

# Charting a Course to Energy Independence

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## Multiple Renewables at FCC Petersburg

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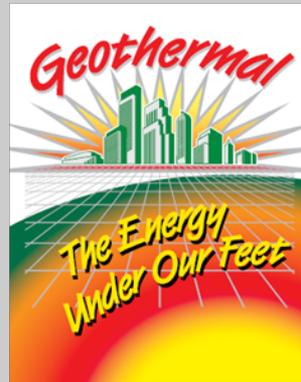


# Overview

FCC Petersburg will soon be utilizing energy from three different renewable resources:



Biomass



Geothermal



Solar



# FCC Petersburg

- Located in Hopewell, Virginia (30 miles south of Richmond)
- 36 Buildings – 1,015,300 square feet
- Scope – Medium Security Compound, Low Security Compound, Camp Compound and various other buildings “outside the fence” including the Central Utility Plant





# Contracting Mechanism

- Comprehensive ESPC Project under DOE Super ESPC Regional Contract
- 16-year term allows bundling ECMs with long & short paybacks
- 12 ECMs – others included chiller upgrades, steam system upgrades, laundry improvements, controls, lighting, water savings, all-electric patrol vehicles and advanced metering
- ESCO Partner: Constellation Energy



# Biomass Boiler

## ECM Overview

- 350 HP biomass steam boiler
- Fired on wood chips
- Connects to central energy plant and will run as base load during heating season
- Operated by FBOP with technical support from Constellation





# Biomass Boiler

## Fuel Procurement & Operations

- Contractor responsible for locating, ordering and paying for fuel
- 6,800 tons per year expected
- BOP responsible for daily operations
- Intended as training for inmates
- Operational Support – Contractor will employ a technician to support renewable energy systems, and automated controls for the life of the contract.





# Biomass Boiler

## Energy Generation / Savings

- 59,570 Mbtu annual heat production predicted
- \$ 681,906 annual natural gas savings
- 5.4 year simple payback
- Payback would increase to roughly 8 years if cost of biomass fuel and annual operational support from contractor were included.

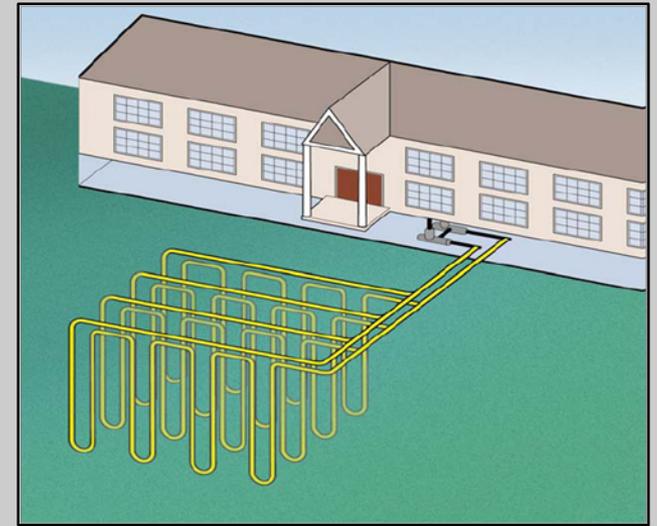
***Message: this ECM stands on its own economically and helps BOP meet its renewable energy goals***



# Geothermal Heat Pump

## ECM Overview

- Install 45 tons of cooling capacity GHP units for Gym at Low Security Complex
- System has 48 boreholes at 175 foot depth
- End use equipment is 3 X 15 ton McQuay Heat Pumps
- Use renewable energy for heating and cooling instead of fossil fuel heating and cooling systems





# Geothermal Heat Pump

## Energy Generation / Savings

- 754 MBtu/ in natural gas savings annual production predicted
- Additional electric 30,597 kWh/yr
- 649 MBtu net energy savings
- \$7,829 annual cost savings
- 60 year simple payback

*Message: this ECM needed to be bundled with other measures in the ESPC project in order to work*



# Solar PV

## ECM Overview

- 18 kW capacity
- 100+ crystalline panels
- Installed on the roof of the new biomass boiler plant
- Ties into biomass boiler plant electrical infrastructure
- Constellation will support operation and maintenance





# Solar PV

## Energy Generation / Savings

- 21,818 kWh annual production predicted
- \$ 515 annual energy savings
- 391 year simple payback

Ownership stayed with BOP, so no tax credits were claimed.  
No market for RECs in Virginia, so government will retain all credits for solar generation (allows double-counting).

***Message: this ECM really, really needed to be bundled with other measures in order to work***



# Renewable Goal Impact

## FEMP Guidance

- Biomass system entitled under EO 13423 to be scored against FBOP's renewable goals on a kWh equivalent basis for "new renewable" requirement
- Biomass system generates 14,300,000 kWh equivalent of new renewable energy or 70% of the site's electric energy usage
- Geothermal system also eligible for counting against EO 13423 goals for new renewables.
- Solar PV entitled to double credit for both EPACK 05 and EO 13423 goals for on-site generation and use of renewable energy



# Benefits to Government

- Energy Goals – compliance with Executive Orders and legislation
  - ☐ 15% reduction in facility’s energy consumption;
  - ☐ 25% reduction in water consumption;
  - ☐ use of renewable energy systems; and
  - ☐ use of alternative financing
- Improved Conditions – better lighting, plumbing, HVAC, etc., will improve inmate comfort.
- Capital Improvements – total infrastructure upgrades over \$10.6 million with first-year cost savings of \$ 1.4 million. Savings guaranteed and measured annually.
- Operational Support – Constellation will employ a technician to support biomass system, PV system, GHP system, and automated controls.



# Conclusions

- FBOP leader in promoting renewable energy at their facilities
- Many of these are done under ESPC projects
- Allows bundling ECMs with long and short paybacks
- Will have more projects like this in the future



# Contact Information

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