ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

BASSETT ARMY COMMUNITY HOSPITAL
FORT WAINWRIGHT, ALASKA

FINAL SUBMITTAL

NOVEMBER 15, 1985

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II. EXECUTIVE SUMMARY

1. Introduction

1.0 This energy audit and analysis of Bassett Army Community Hospital has been prepared for the Alaska District, Corps of Engineers and is structured to meet the requirements of the Energy Engineering Analysis Program (EEAP).

1.1 The scope of work under Contract No. DACA85-84-C-0018 is to provide a complete energy audit and analysis of the Hospital, Building 4065, including an hourly computer building simulation to model the energy performance of the building as well as the interactive and synergistic responses of the building and systems to recommended improvements. In addition to the above, a complete survey of all energy-consuming systems in the building is to be made to determine the condition of the equipment, operational procedures, adequacy of plant capacities and identify opportunities for efficiency improvements and heat recovery. Also to be evaluated is the potential savings of installation of and Energy Monitoring and Control System (EMCS), that would be stand-alone, but interface with any future base-wide EMCS.

1.0.03 Documents included in this submittal will only be changed to comply with comments made during the prefinal conference. Volumes issued should be retained.

2.0 Present Energy Consumption

2.0.01 The estimated energy consumption of Building 4065 is 617,000 BTUs per square foot per year. This figure represents the energy produced at the Central Heating and Power Plant and includes generation efficiencies, distribution and conversion losses. The net energy consumed at the hospital before conversion and losses is 31,069,884 pounds of steam and 2,280,011 KWH of electricity per year. It must be remembered that all energy consumed at Fort Wainwright, whether electric or steam, results in the consumption of coal by the Central Heating and Power Plant. All energy indices determined in this study are ultimately converted to Millions of BTUs of coal for comparison and economic analysis.

2.0.02 Figure 1 on the following page is a graphical breakdown of the relative energy consumption by component in Building 4065. As can be seen, the 56.3% of the energy consumption goes to heat the building. The next largest consumer of energy is the lighting at 17.7%. Miscellaneous electical equipment accounts for 11.1 %, fans for 8.5% and Domestic Hot Water for 3.7%.

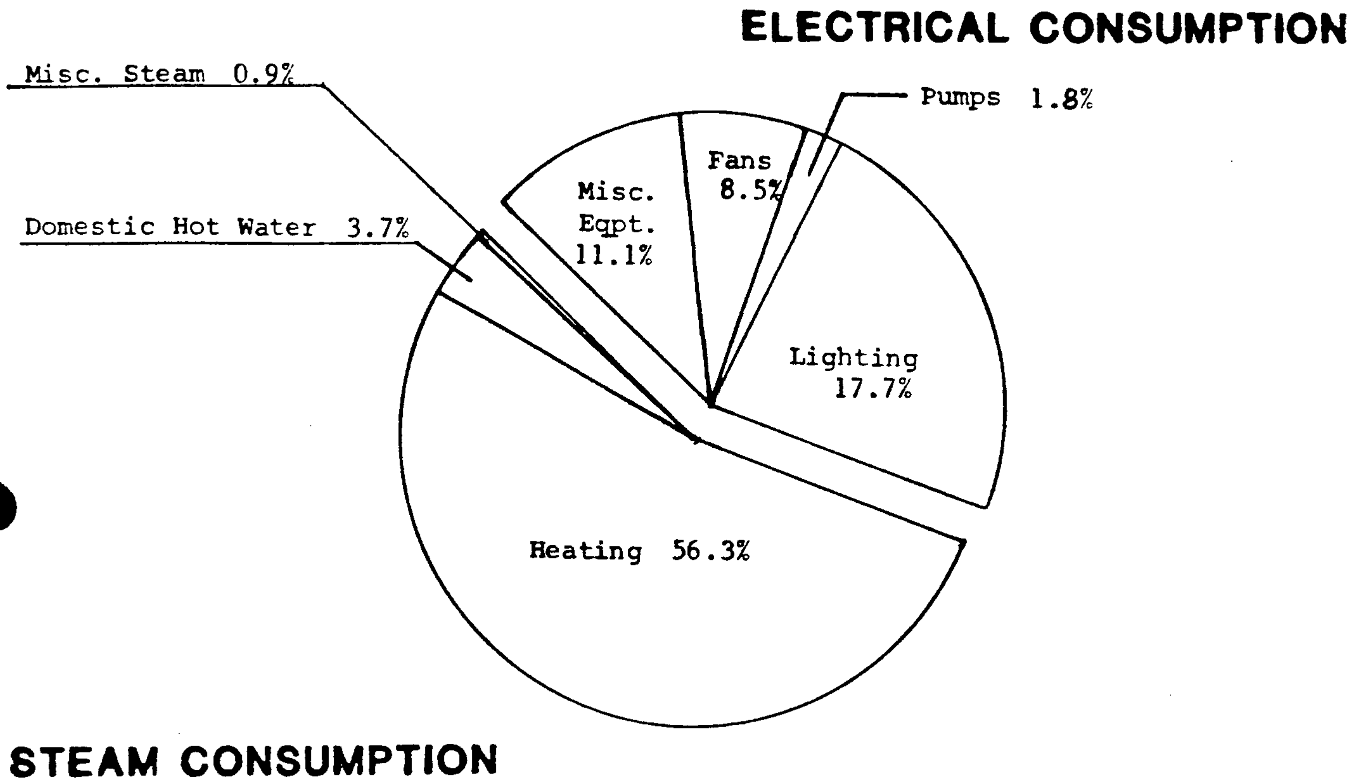

FIGURE 1

Bassett Army Hospital

Breakdown of Annual Energy Consumption

3.0 Historical Energy Consumption

3.0.01 The historical energy consumption of Building 4065 is not known precisely. The building is not metered for steam or electrical consumption. A previous study by Grumann estimated the energy consumption at 533,900 BTUs per square foot per year, but without metering, consumption cannot be precisely determined. Several discrete tests of steam flow through the condensate pump were made under different outside temperatures and show good agreement with the computer model constructed for this facility. We believe the energy consumption to be on the order of 650,000 to 700,000 BTUs per square foot per year.

4. Operation and Maintenance Improvements

4.1 The building survey in section C describes in detail many of the conditions encountered on the site visits. As stated elsewhere in this report, it is important to correct the existing system problems prior to implementation of energy conservation measures. In the case of this building, the O & M measures will result in an increase in energy use. The building, as designed, is just marginally providing four air changes of ventilation. This is the minimum ventilation rate for <u>any</u> area within a hospital according to TM 5-838-2. Currently the hospital is getting approximately half the design ventilation as shown on original design documents. Air quantities should be up to design levels as a minimum.

4.2 Emergency measures are described in the letter to the Alaska District Army Corps and are included in Appendix B, dated March 13, 1985. Recommended O & M measures are as follows:

4.2.01 Air System:

1. Remove (and replace) the sagging duct liner on the upstream side of the Recirculating Fan.

2. Clean and "comb" fins on all preheat and run-around coils.
3. Install filters on upstream side of surgery preheat coils and main system run-around coils.
4. Seal leaks in penthouse supply ductwork
5. Balance all air systems to recommended or design air quantities.

4.2.02 Heating System

1. Clean perimeter convector heater coils.
2. Calibrate convector heaters
3. Educate staff as to proper seasonal operation of convector heaters.

4.2.03 Steam System

1. Repair Valve Leaks in Basement PRV Station area.
2. Repair/replace condensate pump leaks

4.2.04 Lighting

1. Begin use of lighter paint in offices, corridors and waiting areas.
2. Delamp library and isolated classrooms and conference rooms on the extreme east and west ends of each floor to reduce footcandle levels to those recommended in Table II, Section III C, pg. 25.
3. Begin stocking low energy lamps and ballasts
4. Consider use of lighter colored floor tiles in future projects

4.2.05 Air Conditioning System

1. Reset condenser water temperature to 80 degrees.

4.3 With the exception of the lighting recommendations, computer simulation inputs for Energy Conservation Opportunity measures are based up the assumption that the above measures are performed.

5. Energy Conservation Analysis

5.0 ECOs Investigated

5.0.01 Of the potential ECOs suggested in Annex A of the project scope and the many investigated during site visits to the facility, the following appeared promising enough to model their impact on the facilities energy consumption in the building computer energy simulation. Cost estimates were made to fiscal year 1988, as required in the scope of work. This was done to ensure that results would meet ECIP criteria if the larger projects qualified. The ECOs are listed in descending order of S.I.R. and also include capital cost, first year savings and simple amortization period.

5.0.02 ECO No. 1: Time Clock Operation of Exhaust Fans

The main kitchen exhaust hood exhaust, serving line exhaust and dishwasher exhaust were all found to be in operation 24 hours per day. While switches exist to turn them off, subsequent visits showed that staff were not using them regularly. Two small outside air fans in the basement also run 24 hours in an area with an occupancy of 10 hours per day. This ECO requires installation of five time clocks to turn these fans off during unoccupied periods. The savings result in less fan energy and less lost building heat.

Capital Cost	$ 4,572
Energy Savings (MBTU)	3,820
First Year Dollar Savings	13,981
SIR	37.6
Simple Amortization Period	0.33 Years

5.0.03 ECO No. 2: Garage and Entrance Door Weatherstripping

This measure would replace the weatherstripping around the four garage doors and two frequently used building entrance areas. Savings result from less infiltration into the main corridors.

Capital Cost	$ 1,156
Energy Savings (MBTU)	172
First Year Dollar Savings	629
SIR	6.69
Simple Amortization Period	1.84 Years

5.0.04 ECO No. 3: Convector Heater Cover Modifications

The convector heaters are difficult to adjust and very few of the hospital staff know how they work. This measure would install an access door in each convector cover so it could be adjusted without removing the heavy cover. Permanent plastic-covered instructions would be mounted in the vicinity of the door, so no operation training would be required.

Capital Cost	$43,166
Energy Savings (MBTU)	2,184
First Year Dollar Savings	22,619
SIR	4.54
Simple Amortization Period	1.91 Years

5.0.05 ECO No. 4: Power Factor Correction

Bassett Hospital does not have many large motors, but most of the motors used by the distribution systems are in operation 24 hours per day. While there is no power factor penalty imposed, the base power plant is the direct beneficiary in improved power factor, which translates into less electricity that must be generated. This measure assumes capacitors are installed on all motors 5 H.P. and greater that are in constant operation.

Capital Cost	$ 9,467
Energy Savings (MBTU)	949
First Year Dollar Savings	3,474
SIR	3.17
Simple Amortization Period	2.73 Years

5.0.06 ECO No. 5: Install Water Flow Restrictors

This ECO requires the installation of plastic disk water flow restrictors on 127 sink fixtures and 42 showers. Flow restrictors can reduce the flow of a 1.5 GPM fixture to 0.5 GPM and a 5.0 GPM shower fixture to 3.0. Savings are gained in reduced hot water consumption and reduced overall hot and cold water consumption.

Capital Cost	$ 3,135
Energy Savings (MBTU)	703
First Year Dollar Savings	2,573
SIR	2.93
Simple Amortization Period	1.22 Years

5.0.07 ECO No. 6: Insulate Basement Ceiling and Steam Valves

The basement is overheating most of the year. The excess heat comes from uninsulated steam valves in the vicinity of the PRV Station. Several hot water lines also require insulating in this area. Additionally, there is an uninsulated concrete floor between this hot area and the freezers in the kitchen. This causes additional compressor energy consumption by the freezers to reject this additional heat back to the basement.

Capital Cost	$14,206
Energy Savings (MBTU)	683
First Year Dollar Savings	2,500
SIR	2.16
Simple Amortization Period	5.68 Years

5.0.08 ECO No. 7: Kitchen Exhaust Heat Recovery

The kitchen exhaust fan is located in the vicinity of the Surgery Fan in the hospital penthouse. This ECO requires the installation of a run-around heat reclaim system that would transfer wasted exhaust heat through coils and a glycol loop to outside air coming into the surgery fan system.

Capital Cost	$31,352
Energy Savings (MBTU)	1,212
First Year Dollar Savings	4,436
SIR	1.74
Simple Amortization Period	7.07 Years

5.0.09 ECO No. 8: Install High Efficiency Motors

This measure would require the installation of high efficiency motors on the larger fans that are in constant operation. Lower electical consumption and improved power factor are the benefits of this ECO.

Capital Cost	$16,670
Energy Savings (MBTU)	434
First Year Dollar Savings	1,589
SIR	1.17
Simple Amortization Period	10.5 Years

5.0.10 ECO No. 9: Weatherstrip Windows, Garage Doors & Entrances

The intent of this ECO was to take ECO No. 2 a step further and include weatherstripping of all 576 hospital windows. The measure did not prove to be cost effective, for the most part because of the low average wind velocities in the Fairbanks area and the fact that the double windows already have a good seal.

Capital Cost	$70,848
Energy Savings (MBTU)	809
First Year Dollar Savings	2,961
SIR	.51
Simple Amortization Period	23.9 Years

5.0.11 ECO No. 10: New Convector Control Valves & Remote Thermostats

This ECO represents a controls solution to the overheating problem described in the discussion under ECO No. 3. Locating wall mounted thermostats in each heater zone that set to a temperature rather than modulate flow, and within easy access of patients and staff provided the best overall heating savings of any ECO. Savings in energy were not enough to offset the high mechanical costs of this measure.

Capital Cost	$1,110,984
Energy Savings (MBTU)	10,029
First Year Dollar Savings	36,706
SIR	.29
Simple Amortization Period	30.3 Years

5.0.12 ECO No. 11: Install Multiple Level Light Switching

This measure would install multiple switches in areas of the hospital that can take advantage of natural light. The principle is that staff can voluntarily reduce the lighting consumption at times of the day when it is not needed. Assumptions were made that compliance of staff could be anticipated. Even so, the measure does not prove cost effective. As with the other lighting measures, this ECO is attempting to improve on a reasonably designed lighting system that already has lower energy lamps and ballasts in place.

Capital Cost	$24,374
Energy Savings (MBTU)	171
First Year Dollar Savings	513
SIR	.26
Simple Amortization Period	47.5 Years

5.0.13 ECO No. 12: Light Delamping and Floor Tile Replacement

Ots been demonstrated in this study that the corridor and assembly area lighting could be reduced by more than 25 percent by removal of fixtures, if the floor tile color scheme were changed. The hospital currently has dark green floors, and currently there is a project underway to replace those tiles with dark brown tiles. This project could not pay for new floors. If the tile color could be changed in replacement projects already funded and underway, installed lighting could be reduced.

Capital Cost	$211,505
Energy Savings (MBTU)	1,190
First Year Dollar Savings	4,356
SIR	.25
Simple Amortization Period	48.6 Years

5.0.14 ECO No. 13: Install Insulated Shutters

This ECO assumes the installation of insulated shutters that could be closed over the windows during periods of darkness to reduce heat loss through the windows. Assuming full staff compliance, this measure did not prove to be cost effective.

Capital Cost	$188,973
Energy Savings (MBTU)	684
First Year Dollar Savings	2,504
SIR	.16
Simple Amortization Period	75.5 Years

5.0.15 ECO No. 14: Occupancy Sensor Switching of Lights

The intent of this ECO is to shut off office and exam room lights when unoccupied. While this is finding successful application in new construction in some parts of the United States and Canada, the savings as a retrofit measure could not justify the large first costs.

Capital Cost	$131,001
Energy Savings (MBTU)	435
First Year Dollar Savings	1,592
SIR	.15
Simple Amortization Period	82.3 Years

5.1 ECOs Recommended

5.1.01 ECOs 1 through 8 individually are cost effective by life cycle cost criteria, however the principle of diminishing returns shows that the individual savings of the measures is greater than the savings of a combination of measures. For example, if we turn the kitchen exhaust fan off at night, we reduce the savings the run-around coil in the heat recovery ECO. One of the benefits of modeling the effects of the various measures on an hourly computer program is that these interactive effects on combined ECOs can be modeled.

5.1.02 All qualifying ECOs (1-8) were recommended for project implementation with the exception of the flow restriction (ECO No. 5) which hospital and base staff have had difficulty with in the past.

6. Energy Plan

6.0 Project ECO Package - ECOs 1, 2, 3, 4, 6, 7 and 8

The project package consists of Fan Time clocks, entrance and garage weatherstripping, convector cover modification, high efficiency motor/motor power factor correction, basement insulation, and kitchen exhaust heat recovery. This package in it entirety is recommended for implementation. Programming documents are contained in Volume II of the report.

Capital Cost	$ 120,587
Energy Savings (MBTU)	8,830
First Year Dollar Savings	32,318
SIR	3.29
Simple Amortization Period	3.7 Years

6.1 Figure 2 on the following page is a bar chart representation of cumulative savings of alternatives studied. These savings are documented and tabulated in Tables I and II following.

7. Energy and Cost Savings

7.0 Incorporation of all recommended ECO packages will result in a net savings of 8,830 MBTU per year, or $32,318 per year. Total building energy consumption is reduced from the O & M incorporated base case of 93,749 MBTUs per year to 84,918 MBTUs per year, representing a reduction of more than 9 percent of the total energy consumption.

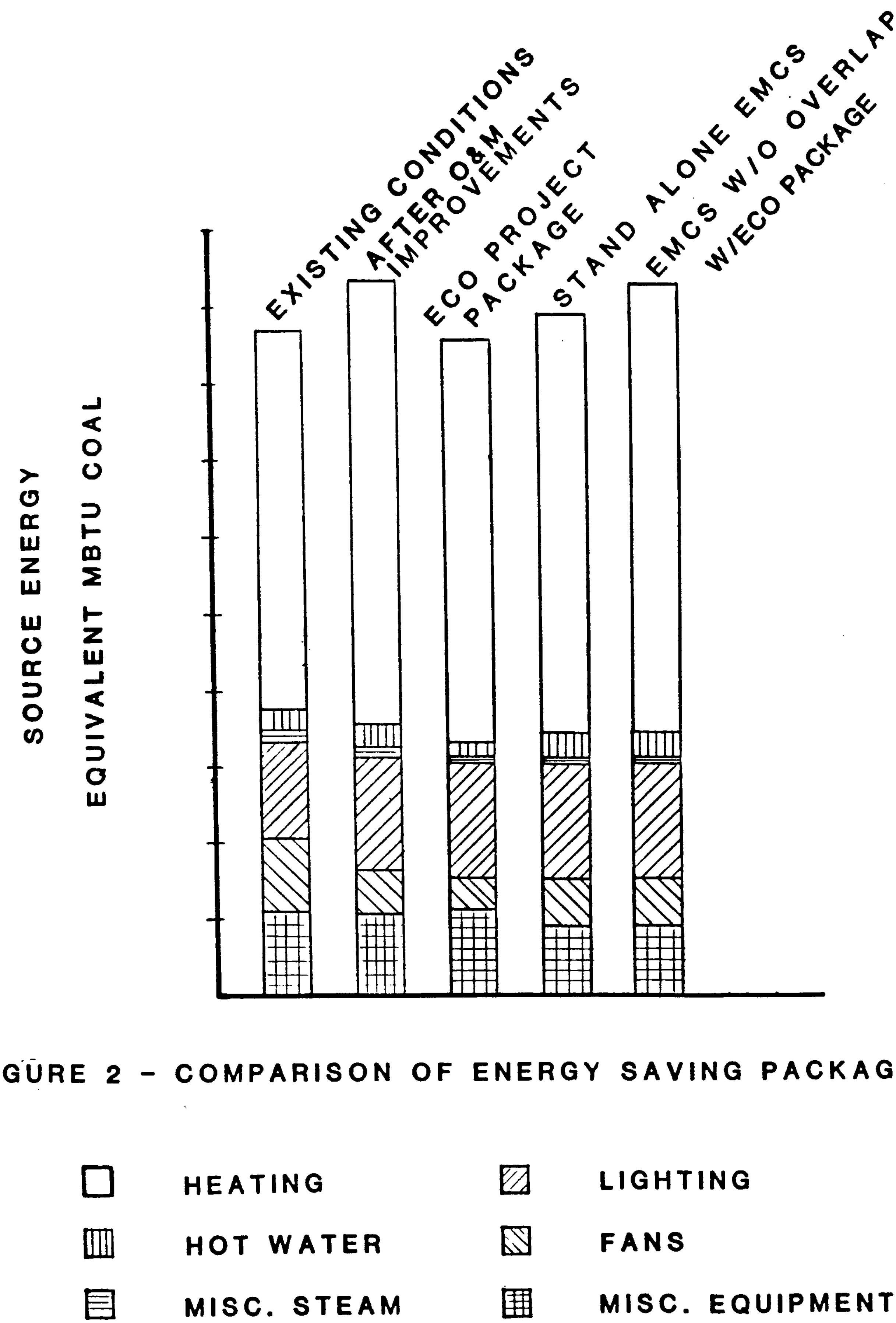

FIGURE 2 - COMPARISON OF ENERGY SAVING PACKAGES

	EXISTING CONDITIONS	INCORPORATE O & M	ECO NO. 1 BSMT/KITCHEN FAN TIMERS	ECO NO. 2 DOOR WEATHER-STRIPPING	ECO NO. 3 CONVECTOR HEATER ACCESS PANEL	ECO NO. 4 POWER FACTOR CORRECTION	ECO NO. 5 HOT WATER FLOW RESTRICTORS	ECO NO. 6 INSULATE BSMT GLYCOL STEAM LINE & CEILING	ECO NO. 7 KIT EXH HT RECOV	ECO NO. 8 HIGH EFFICIENCY MOTORS
HEATING: (KBTU)										
PRIMARY	4,185,253	6,362,189	5,326,222	6,268,935	7,067,417	6,362,189	6,362,189	6,522,419	5,442,124	6,362,189
SECONDARY	-- 13,819	57,877	57,877	57,877	69,565	57,877	57,877	57,877	57,642	57,877
SUPPLEMENTAL	13,858,918	13,858,918	13,858,918	13,858,918	11,924,775	13,858,918	13,858,918	13,858,918	13,858,918	13,858,918
PRE-HEAT	8,681,218	11,515,081	10,600,095	11,515,081	11,515,081	11,515,081	11,515,081	11,515,081	11,515,081	11,515,081
TOTAL HEATING	26,739,208	31,794,065	29,843,112	31,700,811	30,576,838	31,794,065	31,794,065	31,954,295	30,873,765	31,794,065
COOLING: (TON-HRS)										
PRIMARY	2,140	3,842	3,842	3,842	3,843	3,842	3,842	3,842	3,643	3,842
SECONDARY	22,506	12,783	12,854	12,678	12,774	12,783	12,783	12,783	12,783	12,783
TOTAL COOLING	24,646	16,625	16,696	16,520	16,617	16,625	16,625	16,625	16,426	16,625
ELECTRIC: (KWH)										
FANS	495,113	376,245	376,245	376,245	376,245	322,804	376,245	376,245	387,371	346,896
ELECTRIC BASE (INCLUDES FANS)	2,228,665	2,106,285	2,087,893	2,106,285	2,106,285	2,044,614	2,106,285	2,072,746	2,137,616	2,076,937
ELECTRIC CLG ACC	32,399	32,399	32,399	32,399	32,399	30,835	32,399	32,399	32,399	32,399
ELECTRIC CLG	18,947	15,498	15,564	15,409	15,495	14,637	15,498	15,498	15,380	15,498
INDIRECT PROCESS (MBTU)	2,477	2,477	2,477	2,477	2,477	2,477	2,041	2,181	2,477	2,477
BOILER ENERGY: (MBTU)	30,147	35,878	33,678	35,772	34,524	35,878	35,878	36,058	34,840	35,878
TOTAL SITE ELECTRIC CONSUMPTION (KWH)	2,280,011	2,154,182	2,135,856	2,154,093	2,154,179	2,090,086	2,154,182	2,120,643	2,185,395	2,124,834
TOTAL SITE STEAM CONSUMPTION (K LBS)	31,070	36,529	34,433	36,428	35,239	36,529	36,113	36,418	35,540	36,529
SOURCE ENERGY CONSUMPTION BY ENERGY TYPE (MBTU):										
ELECTRIC (23 % EFF.)	33,744	31,882	31,611	31,881	31,882	30,933	31,882	31,386	32,344	31,448
STEAM (62 % EFF.)	52,623	61,867	58,318	61,696	59,683	61,867	61,163	61,680	60,192	61,867
TOTAL SITE TO SOURCE ENERGY (MBTU)	86,367	93,749	89,929	93,576	91,564	92,800	93,045	93,065	92,536	93,314

	ECO NO. 9 DOOR/WINDOW WEATHER-STRIPPING	ECO NO. 10 CONVECTOR CONTROLS	ECO NO. 11 MULTI LEVEL SWITCHING	ECO NO. 12 DELAMP PAINT CEILNG, WALL REPLACE FLR TILE	ECO NO. 13 INSULATED WINDOW SHUTTERS	ECO NO.14 OCCUPANCY SENSORS	STAND ALONE EMCS PACKAGE	EMCS NOT OVERLAPPING ECO PROJECT FUNCTIONS	COMBINATION ECO NO. 1 AND ECO NO. 7	COMBINATION ECO NO. 4 AND ECO NO. 8	ECO PROJECT PACKAGE
HEATING: (KBTU)											
PRIMARY	5,926,124	10,554,690	6,370,306	6,455,349	5,980,084	6,390,325	5,325,611	6,362,166	3,952,070	6,362,189	4,717,389
SECONDARY	57,534	210,754	57,877	57,877	57,636	57,877	57,877	57,877	703,853	57,877	721,029
SUPPLEMENTAL	13,858,918	3,988,307	13,858,918	13,858,918	13,858,918	13,858,918	13,858,918	13,858,918	13,858,918	13,858,918	11,924,775
PRE-HEAT	11,515,081	11,515,081	11,515,081	11,515,081	11,515,081	11,515,081	10,600,095	11,515,081	10,600,095	11,515,081	10,600,095
TOTAL HEATING	31,357,657	26,268,832	31,802,182	31,887,225	31,411,719	31,822,201	29,842,501	31,794,042	29,115,736	31,794,065	27,963,288
COOLING: (TON-HRS)											
PRIMARY	3,903	3,844	3,842	3,842	3,872	3,842	3,842	3,842	3,648	3,842	.
SECONDARY	12,207	12,797	12,712	12,539	13,661	12,628	12,854	12,783	12,854	12,783	12,829
TOTAL COOLING	16,110	16,641	16,554	16,381	17,533	16,470	16,696	16,625	16,502	16,625	12,829
ELECTRIC: (KWH)											
FANS	376,245	376,245	376,245	376,245	376,245	376,245	376,245	376,245	387,371	386,162	386,162
ELECTRIC BASE (INCLUDES FANS)	2,106,285	2,106,285	2,095,852	2,014,736	2,106,285	2,073,557	2,024,572	2,044,285	2,124,472	2,027,975	2,011,294
ELECTRIC CLG ACC	32,399	32,399	32,399	32,399	32,399	32,399	6,258	6,255	32,399	30,835	32,399
ELECTRIC CLG	15,015	15,538	15,454	15,385	16,377	15,367	12,863	12,805	15,462	14,637	15,422
INDIRECT PROCESS (MBTU)	2,477	2,477	2,477	2,477	2,477	2,477	2,477	2,477	2,477	2,477	2,181
BOILER ENERGY: (MBTU)	35,381	29,660	35,868	35,982	35,446	35,910	33,322	35,499	32,855	35,878	31,572
TOTAL SITE ELECTRIC CONSUMPTION (KWH)	2,153,699	2,154,222	2,143,705	2,062,440	2,155,061	2,121,323	2,043,673	2,063,345	2,172,333	2,073,447	2,059,113
TOTAL SITE STEAM CONSUMPTION (K LBS)	36,053	30,607	36,319	36,628	36,117	36,559	34,094	36,160	33,650	36,529	32,146
SOURCE ENERGY CONSUMPTION BY ENERGY TYPE (MBTU):											
ELECTRIC (23 % EFF.)	31,875	31,882	31,727	30,524	31,895	31,396	30,247	30,538	32,151	30,687	30,475
STEAM (62 % EFF.)	61,065	51,837	61,850	62,034	61,170	61,918	57,744	61,255	56,991	61,867	54,444
TOTAL SITE TO SOURCE ENERGY (MBTU)	92,940	83,719	93,577	92,558	93,065	93,314	87,990	91,793	89,141	92,554	84,918

TABLE I - ENERGY CONSUMPTION BY ECO

EXISTING CONDITIONS	* INCORPORATE O & M	ECO NO. 1 BSMT/KITCHEN FAN TIMERS	ECO NO. 2 DOOR WEATHER-STRIPPING	ECO NO. 3 CONVECTOR HEATER ACCESS PANEL	ECO NO. 4 POWER FACTOR CORRECTION	ECO NO. 5 HOT WATER FLOW RESTRICTORS	ECO NO. 6 INSULATE BSMT GLYCOL STEAM LINE & CEILING	ECO NO. 7 KIT EXH HT RECOV	ECO NO. 8 HIGH EFFICIENCY MOTORS	ECO NO. 9 DOOR/WINDOW WEATHER-STRIPPING	ECO NO. 10 CONVECTOR CONTROLS	ECO NO. 11 MULTI LEVEL SWITCHING	ECO NO. 12 DELAMP PAINT CEILNS, WALL REPLACE FLR TILE	ECO NO. 13 INSULATED WINDOW SHUTTERS	ECO NO.14 OCCUPANCY SENSORS	STAND ALONE EMCS PACKAGE	EMCS NOT OVERLAPPING ECO PROJECT FUNCTIONS	COMBINATION ECO NO. 1 AND ECO NO. 7	COMBINATION ECO NO. 4 AND ECO NO. 8	ECO PROJECT PACKAGE
HEATING: (MBTU)																				
PRIMARY	-2,176,936	1,035,967	93,254	-705,228	0	0	-160,230	920,065	0	436,065	-4,192,501	-8,117	-93,160	382,105	-28,136	1,036,570	23	2,409,319	0	1,644,000
SECONDARY	-44,058	0	0	-11,680	0	0	0	235	0	343	-152,877	0	0	241	0	0	0	-645,976	0	-463,152
SUPPLEMENTAL	0	0	0	1,934,143	0	0	0	0	0	0	9,870,611	0	0	0	0	0	0	0	0	1,934,143
PRE-HEAT	-2,833,863	914,986	0	0	0	0	0	0	0	0	0	0	0	0	0	914,986	0	914,986	0	914,986
TOTAL HEATING	-5,054,857	1,950,953	93,254	1,217,227	0	0	-160,230	920,300	0	436,408	5,525,233	-8,117	-93,160	382,346	-28,136	1,951,564	23	2,678,329	0	3,030,777
COOLING: (TON-HRS)																				
PRIMARY	-1,702	0	0	-1	0	0	0	199	0	-61	-2	0	0	-30	0	0	0	194	0	3,002
SECONDARY	9,723	-71	105	9	0	0	0	0	0	576	-14	71	244	-878	155	-71	0	-71	0	25
TOTAL COOLING	8,021	-71	105	0	0	0	0	199	0	515	-16	71	244	-908	155	-71	0	123	0	3,796
ELECTRIC: (KWH)																				
FANS	110,868	0	0	0	53,441	0	0	-11,126	29,349	0	0	0	0	0	0	0	0	-11,126	70,003	70,003
ELECTRIC BASE (INCLUDES FANS)	122,380	10,392	0	0	61,671	0	33,539	-31,331	29,348	0	0	10,433	91,549	0	32,720	81,713	62,000	-18,187	78,310	94,991
ELECTRIC CLG ACC	0	0	0	0	1,564	0	0	0	0	0	0	0	0	0	0	26,141	26,144	0	1,564	0
ELECTRIC CLG	3,449	-66	89	3	861	0	0	118	0	483	-40	44	193	-879	131	2,635	2,693	36	861	76
INDIRECT PROCESS (MBTU)	0	0	0	0	0	436	296	0	0	0	0	0	0	0	0	0	0	0	0	296
BOILER ENERGY: (MBTU)	-5,731	2,200	106	1,354	0	0	-180	1,038	0	497	6,218	10	-104	432	-32	2,556	379	3,023	0	4,386
TOTAL SITE ELECTRIC CONSUMPTION (KWH)	125,829	10,326	89	3	64,096	0	33,539	-31,213	29,348	483	-40	10,477	91,742	-879	32,859	110,489	90,837	-18,151	80,735	95,067
TOTAL SITE STEAM CONSUMPTION (K LBS)	-5,458	2,095	101	1,290	0	415	110	989	0	473	5,922	10	-99	411	-30	2,434	361	2,079	0	4,383
SOURCE ENERGY CONSUMPTION BY ENERGY TYPE (MBTU):																				
ELECTRIC (23 % EFF.)	1,862	271	1	0	949	0	496	-462	434	7	-1	155	1,330	-13	406	1,635	1,344	-209	1,195	1,407
STEAM (62 % EFF.)	-9,244	3,549	171	2,184	0	703	187	1,674	0	802	10,030	16	-168	697	-52	4,123	611	4,076	0	7,423
TOTAL SITE TO SOURCE ENERGY (MBTU)	-7,382	3,820	172	2,184	949	703	683	1,212	434	809	10,029	171	1,190	684	435	5,758	1,956	4,607	1,195	8,830

TABLE II - ENERGY SAVINGS BY ECO

* ALL ECO'S COMPARED WITH O&M

8. EMCS Feasibility

8.1.01 The feasibility analysis for installation of a stand-alone EMCS for Bassett Community Hospital. While installation of an EMCS with the basic architecture described has the potential to save more than 5700 MBTUs per year, the measure did not meet the ECIP criteria. EMCS is most effective when it can optimally start and stop loads in facilities with varying occupancy and system use profiles. Most of the systems and zones at Bassett Hospital are in operation 24 hours per day. Those that are not, are too well integrated into the rest of the system to isolate.

8.1.02 The system is defined as a "Small EMCS" by the guidelines, and consists of a minimum capacity of 78 points, including expansion, one Field Interface Device and three Intelligent Multiplexers. Energy savings overlapped some of the savings obtained in the recommended ECO packages, including timed operation of fans and glycol pump operation by outside air temperature.

8.1.03 Savings consistent with the format of other ECOs are presented below:

Capital Cost	$ 318,190
Energy Savings (MBTU)	5,758
First Year Dollar Savings	25,277
SIR	.69
Simple Amortization Period	12.6 Years

8.1.04 Based on this preliminary analysis, the Bassett Community Hospital should not be considered for a stand-alone EMCS or for inclusion in any base-wide EMCS system based on energy savings.