -----I			DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE	O&D RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION PRINC.	INTEREST	TOTAL COSTS	ENERGY SAVINGS	TAX EFFECTS	TOTAL SAVINGS	CUMULATIVE SAVINGS	UNPAID PRINCIPAL	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1989	5.70	1.53	7.23	53,034	\$6.97	51,083	1,100	3,191	55,374	1,951	2,511	172	172	32,492	1989 .
1990	5.92	1.56	7.48	54,868	\$7.51	55,065	1,204	3,087	59,356	(197)	4,270	(219)	(47)	31,288	1990 .
1991	6.16	1.59	7.75	56,848	\$6.19	45,376	1,319	2,972	49,667	11,472	(578)	6,603	6,556	29,969	1991 .
1992	6.41	1.63	8.04	58,975	\$6.34	46,508	1,444	2,847	50,799	12,467	(1,026)	7,149	13,705	28,525	1992 .
1993	6.66	1.67	8.33	61,102	\$6.50	47,695	1,581	2,710	51,987	13,406	(1,457)	7,658	21,364	26,943	1993 .
1994	6.93	1.70	8.63	63,302	\$6.67	48,940	1,732	2,560	53,231	14,362	(4,721)	5,350	26,714	25,212	1994 ***
1995	7.21	1.74	8.95	65,649	\$6.85	50,243	1,896	2,395	54,534	15,406	(5,204)	5,910	32,624	23,316	1995 .
1996	7.49	1.78	9.27	67,996	\$7.04	51,608	2,076	2,215	55,899	16,387	(5,669)	6,427	39,051	21,240	1996 .
1997	7.79	1.83	9.62	70,563	\$7.23	53,038	2,273	2,018	57,329	17,525	(6,203)	7,031	46,082	18,966	1997 .
1998	8.11	1.87	9.98	73,203	\$7.44	54,534	2,489	1,802	58,825	18,669	(6,747)	7,631	53,713	16,477	1998 .
1999	8.43	1.92	10.35	75,916	\$7.65	56,100	2,726	1,565	60,391	19,817	(7,301)	8,225	61,938	13,751	1999 .
2000	8.77	1.96	10.73	78,703	\$7.87	57,737	2,985	1,306	62,029	20,966	(7,864)	8,811	70,749	10,766	2000 .
2001	9.12	2.01	11.13	81,637	\$8.11	59,450	3,268	1,023	63,742	22,187	(8,465)	9,430	80,179	7,498	2001 .
2002	9.48	2.07	11.55	84,717	\$8.35	61,241	3,579	712	65,533	23,476	(9,105)	10,079	90,258	3,919	2002 .
2003	9.86	2.12	11.98	87,871	\$8.61	63,114	3,919	372	67,405	24,757	(9,754)	10,712	100,970	0	2003 .
2004	10.26	2.18	12.44	91,244	\$8.87	65,071	0	0	65,071	26,174	(10,470)	15,704	116,674	0	2004 .
2005	10.67	2.59	13.26	97,228	\$9.15	67,115	0	0	67,115	30,113	(12,045)	18,068	134,742	0	2005 .
2006	11.09	2.65	13.74	100,748	\$9.44	69,251	0	0	69,251	31,497	(12,599)	18,898	153,641	0	2006 .
2007	11.54	2.72	14.26	104,562	\$9.75	71,482	0	0	71,482	33,080	(13,232)	19,848	173,489	0	2007 .
2008	12.00	2.78	14.78	108,376	\$10.06	73,812	0	0	73,812	34,564	(13,826)	20,738	194,227	0	2008 .

*** PAYBACK OCCURS IN YEAR 1994 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW

1991

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MS3

HOPES WINDOWS PAYS BACK IN ***YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$31,000 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$32,240
FINANCING CONDITIONS-->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$4,118 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	40,238 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	32,110
GAS/OIL RATE (\$/MMBTU)-->	PRIMARY FUEL:	3.51 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	80% -->	PIPING LOSS:	0% -->	TOTAL:	80%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	4.40 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	4.40
CURRENT O&M EXPENSE---->	ANNUAL (\$):	18,700 -->	RATE (\$/MMBTU):	0.58 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$4,090 1989-1998 \$4,100 1999-2008

I----- CURRENT SYSTEM -----I					DISTRICT HEATING CONVERSION -----I				I-----COMPARISON-----I				I-----PAYBACK-----I		
YEAR	FUEL RATE	O&O RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION PRINC.	INTEREST	TOTAL COSTS	ENERGY SAVINGS	TAX EFFECTS	TOTAL SAVINGS	CUMULATIVE SAVINGS	UNPAID PRINCIPAL	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1989	4.57	0.74	5.31	170,420	\$6.97	223,653	1,056	3,063	227,772	(53,233)	24,453	(32,899)	(32,899)	31,184	1989 .
1990	4.76	0.76	5.52	177,163	\$7.51	241,087	1,156	2,963	245,206	(63,924)	29,592	(38,451)	(71,350)	30,028	1990 .
1991	4.95	0.79	5.74	184,227	\$6.19	198,667	1,266	2,853	202,785	(14,440)	9,625	(8,933)	(80,283)	28,763	1991 .
1992	5.14	0.81	5.95	190,970	\$6.34	203,624	1,386	2,732	207,743	(12,654)	8,863	(7,910)	(88,193)	27,377	1992 .
1993	5.35	0.84	6.19	198,677	\$6.50	208,822	1,518	2,601	212,940	(10,145)	7,806	(6,457)	(94,650)	25,859	1993 .
1994	5.56	0.87	6.43	206,383	\$6.67	214,269	1,662	2,457	218,387	(7,886)	4,137	(7,867)	(102,517)	24,197	1994 .
1995	5.79	0.90	6.69	214,732	\$6.85	219,976	1,820	2,299	224,095	(5,244)	3,017	(6,346)	(108,863)	22,377	1995 .
1996	6.02	0.93	6.95	223,080	\$7.04	225,953	1,993	2,126	230,072	(2,873)	2,000	(4,992)	(113,855)	20,385	1996 .
1997	6.26	0.96	7.22	231,750	\$7.23	232,212	2,182	1,937	236,330	(462)	959	(3,621)	(117,476)	18,203	1997 .
1998	6.51	0.99	7.50	240,741	\$7.44	238,763	2,389	1,729	242,881	1,978	(99)	(2,240)	(119,716)	15,814	1998 .
1999	6.77	1.03	7.80	250,384	\$7.65	245,617	2,616	1,502	249,736	4,766	(1,306)	(658)	(120,374)	13,198	1999 .
2000	7.04	1.06	8.10	260,017	\$7.87	252,788	2,865	1,254	256,907	7,228	(2,390)	720	(119,654)	10,333	2000 .
2001	7.32	1.10	8.42	270,292	\$8.11	260,288	3,137	982	264,407	10,004	(3,609)	2,276	(117,377)	7,196	2001 .
2002	7.61	1.14	8.75	280,888	\$8.35	268,130	3,435	684	272,248	12,758	(4,830)	3,810	(113,567)	3,761	2002 .
2003	7.92	1.18	9.10	292,127	\$8.61	276,327	3,761	357	280,446	15,800	(6,177)	5,504	(108,063)	0	2003 .
2004	8.24	1.22	9.46	303,686	\$8.87	284,894	0	0	284,894	18,792	(7,517)	11,275	(96,788)	0	2004 .
2005	8.56	1.26	9.82	315,246	\$9.15	293,846	0	0	293,846	21,400	(8,560)	12,840	(83,948)	0	2005 .
2006	8.91	1.31	10.22	328,090	\$9.44	303,198	0	0	303,198	24,892	(9,957)	14,935	(69,012)	0	2006 .
2007	9.26	1.36	10.62	340,934	\$9.75	312,966	0	0	312,966	27,968	(11,187)	16,781	(52,231)	0	2007 .
2008	9.63	1.41	11.04	354,420	\$10.06	323,166	0	0	323,166	31,254	(12,502)	18,752	(33,479)	0	2008 .

*** PAYBACK OCCURS IN YEAR 3000 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW

2000

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MSB

HOPES WINDOWS (W/O DF) PAYS BACK IN 3 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$16,000 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$16,640
FINANCING CONDITIONS--->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$2,126 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	14,364 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	9,394
GAS/OIL RATE (\$/MMBTU)-->	PRIMARY FUEL:	3.51 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	5.36 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.36
CURRENT O&M EXPENSE---->	ANNUAL (\$):	18,700 -->	RATE (\$/MMBTU):	1.99 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$4,090 1989-1998 \$4,100 1999-2008

I----- CURRENT SYSTEM -----I			II----- DISTRICT HEATING CONVERSION -----I			I----- COMPARISON -----I			I----- PAYBACK -----I						
YEAR	FUEL RATE	O&M RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION PRINC.	INTEREST	TOTAL COSTS	ENERGY SAVINGS	TAX EFFECTS	TOTAL SAVINGS	CUMULATIVE SAVINGS	UNPAID PRINCIPAL	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1989	5.58	2.51	8.09	75,954	\$6.97	65,457	545	1,581	67,582	10,497	(2,568)	5,804	5,804	16,095	1989 .
1990	5.80	2.59	8.39	78,772	\$6.72	63,140	597	1,529	65,266	15,632	(4,177)	9,329	15,133	15,499	1990 .
1991	6.03	2.68	8.71	81,778	\$6.88	64,604	653	1,472	66,729	17,175	(4,883)	10,166	25,299	14,845	1991 ***
1992	6.28	2.77	9.05	84,972	\$7.04	66,140	715	1,410	68,266	18,832	(5,571)	11,135	36,434	14,130	1992 .
1993	6.53	2.86	9.39	88,166	\$7.21	67,753	783	1,342	69,879	20,413	(6,231)	12,057	48,491	13,347	1993 .
1994	6.79	2.96	9.75	91,548	\$7.39	69,445	858	1,268	71,571	22,103	(6,934)	11,643	60,134	12,489	1994 .
1995	7.06	3.06	10.12	95,024	\$7.58	71,220	939	1,186	73,346	23,804	(9,047)	12,631	72,766	11,550	1995 .
1996	7.34	3.16	10.50	98,594	\$7.78	73,080	1,028	1,097	75,206	25,514	(9,767)	13,621	86,387	10,521	1996 .
1997	7.64	3.27	10.91	102,445	\$7.99	75,030	1,126	1,000	77,155	27,416	(10,566)	14,724	101,110	9,395	1997 .
1998	7.94	3.39	11.33	106,391	\$8.20	77,072	1,233	893	79,197	29,319	(11,371)	15,823	116,933	8,162	1998 .
1999	8.26	3.50	11.76	110,440	\$8.43	79,210	1,350	775	81,336	31,230	(12,182)	16,922	133,856	6,812	1999 .
2000	8.59	3.63	12.22	114,761	\$8.67	81,449	1,479	647	83,575	33,312	(13,066)	18,121	151,976	5,333	2000 .
2001	8.93	3.75	12.68	119,083	\$8.92	83,792	1,619	507	85,918	35,290	(13,913)	19,251	171,227	3,714	2001 .
2002	9.29	3.89	13.18	123,780	\$9.18	86,244	1,773	353	88,369	37,536	(14,873)	20,537	191,764	1,941	2002 .
2003	9.66	4.03	13.69	128,571	\$9.45	88,808	1,941	184	90,934	39,762	(15,831)	21,805	213,570	0	2003 .
2004	10.05	4.17	14.22	133,549	\$9.74	91,490	0	0	91,490	42,059	(16,824)	25,236	238,805	0	2004 .
2005	10.45	4.32	14.77	138,716	\$10.04	94,294	0	0	94,294	44,422	(17,769)	26,653	265,459	0	2005 .
2006	10.87	4.47	15.34	144,071	\$10.35	97,224	0	0	97,224	46,846	(18,738)	28,108	293,567	0	2006 .
2007	11.30	4.63	15.93	149,613	\$10.68	100,287	0	0	100,287	49,326	(19,730)	29,596	323,162	0	2007 .
2008	11.76	4.80	16.56	155,531	\$11.02	103,487	0	0	103,487	52,044	(20,818)	31,227	354,389	0	2008 .

*** PAYBACK OCCURS IN YEAR 1991 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

JMSTOWN METAL MFG PAY BACK IN 1 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$10,300 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$10,712
FINANCING CONDITIONS---	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$1,368 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	18,558 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	12,100
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.93 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	6.06 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	6.06
CURRENT O&M EXPENSE---->	ANNUAL (\$):	19,200 -->	RATE (\$/MMBTU):	1.59 -->	ESCALATION (%/YEAR):	4.00%
BOILER ANNUAL REPLACEMENT COST:		\$10,770 1989-1995	\$8,900 1996-2004		\$9,500 2005-2008	

I----- CURRENT SYSTEM -----II-----			DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE	O&O RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION		TOTAL	ENERGY	TAX	TOTAL	CUMULATIVE	UNPAID	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	PRINC.	INTEREST	COSTS	SAVINGS	EFFECTS	SAVINGS	SAVINGS	PRINCIPAL	
							(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1989	6.31	2.54	8.85	107,086	\$6.97	84,279	351	1,018	85,648	22,807	(8,073)	13,366	13,366	10,361	1989 ***
1990	6.56	2.61	9.17	110,958	\$7.51	90,849	384	984	92,217	20,109	(6,707)	12,033	25,399	9,977	1990 .
1991	6.82	2.67	9.49	114,830	\$6.19	74,864	421	948	76,232	39,966	(14,708)	23,890	49,289	9,557	1991 .
1992	7.09	2.75	9.84	119,065	\$6.34	76,732	461	908	78,100	42,333	(15,670)	25,295	74,584	9,096	1992 .
1993	7.38	2.82	10.20	123,421	\$6.50	78,690	504	864	80,059	44,731	(16,647)	26,716	101,300	8,592	1993 .
1994	7.67	2.90	10.57	127,898	\$6.67	80,743	552	816	82,111	47,155	(18,536)	27,251	128,551	8,040	1994 .
1995	7.98	2.98	10.96	132,617	\$6.85	82,894	605	764	84,262	49,723	(19,584)	28,771	157,322	7,435	1995 .
1996	8.30	2.91	11.21	135,587	\$7.04	85,146	662	706	86,514	50,441	(19,894)	29,179	186,501	6,773	1996 .
1997	8.63	3.00	11.63	140,669	\$7.23	87,504	725	643	88,873	53,165	(21,008)	30,788	217,288	6,048	1997 .
1998	8.98	3.09	12.07	145,993	\$7.44	89,973	794	575	91,341	56,020	(22,178)	32,474	249,762	5,254	1998 .
1999	9.34	3.18	12.52	151,438	\$7.65	92,556	869	499	93,924	58,882	(23,353)	34,160	283,922	4,385	1999 .
2000	9.71	3.28	12.99	157,125	\$7.87	95,258	952	417	96,627	61,867	(24,580)	35,918	319,841	3,433	2000 .
2001	10.10	3.38	13.48	163,054	\$8.11	98,084	1,042	326	99,453	64,970	(25,857)	37,744	357,585	2,391	2001 .
2002	10.50	3.49	13.99	169,225	\$8.35	101,039	1,141	227	102,408	68,186	(27,183)	39,634	397,219	1,250	2002 .
2003	10.92	3.60	14.52	175,638	\$8.61	104,128	1,250	119	105,497	71,510	(28,556)	41,585	438,804	0	2003 .
2004	11.36	3.71	15.07	182,293	\$8.87	107,357	0	0	107,357	74,936	(29,975)	44,962	483,765	0	2004 .
2005	11.81	3.88	15.69	189,790	\$9.15	110,730	0	0	110,730	79,060	(31,624)	47,436	531,202	0	2005 .
2006	12.28	4.00	16.28	196,929	\$9.44	114,254	0	0	114,254	82,675	(33,070)	49,605	580,807	0	2006 .
2007	12.78	4.13	16.91	204,552	\$9.75	117,935	0	0	117,935	86,617	(34,647)	51,970	632,777	0	2007 .
2008	13.29	4.27	17.56	212,417	\$10.06	121,779	0	0	121,779	90,638	(36,255)	54,383	687,160	0	2008 .

*** PAYBACK OCCURS IN YEAR 1989 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW 1989

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MSB

JMSTOWN METAL MFG PAY BACK IN 1 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$10,300 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$10,712
FINANCING CONDITIONS--->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$1,368 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	18,558 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	12,100
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.95 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	6.06 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	6.06
CURRENT O&M EXPENSE---->	ANNUAL (\$):	19,200 -->	RATE (\$/MMBTU):	1.59 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$10,770 1989-1995 \$8,900 1996-2004 \$9,500 2005-2008

I----- CURRENT SYSTEM -----II-----			DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE	O&D RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION PRINC.	INTEREST	TOTAL COSTS	ENERGY SAVINGS	TAX EFFECTS	TOTAL SAVINGS	CUMULATIVE SAVINGS	UNPAID PRINCIPAL	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1989	6.31	2.54	8.85	107,086	\$6.97	84,312	351	1,018	85,680	22,774	(8,060)	13,346	13,346	10,361	1989 ***
1990	6.56	2.61	9.17	110,958	\$6.72	81,328	384	984	82,697	29,630	(10,515)	17,746	31,092	9,977	1990 .
1991	6.82	2.67	9.49	114,830	\$6.88	83,213	421	948	84,582	31,617	(11,368)	18,881	49,972	9,557	1991 .
1992	7.09	2.75	9.84	119,065	\$7.04	85,193	461	908	86,561	33,872	(12,286)	20,218	70,190	9,096	1992 .
1993	7.38	2.82	10.20	123,421	\$7.21	87,270	504	864	88,638	36,151	(13,215)	21,568	91,758	8,592	1993 .
1994	7.67	2.90	10.57	127,898	\$7.39	89,450	552	816	90,818	38,448	(15,053)	22,027	113,785	8,040	1994 .
1995	7.98	2.98	10.96	132,617	\$7.58	91,735	605	764	93,104	40,882	(16,047)	23,466	137,251	7,435	1995 .
1996	8.30	2.91	11.21	135,587	\$7.78	94,131	662	706	95,500	41,456	(16,300)	23,788	161,039	6,773	1996 .
1997	8.63	3.00	11.63	140,669	\$7.99	96,642	725	643	98,011	44,027	(17,353)	25,305	186,344	6,048	1997 .
1998	8.98	3.09	12.07	145,993	\$8.20	99,273	794	575	100,641	46,720	(18,458)	26,894	213,238	5,254	1998 .
1999	9.34	3.18	12.52	151,438	\$8.43	102,027	869	499	103,396	49,411	(19,565)	28,478	241,715	4,385	1999 .
2000	9.71	3.28	12.99	157,125	\$8.67	104,911	952	417	106,279	52,214	(20,719)	30,127	271,842	3,433	2000 .
2001	10.10	3.38	13.48	163,054	\$8.92	107,929	1,042	326	109,297	55,125	(21,920)	31,837	303,679	2,391	2001 .
2002	10.50	3.49	13.99	169,225	\$9.18	111,087	1,141	227	112,455	58,138	(23,164)	33,605	337,284	1,250	2002 .
2003	10.92	3.60	14.52	175,638	\$9.45	114,390	1,250	119	115,758	61,248	(24,452)	35,428	372,712	0	2003 .
2004	11.36	3.71	15.07	182,293	\$9.74	117,844	0	0	117,844	64,449	(25,780)	38,669	411,382	0	2004 .
2005	11.81	3.88	15.69	189,790	\$10.04	121,456	0	0	121,456	68,334	(27,334)	41,001	452,382	0	2005 .
2006	12.28	4.00	16.28	196,929	\$10.35	125,230	0	0	125,230	71,699	(28,679)	43,019	495,401	0	2006 .
2007	12.78	4.13	16.91	204,552	\$10.68	129,175	0	0	129,175	75,377	(30,151)	45,226	540,627	0	2007 .
2008	13.29	4.27	17.56	212,417	\$11.02	133,297	0	0	133,297	79,120	(31,648)	47,472	588,099	0	2008 .

*** PAYBACK OCCURS IN YEAR 1989 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MS3

JMSTOWN METAL PROD PAY BACK IN 2 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$12,300 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$12,792
FINANCING CONDITIONS-->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$1,634 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	11,040 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	7,176
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.95 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	6.08 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	6.08
CURRENT O&M EXPENSE---->	ANNUAL (\$):	12,000 -->	RATE (\$/MMBTU):	1.67 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$4,040 1989-1997 \$3,500 1998-2008

I----- CURRENT SYSTEM -----II-----			DISTRICT HEATING CONVERSION -----I I-----COMPARISON-----I I-----PAYBACK-----I												
YEAR	FUEL RATE (\$/MMBTU)	O&O RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1989	6.33	2.30	8.63	61,950	\$6.97	49,982	419	1,215	51,616	11,968	(3,534)	6,800	6,800	12,373	1989 .
1990	6.58	2.37	8.95	64,247	\$7.51	53,879	459	1,175	55,513	10,368	(2,551)	6,183	12,983	11,914	1990 ***
1991	6.84	2.44	9.28	66,615	\$6.19	44,398	502	1,132	46,033	22,216	(7,359)	13,223	26,206	11,412	1991 .
1992	7.12	2.52	9.64	69,198	\$6.34	45,506	550	1,084	47,140	23,692	(7,969)	14,089	40,295	10,862	1992 .
1993	7.40	2.59	9.99	71,710	\$6.50	46,668	602	1,032	48,302	25,042	(8,529)	14,878	55,173	10,260	1993 .
1994	7.70	2.68	10.38	74,508	\$6.67	47,885	659	975	49,519	26,623	(10,259)	14,730	69,903	9,601	1994 .
1995	8.00	2.76	10.76	77,235	\$6.85	49,161	722	912	50,795	28,075	(10,865)	15,575	85,478	8,879	1995 .
1996	8.32	2.85	11.17	80,177	\$7.04	50,496	791	843	52,131	29,681	(11,535)	16,512	101,990	8,088	1996 .
1997	8.66	2.94	11.60	83,263	\$7.23	51,895	866	768	53,529	31,368	(12,240)	17,494	119,484	7,222	1997 .
1998	9.00	2.97	11.97	85,880	\$7.44	53,359	948	686	54,993	32,521	(12,734)	18,153	137,637	6,274	1998 .
1999	9.36	3.06	12.42	89,110	\$7.65	54,891	1,038	596	56,525	34,219	(13,449)	19,136	156,773	5,236	1999 .
2000	9.74	3.17	12.91	92,626	\$7.87	56,494	1,137	497	58,128	36,132	(14,254)	20,244	177,017	4,100	2000 .
2001	10.13	3.27	13.40	96,142	\$8.11	58,170	1,245	389	59,804	37,973	(15,033)	21,305	198,322	2,855	2001 .
2002	10.53	3.39	13.92	99,874	\$8.35	59,922	1,363	271	61,556	39,952	(15,872)	22,445	220,768	1,492	2002 .
2003	10.95	3.50	14.45	103,677	\$8.61	61,754	1,492	142	63,388	41,923	(16,712)	23,576	244,344	0	2003 .
2004	11.39	3.62	15.01	107,696	\$8.87	63,669	0	0	63,669	44,027	(17,611)	26,416	270,760	0	2004 .
2005	11.85	3.75	15.60	111,929	\$9.15	65,669	0	0	65,669	46,260	(18,504)	27,756	298,516	0	2005 .
2006	12.32	3.88	16.20	116,235	\$9.44	67,759	0	0	67,759	48,476	(19,390)	29,085	327,602	0	2006 .
2007	12.82	4.01	16.83	120,756	\$9.75	69,942	0	0	69,942	50,814	(20,325)	30,488	358,090	0	2007 .
2008	13.33	4.15	17.48	125,420	\$10.06	72,222	0	0	72,222	53,198	(21,279)	31,919	390,009	0	2008 .

*** PAYBACK OCCURS IN YEAR 1990 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW

1989

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MSB

JMSTOWN METAL PROD PAY BACK IN 2 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1989
CONVERSION COST----->	PRESENT YEAR:	\$12,300 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$12,792
FINANCING CONDITIONS--->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$1,634 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	11,040 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	7,176
GAS/OIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.95 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	6.08 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	6.08
CURRENT O&M EXPENSE---->	ANNUAL (\$):	12,000 -->	RATE (\$/MMBTU):	1.67 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$4,040 1989-1997 \$3,500 1998-2008

I----- CURRENT SYSTEM -----II-----			DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE	O&O RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION PRINC.	INTEREST	TOTAL COSTS	ENERGY SAVINGS	TAX EFFECTS	TOTAL SAVINGS	CUMULATIVE SAVINGS	UNPAID PRINCIPAL	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1989	6.33	2.30	8.63	61,950	\$6.97	50,002	419	1,215	51,636	11,949	(3,526)	6,789	6,789	12,373	1989 .
1990	6.58	2.37	8.95	64,247	\$6.72	48,232	459	1,175	49,867	16,014	(4,810)	9,570	16,359	11,914	1990 ***
1991	6.84	2.44	9.28	66,615	\$6.88	49,350	502	1,132	50,984	17,264	(5,378)	10,252	26,611	11,412	1991 .
1992	7.12	2.52	9.64	69,198	\$7.04	50,524	550	1,084	52,158	18,674	(5,961)	11,078	37,689	10,862	1992 .
1993	7.40	2.59	9.99	71,710	\$7.21	51,756	602	1,032	53,390	19,954	(6,494)	11,825	49,515	10,260	1993 .
1994	7.70	2.68	10.38	74,508	\$7.39	53,049	659	975	54,683	21,460	(8,194)	11,632	61,146	9,601	1994 .
1995	8.00	2.76	10.76	77,235	\$7.58	54,404	722	912	56,038	22,831	(8,768)	12,429	73,575	8,879	1995 .
1996	8.32	2.85	11.17	80,177	\$7.78	55,825	791	843	57,459	24,352	(9,403)	13,315	86,890	8,088	1996 .
1997	8.66	2.94	11.60	83,263	\$7.99	57,314	866	768	58,949	25,949	(10,072)	14,242	101,132	7,222	1997 .
1998	9.00	2.97	11.97	85,880	\$8.20	58,874	948	686	60,508	27,006	(10,528)	14,844	115,976	6,274	1998 .
1999	9.36	3.06	12.42	89,110	\$8.43	60,508	1,038	596	62,142	28,602	(11,202)	15,765	131,742	5,236	1999 .
2000	9.74	3.17	12.91	92,626	\$8.67	62,218	1,137	497	63,852	30,408	(11,964)	16,809	148,551	4,100	2000 .
2001	10.13	3.27	13.40	96,142	\$8.92	64,008	1,245	389	65,642	32,134	(12,698)	17,802	166,353	2,855	2001 .
2002	10.53	3.39	13.92	99,874	\$9.18	65,881	1,363	271	67,515	33,993	(13,489)	18,870	185,223	1,492	2002 .
2003	10.95	3.50	14.45	103,677	\$9.45	67,840	1,492	142	69,474	35,837	(14,278)	19,925	205,148	0	2003 .
2004	11.39	3.62	15.01	107,696	\$9.74	69,888	0	0	69,888	37,807	(15,123)	22,684	227,832	0	2004 .
2005	11.85	3.75	15.60	111,929	\$10.04	72,030	0	0	72,030	39,899	(15,960)	23,939	251,772	0	2005 .
2006	12.32	3.88	16.20	116,235	\$10.35	74,269	0	0	74,269	41,966	(16,786)	25,180	276,952	0	2006 .
2007	12.82	4.01	16.83	120,756	\$10.68	76,608	0	0	76,608	44,147	(17,659)	26,488	303,440	0	2007 .
2008	13.33	4.15	17.48	125,420	\$11.02	79,053	0	0	79,053	46,367	(18,547)	27,820	331,260	0	2008 .

*** PAYBACK OCCURS IN YEAR 1990 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW 1989

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MS3

BLACKSTONE MFG. PAYS BACK IN 20 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1991
CONVERSION COST----->	PRESENT YEAR:	\$41,200 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$46,344
FINANCING CONDITIONS-->	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$5,920 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)---->	PRIMARY FUEL:	195,935 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	147,147
GAS/DIL RATE (\$/MMBTU)->	PRIMARY FUEL:	3.51 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	75% -->	PIPING LOSS:	0% -->	TOTAL:	75%
FUEL RATE (\$/MMBTU)---->	PRIMARY FUEL:	4.67 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	4.67
CURRENT O&M EXPENSE---->	ANNUAL (\$):	32,500 -->	RATE (\$/MMBTU):	0.22 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$2,120 1989-2004 \$5,000 2005-2008

I----- CURRENT SYSTEM -----I			DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE (\$/MMBTU)	O&O RATE (\$/MMBTU)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	ENERGY RATE (\$/MMBTU)	ENERGY COSTS (\$)	AMORTIZATION PRINC. (\$)	INTEREST (\$)	TOTAL COSTS (\$)	ENERGY SAVINGS (\$)	TAX EFFECTS (\$)	TOTAL SAVINGS (\$)	CUMULATIVE SAVINGS (\$)	UNPAID PRINCIPAL (\$)	YEAR
1991	5.26	0.26	5.52	812,900	\$6.19	910,409	1,517	4,403	916,329	(97,509)	43,545	(59,884)	(59,884)	44,827	1991 .
1992	5.47	0.27	5.74	845,272	\$6.34	933,126	1,662	4,259	939,046	(87,854)	40,923	(52,851)	(112,735)	43,165	1992 .
1993	5.68	0.28	5.96	877,645	\$6.50	956,944	1,820	4,101	962,864	(79,299)	37,253	(47,967)	(160,701)	41,346	1993 .
1994	5.91	0.29	6.20	912,960	\$6.67	981,907	1,992	3,928	987,827	(68,947)	33,043	(41,824)	(202,526)	39,353	1994 .
1995	6.15	0.30	6.45	949,747	\$6.85	1,008,060	2,182	3,739	1,013,981	(58,314)	28,714	(35,520)	(238,046)	37,172	1995 .
1996	6.39	0.31	6.70	986,533	\$7.04	1,035,452	2,389	3,531	1,041,373	(48,919)	20,980	(33,859)	(271,905)	34,783	1996 .
1997	6.65	0.32	6.97	1,026,263	\$7.23	1,064,132	2,616	3,304	1,070,053	(37,869)	16,469	(27,320)	(299,225)	32,167	1997 .
1998	6.92	0.34	7.26	1,068,936	\$7.44	1,094,152	2,864	3,056	1,100,072	(25,216)	11,309	(19,828)	(319,052)	29,303	1998 .
1999	7.19	0.35	7.54	1,110,137	\$7.65	1,125,565	3,136	2,784	1,131,485	(15,428)	7,285	(14,063)	(333,116)	26,166	1999 .
2000	7.48	0.36	7.84	1,154,281	\$7.87	1,158,426	3,434	2,486	1,164,346	(4,145)	2,652	(7,413)	(340,528)	22,732	2000 .
2001	7.78	0.38	8.16	1,201,368	\$8.11	1,192,794	3,761	2,160	1,198,714	8,574	(2,566)	88	(340,440)	18,971	2001 .
2002	8.09	0.39	8.48	1,248,455	\$8.35	1,228,729	4,118	1,802	1,234,649	19,726	(7,169)	6,636	(333,804)	14,853	2002 .
2003	8.41	0.41	8.82	1,298,485	\$8.61	1,266,294	4,509	1,411	1,272,214	32,191	(12,312)	13,959	(319,845)	10,344	2003 .
2004	8.75	0.42	9.17	1,349,987	\$8.87	1,305,554	4,938	983	1,311,474	44,433	(17,380)	21,133	(298,713)	5,407	2004 .
2005	9.10	0.44	9.54	1,404,431	\$9.15	1,346,576	5,407	514	1,352,496	57,855	(22,937)	28,998	(269,714)	0	2005 .
2006	9.46	0.46	9.92	1,460,347	\$9.44	1,389,432	0	0	1,389,432	70,915	(28,366)	42,549	(227,165)	0	2006 .
2007	9.84	0.50	10.34	1,522,086	\$9.75	1,434,194	0	0	1,434,194	87,892	(35,157)	52,735	(174,430)	0	2007 .
2008	10.24	0.51	10.75	1,582,416	\$10.06	1,480,938	0	0	1,480,938	101,477	(40,591)	60,886	(113,544)	0	2008 .
2009	10.65	0.53	11.18	1,645,689	\$10.39	1,529,207	0	0	1,529,207	116,482	(46,593)	69,889	(43,654)	0	2009 .
2010	11.07	0.55	11.62	1,710,434	\$10.73	1,579,048	0	0	1,579,048	131,385	(52,554)	78,831	35,177	0	2010 ***

*** PAYBACK OCCURS IN YEAR 2010 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW

2001

JAMESTOWN INDUSTRIAL CORRIDOR DISTRICT HEATING - CUSTOMER ECONOMICS CASE MSB

BLACKSTONE MFG. (W/O DF) PAYS BACK IN 6 YEARS

SCHEDULE----->	PRESENT YEAR:	1988 -->	CONSTRUCTION:	1989 -->	HOOKUP YEAR:	1990
CONVERSION COST----->	PRESENT YEAR:	\$16,000 -->	ESCALATION (%/YR):	4.00% -->	HOOKUP YEAR:	\$17,306
FINANCING CONDITIONS----	% FINANCED:	100% -->	INTEREST RATE:	9.50% -->	TERM (YEARS):	15
VALUE OF PAYMENTS----->	DOWNPAYMENT:	\$0 -->	ANNUAL PAYMENT:	\$2,211 -->	PURE CASH TRANSACTION:	\$0
TAX CONSIDERATION----->	TAX RATE:	40% -->	DEPREC (YEARS):	5 -->	ACCELERATED (1=YES,0=NO):	1
CURRENT SYSTEM----->	PRIMARY FUEL:	GAS -->	SECONDARY FUEL:	- -->	PIPING:	STM
CONSUMPTION (MMBTU)----->	PRIMARY FUEL:	80,692 -->	SECONDARY FUEL:	0 -->	TOTAL ENERGY DEMAND:	52,450
GAS/OIL RATE (\$/MMBTU)---	PRIMARY FUEL:	3.51 -->	SECONDARY FUEL:	0.00 -->	ESCALATION (%/YEAR):	4.00%
SYSTEM EFFICIENCY (%)-->	BLR/DIR. FIRED AVG:	65% -->	PIPING LOSS:	0% -->	TOTAL:	65%
FUEL RATE (\$/MMBTU)----->	PRIMARY FUEL:	5.40 -->	SECONDARY FUEL:	0.00 -->	TOTAL:	5.40
CURRENT O&M EXPENSE----->	ANNUAL (\$):	32,500 -->	RATE (\$/MMBTU):	0.62 -->	ESCALATION (%/YEAR):	4.00%

BOILER ANNUAL REPLACEMENT COST: \$2,120 1989-2004 \$5,000 2005-2008

I----- CURRENT SYSTEM -----I			DISTRICT HEATING CONVERSION -----I			I-----COMPARISON-----I			I-----PAYBACK-----I						
YEAR	FUEL RATE	O&O RATE	ENERGY RATE	ENERGY COSTS	ENERGY RATE	ENERGY COSTS	AMORTIZATION PRINC.	INTEREST	TOTAL COSTS	ENERGY SAVINGS	TAX EFFECTS	TOTAL SAVINGS	CUMULATIVE SAVINGS	UNPAID PRINCIPAL	YEAR
	(\$/MMBTU)	(\$/MMBTU)	(\$/MMBTU)	(\$)	(\$/MMBTU)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	(\$)	
1990	5.84	0.71	6.55	343,570	\$6.72	352,535	567	1,644	354,746	(8,966)	5,282	(5,894)	(5,894)	16,739	1990 .
1991	6.07	0.74	6.81	357,207	\$6.88	360,706	620	1,590	362,916	(3,499)	3,559	(2,151)	(8,045)	16,118	1991 .
1992	6.31	0.76	7.07	370,844	\$7.04	369,285	679	1,531	371,496	1,558	1,443	790	(7,255)	15,439	1992 .
1993	6.57	0.79	7.36	386,054	\$7.21	378,290	744	1,467	380,501	7,764	(1,065)	4,488	(2,767)	14,695	1993 .
1994	6.83	0.82	7.65	401,265	\$7.39	387,738	815	1,396	389,948	13,527	(3,399)	7,917	5,151	13,880	1994 .
1995	7.10	0.86	7.96	417,524	\$7.58	397,646	892	1,319	399,856	19,878	(7,424)	10,244	15,394	12,988	1995 ***
1996	7.39	0.89	8.28	434,308	\$7.78	408,032	977	1,234	410,243	26,276	(10,017)	14,049	29,443	12,012	1996 .
1997	7.68	0.92	8.60	451,092	\$7.99	418,916	1,070	1,141	421,127	32,176	(12,414)	17,551	46,994	10,942	1997 .
1998	7.99	0.96	8.95	469,450	\$8.20	430,318	1,171	1,039	432,529	39,131	(15,237)	21,684	68,678	9,771	1998 .
1999	8.31	0.99	9.30	487,807	\$8.43	442,258	1,282	928	444,469	45,549	(17,848)	25,490	94,168	8,488	1999 .
2000	8.64	1.03	9.67	507,214	\$8.67	454,759	1,404	806	456,969	52,455	(20,659)	29,585	123,753	7,084	2000 .
2001	8.99	1.07	10.06	527,669	\$8.92	467,841	1,538	673	470,052	59,828	(23,662)	33,955	157,708	5,546	2001 .
2002	9.35	1.11	10.46	548,649	\$9.18	481,529	1,684	527	483,740	67,120	(26,637)	38,272	195,980	3,863	2002 .
2003	9.72	1.16	10.88	570,678	\$9.45	495,847	1,844	367	498,058	74,831	(29,785)	42,834	238,814	2,019	2003 .
2004	10.11	1.20	11.31	593,232	\$9.74	510,821	2,019	192	513,031	82,411	(32,888)	47,313	286,127	0	2004 .
2005	10.51	1.25	11.76	616,834	\$10.04	526,475	0	0	526,475	90,359	(36,144)	54,215	340,342	0	2005 .
2006	10.94	1.36	12.30	644,890	\$10.35	542,838	0	0	542,838	102,052	(40,821)	61,231	401,574	0	2006 .
2007	11.37	1.41	12.78	670,066	\$10.68	559,938	0	0	559,938	110,128	(44,051)	66,077	467,651	0	2007 .
2008	11.83	1.46	13.29	696,816	\$11.02	577,804	0	0	577,804	119,012	(47,605)	71,407	539,058	0	2008 .
2009	12.30	1.51	13.81	724,090	\$11.37	596,240	0	0	596,240	127,850	(51,140)	76,710	615,768	0	2009 .

*** PAYBACK OCCURS IN YEAR 1995 (CUMULATIVE SAVINGS EXCEEDS UNPAID PRINCIPAL)

FIRST YEAR OF CONTINUED ANNUAL POSITIVE CASH FLOW 1992

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State of New York

New York State Energy Research and Development Authority

William D. Cotter, Chairman

Mario M. Cuomo, Governor

Irvin L. White, President