



# Fort Knox Energy Initiatives



## Fort Knox Energy Program *One of the Nation's Best*



## Energy Saving Projects



## Lighting Improvements

- Improve low lighting conditions while saving energy
- Provide on-demand lighting through use of occupancy sensors
- Harvest natural light when applicable
- Eliminate High Intensity Discharge (HID) lighting indoors





## Infrared Heating

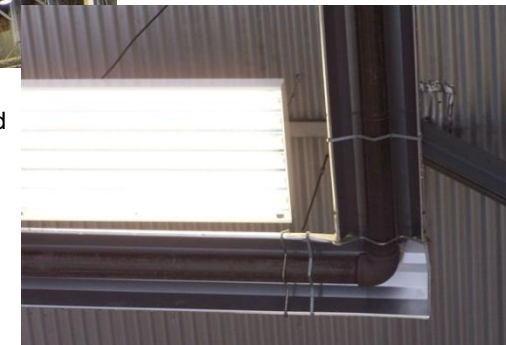
Infrared systems heat buildings in the same way the sun heats the earth

- Energy efficient (92%)
- Quick heat recovery
- Environmentally friendly
- Reduced heating costs
- Comfortable heat
- Focus heat on people and objects
- Eliminate inefficient boilers

\*\* 110 buildings on post, typically high bay maintenance and storage



Infrared heat @  
Godman Army Airfield





## Insulation Upgrades

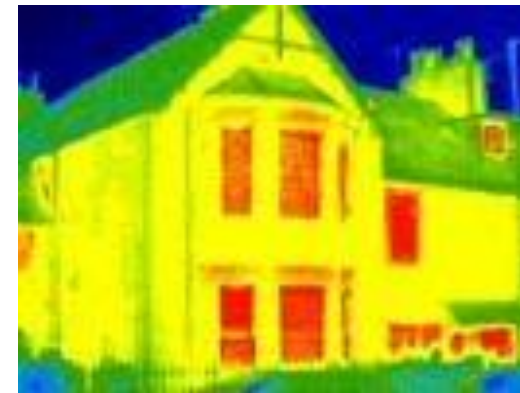
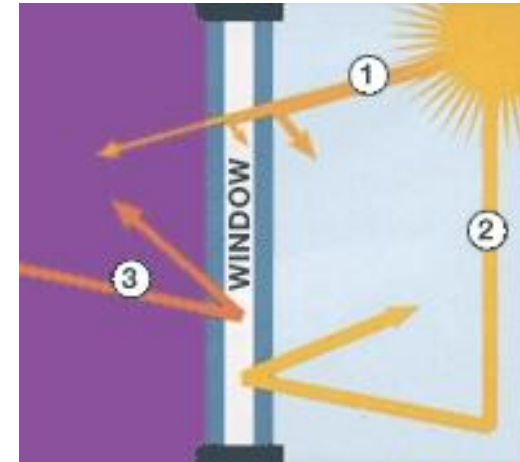
- Upgraded insulation in multiple types of buildings
  - Spray foam
- Encapsulated crawl spaces improving energy efficiency and indoor air quality
- Decreases infiltration and creates a tight building
- Used primarily on old leaky maintenance buildings





## Energy Efficient Windows

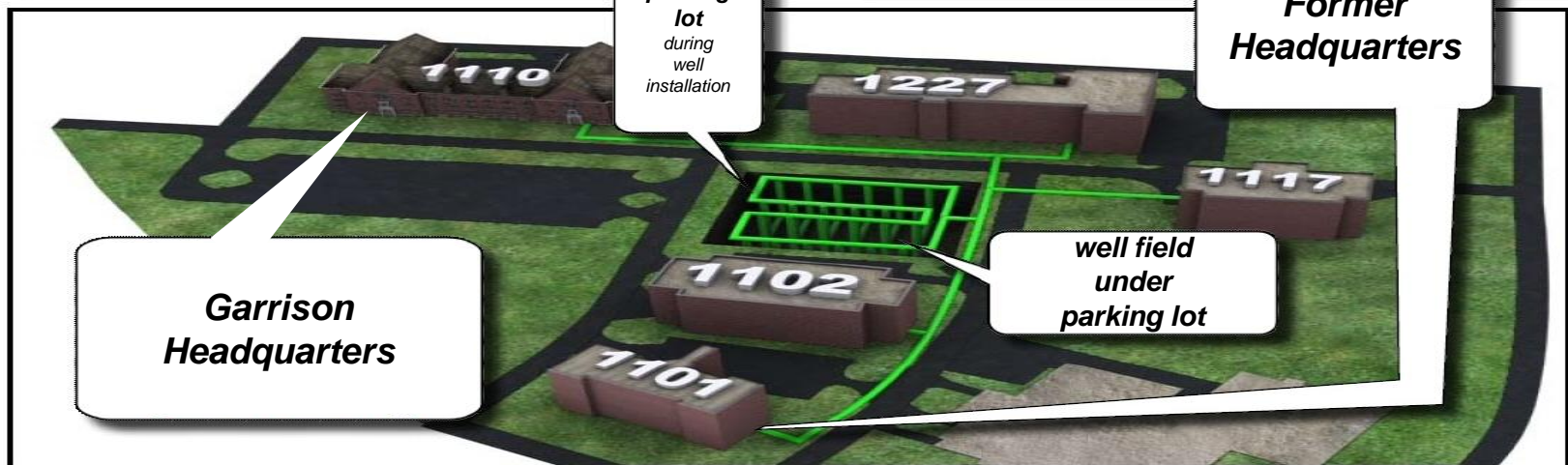
- Replaced majority of windows in older facilities
- Established a minimum standard for historical and commercial type windows for both repair and new construction
- Windows used must be:
  - Thermopane insulated panel
  - Low E glass
  - Argon or Krypton filled
  - 30-year replacement warranty
  - Installed per manufacturer's guideline to provided tightness seal and vapor barrier





## Ground Coupled Heat Pumps

A typical example of many large ground coupled heat pump projects constructed at Fort Knox. This 5-building complex (140K ft<sup>2</sup>) was disconnected from natural gas and connected to a geothermal ground coupled heat pump system (containing 130 500-ft deep wells)

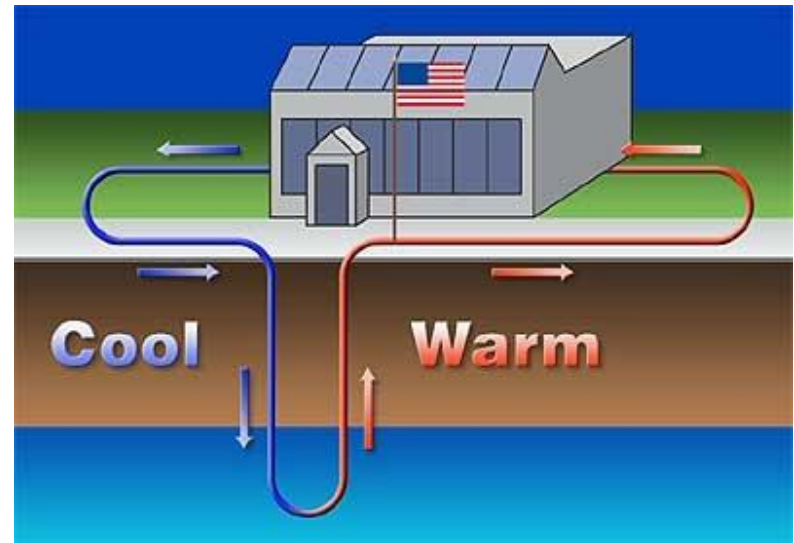




## Ground Coupled Heat Pumps

### Facts:

- ~6 million ft<sup>2</sup> of “eligible” 12 million ft<sup>2</sup> heated and cooled from constant earth temperature
- ~5000 wells (500 ft deep) to couple with the earth temp of 57 F
- ~900 miles of underground piping
- 3 leaks in system in 9 years, fixed by installer
- HVAC-automation team  
Nolin/Harshaw-Trane





## Benefit to Converting Buildings to Ground Coupled HVAC

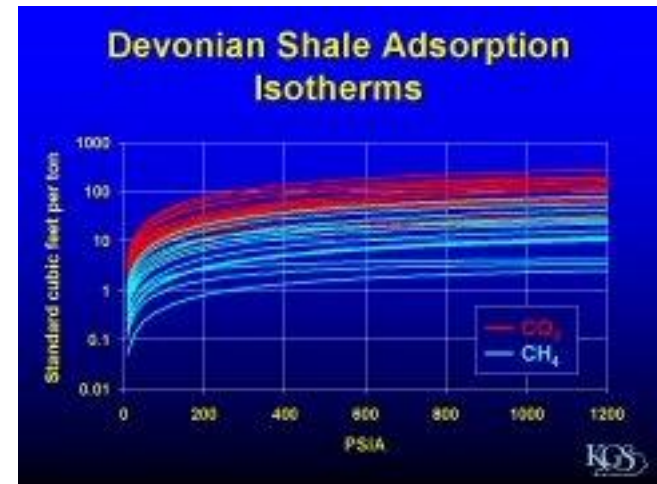
- Improved energy efficiency
- Improved indoor air quality
  - Providing the correct amount of ventilation
  - More comfortable and productive working conditions
  - Significant component to mold elimination
- Smaller carbon footprint
- Sustainable performance
- Reduced cooling tower and boiler water usage due to implementation of geothermal systems





## Renewable Methane Gas

- Drill renewable energy from below Fort Knox that is trapped within the Devonian Shale
- Entire project conceived and accomplished at no cost to the government
- Gas production began in January 2009
- Gas price is indexed to 86% of the NYMEX spot price
  - Government saves transportation and marketing fees
  - Government has a pricing cap of \$11.00 per MCF
- Provides enough gas for entire summertime load





## Renewable Methane Gas





# New Initiatives/ Research and Development (R&D)



# FORT KNOX ENERGY INITIATIVES BRIEF



## ENERGY DASHBOARD



- Fort Knox met smart metering requirements in 2009
- Metered data analysis supported by TRANE Intelligent Services software
- Allows instantaneous review of Bldg Energy Performance against baselines
- Minimizes energy waste by flagging poor performing bldgs for immediate action



# FORT KNOX ENERGY INITIATIVES



## Maple Ridge Housing

Housing partner installing ground coupled heat pumps in new construction.



# FORT KNOX ENERGY INITIATIVES BRIEF



## Results



## Program Results

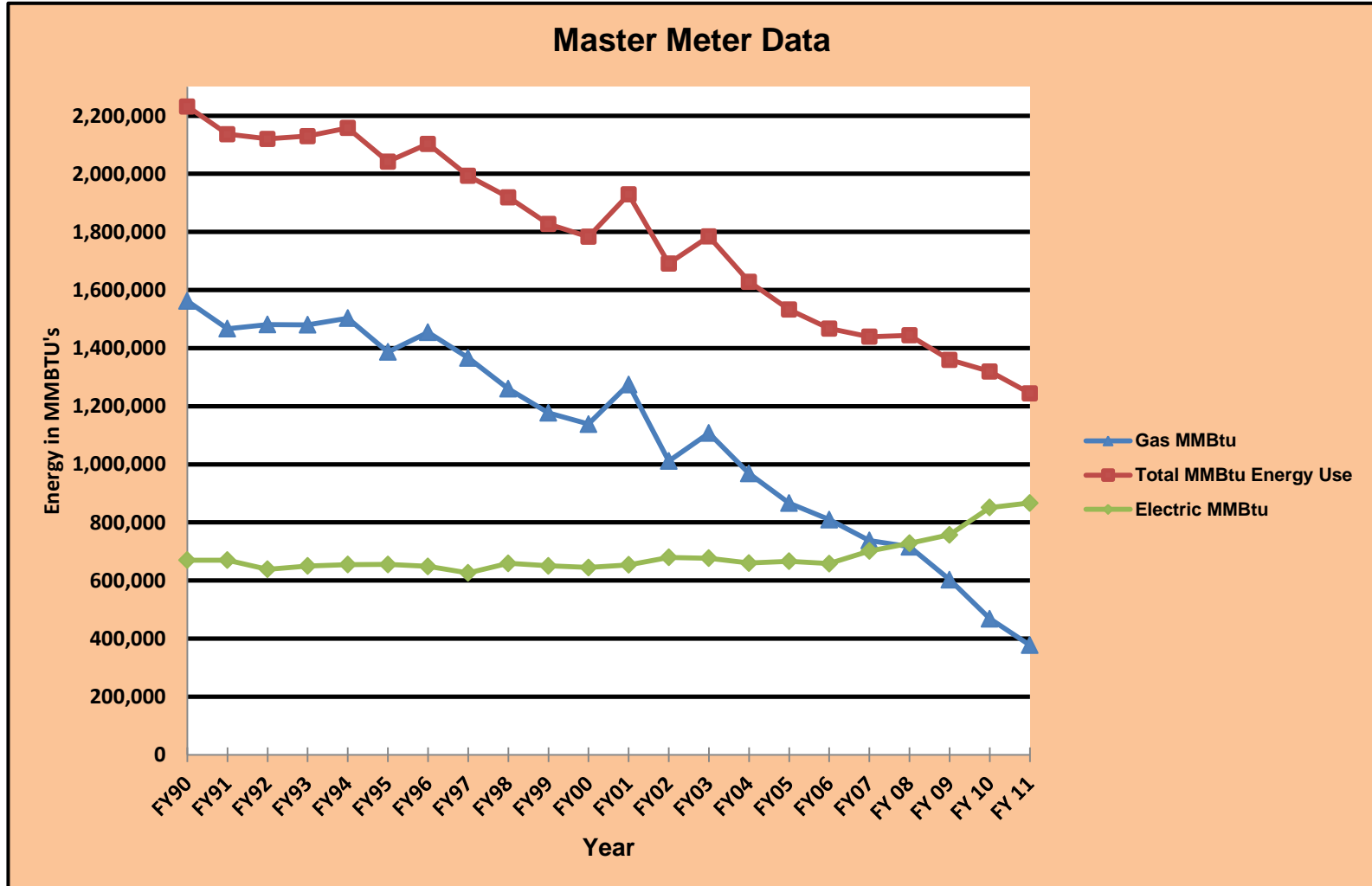
- Improved comfort measured by decreased comfort complaints
  - Comfort complaints have been reduced by more than 90%
- Decreased energy consumption
  - Total energy consumption decreased 36% from 1990 baseline
- Annually saves Fort Knox over \$10 million due to energy initiatives
- Decreased pollutants
  - Geothermal systems have greatly reduced number of boilers
- Reduced maintenance expenditures and extended useful life of HVAC systems. Over 20 MY reduction in Boiler operation and maint personnel.
- Fort Knox has been recognized as a leader within the Army and local community for their energy efficiency practices



# FORT KNOX ENERGY INITIATIVES

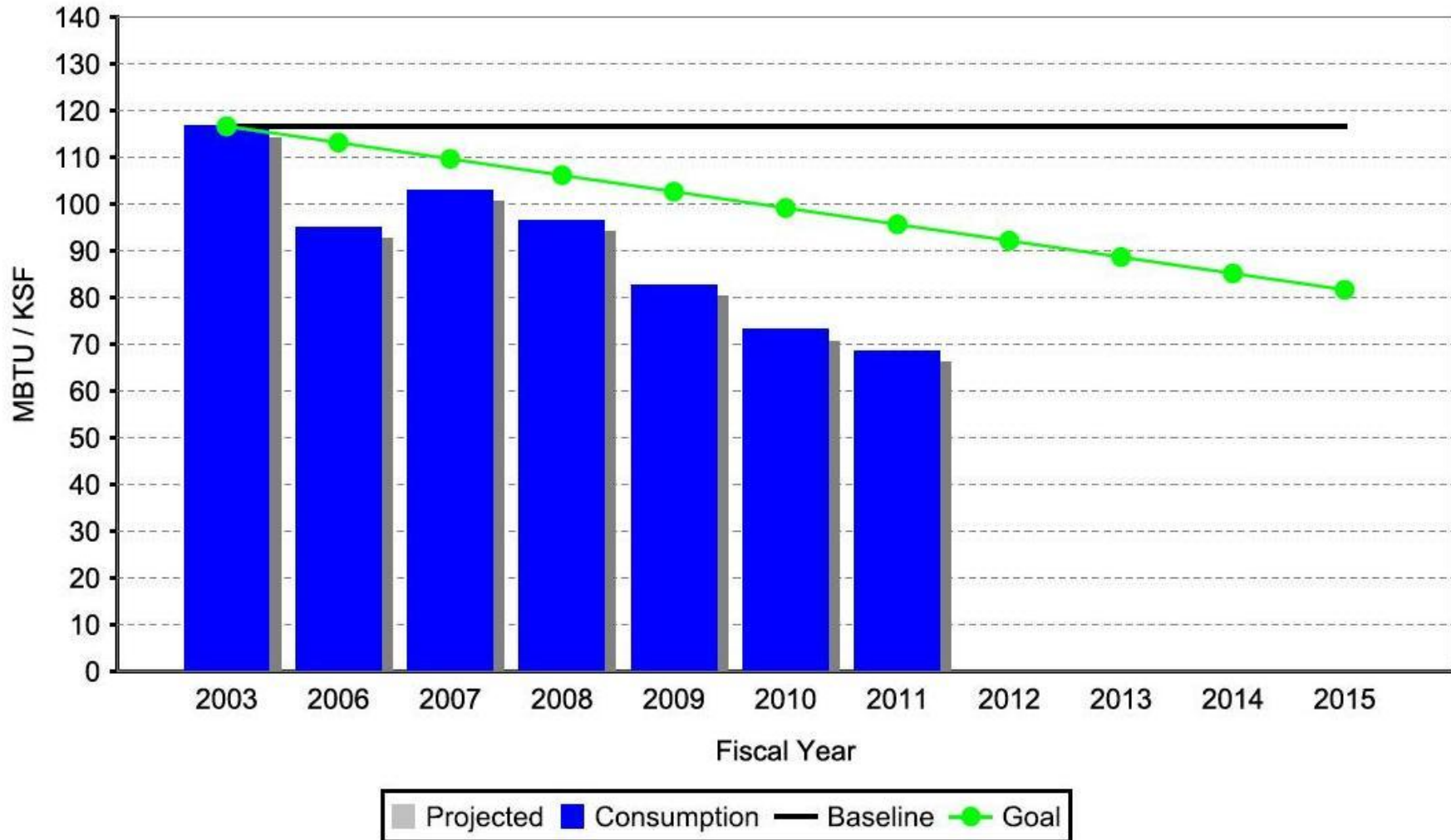


## Master Meter Data





# FORT KNOX ENERGY INITIATIVES





# FORT KNOX ENERGY INITIATIVES



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PLEASE RETURN THIS PORTION WITH YOUR PAYMENT

Summary Account Number	Payment Due Date	Amount Due By Due Date	Previous Balance	Amount Due 3 Days After Due Date	Amount Enclosed
3000-0000-1580	08/24/11	\$1,421,040.00	\$0.00	\$1,435,270.53	\$

Contact Phone # (502) 624-8358

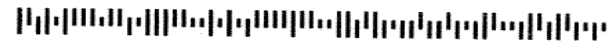
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ATLANTA, GA 30353-8612

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ATTN: GARY MEREDITH  
BLDG 1110 125 SIXTH AVE / ENERGY  
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## Our Second Largest bill on Post behind the labor bill !!



## End of Brief

# INSTALLATION MANAGEMENT COMMAND



***“Sustain, Support and Defend”***