University of Virginia- Heating Plant Boiler #6

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Project Context and Timeline

- Peak Demand
- Master Plan
- MACT vs Reality
- CHP & LTHW Study
- Hot Water Boiler Project
- LTHW Project
UVA Grounds and Planned Growth

- 25 year projected growth
- Master Plan vs Actual
- Record demand in 2015
- Known demand of 340kPPH in 2019
Existing Heat Plant Capacity

Plant Capacity Gap (kPPH)

- **Nameplate**: 431
- **MACT Testing**: 398
- **Reliable**: 320

2019 Need: 431
2015 Max: 341

Max - blue, Firm - orange
Other Influencing Factors

- Existing steam and hot water distribution systems
  - Hot water produced from steam boiler and HXs

- CHP and LTHW Study
  - LTHW is our future
Project Success Criteria

Design

- Innovation
- Schedule
- Cost
Project Success Criteria

Construction

- Safety
- Continuity of Operations
- Schedule
- Cost
Boiler Technology Evaluation

Hot Water Produced From a Steam Boiler

- Combustion/Stack (17%)
- Makeup Heating (5%)
- Blowdown (3%)
- Deaerator Venting (1%)
- Heat Exchanger (1%)
- Hot Water Generated (73%)
Boiler Technology Evaluation

Hot Water Produced from a Hot Water Boiler

- Combustion/Stack (17%)
- Hot Water Generated (83%)
Boiler Selection

Existing Steam Boilers

- 112.5 MMBtu Input Capacity
- 83 MMBtu Output (Hot Water)

New Hot Water Boiler

- 100 MMBtu Input Capacity
- 83 MMBtu Output (Hot Water)

***CEMS Not Required***
Boiler Technology Evaluation

Hot Water Boiler
- Lower Construction Cost
- Higher Efficiency
- Fewer Greenhouse Gas Emissions

$12M in life cycle cost savings
Design For Constructability
Design For Constructability
Victory Boiler Design

- Designed for Hot Water
- 4:1 Turndown on Water
- 10:1 Burner Firing
- Dual Fuel
- Flexible Delta-T –40°F to 100°F
- 83% Efficiency
- Integral Finned Design
Victory Boiler Design

- Membrane Wall
- Fully Welded
- Rigid base frame
- Custom Modular Design
Victory Boiler Design

- Shop Fabricated Modules Require Fewer Field Welds than Stick Built Design
- Opposed Header Design with Tubes Perpendicular to Gas Path
Vision Burner
Vision Burner

Main (85 % of gas) Pre-mixed flame

Center core (15 % of gas) Diffusion flame
Construction

Challenges:

- Tight material handling path
Construction

Challenges:
- Continuity of Operations
- Limited Laydown
Installation Sequence

- Pre-Position Breeching
- Assemble Modules from Rear to Front
- Hydro Test
- Install Burner, Insulation and Ancillary Components
Stack Connections

- 48” double wall
- 110 Ton. Crane
Stack Connection
Stack Connection

Use of Bypass "Stubby" Stack
Final Construction

Successes

- Zero Lost Time Accidents
- Met GMP for the Project
- Completed ahead of schedule
- Single Point-of-Contact
Questions?

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