FINAL REPORT

ENERGY ENGINEERING ANALYSIS PROGRAM

NATIONAL TRAINING CENTER
FORT IRWIN, CALIFORNIA

EXECUTIVE SUMMARY

PREPARED FOR

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA

PREPARED BY

KELLER & GANNON
ENGINEERS • ARCHITECTS
1453 MISSION STREET, SAN FRANCISCO, CA. 94103

JUNE 1984

CONTRACT NO.
DACA05-81-C-0258

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
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Engineers - Architects

7 June 1984

U. S. Army Engineer District
Sacramento Corps of Engineers
650 Capitol Mall
Sacramento, CA 95814

Attention: SPKED-M (Mr. Nathaniel Hunter)

Subject: Energy Engineering Analysis Program (EEAP)
National Training Center
Fort Irwin, California
Contract No. DACA05-81-C-0258

Gentlemen:

Transmitted herewith are fifteen (15) copies of the Final Report for the Energy Engineering Analysis Program, National Training Center, Fort Irwin, California, consisting of four (4) volumes each.

Instructions for making page changes in Volumes I, II, and III are provided on the pink sheets preceeding the revised pages.

The cooperation of Fort Irwin Directorate of Engineering personnel was of great assistance in preparing this report, and their efforts are appreciated.

Keller & Gannon has enjoyed the opportunity of working on this important project and looks forward to future service at Fort Irwin.

Very truly yours,

Richard C. Lennig
Project Manager

RCL:rtb
16-463-01

With Enclosures

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EXECUTIVE SUMMARY

A.1 INTRODUCTION

This Executive Summary outlines the results of all work under Phases I and II for the Energy Engineering Analysis Program (EEAP) for Fort Irwin, National Training Center (NTC). Work is authorized under contract number DACA 05-81-C-0258 with the U.S. Army Corps of Engineers, Sacramento District, California.

A.1.1 Purpose

The purpose of this Energy Engineering Analysis Program is to develop Energy Conservation Investment Program (ECIP) projects in compliance with the objectives set forth in the Army Facilities Energy Plan (AFEP). Energy conservation goals for the Fort Irwin NTC facilities in terms of reduction in energy consumption per square foot of building floor area are as follows:

- 20% reduction by FY1985
- 40% reduction by FY2000

A.1.2 Scope

The EEAP for Fort Irwin NTC is divided into three phases and into several increments of work. Phases of work, or the project schedule are organized according to the following brief descriptions:

- Phase I - Data gathering and inspection of facilities, buildings and records; listing of annual energy consumption; preparation of building lists including all factors relating to energy analysis.

- Phase II - Analysis of data, identification of potential energy conserving projects and evaluation of their technical and economic feasibility, and completion of first pages of DD Forms 1391.
- Phase III - Preparation and completion of DD Forms 1391, including Detailed Justifications and Project Development Brochures, and submittal of a final report of results and recommendations.

The increments of work relate to the subdivision of the total project into groups of related types of facilities. The increments also incorporate a fairly detailed specification of tasks to be performed in regard to their respective facilities. The authorized increments for this contract are as follows:

- Increment A: Buildings and processes
- Increment B: Utilities and energy distribution systems, Energy Monitoring and Control Systems (EMCS) and use of waste fuels in existing energy plants
- Increment E: Central Boiler Plants
- Increment F: Facilities Engineer funding authority energy conservation projects
- Increment G: Energy conservation projects found viable but not meeting ECIP criteria.

A.1.3 Overview

This Final Report is organized into three volumes as follows:

- Volume I: Main Report consists of a narrative description of the work including study methodology, results of all analyses, and a summary of recommended projects.

- Volume II: Appendices includes back-up information and calculations referenced throughout Volume I.
- Volume III: Programming Documents includes DD Forms 1391 and Project Development Brochures for ECIP projects.

A.2 EXISTING ENERGY CONSUMPTION

A.2.1 FY1982 Basewise Consumption

Since Fort Irwin has only recently been reactivated, the baseline year upon which target energy reduction goals are set is fiscal year 1982.[1/] The first month of record under the present mission was July 1982.

Total energy consumption at Fort Irwin in FY1982 of nontransportation energy sources was 421,697 million BTU. This value includes liquid propane gas (LPG) at 95,500 BTU per gallon and electricity converted at 11,600 BTU per KWH which includes the efficiency of power generation. A breakdown in FY1982 energy consumption and cost for both sources is shown in the following table:

Energy Source	Quantity	MBTU	Cost
Electricity	20,634,000 KWH	239,356	$1,405,400
Liquid Propane Gas	1,909,349 gallons	182,341	$1,158,400

1/SPKED Scope of Work, paragraph 4.3.1.1.h, revised 22 June 1982.

Monthly energy consumption for FY82 is shown graphically in Figure A-1.

Total energy consumption per square foot of active building floor area is 202,900 BTU per square foot (SF) per year based on 2,078,000 SF as of the end of FY82.

A.2.2 Energy Consumption by End Use and Building Function

Estimated distribution of FY82 energy consumption to the following end uses is listed in Table A-1 and shown graphically in Figure A-2:

- Space cooling
- Space heating
- Domestic hot water
- Process loads (including cooking)
- Lighting (including exterior lights)
- Utilities (includes street lighting; water supply, treatment and distribution; sewage collection, treatment and disposal; electrical distribution losses; and LPG distribution losses)

Distribution of FY82 energy consumption among facility functional groups is listed in Table A-2 and shown graphically in Figure A-2. The following functional groups are considered in this distribution:

- Offices and administration
- Shops, maintenance and storage
- Barracks and quarters
- Dining facilities and clubs
- Community facilities (e.g., hospital, chapel, gymnasium)
- Family housing
- Site utilities

A.3 ENERGY CONSERVATION OPPORTUNITIES

A.3.1 Energy Conservation Opportunities Investigated

A summary of all potential energy conservation opportunities (ECO's) considered for implementation at Fort Irwin NTC is presented in Table A-3. This table includes a matrix of reasons for eliminating ECO's from further consideration.

A.3.2 ECIP Projects Developed

During the Phase II effort, documentation was developed for 16 ECO's, including many projects that did not meet the ECIP $200,000 minimum funding requirement. Fort Irwin DEH recommended that all retrofits be combined into two ECIP projects, one for family housing and another for cantonment area facilities. The following paragraphs describe the measures included in these two projects.

A.3.2.1 ECIP: Energy Conservation Project for Cantonment Facilities includes the following retrofit measures:

a. Install time switch control of evaporative coolers.

b. Install programmable thermostats.

c. Install time switch and photocell lighting control.

d. Install efficient lighting systems.

e. Install exterior wall insulation.

f. Install roof insulation.

g. Weatherstrip doors and windows.

h. Install evaporative cooler dampers.

i. Install make-up air system for exhaust hood in Building 166.

j. Install domestic hot water heater, storage tank, and piping insulation.

A.3.2.2 ECIP: Energy Conservation Project for Family Housing includes the following retrofit measures:

a. Install thermostats with night setback.

b. Install more efficient lighting fixtures.

c. Install roof and wall insulation.

d. Weatherstrip doors.

A.3.3 Other Energy Conservation Projects

All projects identified during Phase II have been combined into ECIP projects, and no projects developed during this study fall into the Increment G category. Recommended energy conservation projects that fall within the funding authority and management control of the Facilities Engineer are summarized in Table A-6.

A.4 ENERGY AND COST SAVINGS

A.4.1 Basewide Consumption Forecast After Total Project Implementation

Projected energy consumption by end use with conservation measures implemented (including proposed construction through FY85) is summarized in Table A-4. Projected energy consumption by facility function with conservation measures implemented, including proposed construction through FY85, is summarized in Table A-5. These projections represent the levels below which the base could not realistically be expected to function.

A.4.2 Projected Energy Costs

Projected energy costs for For Irwin NTC are as follows (average costs/MBTU in dollars):

Energy Source	Actual FY82	Projected[1/] FY85	Projected[1/] FY90	Projected[1/] FY95
Electricity	$4.56	$5.32	$5.21	$5.02
Liquid Propane Gas	$6.18	$7.97	$7.69	$8.04

A.5 CENTRAL BOILER PLANTS

A.5.1 Scope

The Scope of Work called for a feasibility analysis for installing three central boiler plants to serve discrete portions of the Fort Irwin cantonment area.

A model central plant system was developed based on the General Reservation Plan, Future Development Plans map by RMS Corporation dated June 1981.

A.5.2 Results and Recommendations

Results of the model plant analysis revealed that the construction cost of a steam boiler plant and site distribution system ($2.08 million) far exceeds the sum of the costs of individual building heating plants ($0.73 million). The large difference in cost between the central and individual plant schemes may be attributed to:

[1/]Based on DOE mid-term energy forecasts (commercial sector) for Region 9, exclusive of general inflation.

a. the relatively small scale of many of the proposed facilities,

b. the dispersed location of proposed buildings leading to high distribution system costs, and

c. moderate winter heating requirements at Fort Irwin.

Since the operation and maintenance costs of a central plant exceed that of individual plants, a central heating plant scheme is not recommended for Fort Irwin.

A.6 FACILITIES ENGINEER CONSERVATION MEASURES

Data for recommended energy conservation projects that fall within the funding authority and management control of the Facilities Engineer are summarized in Table A-6.

A.7 RECOMMENDED ENERGY PLAN

Data for the recommended ECIP projects is summarized in Table A-7, and data for the recommended Increment F projects is summarized in Table A-6.

Implementation of all ECIP and Increment F projects would yield an estimated annual energy savings of 58,971 million BTU, or a 14 percent reduction based on FY82 energy consumption. As a result, energy consumption per active square foot of building floor area would be reduced to 174,600 BTU per square foot[1/] from 202,900 BTU per square foot recorded in FY82.

1/Based on 2,078,000 SF active building floor area.

When the effect of (a) the removal of all buildings slated for demolition or in the path of future construction and (b) planned construction[1/] through FY85 is considered, annual energy consumption would be reduced by 26 percent from that recorded in FY82 to 149,900 BTU per square foot[2/]. Therefore, it is imperative that the new construction at Fort Irwin be energy-efficient in order for the base to meet the energy conservation goals set forth in the Army Facilities Energy Plan.

[1/]Impact computed using energy budgets specified in ETL 1110-3-309.

[2/]Based on 2,852,000 SF active building floor area (projected).

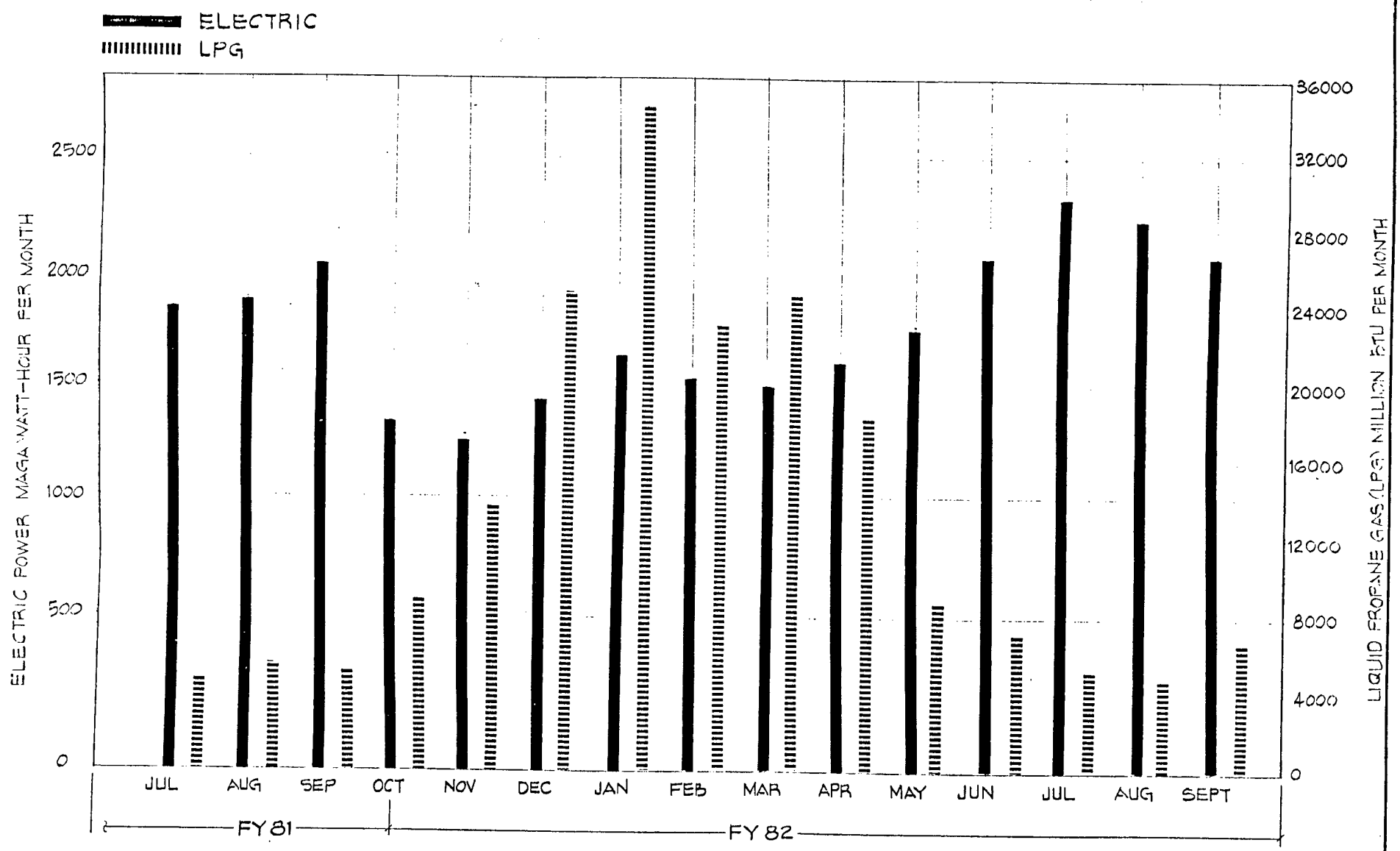
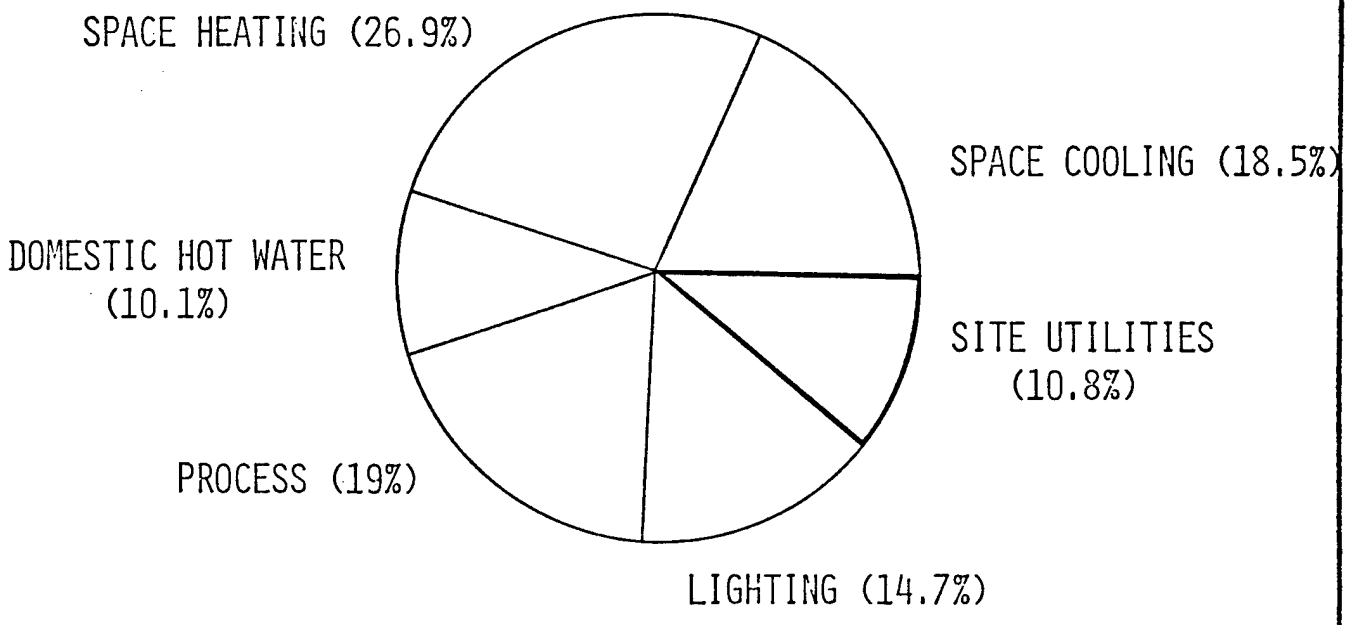


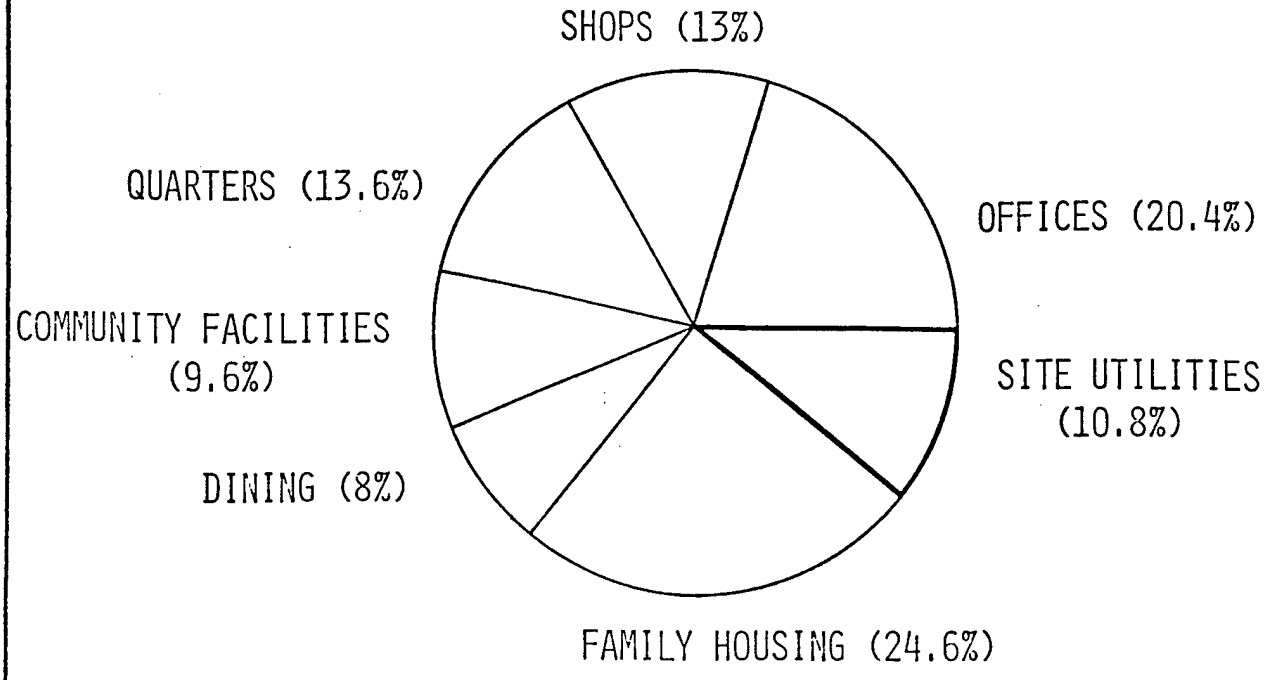
FIGURE A-1

HISTORICAL ENERGY CONSUMPTION

RELATIVE DISTRIBUTION OF FY82 ENERGY CONSUMPTION



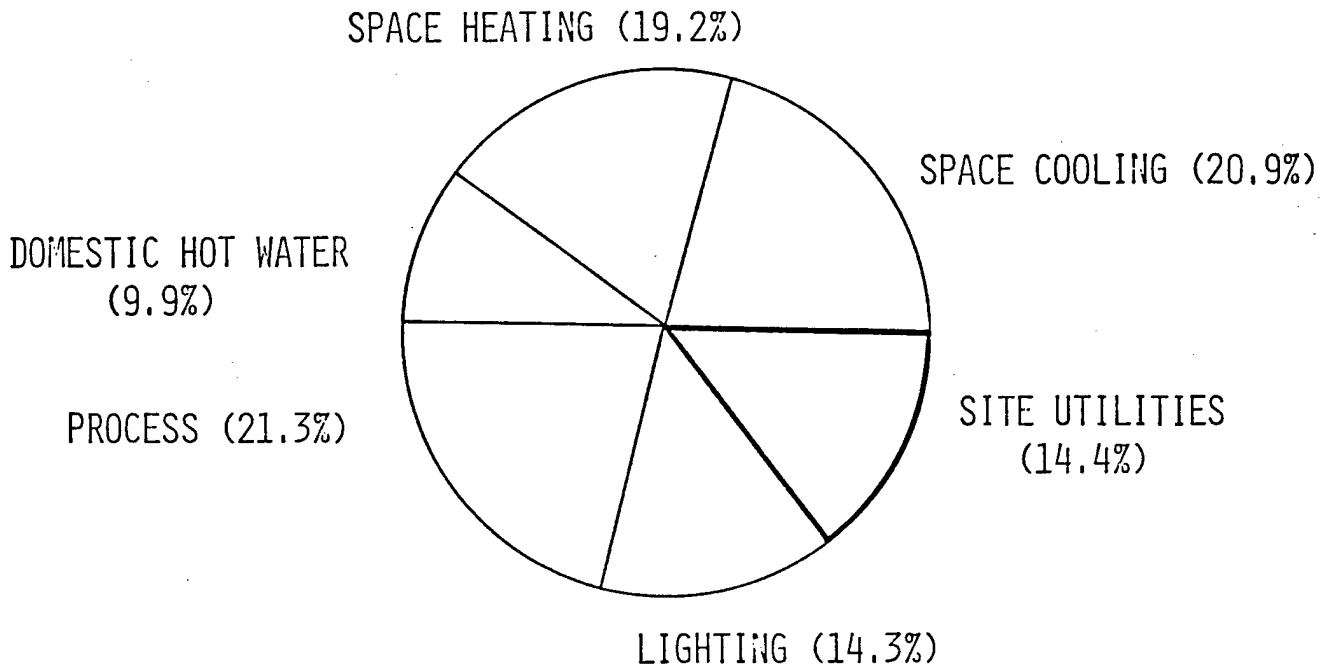
END USES



BUILDING FUNCTIONS

FIGURE A-2

RELATIVE DISTRIBUTION OF PROJECTED ENERGY CONSUMPTION



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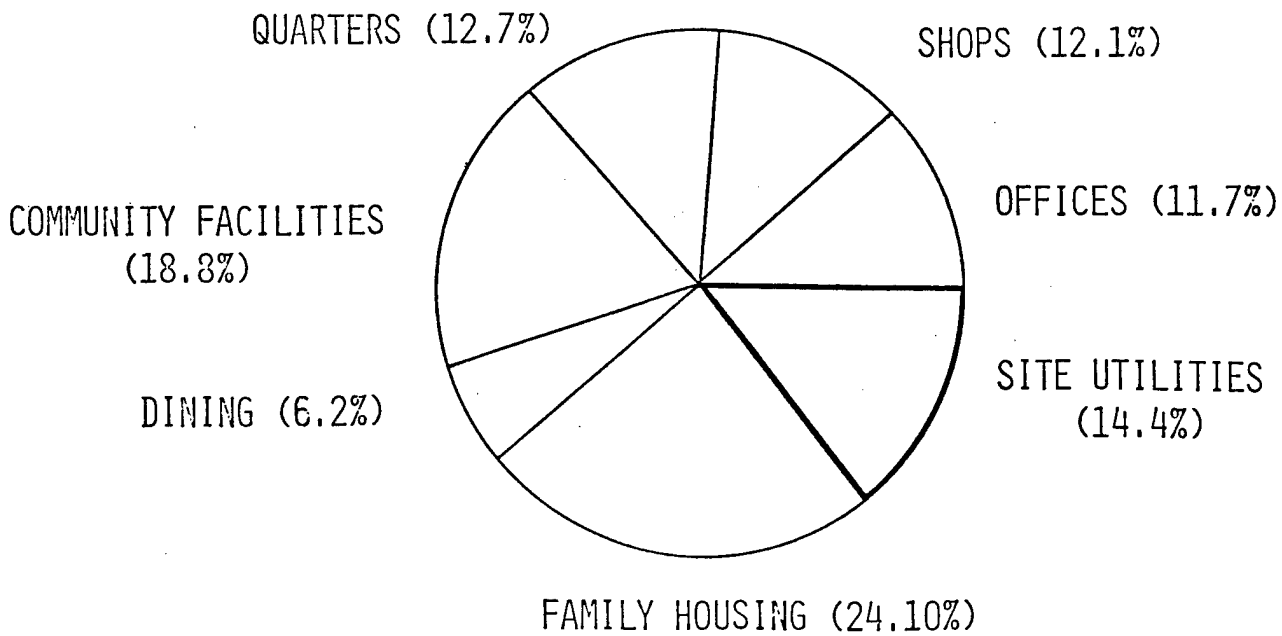

BUILDING FUNCTIONS

FIGURE A-3

ESTIMATED DISTRIBUTION OF FY82 ENERGY CONSUMPTION
BY END USES

ENERGY END USE CATEGORY	ELECTRIC POWER MWH/YEAR	LPG 10^6 BTU/YEAR
BUILDING SYSTEMS		
Space Cooling	6,769	-
Space Heating	216	112,133
Domestic Hot Water	8	42,676
Process Loads	5,363	18,515
Lighting Loads	5,430	-
SUBTOTAL BUILDINGS	17,786	173,324
UTILITIES SYSTEMS		
Street Lighting	247	-
Water Supply/Treatment/Distribution	1,649	-
Sewage Collection/Treatment/Disposal	818	1,180
Electrical Distribution Losses	619	-
LPG Distribution Losses	-	6,000
SUBTOTAL UTILITIES	3,333	7,180
FORT IRWIN FACILITY ESTIMATED TOTAL	21,029	180,504
FORT IRWIN FY82 HISTORICAL TOTAL	20,634	182,341
PERCENT DIFFERENCE	+1.9	-1.0

TABLE A-1

ESTIMATED DISTRIBUTION OF FY82 ENERGY CONSUMPTION
BY FACILITY FUNCTION

FUNCTION CATEGORY	LP GAS MBTU/YEAR	ELECTRICITY MWH/YEAR	TOTAL MBTU/YEAR
Offices	20,013	5,771	86,959
Shops, Maintenance and Storage	30,014	2,186	55,372
Barracks and Quarters	29,336	2,466	57,947
Community Facilities	14,106	2,322	41,039
Dining Facilities and Clubs	25,134	750	33,837
Family Housing	54,721	4,290	104,483
Site Utilities	7,180	3,333	45,843
TOTAL	180,504	21,119	425,480

TABLE A-2

SUMMARY OF ECO EVALUATIONS FOR FORT IRWIN NTC

DESIGNATION	DESCRIPTION OF ECO	ECIP 1/	INCREMENT 'G'	INCREMENT 'F'	NOT APPLICABLE	SIR LESS THAN 1.0	PROHIBITIVE FIRST COST	IN-HOUSE MAINTENANCE EFFORT	INCLUDED UNDER OTHER ECO'S
	OPERATIONAL ECO'S								
1	Reduce Cooling System Operating Hours	•							
2A	Reduce Space Level Due to Ventilation				•				
2B	Prevent Air Stratification				•				
3A	Install Night/Weekend Setback Thermostats	•							
3B	Install Thermostatic Controls on Radiators				•				
4A	Reduce Temperature of DHW			•					
4B	Install Flow Restriction Devices			•					
5	Isolate Off-Line Boilers				•				
6	Use Low Temperature Condenser Water				•				
7	Reduce Overall Building Temperature by Segregating Selected Operations				•				
	LIGHTING SYSTEM ECO'S								
8	Reduce Illumination Levels				•				
9	Reduce Lighting Usage (Time Switches, Photocells)	•							
10	Use Natural Light (Skylights)					•	•		
11A	Improve Room Wall and Ceiling Reflectance				•				

1/ Denotes that ECO is included as part of an ECIP project.

TABLE A-3
Sheet 1 of 6

SUMMARY OF ECO EVALUATIONS FOR FORT IRWIN NTC

DESIGNATION	DESCRIPTION OF ECO	ECIP 1/	INCREMENT 'G'	INCREMENT 'F'	NOT APPLICABLE	SIR LESS THAN 1.0	PROHIBITIVE FIRST COST	IN-HOUSE MAINTENANCE EFFORT	INCLUDED UNDER OTHER ECO'S
	LIGHTING SYSTEM ECO'S (continued)								
11B	Group Relamping and Cleaning							•	
12	Install More Efficient Lenses								•
13	Install More Efficient Lamps							•	
14	Install More Efficient Fixtures	•							
15	Install More Efficient Ballasts								•
	BUILDING ENVELOPE ECO'S								
16	Install Wall Insulation	•							
17A	Install Solar Films				•				
17B	Install Panels/Movable Insulation				•				
17C	Install Double Glazing					•			
17D	Reduce Glass Area				•				
18	Install Roof Insulation	•							
19	Install Floor Insulation				•				
20A	Install Weatherstripping and Caulking	•							
20B	Install Dampers in Supply Ducts of Evaporative Coolers	•							
20C	Install Vestibules						•		
20D	Install Load Dock Seals				•				

1/ Denotes that ECO is included as part of an ECIP project.

TABLE A-3
Sheet 2 of 6

SUMMARY OF ECO EVALUATIONS FOR FORT IRWIN NTC

DESIGNATION	DESCRIPTION OF ECO	ECIP 1/	INCREMENT 'G'	INCREMENT 'F'	NOT APPLICABLE	SIR LESS THAN 1.0	PROHIBITIVE FIRST COST	IN-HOUSE MAINTENANCE EFFORT	INCLUDED UNDER OTHER ECO'S
	DISTRIBUTION SYSTEM ECO'S								
21	Remove Resistances to Air Flow							•	
22	Reduce Pump Energy by Reducing Resistance and Flow Rates					•			
23	Insulate Ducts				•				
24	Insulate Piping					•			
25	Replace Steam Traps				•				
	HVAC EQUIPMENT ECO'S								
26	Provide Economizer Cycles					•			
27	Recirculate Exhaust Air Using Activated Charcoal Filters				•				
28	Use Separate Make-Up Air for Exhaust Hoods	•							
29	Use Evaporative Cooling of Outside Air					•			
30	Install Radiant Heating					•			
31	Reduce Energy Consumption by Reheat and Double Duct Systems				•				
32	Provide Improved Chiller Controls				•				
33	Replace Chiller/Replace Absorption Chiller				•				

1/ Denotes that ECO is included as part of an ECIP project.

TABLE A-3
Sheet 3 of 6

SUMMARY OF ECO EVALUATIONS FOR FORT IRWIN NTC

DESIGNATION	DESCRIPTION OF ECO	ECIP 1/	INCREMENT 'G'	INCREMENT 'F'	NOT APPLICABLE	SIR LESS THAN 1.0	PROHIBITIVE FIRST COST	IN-HOUSE MAINTENANCE EFFORT	INCLUDED UNDER OTHER ECO'S
	HVAC EQUIPMENT ECO'S (continued)								
34	Replace Existing Boilers with Modular Boilers						•		
35	Preheat Combustion Air to Increase Boiler Efficiency				•				
36	Maintain Fuel Burning Equipment and Heat Transfer Surfaces							•	
37	Increase Boiler and/or Burner Efficiencies					•			
38	Reduce Blowdown Losses				•				
39	Increase Evaporator and/or Decrease Condenser Water Temperatures and Modify Controls				•				
40	Replace Multiple Units with Central Ducted Heating and/or Cooling System						•		
41	Replace Air Cooled Condensers with Cooling Towers						•		
42	Maintain Cooling System Equipment and Heat Transfer Surfaces							•	
43	Utilize a Heat Reclamation System				•				

1/ Denotes that ECO is included as part of an ECIP project.

TABLE A-3

SUMMARY OF ECO EVALUATIONS FOR FORT IRWIN NTC

DESIGNATION	DESCRIPTION OF ECO	ECIP 1/	INCREMENT 'G'	INCREMENT 'F'	NOT APPLICABLE	SIR LESS THAN 1.0	PROHIBITIVE FIRST COST	IN-HOUSE MAINTENANCE EFFORT	INCLUDED UNDER OTHER ECO'S
	DOMESTIC HOT WATER HEATING SYSTEM ECO'S								
44	Insulate Hot Water Storage Tank and Piping	•							
45	Install Heat Recovery Systems					•			
46A	Provide Separate Generation of Hot Water During Summer					•			
46B	Increase Hot Water Heater Efficiencies				•				
46C	Shut Down Energy to Hot Water Heaters					•			
46D	Control Hot Water Circulation Pump			•					
	POWER SYSTEM ECO'S								
47	Reduce Energy Consumption of Equipment and Machines								•
48	Reduce Peak Loads								•
49	Utilize More Efficient Transformers						•		
50	Replace Oversized and Inefficient Motors							•	
51	Correct the Power Factor					•			
52A	Install an Energy Management and Control System					•			
52B	Install an FM Radio Control System					•			
52C	Install a Power Line Carrier Control System				•				

1/ Denotes that ECO is included as part of an ECIP project.

TABLE A-3

SUMMARY OF ECO EVALUATIONS FOR FORT IRWIN NTC

DESIGNATION	DESCRIPTION OF ECO	ECIP[1/]	INCREMENT 'G'	INCREMENT 'F'	NOT APPLICABLE	SIR LESS THAN 1.0	PROHIBITIVE FIRST COST	IN-HOUSE MAINTENANCE EFFORT	INCLUDED UNDER OTHER ECO'S
	MISCELLANEOUS AND SOLAR ECO'S								
53	Install Recycled Waste Water System				•				
54	Install Solar Domestic Hot Water Heating Systems					•			

1/ Denotes that ECO is included as part of an ECIP project.

TABLE A-3

PROJECTED DISTRIBUTION OF ENERGY CONSUMPTION
BY END USE

ENERGY END USE CATEGORY	FY82 TOTAL MBTU/YEAR	PROJECTED ENERGY USE[1/]		
		ELECTRICITY MWH/YEAR	LP GAS MBTU/YEAR	TOTAL MBTU/YEAR
BUILDING SYSTEMS				
Space Cooling	78,520	6,277	-	72,819
Space Heating	114,639	210	64,238	66,674
Domestic Hot Water	42,769	1	34,203	34,215
Process Loads	80,726	4,886	17,213	73,886
Lighting Loads	62,988	4,297	-	49,846
Future Expansions	-	N/A	N/A	68,420
SUBTOTAL BUILDINGS	379,642	N/A	N/A	365,860
UTILITIES SYSTEMS				
Street Lighting	2,865	370	-	4,292
Water Supply/Treatment/ Distribution	19,128	2,265	-	26,274
Sewage Collection/ Treatment/Disposal	10,669	1,090	1,572	14,216
Electrical Distribution Losses	7,180	929	-	10,776
LPG Distribution Losses	6,000	-	6,000	6,000
SUBTOTAL UTILITIES	45,843	4,654	7,572	61,558
ESTIMATED TOTALS	425,484	N/A	N/A	427,418
TOTAL BUILDING AREA (SF)	2,078,000	-	-	2,851,956
ENERGY USE (1,000 BTU/SF/YEAR	204.76	-	-	149.87

1/ Includes the effect of (a) all recommended energy conservation projects, (b) removal of buildings slated for demolition or in the path of future construction (Table 8-2), and (c) planned construction through FY85 (Table 2-3).

N/A denotes not available.

TABLE A-4

PROJECTED DISTRIBUTION OF ENERGY CONSUMPTION
BY FACILITY FUNCTION

FUNCTION CATEGORY	PROJECTED USES[1/]			EXPANSION FACILITIES[2/] MBTU/YEAR	PROJECTED TOTAL MBTU/YEAR
	LP GAS MBTU/YEAR	ELECTRICITY MWH/YEAR	TOTAL MBTU/YEAR		
Offices	13,291	3,007	48,171	7,420	55,591
Shops, Maintenance and Storage	19,064	1,535	36,865	14,885	51,750
Barracks and Quarters	17,383	2,256	43,548	10,710	54,258
Community Facilities	12,348	4,386	63,226	11,435	74,661
Dining Facilities and Clubs	21,376	349	25,429	1,170	26,599
Family Housing	32,194	4,139	80,204	22,800	103,004
Site Utilities	7,572	4,654	61,558	0	61,558
TOTAL	123,227	20,325	359,002	68,420	427,422

1/ Includes the effect of all recommended energy conservation projects, plus removal of buildings slated for demolition or in the path of future construction (Table 8-2).

2/ Includes the effect of planned construction through FY85 (Table 2-3).

TABLE A-5

INCREMENT F

SUMMARY OF PROJECT DATA

PROJECT	LOCATION(S)	ENERGY SAVINGS PER YEAR (10^6 BTU)	DOLLAR SAVINGS PER YEAR	LIFE CYCLE SAVINGS	COST TO IMPLEMENT 1/				SIR
					MATERIAL COST	MANHOURS		TOTAL COST	
						TRADE	HOURS		
Reduce Domestic Hot Water Temperatures	125 Locations in Cantonment Area	2,078	12,842	155,389	-0-	A/C Mechanic	125	3,500	44.4
Reduce Domestic Hot Water Temperatures	505 Family Housing Units	2,293	14,171	171,466	-0-	A/C Mechanic	253	7,084	24.2
Replace Broken Windows	35 Cantonment Buildings	218	1,347	16,302	257	Glazier	35	1,491	10.9
Insulate Steam and Condensate Piping	Buildings 202 and 222	639	3,949	47,783	1,985	Pipe-fitter	40	3,230	14.7
Install Flow Restrictors in Lavatories & Shower-heads (601 lavatories, 298 showers)	95 Cantonment Buildings	1,891	11,686	141,405	13,150	Plumber	450	28,000	5.06
Replace V-Belts with Cog-belts in Evaporative Coolers	All Buildings with Evaporative Coolers (892 Coolers)	2,356	10,743	114,309	14,935	A/C Mechanic	446	27,626	4.14
Install Flow Restrictors in Lavatories & Shower-heads (762 Lavatories, 567 showers)	505 Family Housing Units	2,036	12,582	152,248	23,340	Plumber	665	45,300	3.36

1/ Includes Contractor overhead and profit plus 10% contingency

TABLE A-6

SUMMARY OF ECIP PROJECTS FOR FORT IRWIN NTC

PROJECT TITLE	ENERGY SAVINGS (10^6 BTU/YR)	ANNUAL COST SAVINGS (DOLLARS)	TOTAL REQUEST FY87 ($1,000)	SAVINGS-TO-INVESTMENT RATIO	REFERENCE SECTION
ECIP: Energy Conservation for Cantonment Facilities • Time Switch Control of Evaporative Coolers • Programmable Thermostats (Heaters) • Time Switch and Photocell Lighting Control • Efficient Lighting Systems • Exterior Wall Insulation • Roof Insulation • Door and Window Weatherstripping • Evaporative Cooler Dampers • Make-up Air System for Exhaust Hood, Building 166 • Domestic Hot Water Heater, Storage Tank, and Piping Insulation	25,358	144,602	1,001.7	2.16	8.3.1
ECIP: Energy Conservation Project for Family Housing • Thermostats with Night Setback • Efficient Lighting Fixtures • Roof Insulation • Door Weatherstripping • Domestic Hot Water Heater Insulation • Wall Insulation	22,102	133,761	1,122.9	1.86	8.3.2

TABLE A-7