FORT KNOX ENERGY PROGRAM

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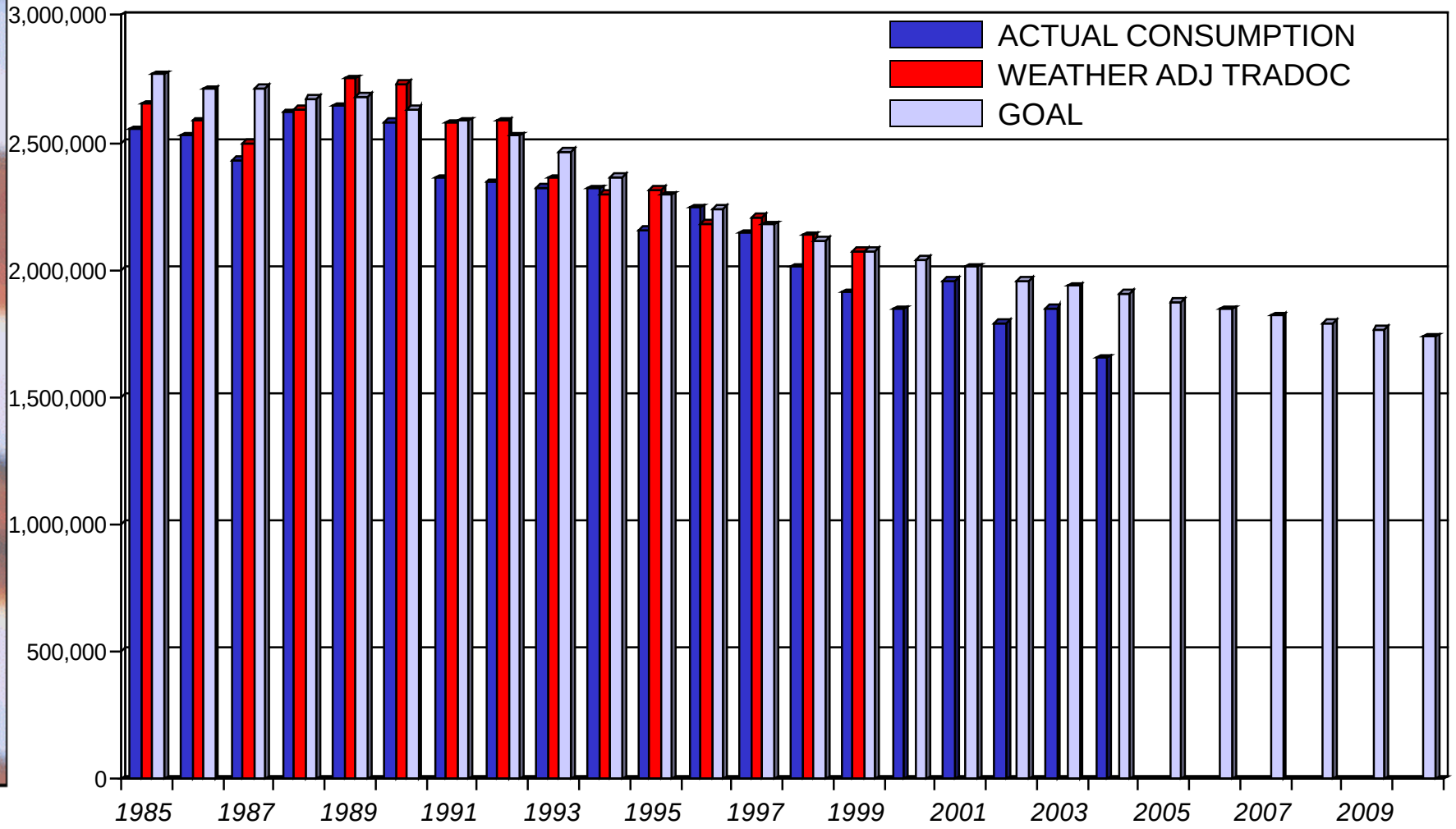
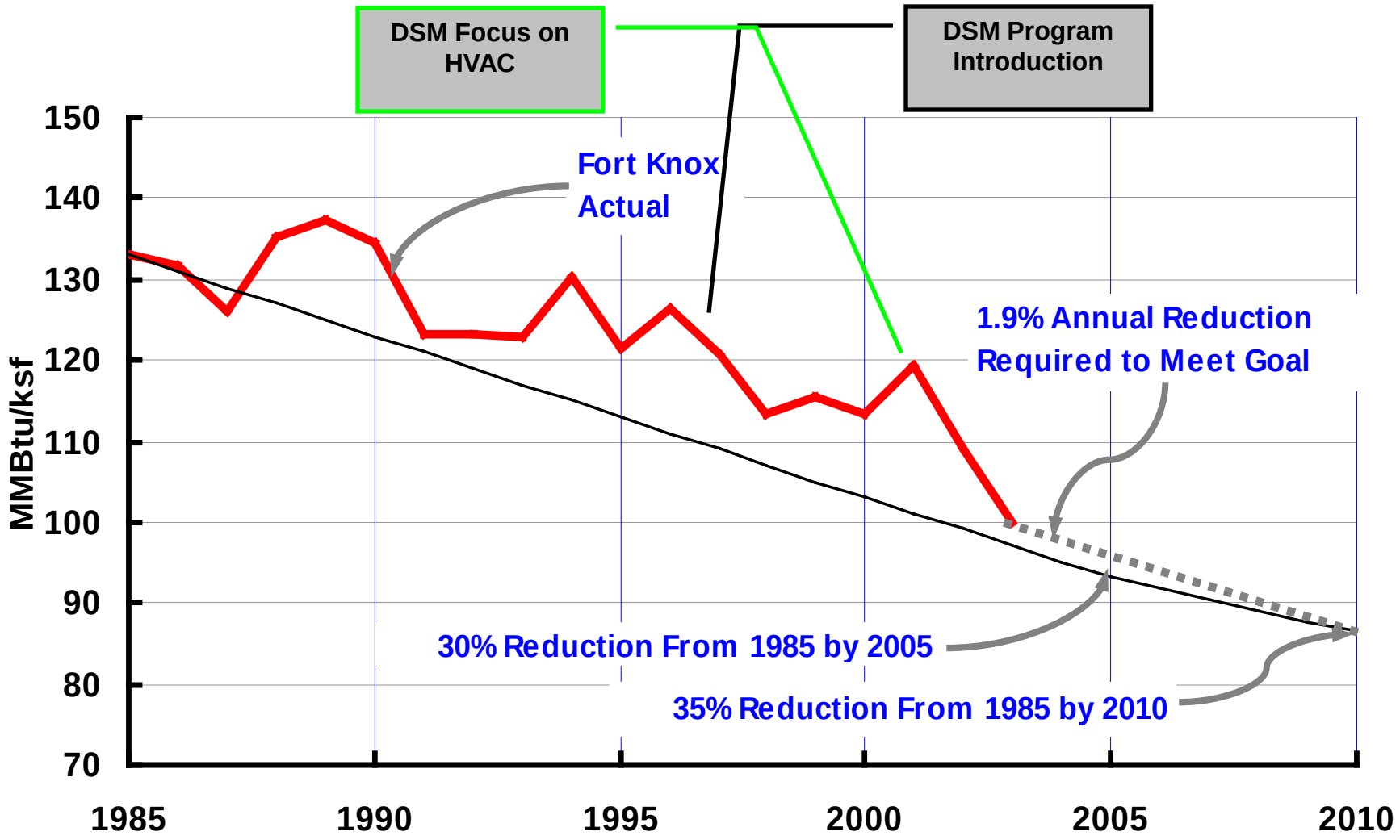
FORT KNOX STATUS
COMPARED TO TRADOC GOAL

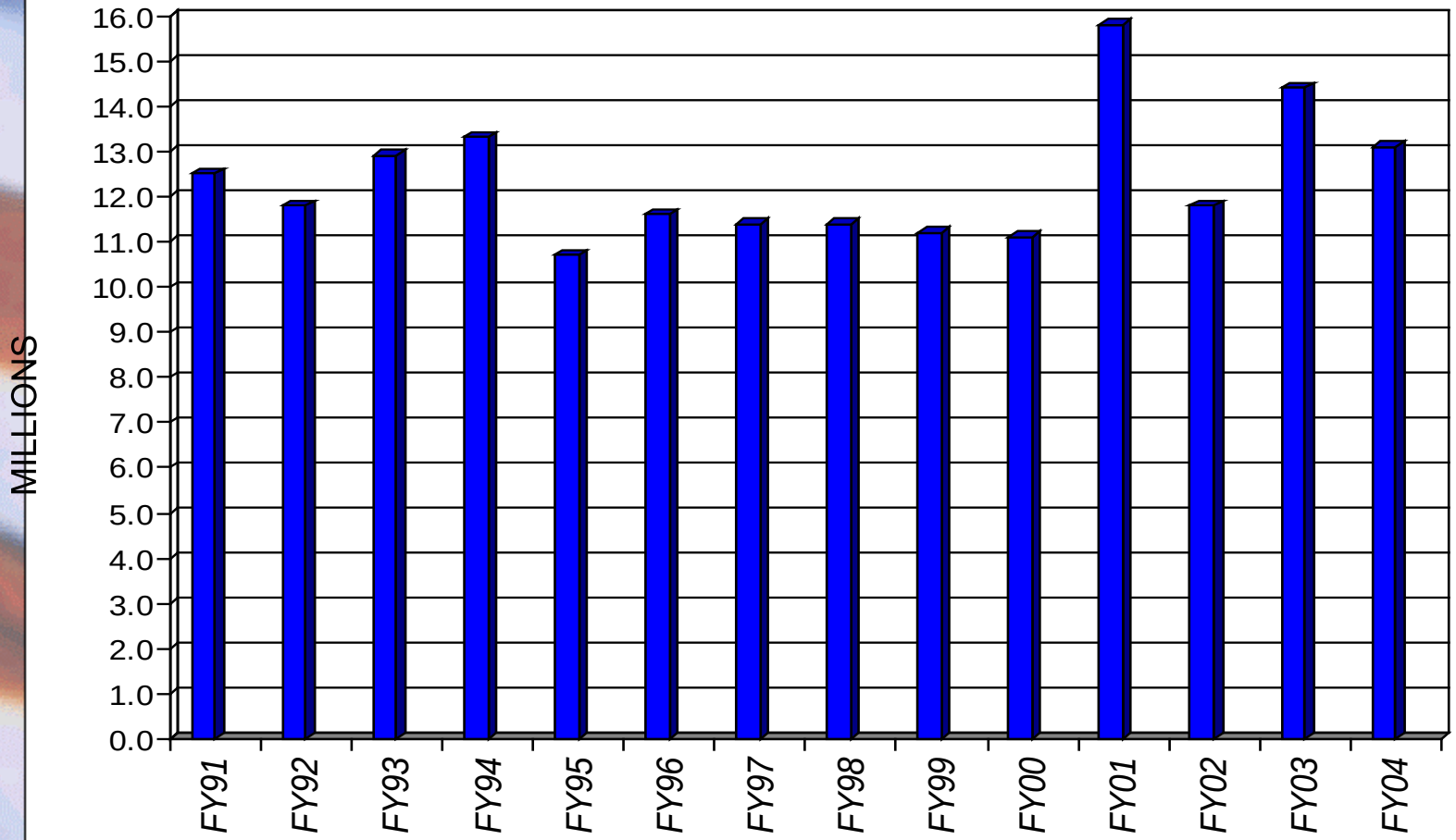
MBTU'S



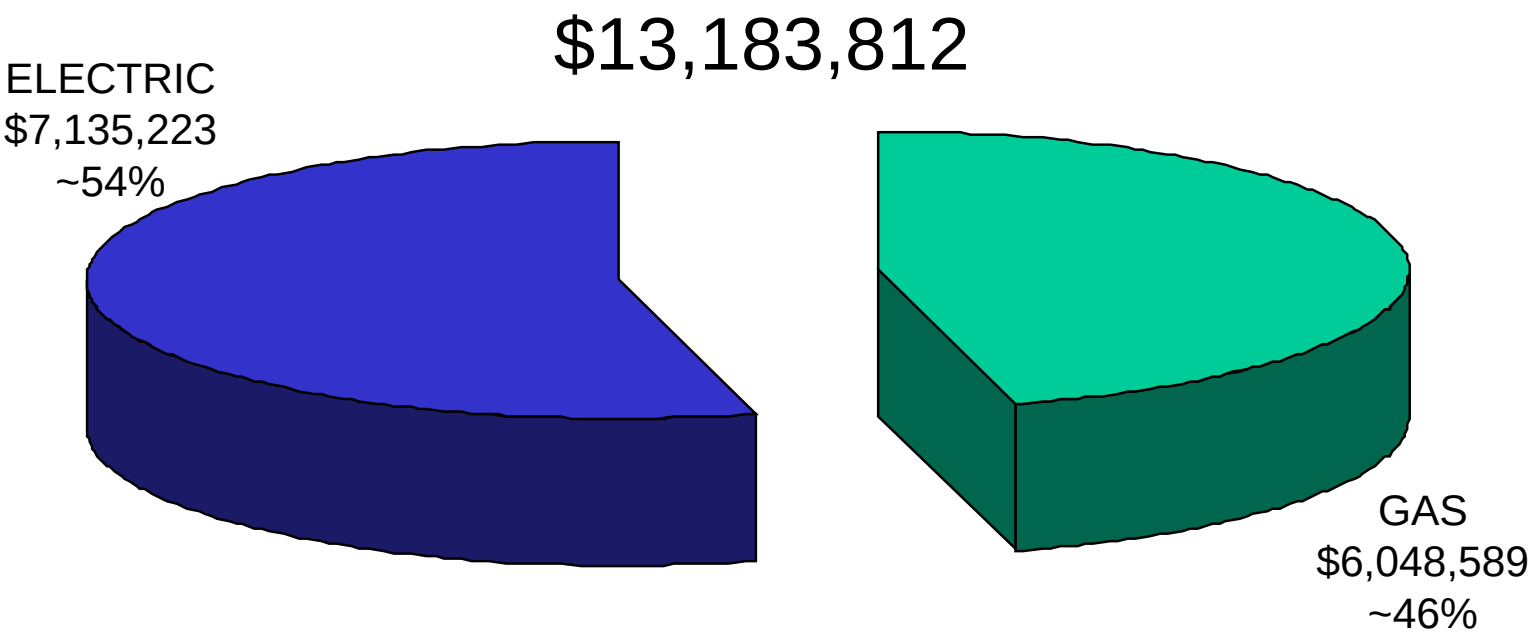
E.O. 13123 Making Progress…BTU'S



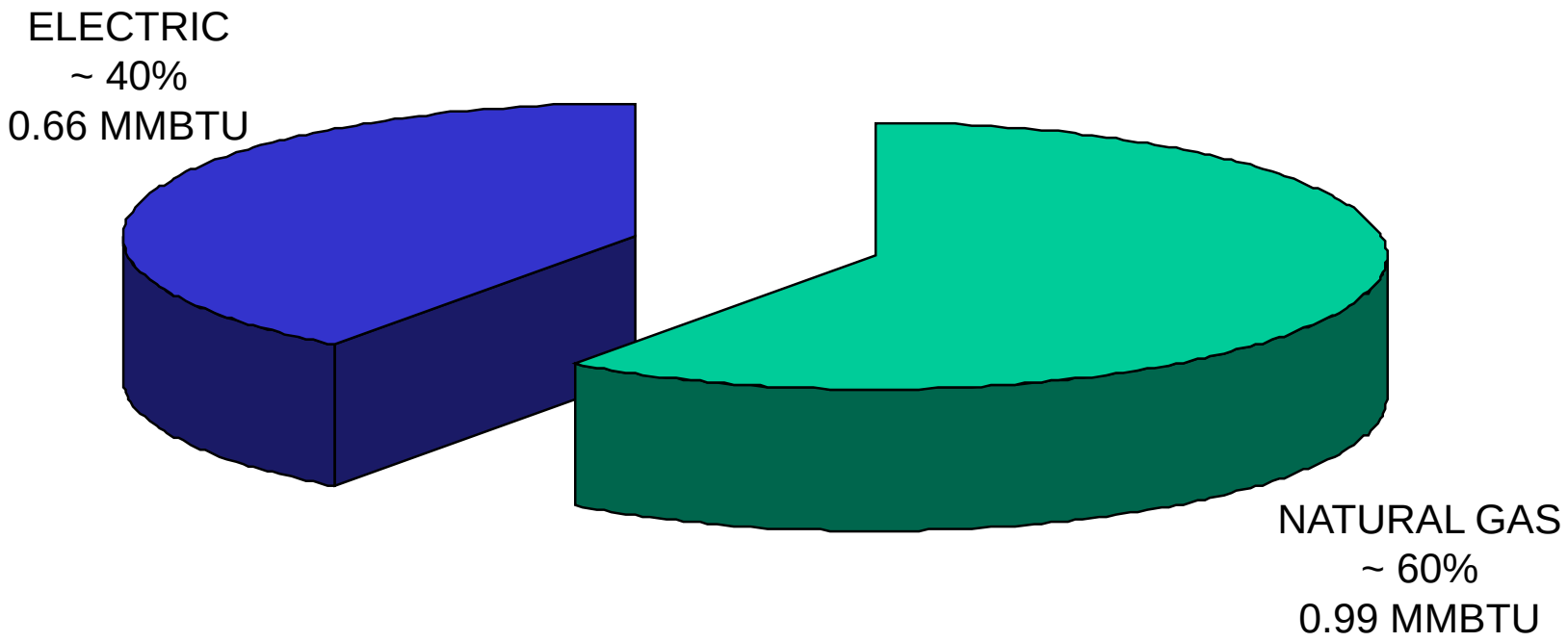
FORT KNOX UTILITY COST
FY DOLLARS SPENT

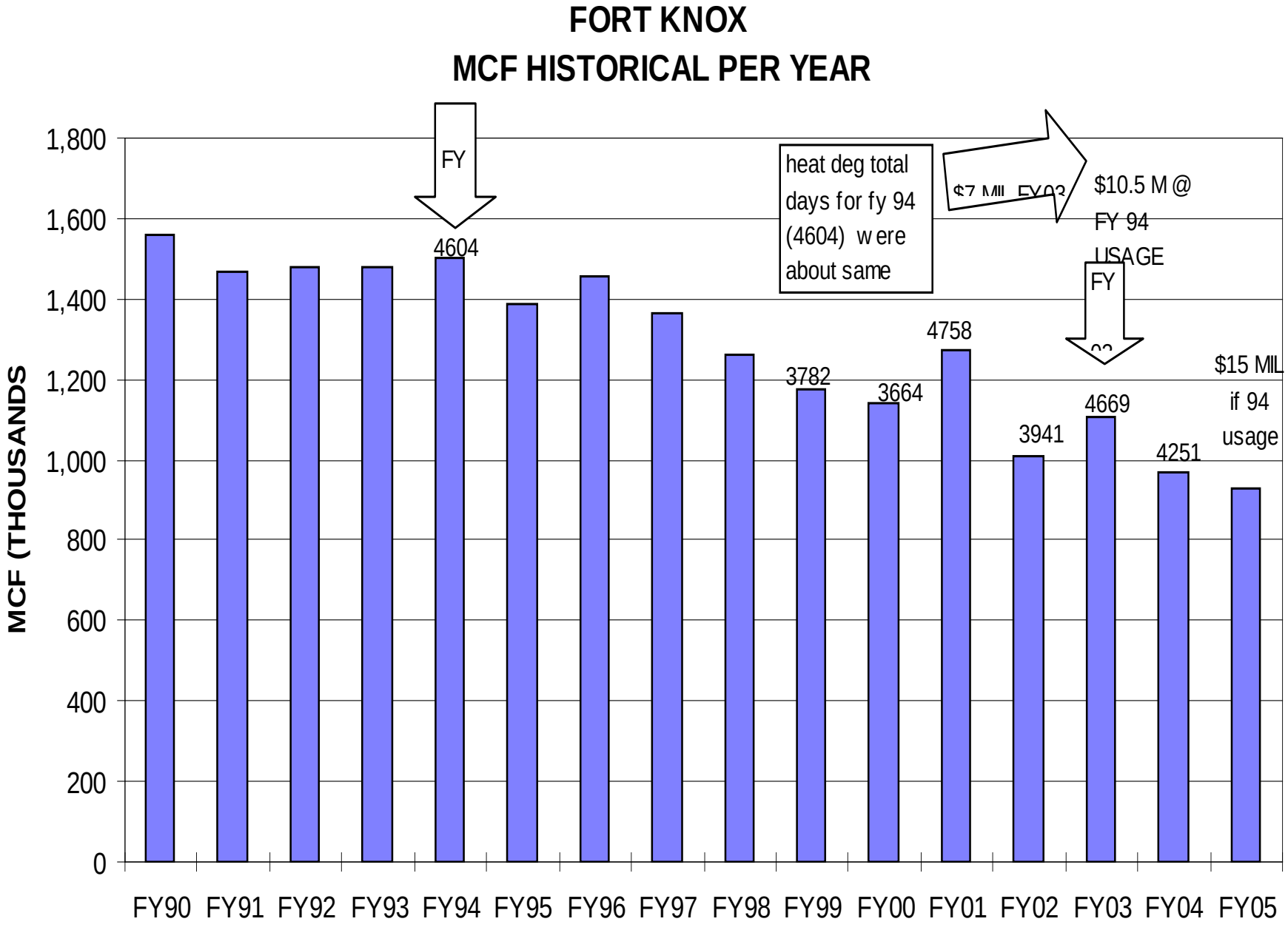


FORT KNOX
FY04 GAS AND ELECTRICITY BILL



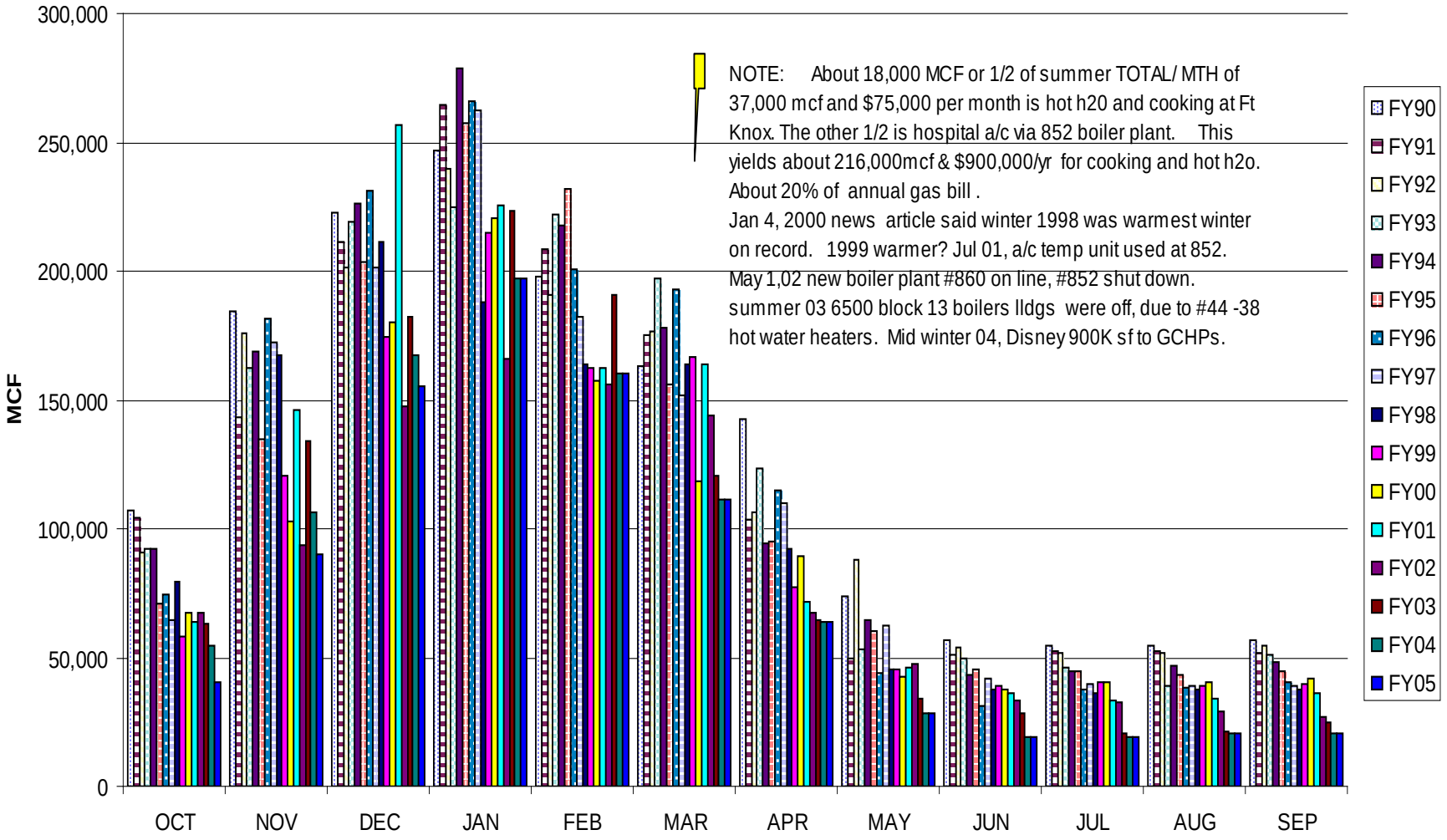
FY04
MMBTU USAGE COMPARISON




FORT KNOX
MCF HISTORICAL PER YEAR
MCF (THOUSANDS
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
FY
4604
heat deg total days for fy 94 (4604) were about same
$10.5 M @ FY 94 USAGE
FY
4758
3782
3664
3941
4669
4251
$15 MIL if 94 usage
FY90 FY91 FY92 FY93 FY94 FY95 FY96 FY97 FY98 FY99 FY00 FY01 FY02 FY03 FY04 FY05

FORT KNOX GAS USAGE

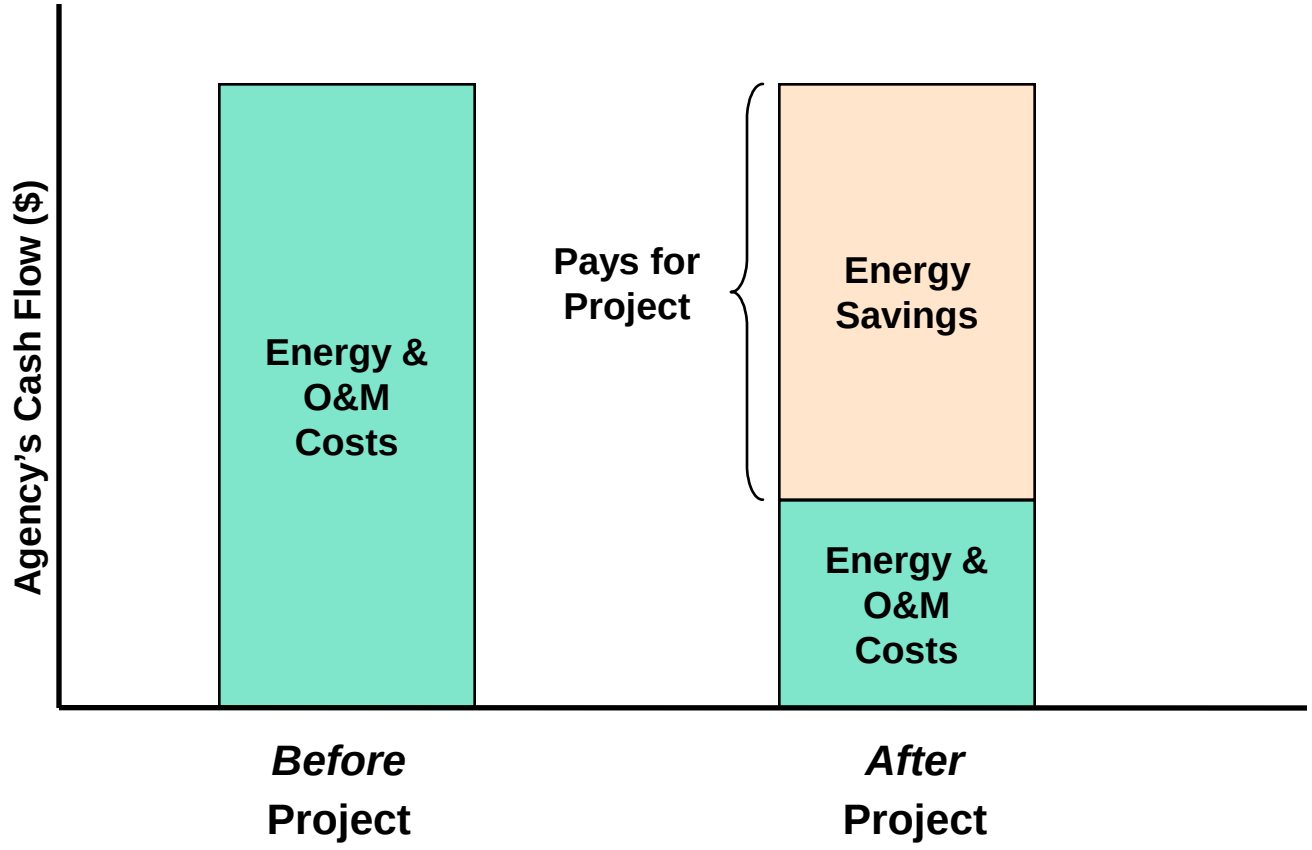
ANNUAL COMPARISON BY MONTH



WHAT IS DSM?

- FORT KNOX SERVED BY 4 ELECTRIC UTILITIES
- CO-OP AND BASE COME UP WITH VIABLE PROJECTS
- DSM UTILITY HIRES A CONTRACTOR
- DSM UTILITY PAYS CONTRACTOR IN FULL ONCE COMPLETE
- POST PAYS FOR PROJECT OVER 10 YEARS AT THE UTILITIES' INTEREST RATE (6 - 6.5%) NOW……2.8%
- NO DESIGN FEES PAID

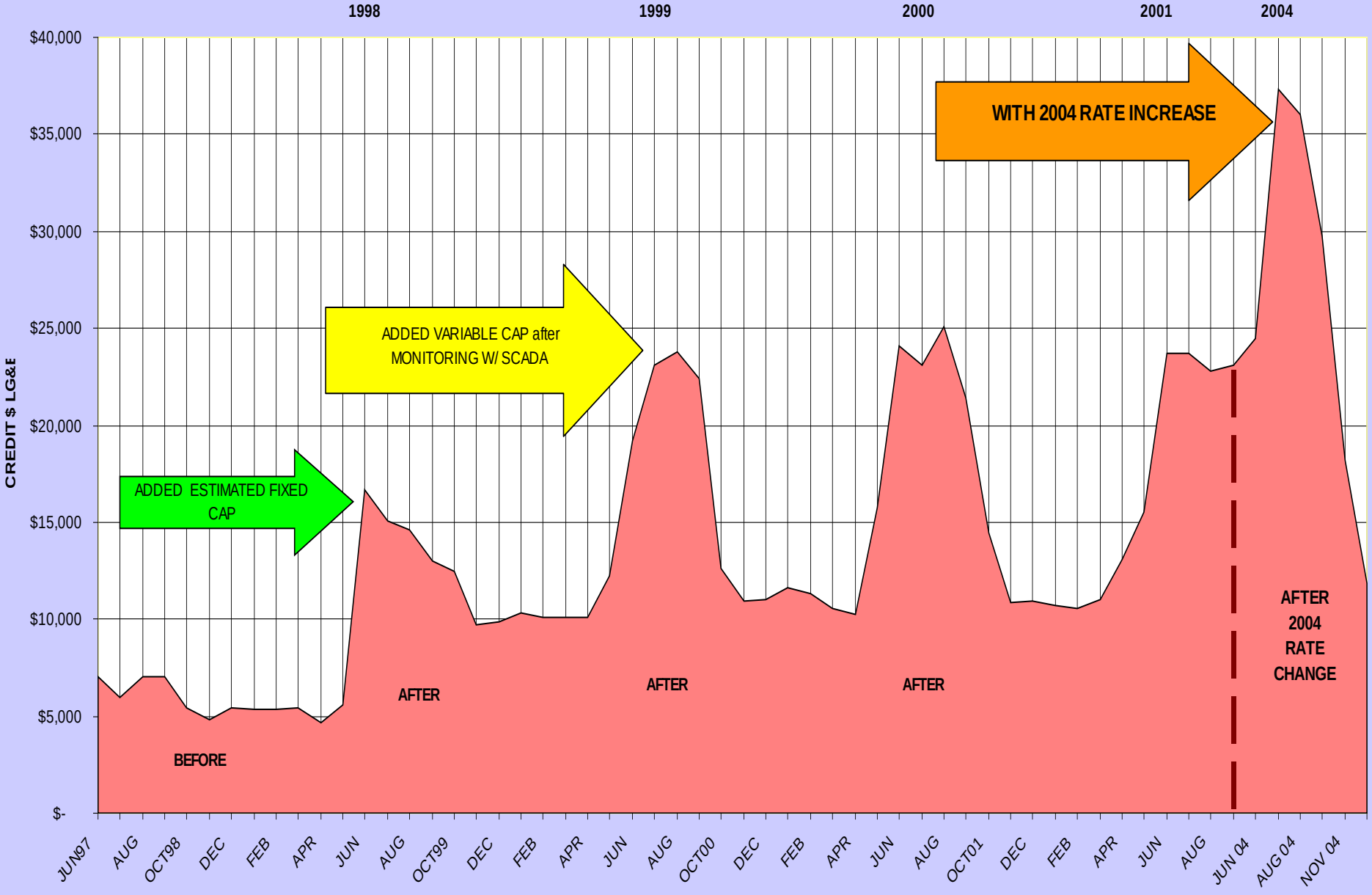
MECHANICS OF HOW DSM WORKS



PROJECTS INCLUDE:

- LIGHTING IN ALL NON-FAMILY HOUSING buildings (SCHOOLS, HOSPITAL, COMMISSARY)
- INFRARED HEAT IN ALL HIGH BAY BUILDINGS (>100 bldgs, 10%, 1.5 M FT^2)
- LED TRAFFIC SIGNALS (12+ YEAR LIFE) (no one noticed)
- REDUCED - HIGH BAY GLASS WALLS WITH SPRAY ROOF (~70 EA)
- GROUND COUPLED HP'S, 42 BLDGS, 1.7 MIL FT^2, ~400 WELLS
- HOSPITAL BOILER PLANT #860 REPLACED, SAVES $1 M/YR &~100K, mmbtu/yr
- LIGHTS-OFF T- STATS IN MOST IR SPACE (Dark goes to 55^OF)
- HVAC REPLACMENTS & BUILDING AUTOMATION SYSTEM
- SCADA TO MONITOR THE ELECTRIC UTILITY SYSTEM (99 PF)

UTILITY DOLLAR CREDIT FOR GOOD POWER FACTOR



ENERGY DESIGN STANDARDS FOR FORT KNOX
(for all NEW & RENOVATION projects)

CMT NO.	REFERENCE	COMMENTS
1	Lighting	Use T-8 lamps only (4100K, CRI 70 (F32TB/TL741) without special permission. Design all to IES stds. Effort to standardize. These lamps shall be driven by instant start electronic ballasts, unless special reason. U-tubes should be avoided as they are fragile and expensive. Use the proper fixture or retrofit for 2 ft straight T-8 tubes. Use Florescent tubes (best choice if applicable), high-pressure Sodium or Metal Halide in high bay areas. Porch/entrance lights, use PL13 w/photo cell.
2	Light Switching	Lighting in large areas (cafeterias, conference areas, maintenance areas) should provide Switching for partial area lighting for small area use, when entire facility is not needed.
3	LED Exit Signs	Use LED Exit signs, all cases.
4	Motors	Use energy efficient motors that meet the "NEMA Premium" efficiency standards.
5	Outside lighting	Install photocells control on all outside lighting and street lighting to Nolin Recc Electric street light standards.
6	Occupancy Sensors	Install occupancy sensors in break areas, conference rooms, bathrooms, offices, and other. Ceiling Mount sensors where applicable.
7	Water heaters	Insulate water heaters and provide thermal breaks or install new high efficient heaters all with electronic ignitions.
8	Metering (All buildings) All Utilities	Gas, electric and water meters should be installed to Public Service Commission (PSC) and Fort Knox standards. All utilities shall be metered and installed to utility company standards. Nolin electric, (LG&E Gas & HC#1 Water) . Knox specs are available on request.
9	Infrared Heating and heating	High bay/K SPAN and maintenance areas should be heated by most efficient means or, with condensing style- inline gas fired type infrared Heating systems capable of exhaust via plastic pipe. Exhaust through walls not roofs is desirable. Employ lightstats to set back at night to 55 degrees F or be tied to the post wide building automation system. Project Manager energy decision on a case by case decision. All heating equip shall have electronic ign. unless special case.
10	Insulated windows	Thermopane insulated windows shall be used with double low E (E squared) glass, and argon filled. Temper glass as applicable.
11	Insulation R-Factor	Proper R value insulation for roof and walls shall be used. Spray Polyurethane foam is often a preferred roof material. Walls shall have a house wrap coating in addition to the normal insulation.
12	General	Designs shall consider all energy saving devices and choose most efficient product in order to conform to the Energy Policy Act of 1992 , & latest exe order on energy, and adhere to LCCA standards.
13	Transformers	Use Amphorous Core transformer for low power consumption should be considered
14	FaucetAerators&shower heads	Use faucet aerators on all faucets
15	Faucets	Use spring loaded or sensor detection faucets except in family housing as applicable.
16	HVAC controls & automation	All building controls shall be compatible w/existing base wide building automation system, Trane Tracer System (spec available). The School System at Knox has a centralized Johnson Controls System.
17	HVAC	Ground coupled heat pumps or hybrid systems shall be considered first for all buildings, where applicable. Seer for air coupled heat pumps minimum shall be 13, higher is desirable if conforms to LCCA..
18	Traffic Signals	Only LED traffic sign bulbs shall be used most cases. Again LCCA (life cycle cost analysis) applies.
19	Sky Lighting/	Day lighting is acceptable in most cases for roofs and walls if applicable to replace artificial lighting.

POC is the Energy office 502-624-8358 Gary Meredith.

Approved by: T. Hutchins

JOSEPH V. MUSCARELLA
COL, EN
Director of Base Operations Suppor

ENERGY PROGRAM CONCERNS

- MOLD PROBLEMS …USUALLY HVAC PROBLEM
- GOVERNMENT MUST BUILD IN ENERGY EFFICIENCY IN ALL CONSTRUCTION, MCA,ETC.
- 1391 PROCESS.. WRITE IN ENERGY EFF. EQUIP ....CAN'T ADD $'s LATER EVEN IF SMART
- PAY NOW OR PAY HIGHER UTIL BILL FOR LIFE
- AVOID LOWEST FIRST COST, IF NOT EFFICIENT.

ENERGY PROJECTS/ STATUS

GROUND COUPLED HEAT PUMPS…

…42 BLDGS...1.7 M SF

GLASS WALLS IMPROVED…

…71 BLDGS… 900,000 SF

INSULATED ROOF SYSTEMS…

…26 BLDGS… 340,000 SF

Radiant Heating Equip…

…105 EA…1.5 MIL SF

Building Automation Systems … 3.7 MIL SF

ECIP PENDING FY06

- **ECIP add BAS TO radiant heat BUILDINGS…105 EA…1.5 MIL SF**
- **ECIP to GCHP 4 BARRACKS… #2375…**
- **WATER HEAT & EXIT SIGNS**

What Does the Gov't Expect From HVAC MAINT. ? BUILDING MAINT. ? ELECTRICAL MAINT. ?

- Satisfy customer needs, HVAC, windows, ETC.
- HVAC after lighting, plug loads and hot water makes up the ~ $14 million bill per year
- Reduce Consumption BTU's / SQUARE FOOT