University of Virginia- Heating Plant Boiler #6

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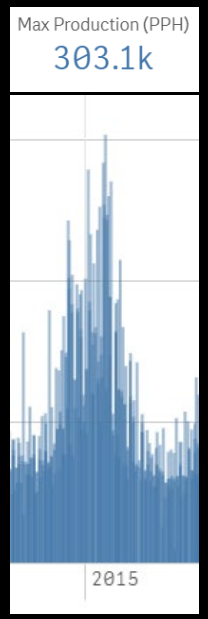
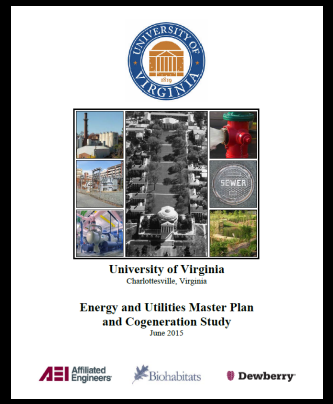
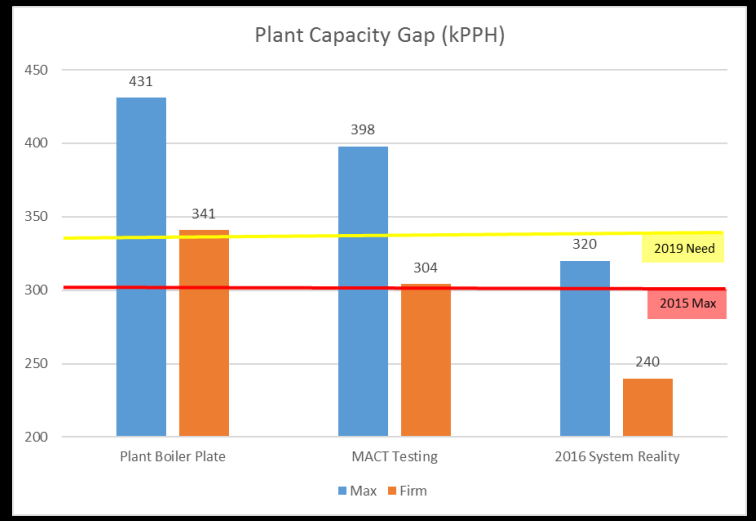
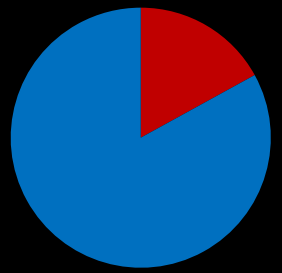
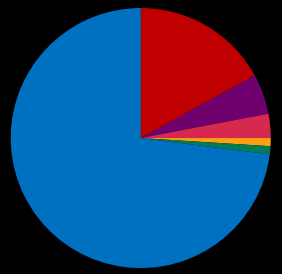
Project Context and Timeline

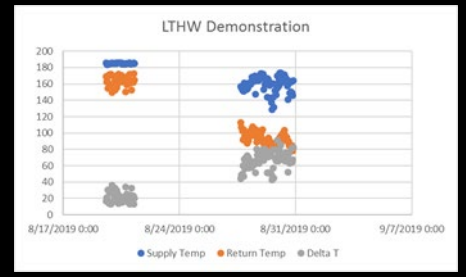












2015 | 2016 | 2017 - 2019 | 2018 - 2023

Peak Demand

Master Plan

MACT vs Reality

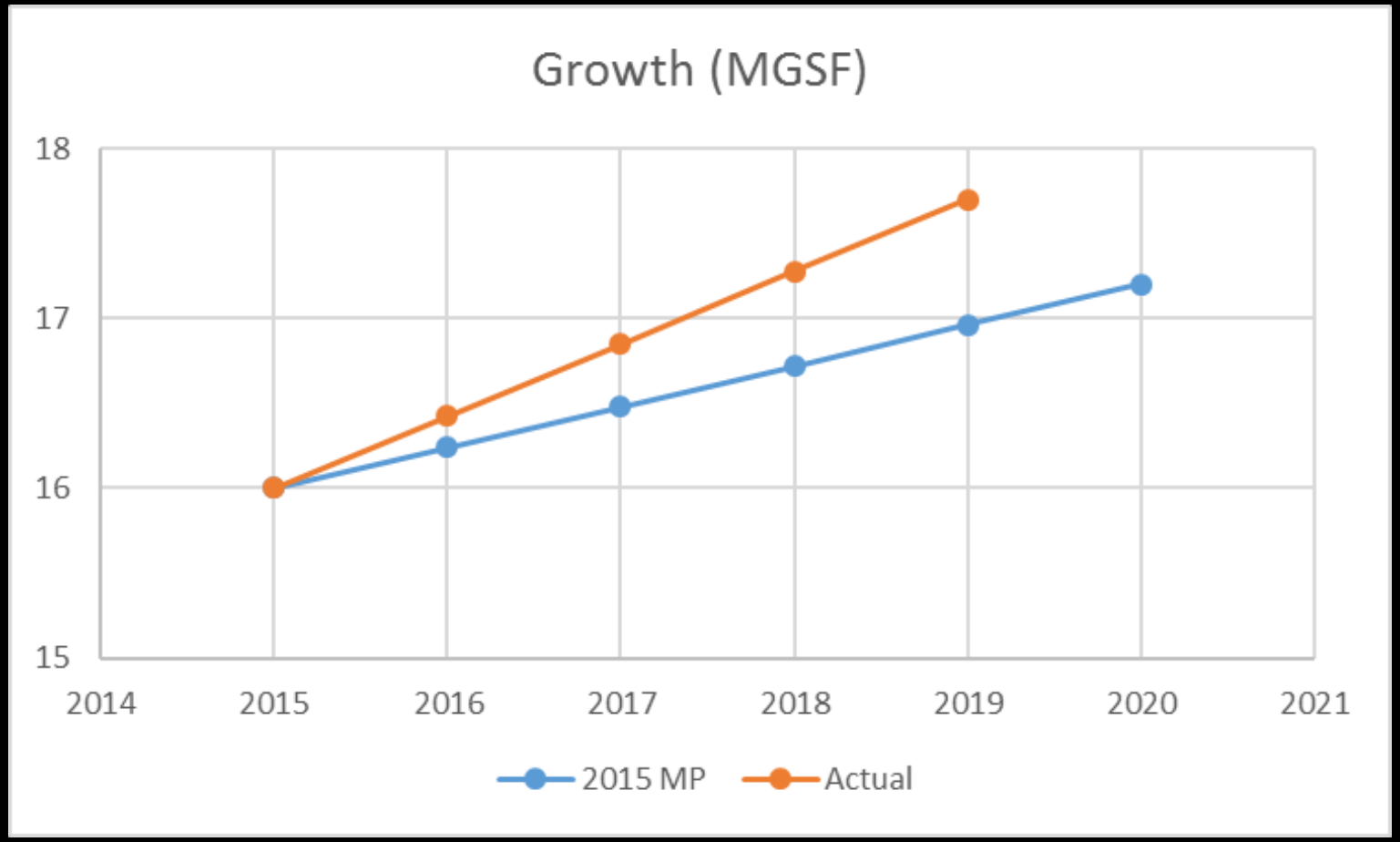
CHP & LTHW Study

Hot Water Boiler Project

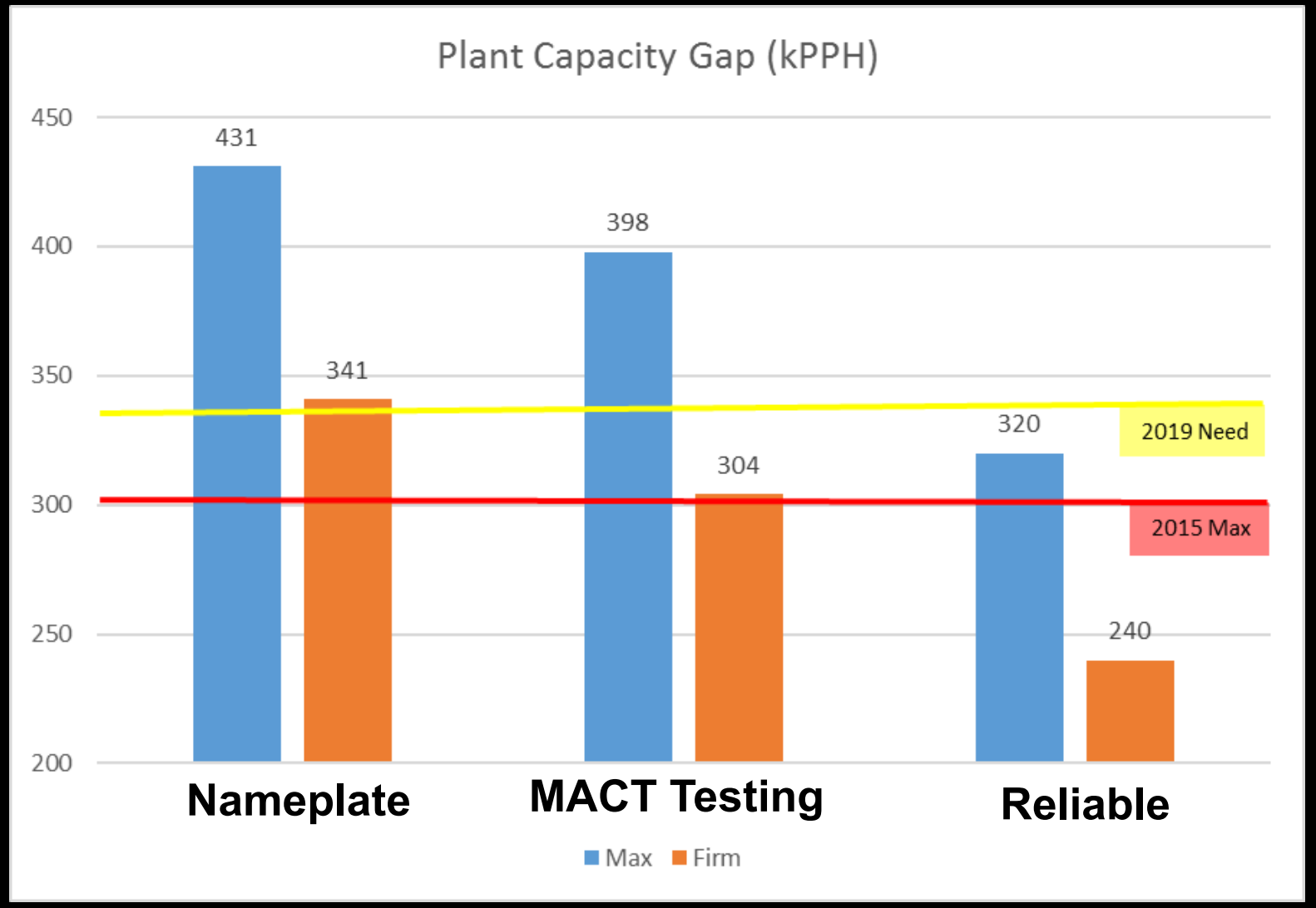
LTHW Project

UVA Grounds and Planned Growth

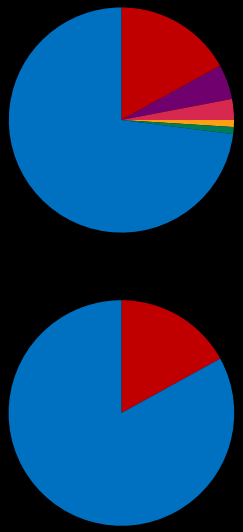
- 25 year projected growth
- Master Plan vs Actual
- Record demand in 2015
- Known demand of 340kPPH in 2019



Existing Heat Plant Capacity

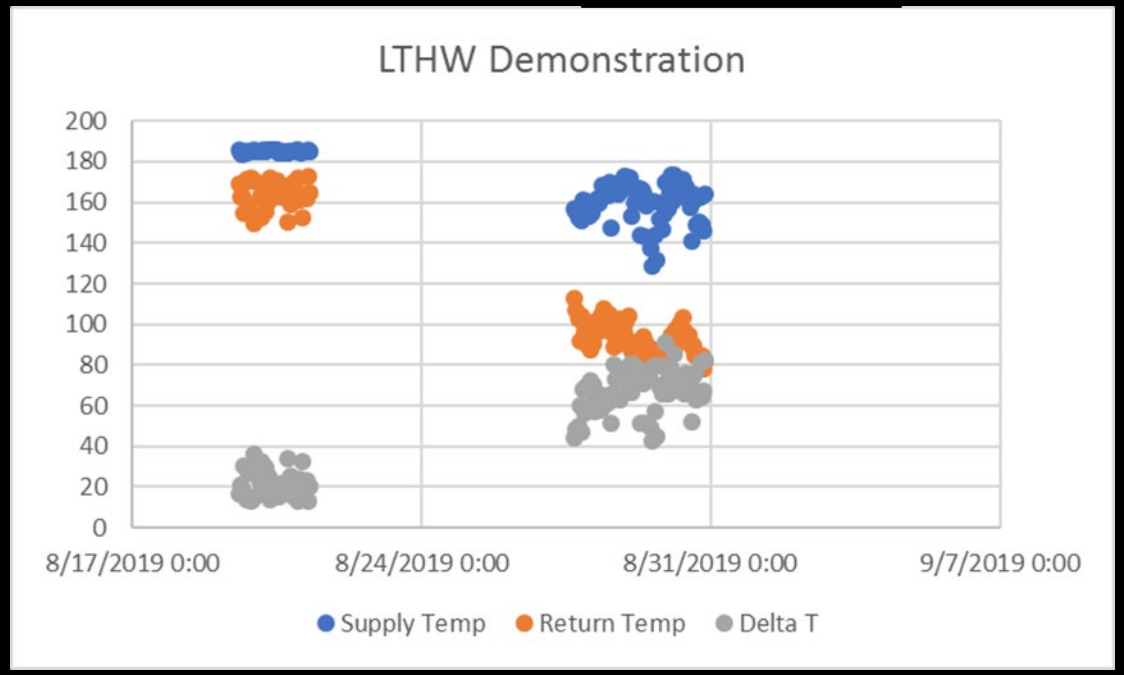


Other Influencing Factors



Steam to Hot Water Conversion

- 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

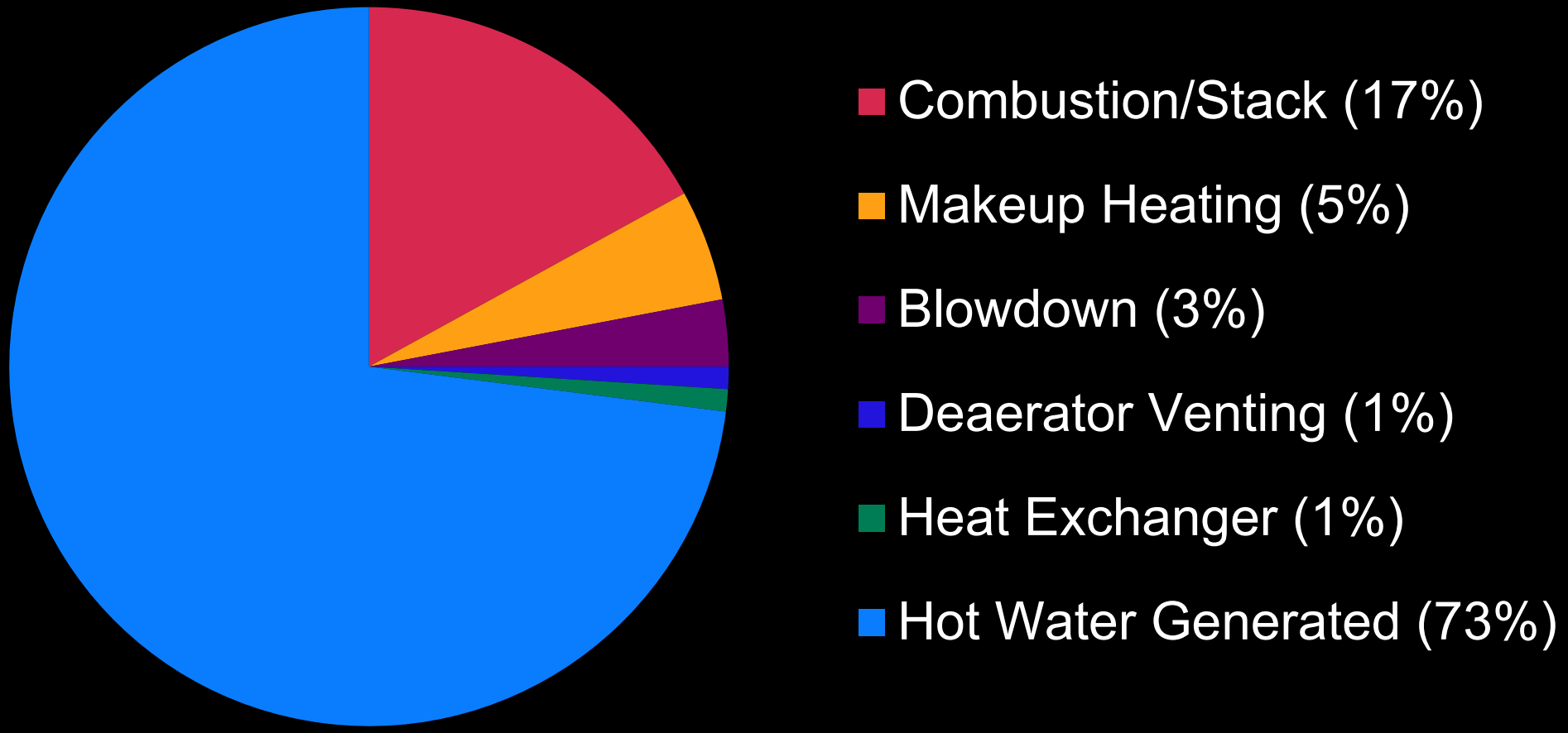
Project Success Criteria

Construction

- Safety
- Continuity of Operations
- Schedule
- Cost

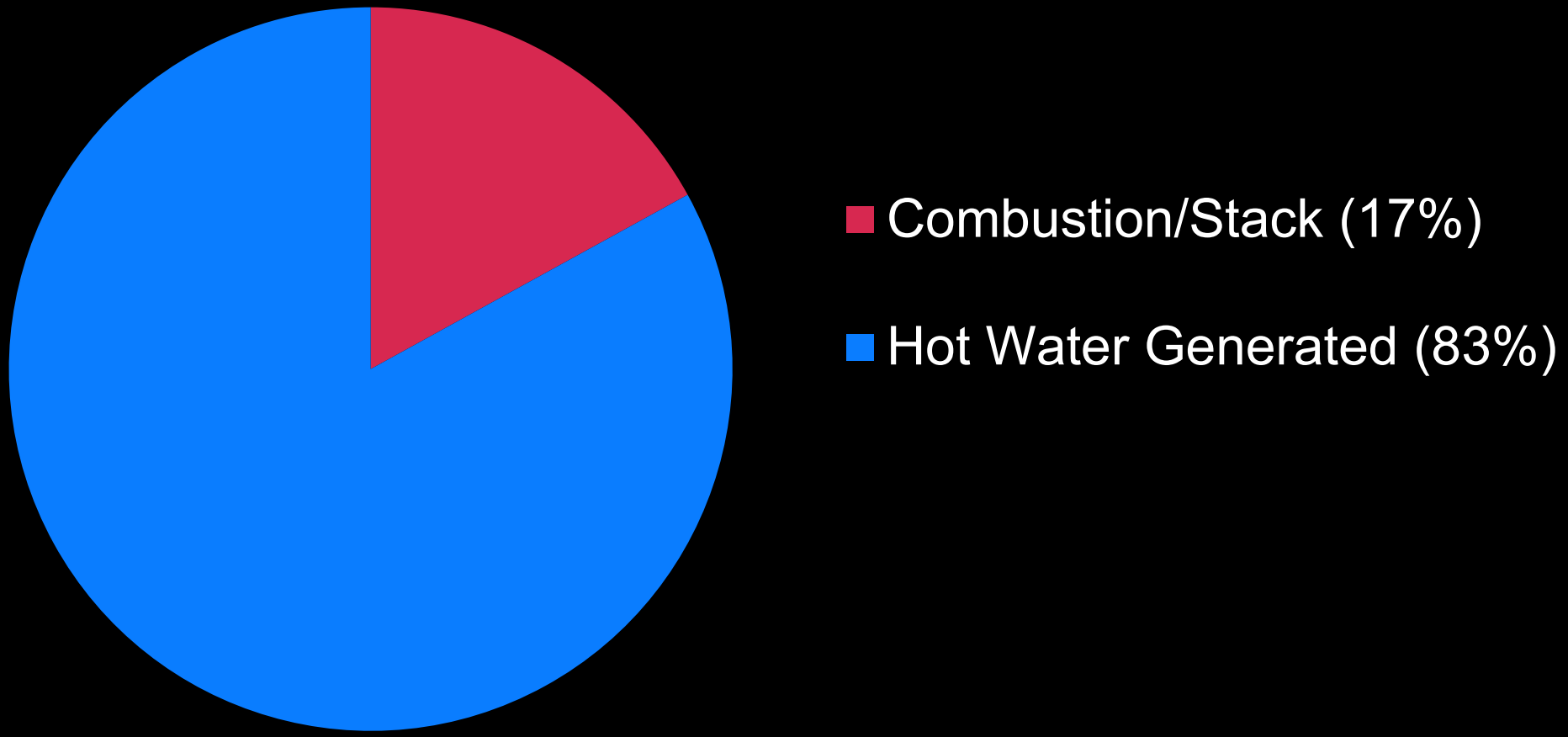
Boiler Technology Evaluation

Hot Water Produced From a **Steam Boiler**



Boiler Technology Evaluation

Hot Water Produced from a **Hot Water Boiler**



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****

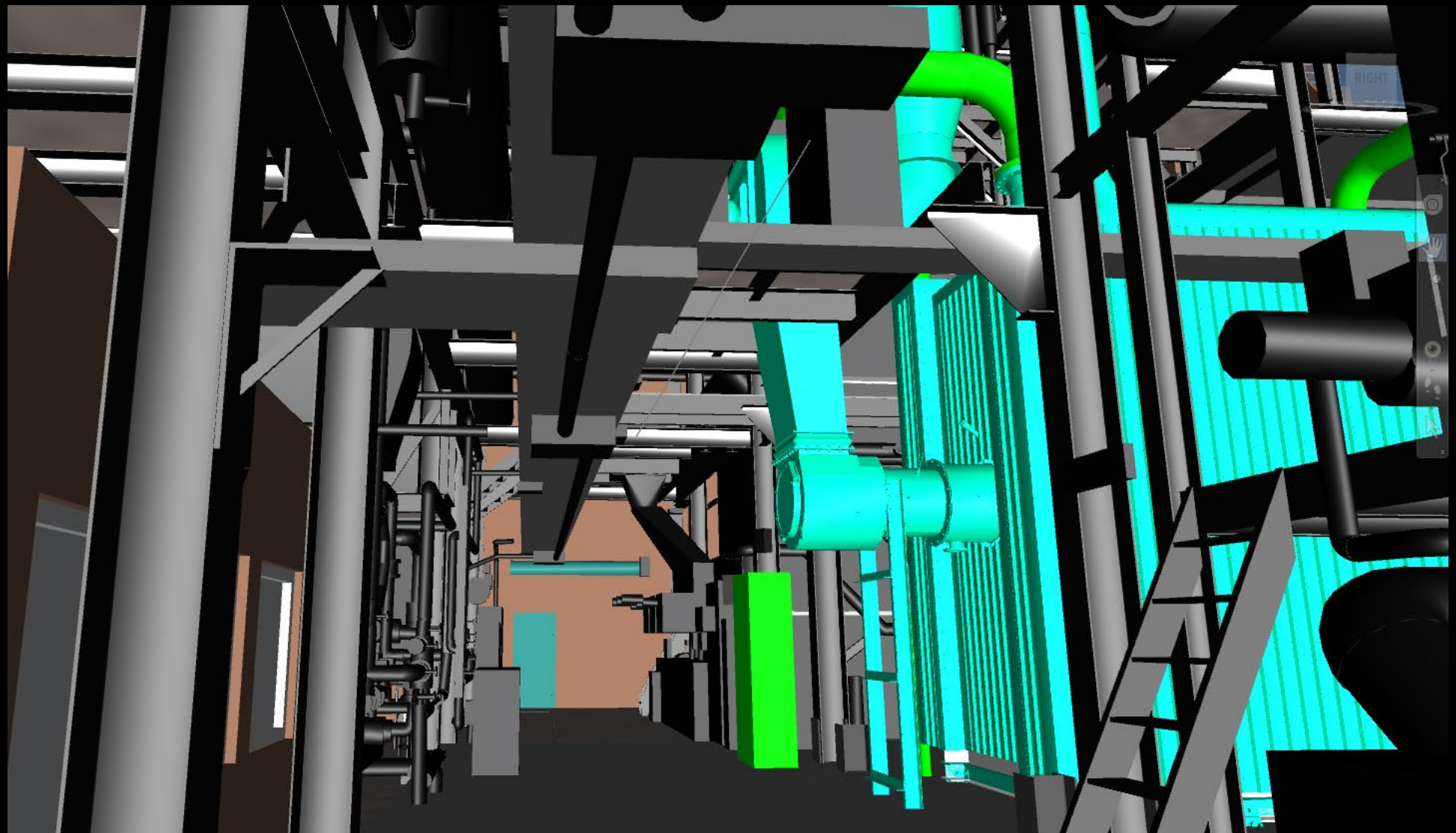
Boiler Technology Evaluation

Hot **Water** Boiler

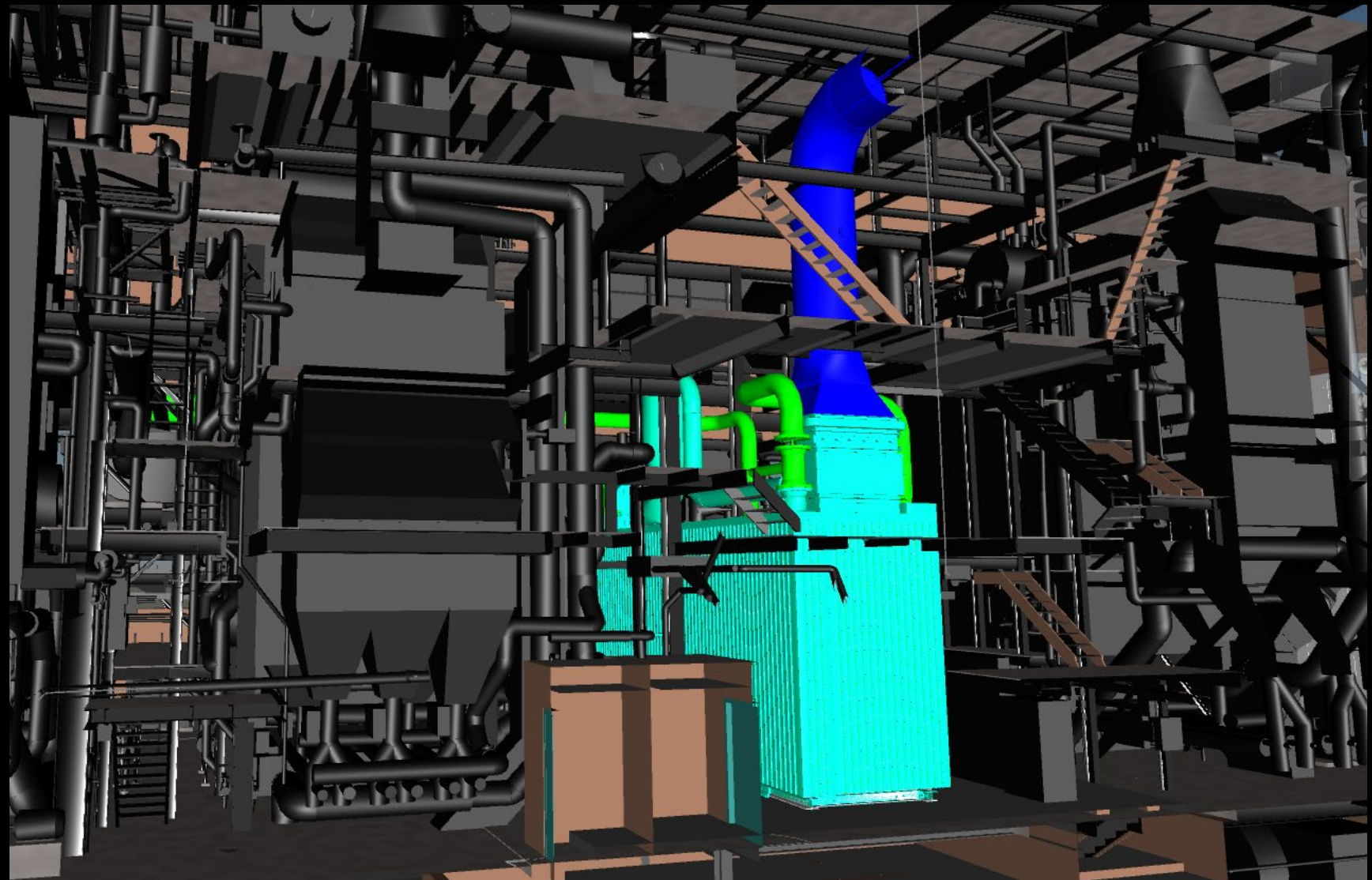
- Lower Construction Cost
- Higher Efficiency
- Fewer Greenhouse Gas Emissions

$12M in life cycle cost savings

Design For Constructability



Design For Constructability



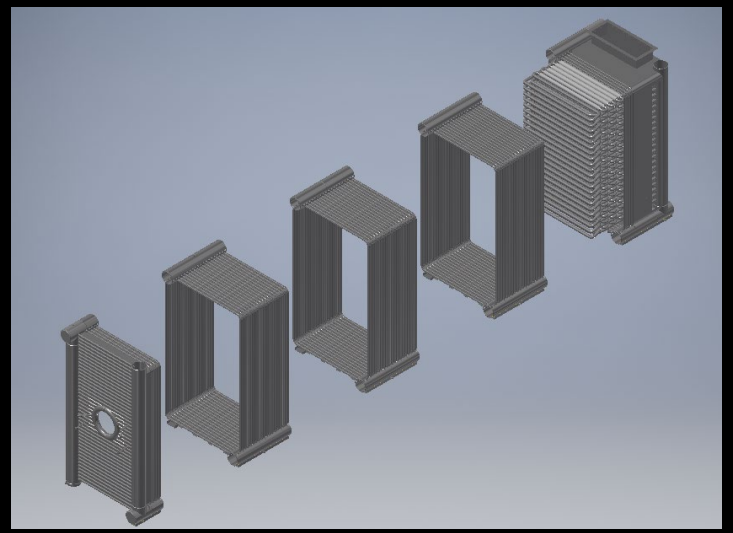
Victory Boiler Design

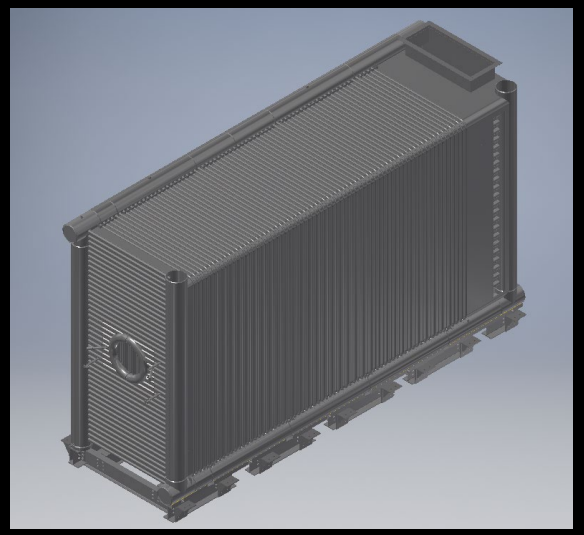
- Designed for Hot Water
- 4:1 Turndown on Water
- 10:1 Burner Firing
- Dual Fuel
- Flexible Delta-T
  –40°F to 100°F
- 83% Efficiency
- Integral Finned Design

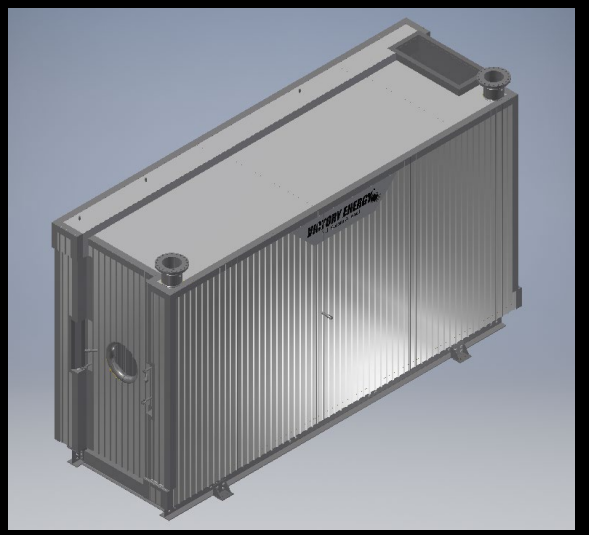
Victory Boiler Design

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

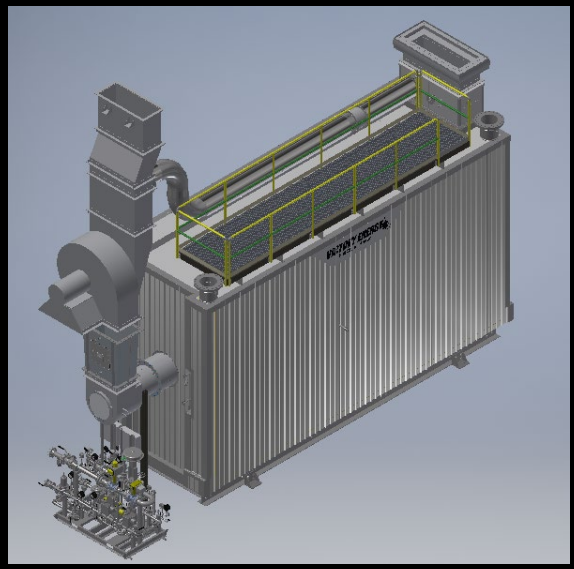
Victory Boiler Design



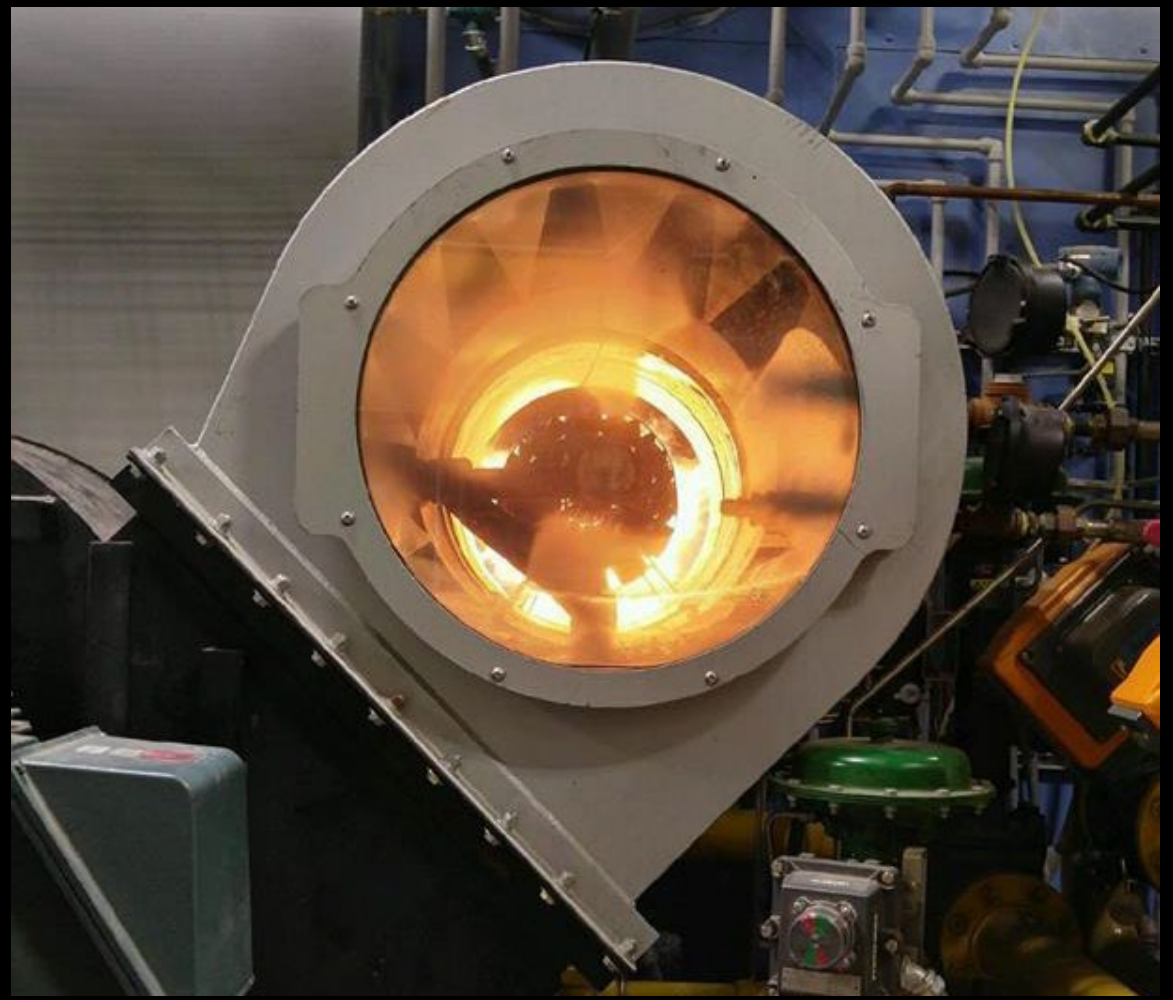




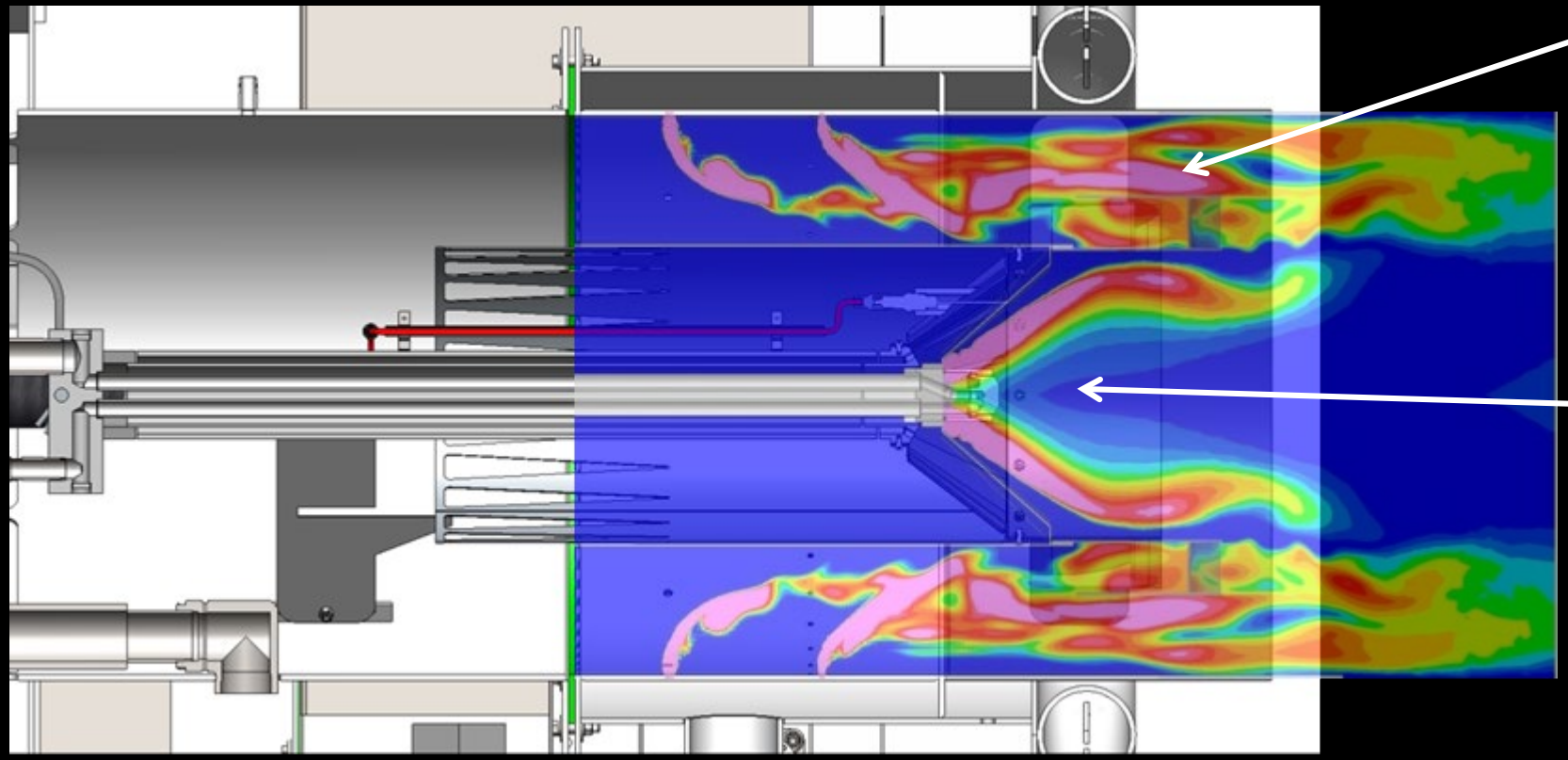
- Shop Fabricated Modules Require Fewer Field Welds than Stick Built Design
- Opposed Header Design with Tubes Perpendicular to Gas Path



Vision Burner



Vision Burner



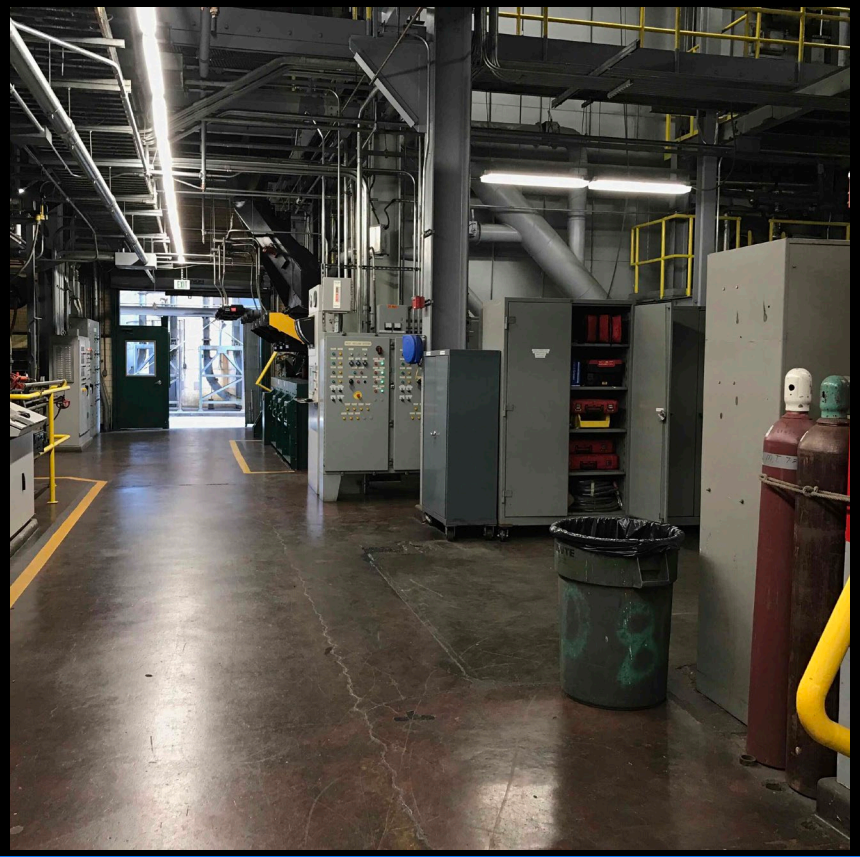
Main (85 % of gas)
Pre-mixed flame

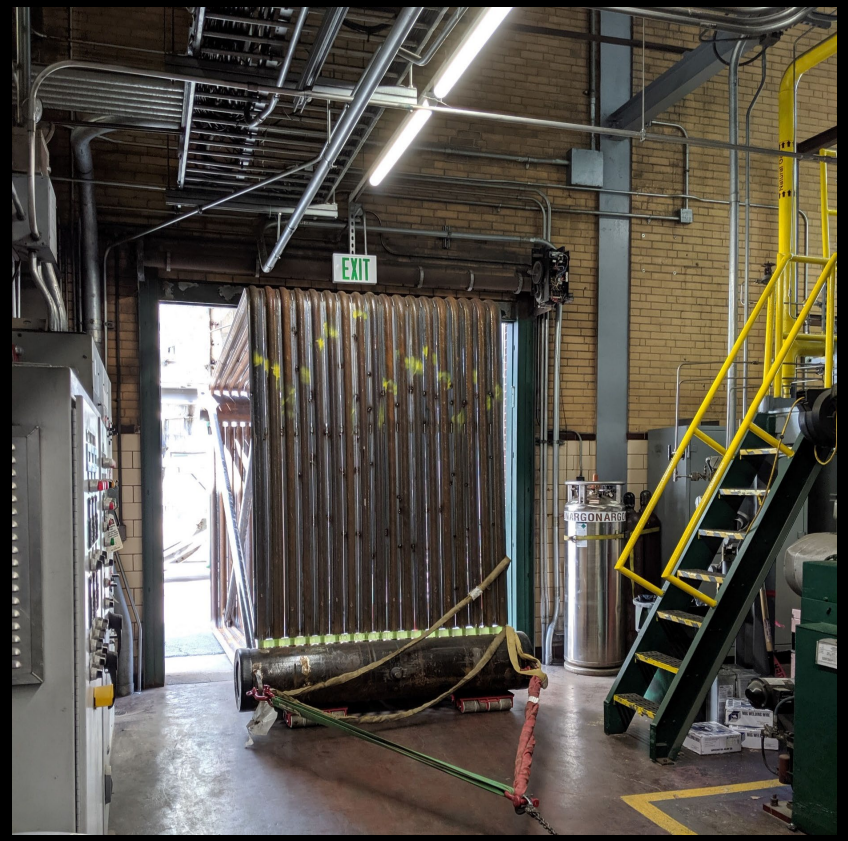
Center core
(15 % of gas)
Diffusion flame

Construction

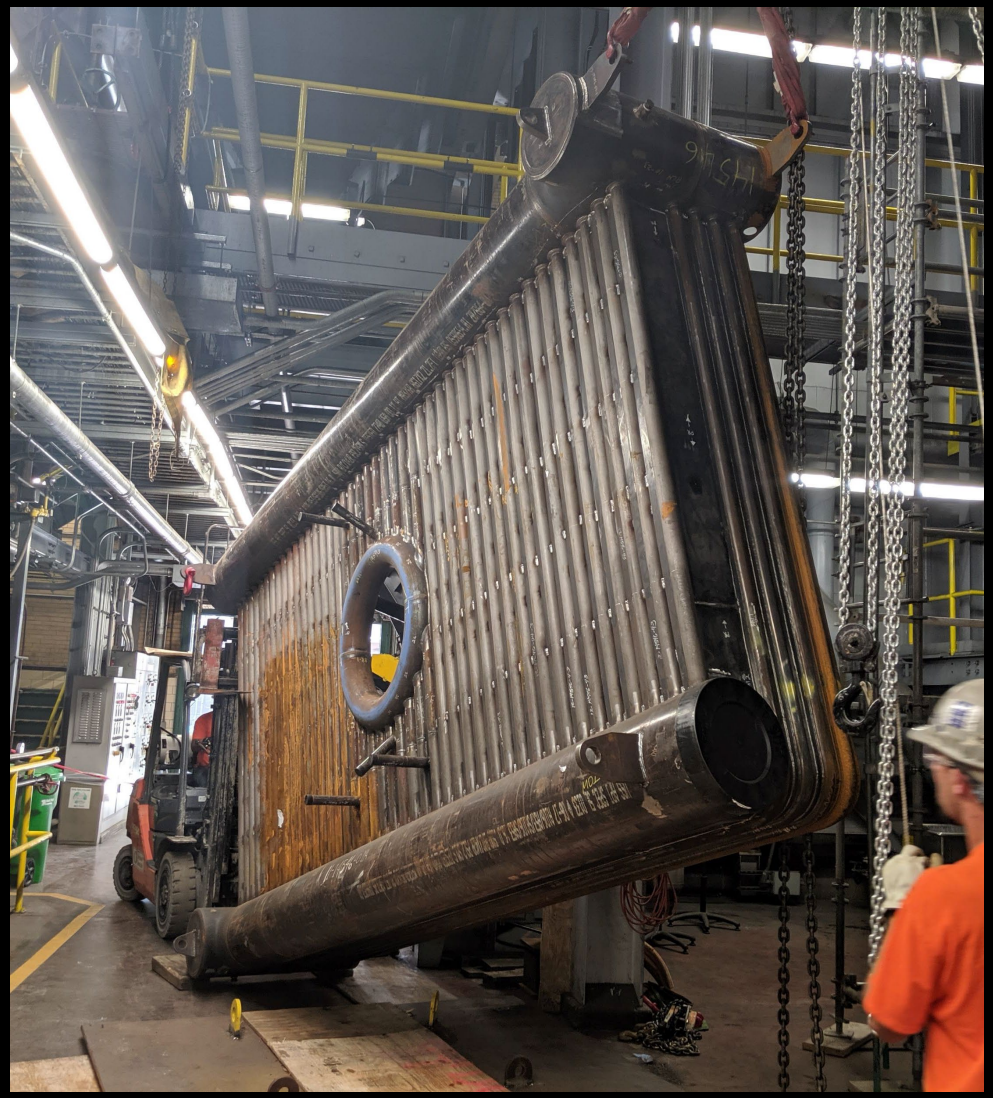
Challenges:

- Tight material handling path





Construction



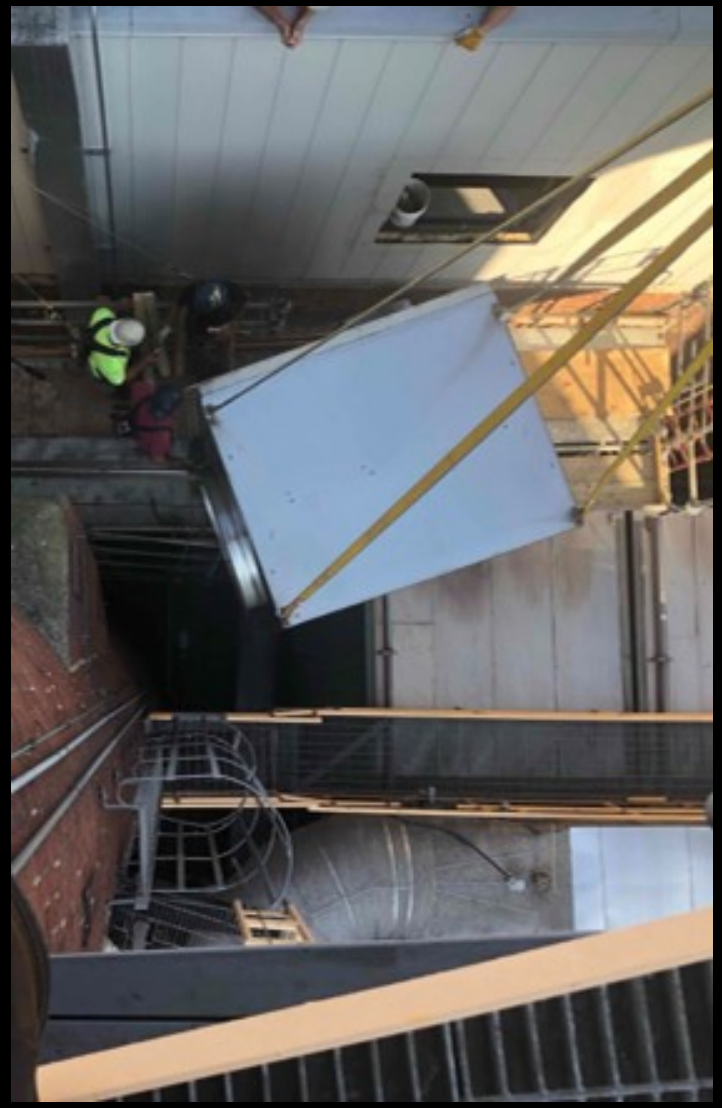
Challenges:

- Continuity of Operations
- Limited Laydown

Installation Sequence

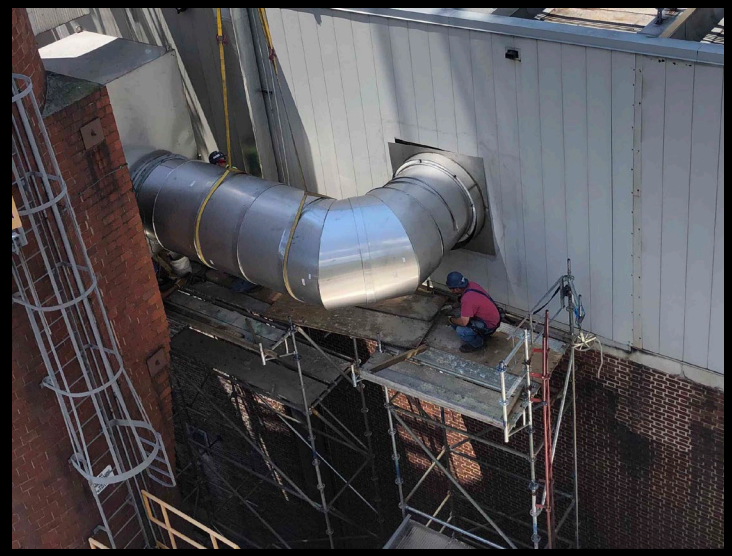
- Pre-Position Breeching
- Assemble Modules from Rear to Front
- Hydro Test
- Install Burner, Insulation and Ancillary Components

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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