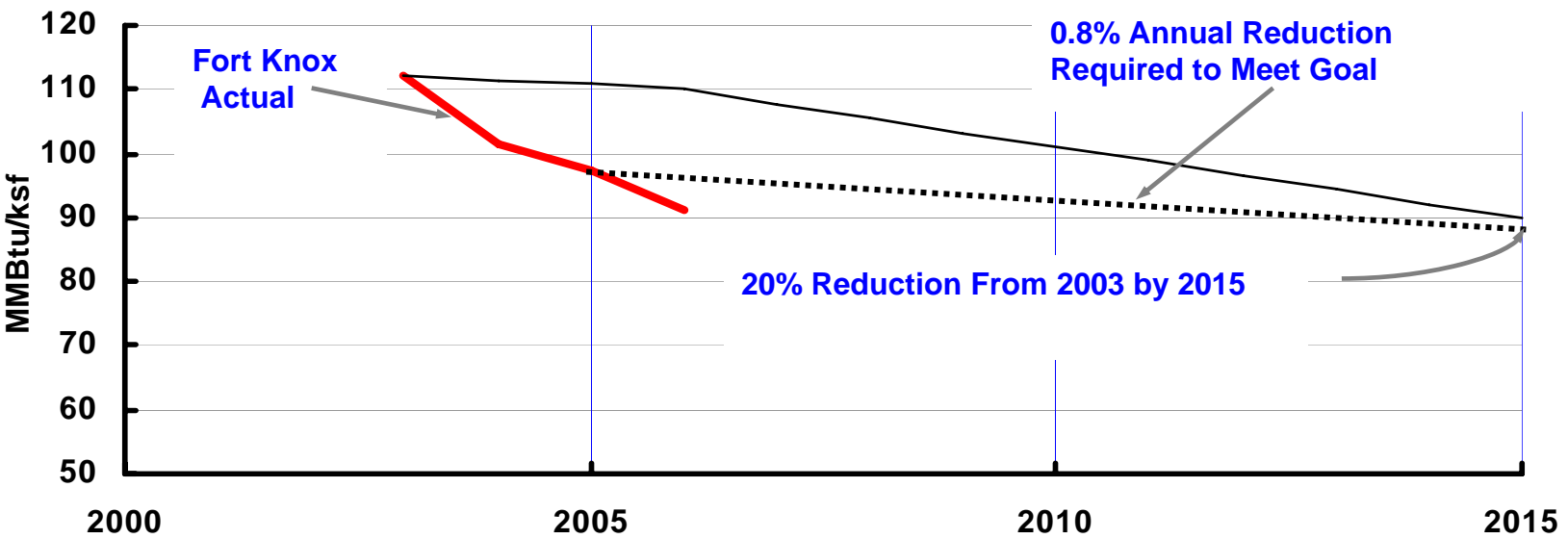


*Common
Sense*

FORT KNOX ENERGY PROGRAM

Innovation

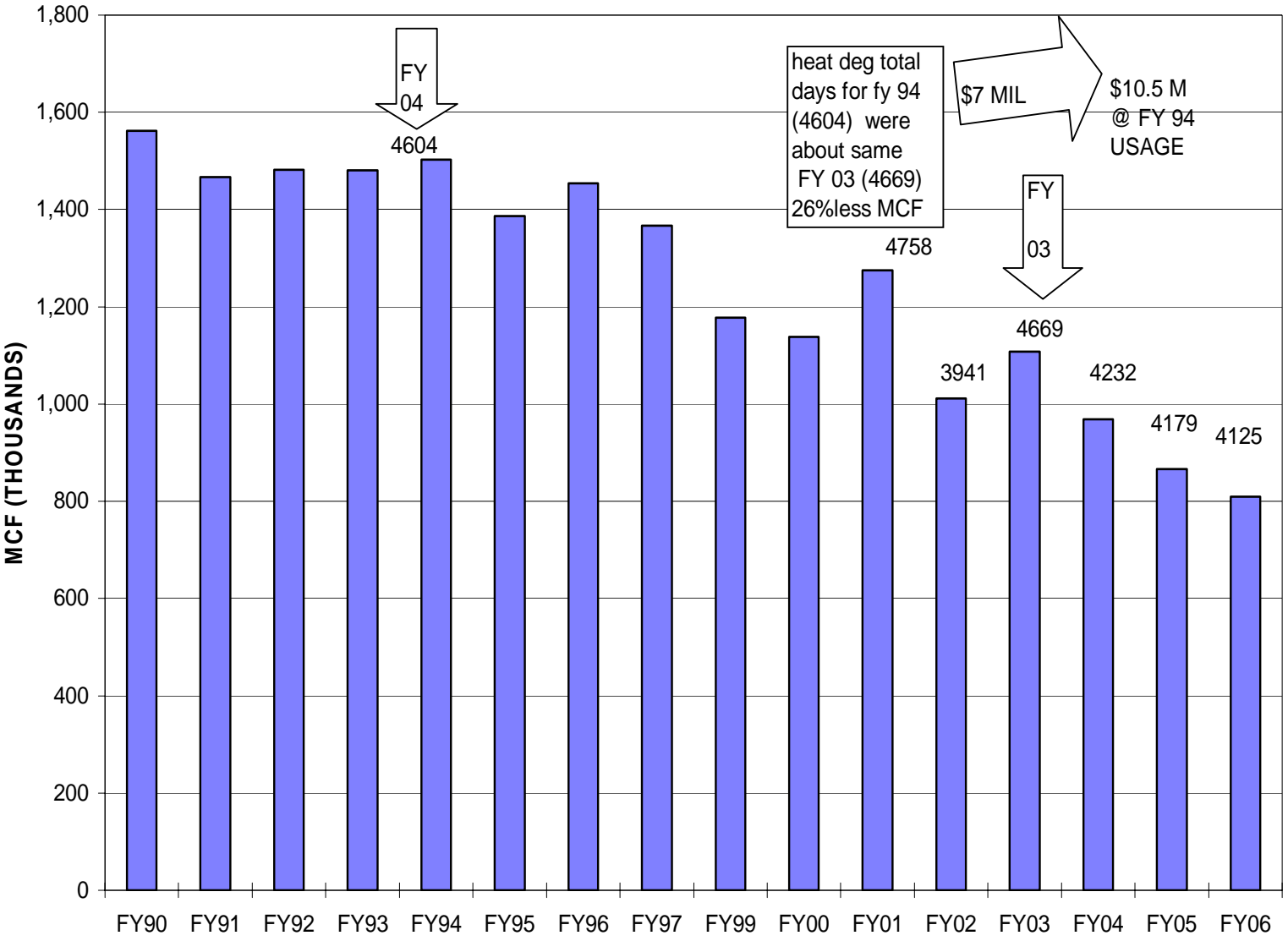
Luck



Fort Knox Energy Reduction Glide Path



FORT KNOX MCF HISTORICAL PER YEAR

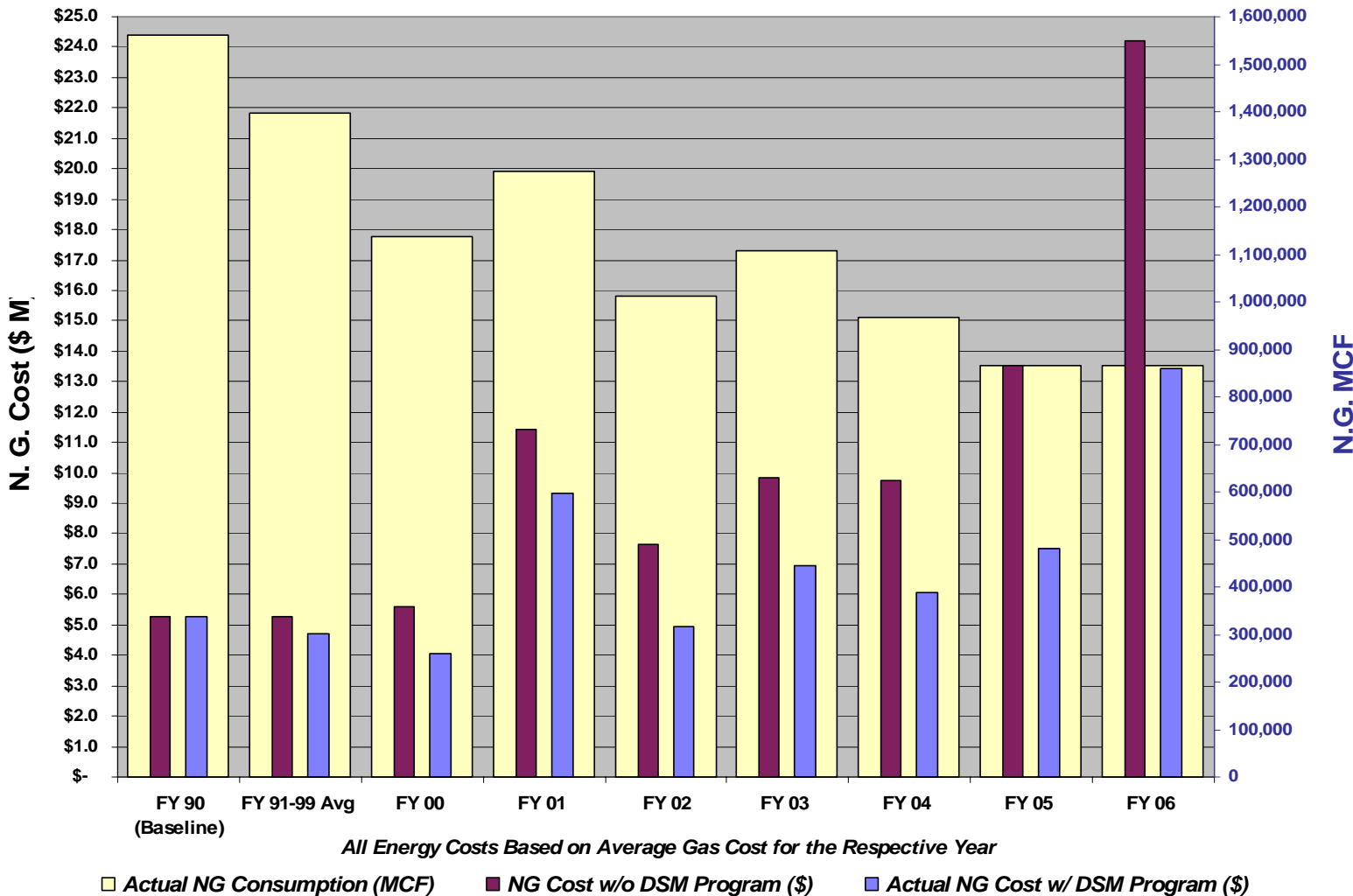




Fort Knox Natural Gas Cost & Consumption

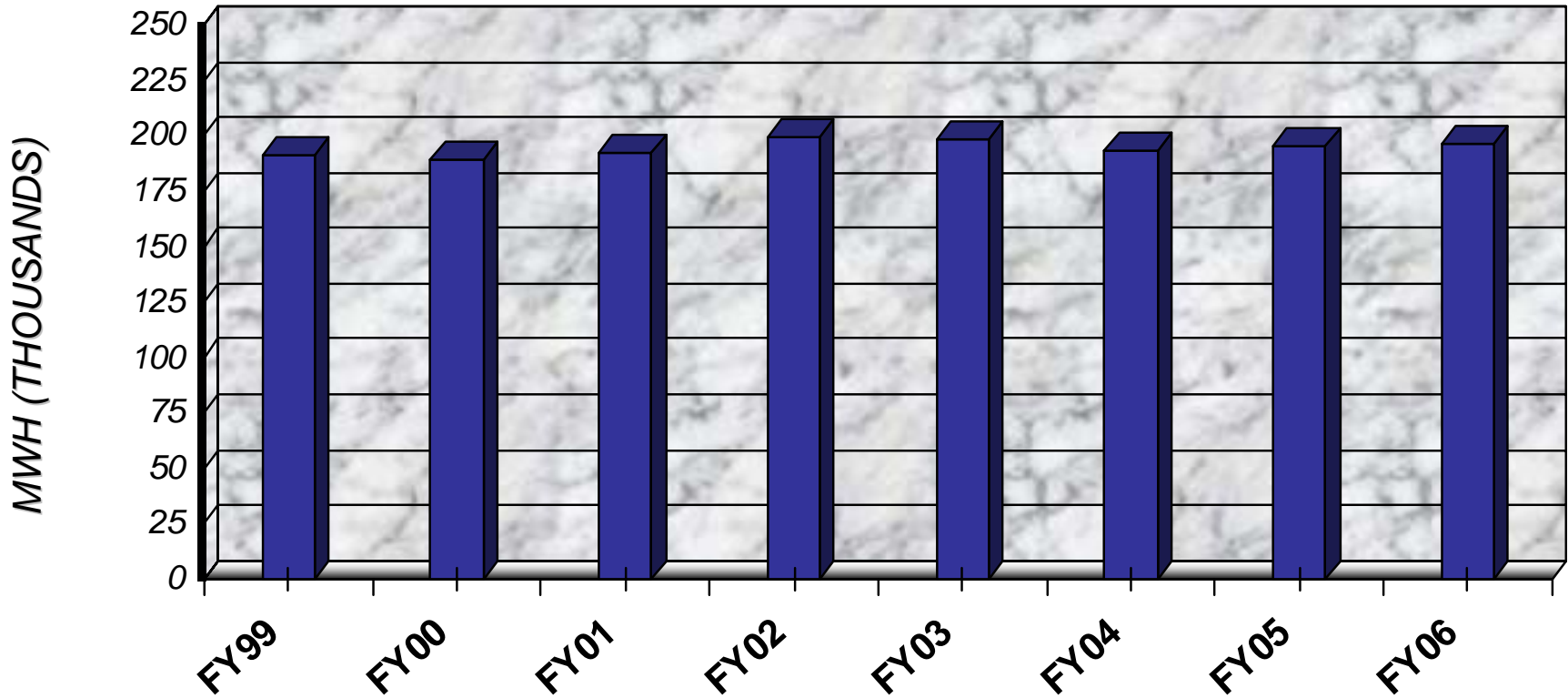


(FY)





Electrical Consumption Chart

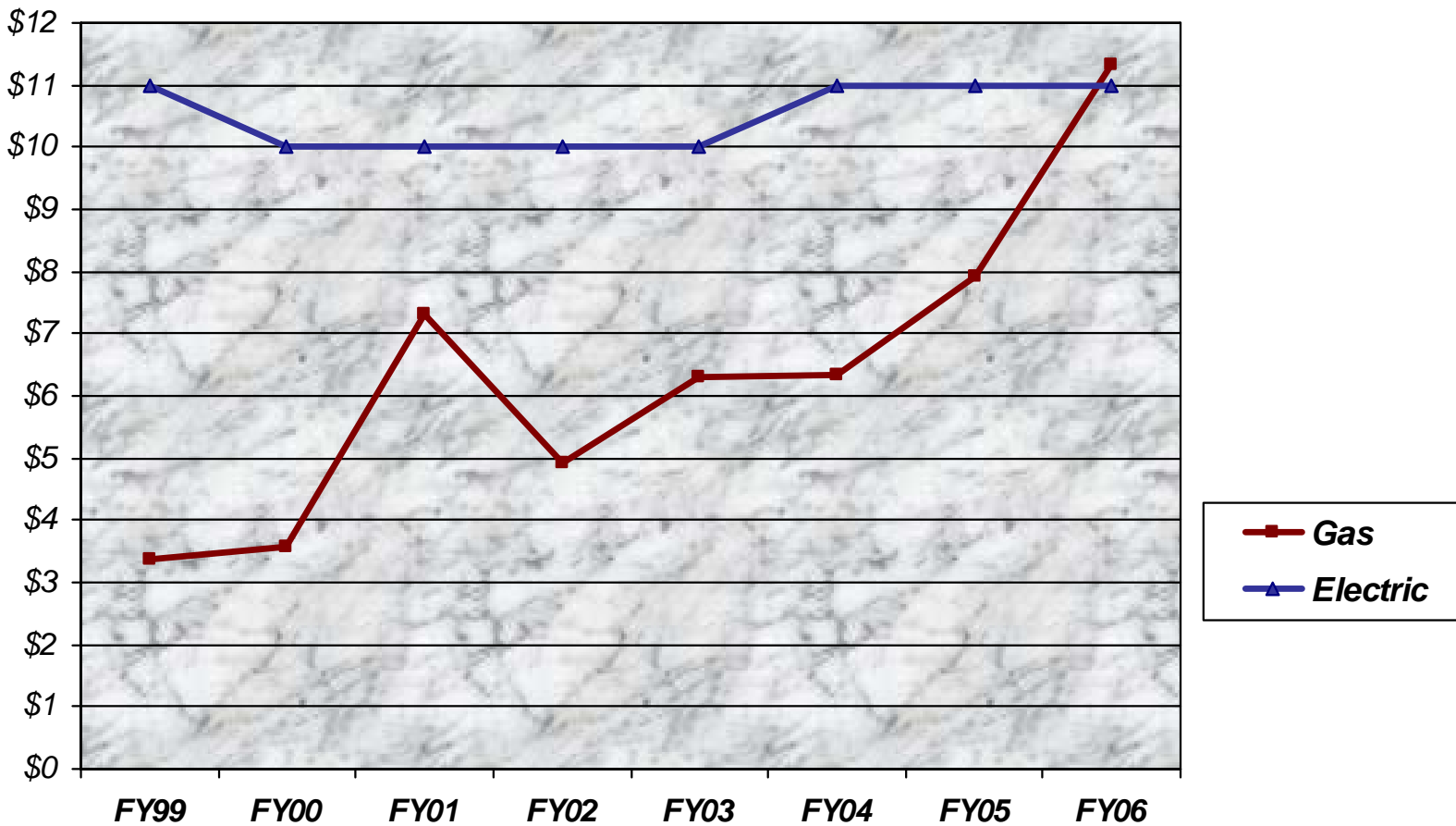




Gas & Electrical Costs



**Cost
per
MMBTU**





Common Sense



- Conservation
- Energy Efficient Lighting
- Infrared Heating Systems
- Spray Foam Insulation (windows and roofs)
- Energy Efficient Systems (ground coupled heat pumps)
- Monitoring and Control Systems
- Maintenance (Keep equipment working to save)
- Re-commissioning (Fixed/HVAC)



Innovation



- Design standards enforced (New Construction build it right!)
- Operational maintenance included in DSM contracts



A Well-Rounded Approach



- Energy Design Guide applies to:

- MILCON & MCA
- DSM
- ECIP
- JOC
- HVAC Services
- Tenant Agencies
- GSA
- Others

ENERGY DESIGN STANDARDS FOR FORT KNOX
 MBTU's/ KSF/YR per metered results)

(-86

| MCF EQUIV/KSF/YR) | | |
|-------------------|---|--|
| CMT NO. | REFERENCE | DESCRIPTION/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 Fluorescent tubes (best choice if applicable). Use High Output ballast w 6 TUBE T-8 fixtures in high bay areas. Porch/entrance lights, use PL13 w/photo cell. No 8 ft or U-tube fixtures, or incandescent bulbs larger than 75 watt without approval. |
| 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 electroluminescent or LED only, 120 volt powered 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 and street lighting to Knox or Nolin Recc Electric street light standards. |
| 6 | Occupancy Sensors | Install occupancy sensors in break areas, conference rooms, bathrooms, offices, proper fit for halls & stairwells, and other. Ceiling Mount sensors are best where applicable. Lights off nights and weekends when unoccupied is goal. |
| 7 | Water heaters | Water heaters shall be 92 % minimum eff; electronic ign.; exhaust via plastic pipe; automated to BAS any recirc pump; or POUse. |
| 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 (R4), or Krypton (R10) 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 insulation of Enhanced cellulose blown/molded in walls preferred. |
| 12 | General/Design Review | Designs shall consider all energy saving devices and most efficient product in order to conform to the Energy Policy Act of 1992, 2005 & latest exe order on energy, and adhere to LCCA standards. To ensure compliance, all HVAC and Lighting Design shall under go review at 60% design completion with the Base Energy Manager and Base Ops support team members. |
| 13 | Transformers | Use "Loss evaluated", Amorphous Core transformer for lower power consumption should be considered |
| 14 | Faucet/Aerators & 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-GCHP's by local A/E Familiar with KY GEO use | 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 14, 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: Pat Walsh, Chief Engineer services Div

- All design and construction facets coming together to "do what's right!"

RENEWABLE ENERGY PROJECTS



- Mostly GCHP'S ~ 80+ buildings
- ~ 2.5 million SF (Total SF 11 million)
- Small solar PV
- 1 solar DHW

