ENERGY SAVINGS OPPORTUNITY SURVEY
FORT BLISS, TEXAS

1.0 EXECUTIVE SUMMARY

1986

1.1 INTRODUCTION

This Energy Savings Opportunity Survey (ESOS) at Ft. Bliss, Texas was prepared by Engineering Design & Management, Inc., St. Louis, MO., under contract with the Department of the Army, Fort Worth District, Corps of Engineers.

In summary, the ESOS can be divided into six essentially separate studies. These are:

1) Re-evaluate previous ECIP on family housing ceiling insulation.

2) Examine 60 to 400 Hz converters for opportunities to reduce utility costs. Review will include examination of alternative technologies. as well as optional utilization of existing stock.

3) Examine the possibility of adding additional storage to potable water system to allow pumping during "off peak" hours as defined by local utility. Savings will occur as demand savings.

4) Study three "typical" buildings on base for savings due to fenestration improvements. These improvements would include exterior shading, double pane glazing, reflective films, and window area reduction.

5) Evaluate the feasibility of down-sizing existing transformers and/or connecting additional load to improve transformer utilization and reduce transformer core energy losses.

6) Evaluate the feasibility of implementing several common ECOs at the base. These ECOs would include wall and roof insulation, timeclocks, etc.

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
P.O. BOX 9005
CHAMPAIGN, ILLINOIS 61826-9005

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1.2 BUILDING DATA

The studies that comprise this ESOS cover a wide range of topics, only three of which deal with buildings. In summary:

ECO	BLDG #	NAME	FUNCTION	SF	COMPARED BUILDINGS
1	339 & 340	MFH	Single Family	1110	339 to 343, 1468 to 1473
1	317 & 318	MFH	Single Family	980	317 to 338, 344 to 351, 353 to 357, 1400 to 1413, 1442 to 1454
1	408 & 526		Single Family	1400	400 to 404, 407 to 412, 426 to 429, 522, 523, 526 to 530, 536 to 544
1	413 & 525		Single Family	1426	301, 303, 406, 413, 525, 531
1	1458 & 1460		Single Family	1178	1457 to 1467, 1474 to 1479, 1481 to 1488, 2100 to 2104, 7183 to 7192, 7194
3	112	Director of Security/ Chaplain	Admin.	7500	(1)
3	515 & 504	Air Def. School	Admin.	5900	(1) (1)
3	777 & 1014	-	Barracks		(1)
6	2	General Instruction	Admin. & ClassRooms	258,638	None
6	746	CW Branch	Training/ Admin.	15,000	None
6	2322	-	Strategy/ Admin.	9,520	None

(1) ECOs proved to be non-feasible. No extrapolation required.

1.3 PRESENT ENERGY CONSUMPTION

1.3.1 TOTAL ANNUAL ENERGY USED -

From DEIS II Report FY 86

Non-MFH

Electricity				Natural Gas		
MWH	MBTU	$	$/MBTU	MBTU	$	$/MBTU
110810	378195	7780132	20.63	712501	2014202	2.66

MFH

Electricity				Natural Gas		
MWH	MBTU	$	$/MBTU	MBTU	$	$/MBTU
22110	75458	1608768	21.33	395686	1681715	4.12

Total

Electricity				Natural Gas		
MWH	MBTU	$	$/MBTU	MBTU	$	$/MBTU
132920	453653	9388980	20.70	1108187	3695917	3.34

1.3.2 ENERGY CONSUMPTION OF BUILDINGS IN THIS STUDY

Fuel records for Ft. Bliss are available on a base-wide basis only. That is, individual buildings are not metered, and therefore data for individual buildings in a fuel-by-fuel basis are unavailable.

This study also consisted of studying selected ECOs for implementation. It did not examine all sources of energy into a building, nor did it allow for a computerized energy simulation that could be compared to metered usage.

1.4 HISTORICAL ENERGY CONSUMPTION

Year	Electricity		Natural Gas
	MWH	MBTU	MBTU
FY 86	132920	453653	1108187

Prior years are not available at time of report printing.

1.5 RE-EVALUATED PROJECTS RESULTS - MFH ROOF INSULATION

This study re-examined the possibility of adding additional "blown-in" insulation to selected MFH units at this base.

Ten units representing five basic construction types were studied. Two units of each construction type were analyzed, and the results of each pair were averaged to represent the construction type as a whole. The prior study indicated that the addition of "blown-in" insulation in the ceiling spaces of these facilities was non-feasible.

Significant data used in analysees:

	Prior Study	EDM, INC.
Inside Design Temp (deg. F)	75	65
Calculation Method per	1973 ASHRAE	1985 ASHRAE
Insulation Cost	$0.0483/in SF	$0.09/In SF
Fuel Cost (1)	$1.89/1000 CF	$4.25/1000 CF

(1) 1.035 MBTU/1000 CF

The analysis indicated that this ECO was feasible for three of the five buildings.

	Each Building		Models Plus Compared Bldgs			
Bldg.	Const. Cost($)	NG Svgs (MBTU/Yr)	Const. Cost($)	NG Svgs (MBTU/Yr)	Simple Payback	SIR
339,340	815.79	11.55	8,974	127.09	17.20	1.20
317,318	720.25	8.61	Non-feasible		21.09	1.00
408,526	1200.41	18.82	37,213	584.56	15.53	1.33
413,525	1222.71	19.17	8,559	134.22	15.53	1.33
1458,1460	865.77	9.25	Non-feasible		0.90	22.98
Project total			54,746	845.89	15.76	1.31

1.6 ENERGY CONSERVATION ANALYSIS

1.6.1 ECOs INVESTIGATED

1.6.1.1 400 Cycle Converters

In excess of 100 converter sets were examined at six discrete geographic locations. This study included examination of alternative technologies as well as optimizing the utilization of existing sets.

Contacts with several major manufacturers of solid-state converters revealed that they were unwilling to provide budget pricing information without research and development time, as well as specifications. None of the manufacturers contacted presently manufacture equipment suitable for this use.

The converters that are presently being used are motor-generator (MG) sets. These devices are typically quite old. For this reason, operators do not load them more than approximately 50 percent. Above this level there is a rather abrupt decrease in reliability. For this reason, it is not possible to connect several launchers to a MG to fully load it and take advantage of increased efficiency at full load.

In addition to the reliability problem, connecting multiple launchers to a single MG is also hampered by the cross-talk that can occur between launchers connected to a single MG. A further complication is the fact that transmission losses through conductors at 400 Hz is very high. Therefore, launchers would have to be set up quite close together. For these reasons, connecting multiple launchers to a single MG was not examined.

The potential solution that was examined was the replacement of existing MG sets with new, more efficient MG sets. Efficiency increases of 22 to 28% can be expected depending on MG size.

Summary of Economic Analysis by site is as follows:

Site	First Cost	Savings (MBTU/Yr)	Simple Payback	SIR
5800 Area	190,866	341	27.15	0.49
700 Area	1,852,858	684	128.60	0.10
McGregor Range	1,423,673	278	247.07	0.05
1000 Area	381,454	81	228.84	0.06
3700 Area - Tobin Wells	2,050,082	471	193.04	0.07
Hawk Park Area	1,202,523	1208	36.94	0.36

1.6.1.2 Water Distribution/Savings

A study was performed to examine the feasibility of reducing electric utility demand costs by eliminating pumping demand during peak periods. This can be accomplished by adding additional storage and utilizing off-peak pumping to fill them, or by adding diesel power plants to reduce demand.

For the storage option, several different alternatives were examined as possible solutions. The alternatives refer to various combinations of tank size and location, the purpose of which is to determine optimal conditions for demand savings. The alternates "A" and "B" relate to different amounts of storage and savings at the same location. Note that in this portion of the study, all savings come as demand savings not energy savings. Therefore, ECIP criteria are not met.

Summary of Water Distribution/Storage Data

Alternate	Tank Size (MG)	Location Adjacent To Bldg.	Const. Cost($)	Yearly Demand Savings($)	Simple Payback	SIR
1A	2.75	7090	1,002,421	56,592	25.09	0.48
1B	1.20	7090	561,650	36,218	19.42	0.61
2A	1.50	7090	670,356	28,409	34.66	0.35
2B	0.60	7090	349,616	21,618	19.47	0.61
3	0.30	7241	251,667	15,091	19.00	0.62
4	0.20	7776	213,733	8,054	31.29	0.38
5	0.20	11172	213,733	11,318	21.20	0.56

MG = Million Gallons

Summary of Diesel Power Plant Option:

Const Cost ($)	Savings (MBTU/Yr) Elec.	NG	Demand Savings ($)	Simple Payback	SIR
309,629	12,118	(12,118)	86,032	--	-6.42

1.6.1.3 Fenestration

Five buildings were examined for the installation of various ECOs that would limit the contribution of the windows to the heating and cooling load of the buildings. These ECOs are:

1. Add solar film.
2. Replace glazing with insulating glass.
3. External shading
4. Close 50% of window openings.

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Solar Film

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
515	20144	2	-14	-0.01	--
777	30988	10	-54	-0.01	--
112	4229	1	- 2	0.01	606.29
504	20144	1	-18	-0.03	--
1014	30988	13	-34	0.06	168.09

Insulating Glass

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
515	15445	-1	33	0.10	234.83
777	23760	-2	61	0.12	189.23
112	3243	-0.4	6	0.06	542.33
504	30988	-1	36	0.05	457.29
1014	15445	6	67	0.34	52.36

External Shading

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
515 (1)					
777	23038	9	-51	-0.01	--
112 (1)					
504 (1)					
1014	23038	10	-49	0.01	268.83

50% Closure

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
515 (1)					
777	39751	10	33	0.11	139.96
112 (1)					
504 (1)					
1014	39751	13	62	0.16	97.77

(1) Building is an historical structure. This ECO was not examined for this building due to its effect on the appearance of the building.

1.6.1.4 Transformer Study

Six pad-mounted transformers were examined for this study. Recorders were attached to the transformers in order to determine the maximum load imposed on the transformers. This peak load would be compared to the transformer nameplate in order to determine the feasibility of improving transformer utilization and reducing transformer core losses.

The Contractor determined that it is not economically feasible to replace an oversized transformer with a properly sized transformer.

Transformer losses are comprised of core losses and winding losses. The core losses are related to the amount and type of core in the transformer, and therefore do not vary with transformer loading, but with transformer size. Winding losses vary with the load squared. For example, if the load on a transformer would double, the effective winding loss would go up by a factor of four.

Savings due to a reduction of transformer size would therefore be the difference between the energy saved in core losses and the energy costs in increased winding losses. This analysis indicates that this balance is negative and a properly sized unit would consume more energy than an oversized unit. This conclusion is not meant to imply that transformers should all be oversized. It is important to note that first costs were not studied here. The point is, that if a transformer is oversized for a certain load, it is not economically feasible to replace it with a properly sized unit for no other reason than energy savings.

In one case (building 5800), two transformers were studied at a single building. Both transformers were under loaded. The study determined that if the loads could be connected, energy savings were available. This is possible because the removal of one of the transformers deletes its associated core loss entirely. The increase in winding losses for the more fully utilized transformer is not sufficient to negate the savings in core losses. This type of transformer arrangement should be studied further to determine if it could be implemented on a base-wide basis.

1.6.1.5 Annex A ECOs

Three buildings were examined at the base in order to determine if implementing various ECOs are economically feasible. These ECOs are:

1. Add weatherstripping to windows/doors.
2. Add vestibule to frequently used doors.
3. Add wall insulation.
4. Add roof insulation.
5. Replace single pane windows with double pane.
6. Reduce glass area by 50%
   - insulated panels
   - infill windows
7. Replace incandescent lighting with more efficient source.
8. Replace standard efficiency lamps with high efficiency type (fluorescent).
9. Replace lamps with more efficient source.
10. Add time clocks to DHW systems.
11. Add night setback to heating systems.
12. Add time clocks to cooling systems.
13. Add oxygen trim controls to boilers.
14. Add controls for multiple boiler optimization.
15. Add fans to destratify air in high bay areas.
16. Steam trap inspection program.

Weatherstripping

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	12,146	0.7	31.7	0.07	123.12
2B	1,116	0.9	31.7	0.82	10.87
2C	5,500	0.2	9.5	0.05	190.31
2D	5,454	0.2	9.6	0.05	182.43
2E	5,856	0.2	9.6	0.05	195.87
746-1	1,312	1.29	48.9	1.06	8.39
746-2	1,312	1.29	48.9	1.06	8.39
746-3	117	0.36	16.2	3.86	2.29
2322-1	1,535	--	209.67	3.34	2.76
2322-2	196	0.10	--	0.08	98.50

Vestibule

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	20,388	1.9	31.5	0.11	166.33
2B	16,321	2.5	40.3	0.18	103.01
746-1	17,677	2.0	41.5	0.37	49.83
2322-1	4,546	--	3.2	0.04	570.25

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Wall Insulation

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	32,672	5.7	249.2	0.46	42.75
2B	41,107	6.2	202.2	0.31	61.94
2C	34,149	5.0	255.3	0.45	43.82
2D	34,217	6.6	255.8	0.46	42.03
2E	33,323	4.9	249.6	0.45	43.77
746-1	11,397	3.5	108.2	0.60	32.68
746-2	11,397	3.0	108.2	0.59	32.68
746-3	1,522	0.2	14.4	0.55	36.36
2322-1	Present insulation meets DOD standards				
2322-2	5,867	0.6	30.5	0.47	41.29

Roof Insulation

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	38,042	0.9	38.6	0.06	315.50
2B	50,868	2.8	95.5	0.12	163.61
2C	79,272	1.5	80.4	0.06	324.69
2D	79,272	2.0	80.4	0.06	311.96
2E	79,272	1.5	80.4	0.06	324.69
746-1	5,614	0.1	4.9	0.05	375.60
746-2	5,614	0.1	4.9	0.05	375.60
746-3	1,735	--	1.0	0.03	580.33
2322-1	Present insulation meets DOD standards				
2322-2	11,474	1.8	88.6	0.47	42.18

Double Glazing

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	75,200	4.2	111.0	0.15	133.56
2B	3,820	0.2	6.7	0.11	174.23
2C	107,084	3.8	196.9	0.11	178.50
2D	106,578	4.9	192.3	0.11	174.47
2E	113,249	4.0	204.8	0.11	181.25
746-1	6,952	0.6	21.7	0.19	99.66
746-2	6,952	0.6	21.7	0.19	99.66
746-3	2,669	0.1	7.7	0.17	116.43
2322-1	12,219	--	15.7	0.07	291.95
2322-2	11,587	0.1	6.7	0.25	79.65

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Glass Area Reduction - Insulated Panels

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	36,361	8.5	130.6	0.26	69.77
2B	1,848	0.7	5.5	0.27	63.93
2C	51,778	9.3	188.1	0.25	75.09
2D	51,533	12.3	187.5	0.26	68.77
2E	54,766	10.1	194.4	0.25	75.49
746-1	3,368	2.1	20.0	0.50	34.85
746-2	3,368	2.1	20.0	0.50	34.85
746-3	1,292	0.5	7.8	0.44	41.84
2322-1	5,908	--	12.0	0.11	185.28
2322-2	774	0.3	5.2	0.47	38.85

Glass Area Reduction - Infill Windows

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	19,965	8.5	130.6	0.47	38.31
2B	1,015	0.7	5.5	0.49	35.14
2C	28,431	9.3	188.1	0.45	41.23
2D	28,298	12.3	187.5	0.48	37.76
2E	30,071	10.1	195.4	0.45	41.45
746-1	1,851	2.1	20.0	0.90	19.14
746-2	1,851	2.1	20.0	0.90	19.14
746-3	708	0.5	7.8	0.80	22.90
2322-1	3,245	--	12.0	0.20	101.75
2322-2	425	0.3	5.2	0.86	21.30

Replace Incandescent Lighting with More Efficient Sources

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2	3,996	2.52	--	0.42	29.93
746	1,432	0.4	--	0.33	36.85
2322	15,636	2.46	--	4.56	2.93

Replace Standard Efficiency Lamps with High Efficiency Type

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2	15,466	181	--	1.38	4.16
746-1,2,3	2,348	37	--	1.86	3.09
746-3	490	4	--	1.08	5.35

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Replace Lamps with More Efficient Source

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
746-1,2	17,684	89	--	3.95	3.09

Time Clock on DHW Systems

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2(1)	4,382	101	79	7.34	1.92
2(2)	991	101	1	28.16	0.48
2(3)	3,392	--	79	1.27	16.29

(1) Includes reduction of DHW supply temperature, addition of booster heater and time clock.

(2) Time Clock Only

(3) Reduction of DHW supply temperature and addition of booster heater.

Night Setback - Heating

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	7,667	--	392.0	1.83	7.38
2B	1,743	--	214.7	4.42	3.06
2C	1,743	--	446.9	9.18	1.47
2D	5,303	--	389.1	2.63	5.14
2E	2,891	--	452.4	5.60	2.41
746-1	866	--	125.8	5.21	2.59
746-2	866	--	125.8	5.21	2.59
746-3	324	--	80.6	8.95	1.51
2322-1	324	--	117.3	12.93	1.05
2322-2	216	--	60.4	9.95	1.36

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Time Clocks - Cooling

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	269	22.6	--	17.79	0.57
2B	269	12.4	--	9.28	1.09
2C	538	25.8	--	10.05	1.01
2D	538	22.4	--	8.51	1.19
2E	538	26.1	--	10.05	1.01
746-1	807	6.3	--	1.55	6.53
746-2	807	6.3	--	1.55	6.53
746-3	135	4.0	--	6.16	1.63
2322-1	Space is not cooled				
2322-2	135	3.3		4.62	2.18

Revise Oxygen Trim Controls

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2	32,664	--	606.2	0.66	20.33
746	16,332	--	112.9	0.25	54.63

Boiler Optimization

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2	5,716	--	242.5	1.52	8.89

Prevent Air Stratification

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
746-1	1,620	- 2.03	30.63	0.69	40.65
746-2	1,620	- 2.03	30.63	0.69	40.65

Steam Trap Inspection

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2A	2,557	-	143.4	1.37	6.73
2B	637	-	45.5	1.75	5.28
2C	882	-	36.69	1.02	9.03
2D	1,017	-	52.33	1.26	7.35
2E	1,017	-	52.33	1.26	7.35

1.6.2 RECOMMENDED ECOs

The following projects are feasible projects and will be incorporated into funding documents as part of this contract. Funding documents are provided under separate cover.

Weatherstripping

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
746 zn 3	117	0.36	16.2	3.86	2.29
2322 zn 1	1,535	-	210.0	3.34	2.76

Replace Standard with Energy Efficient Lamps

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2, zones A,B,C,D,E	15,466	181	-	1.38	4.16

Replace Incandescent Lighting with Fluorescent

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2322	15,636	246	-	4.56	2.92

Replace Fluorescent with Metal Halide

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
746	17,684	89	-	3.95	3.09

Reduce DHW Supply Temperature & Add Time Clocks

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2, zones A,B,C,D,E	4,382	101	79	7.34	1.92

Install Night Setback - Heating

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2, zones A,B,C,D,E	19,349		1895	3.51	3.85
7463-1,2,3	2,056	--	332	5.79	2.33
2322-1,2	540	--	178	11.78	1.14

Install Time Clocks - Cooling

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2, zones A,B,C,D,E	2,152	109	-	10.57	0.95
746, zones 1, 2, 3	1,749	17	-	1.97	5.13
2322, zn 2	135	3	-	5.09	1.99

Boiler Optimization

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2, zones A,B,C,D,E	5,716	-	243	1.52	8.88

Steam Trap Inspection

Building	Construction Cost ($)	Savings (MBTU/Yr) Elec	NG	SIR	Simple Payback
2, zones A,B,C,D,E	6,110	-	330	1.32	6.98

1.6.3 NON-FEASIBLE ECOs

All projects in Section 1.6.1 whose SIR is less than one are, by definition, economically non-feasible. However, several projects listed in the Scope of Work were disqualified for various reasons. These potential ECOs are listed below:

Loading Dock Seals - Building architecture and use are not consistent with the implementation of this ECO.

Air Curtains - Building architecture and use are not consistent with the implementation of this ECO.

Reduce Lighting Levels - Measured footcandle readings taken during field survey were below allowable standards.

Radiator Controls - Existing heating units are thermostatically controlled.

Revise or Repair Building HVAC Controls - Time clocks and night setback have been studied as upgrades to the existing control system. It was not possible for the Contractor, within the scope of the contract, to effect a detailed testing of individual control components.

Infrared Heaters - Building functions under study will not utilize benefits of infrared heaters.

Chiller Replacement - Buildings studied as part of this contract do not have chillers.

Waste Heat Recovery - No opportunities for this ECO were found during the field surveys.

1.6.4 ECIP PROJECTS DEVELOPED

Two ECIP projects were developed under this contract.

1. Roof Insulation at MFH - add blown-in insulation as required to meet DOD 4270.1-M criteria.

Estimated Project Costs	$64,900
Estimated Project Savings NG	850 MBTU/YR $3,500/YR
Simple Payback	17.6 Years
SIR	1.3

2. Annex A ECO's - Implement common ECO's with positive payback.

Estimated Project Costs	$92,627
Estimated Project Savings	$24,135
Simple Payback	Less than 4 Years

1.7 ENERGY AND COST SAVINGS

1.7.1 TOTAL POTENTIAL ENERGY AND COST SAVINGS

Savings potential from implementing the projects in Section 1.6.4 are as follows:

	Energy (MBTU/Yr)		$	
	Elec	NG	Elec	NG
Project #1	--	850	--	3,500
Project #2	746	3,283	15,400	8,735

1.7.2 PERCENTAGE OF ENERGY CONSERVED

When analyzing the effects of these ECOs on base-wide consumption, it is necessary to keep in mind that this ESOS was conducted on a very small percentage of this facilities' inventory.

	Total		Electricity		Natural Gas	
	MBTU	$	MBTU	$	MBTU	$
Base Total	1561740	13084897	453653	9388980	1108187	3695917
Project #1	850	3500	--	--	850	3500
Project #2	4029	24135	746	15400	3283	8735

As indicated in paragraph 1.3.2, energy consumption records are not available for individual buildings at this base.

Estimated savings therefore will be calculated as a percentage of the energy originally consumed for that purpose. For example, lighting savings will be given as a percentage of the electricity initially used for lighting only. Initial consumption would not include electricity required for coffee makers, pencil sharpeners, etc.

Initial consumption and anticipated savings for each programmed project are:

Project #1 - Insulate Military Family Housing

Initial Consumption	-NG (MBTU/Yr)	991
Savings	-NG (MBTU/Yr)	846
Savings	-%	85

Note that the basis for the initial consumption is the roof only.

ENERGY SAVINGS OPPORTUNITY SURVEY
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Project #2 - Annex A ECOs

	INITIAL CONSUMPTION		SAVINGS		SAVINGS %	
Bldg.	NG (MBTU/Yr)	ELEC (MBTU/Yr)	NG (MBTU/Yr)	ELEC (MBTU/Yr)	NG	ELEC
2	4990	1769	2468	391	49	22
746	1203	323	348	106	29	33
2322	849	326	388	249	46	76
	7042	2418	3283	746	47	31

Note that the savings listed for Project #2 includes all feasible ECOs listed in the funding documentation except for gas savings associated with domestic hot water. Due to the difficulties associated with calculating the total energy actually consumed in the production of domestic hot water, that information has been omitted from this summary information. Per the guidance given in CR82.030 Standardized EMCS Energy Savings Calculations, domestic hot water algorithms calculate savings only.

1.7 ENERGY AND COST SAVINGS

1.7.1 TOTAL POTENTIAL ENERGY AND COST SAVINGS

Savings potential from implementing the projects in Section 1.6.4 are as follows:

	Energy (MBTU/rr)		$	
	Elec	NG	Elec	NG
Project #1	--	850	--	3500
Project #2	746	3,283	15,400	8735

1.7.2 PERCENTAGE OF ENERGY CONSERVED

When analyzing the effects of these ECO's on base wide consumption, it is necessary to keep in mind that this ESOS was conducted on a very small percentage of this facilities inventory.

	Total		Electricity		Natural Gas	
	MBTU	$	MBTU	$	MBTU	$
Base Total	1561740	13084897	453653	9388980	1108187	3695917
Project #1	850	3500	--	--	850	3500
Project #2	4029	24135	746	15400	3283	8735