
CampusEnergy2021
BRIDGE TO THE FUTURE
Feb. 16-18 | CONNECTING VIRTUALLY
WORKSHOPS | Thermal Distribution: March 2 | Microgrid: March 16

Benefits of Hot Water

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Jacobs
Challenging today.
Reinventing tomorrow.

Q&A Will Not Be Answered Live

Please submit questions in the Q&A box.
The presenters will respond to questions off-line.

Overview

Steam vs Hot Water for Heating

Quick History Lesson

Steam is self motivated…

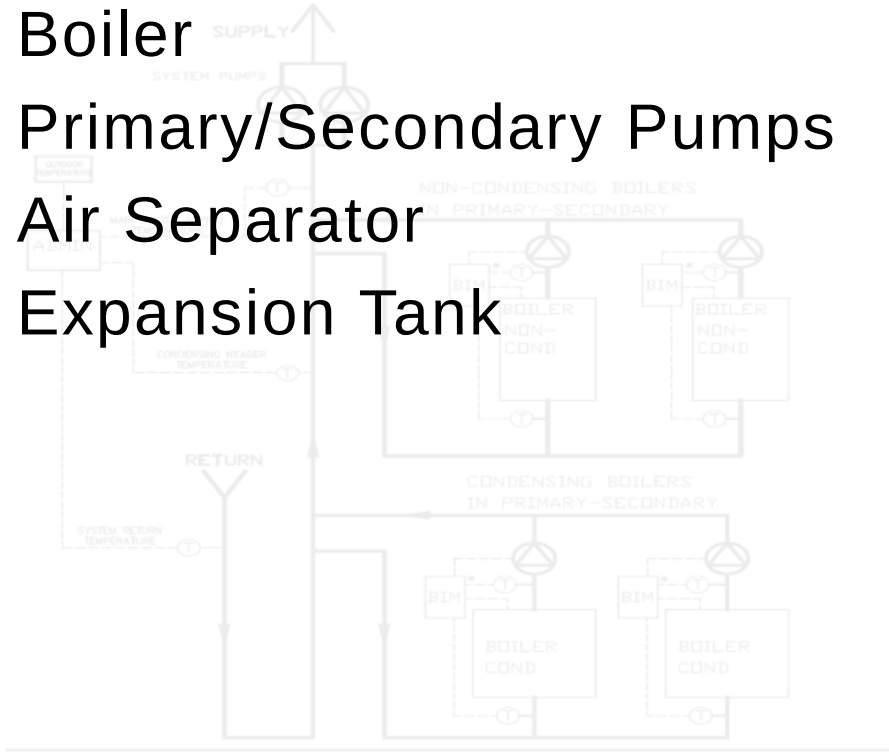
…and controllable

System Advantages: Generation

Steam System

Boiler
Deaerator
Feedwater Pumps
Blowdown Vessel
Flash Tanks
Condensate Receivers
Condensate Pumps
Water Treatment

Hot Water System



Boiler
Primary/Secondary Pumps
Air Separator
Expansion Tank

System Advantages: Generation

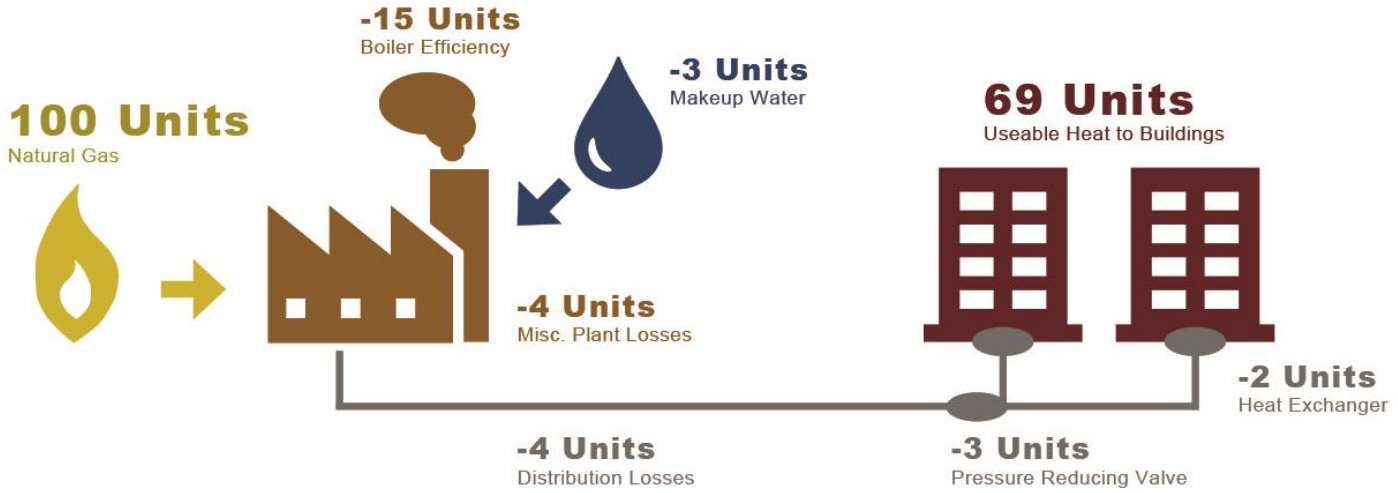
- Increased system efficiency and use of renewable technologies
- Supply water reset control
- Less idle/cycling losses
- Lower conductive losses to ambient
- Little/no make-up water costs
- Lower chemical treatment costs

System Advantages: Distribution

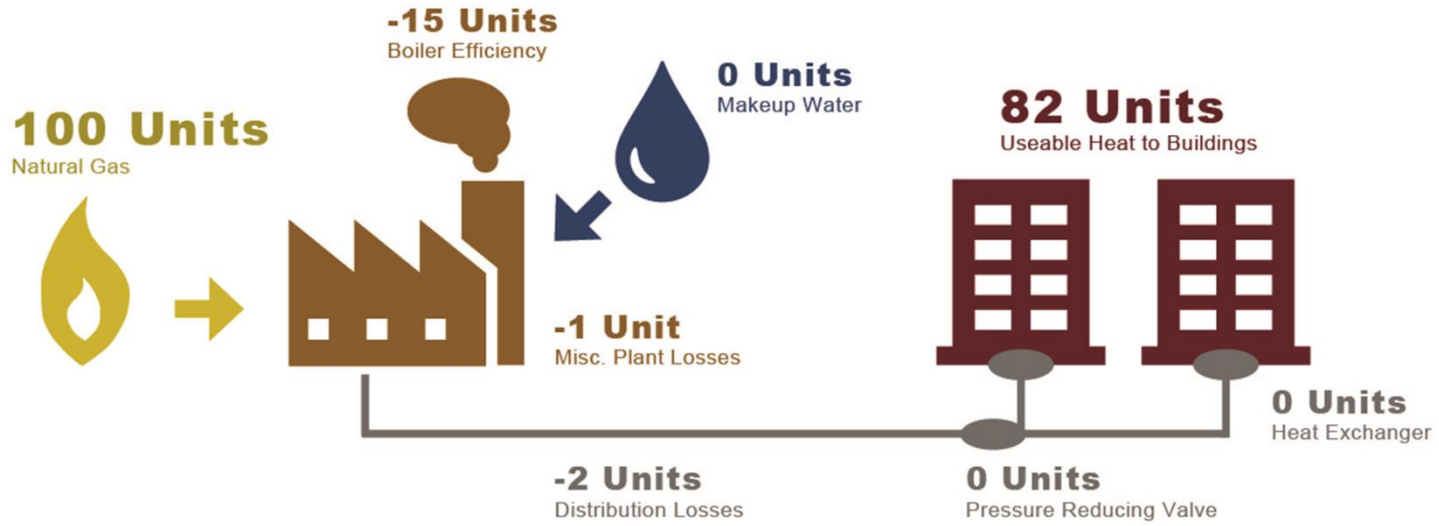
- Reduced distribution losses
- Corrosion potential in condensate return system
- Manholes not required
- Alternative installation methodology
- Safety - system leaks less dangerous
- Pressurized system

Typical System Energy Losses

Steam



Hot Water



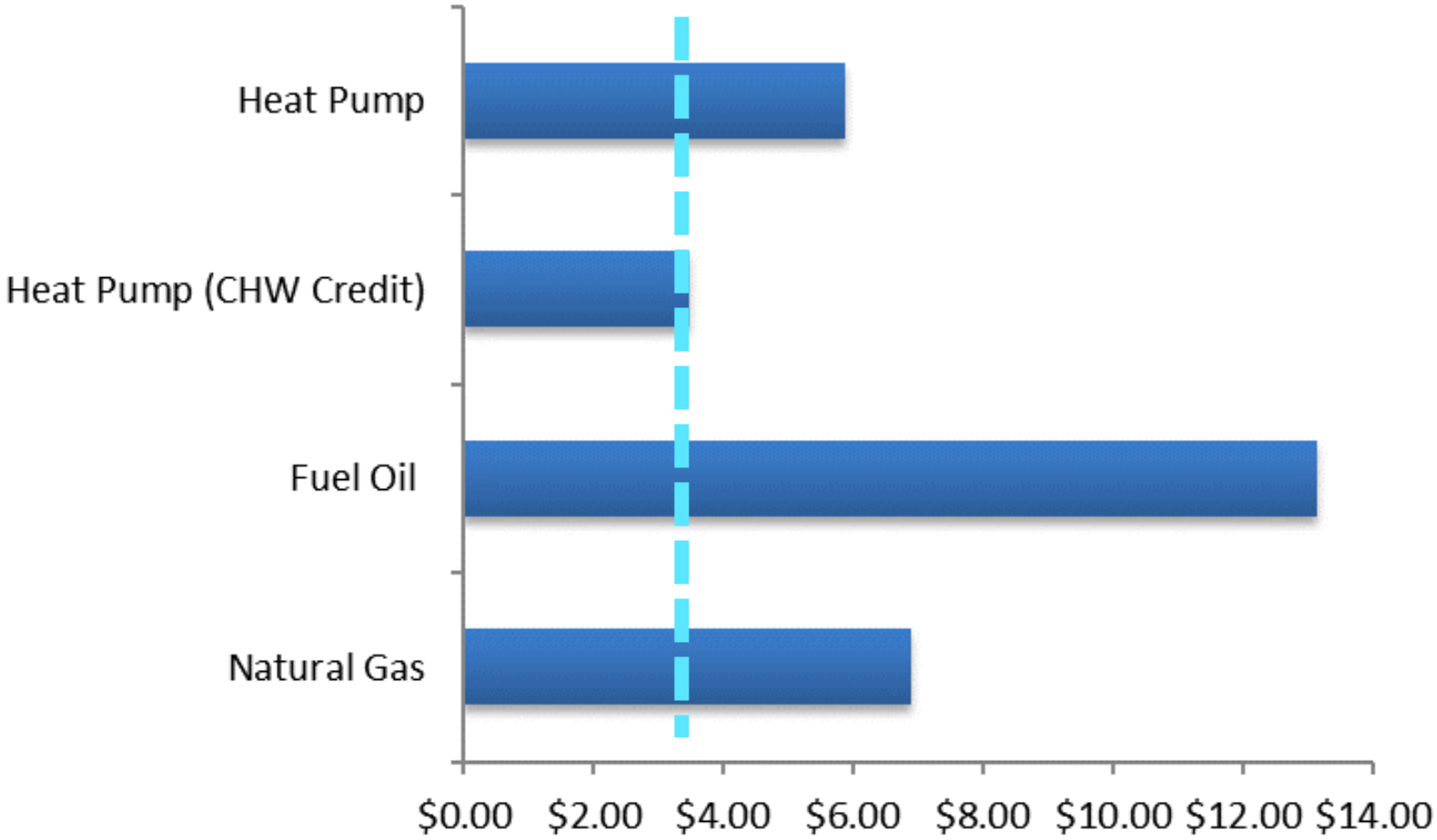
By the Numbers: Distribution Capital Cost

- Reduced installation labor
- Fewer components
- Closer to chilled water installation

Steam	Component	Hot Water
Steel	Piping	PP-RT
Gate	Valves	Butterfly
3	Manholes	0
3	Heat Exchanger	1
$4M	Total	$2.5M

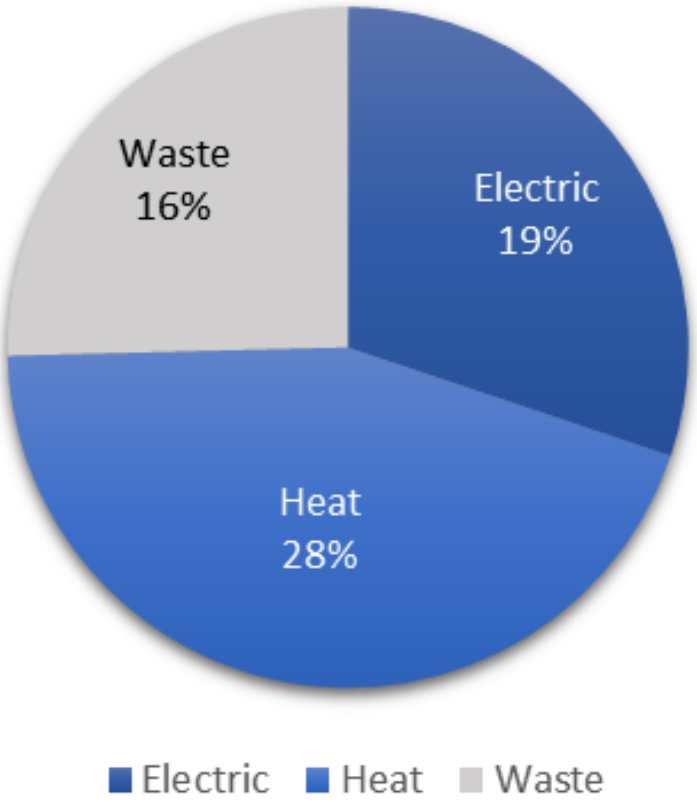
Example: 1000' piping with three buildings

By the Numbers: Production Performance

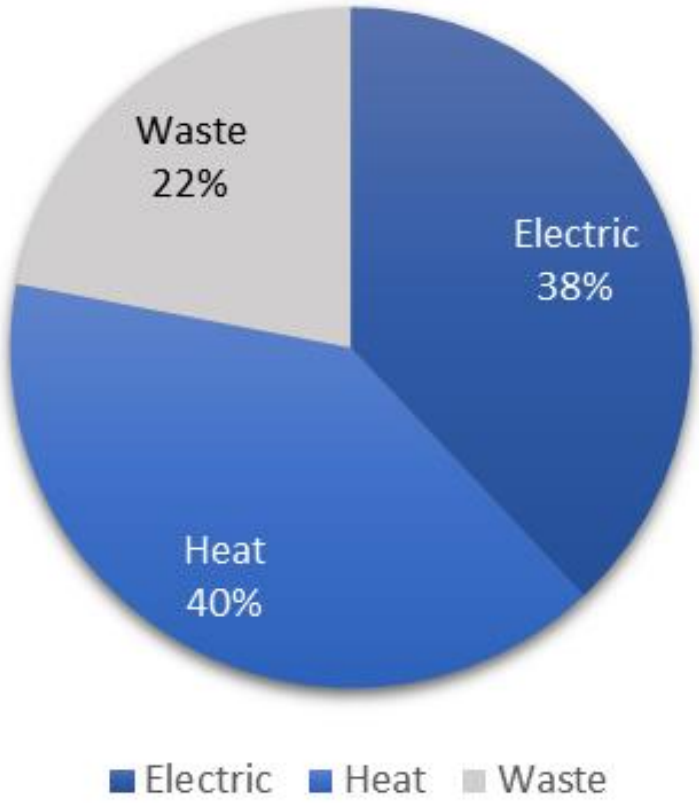


By the Numbers: Production Performance

Steam CHP

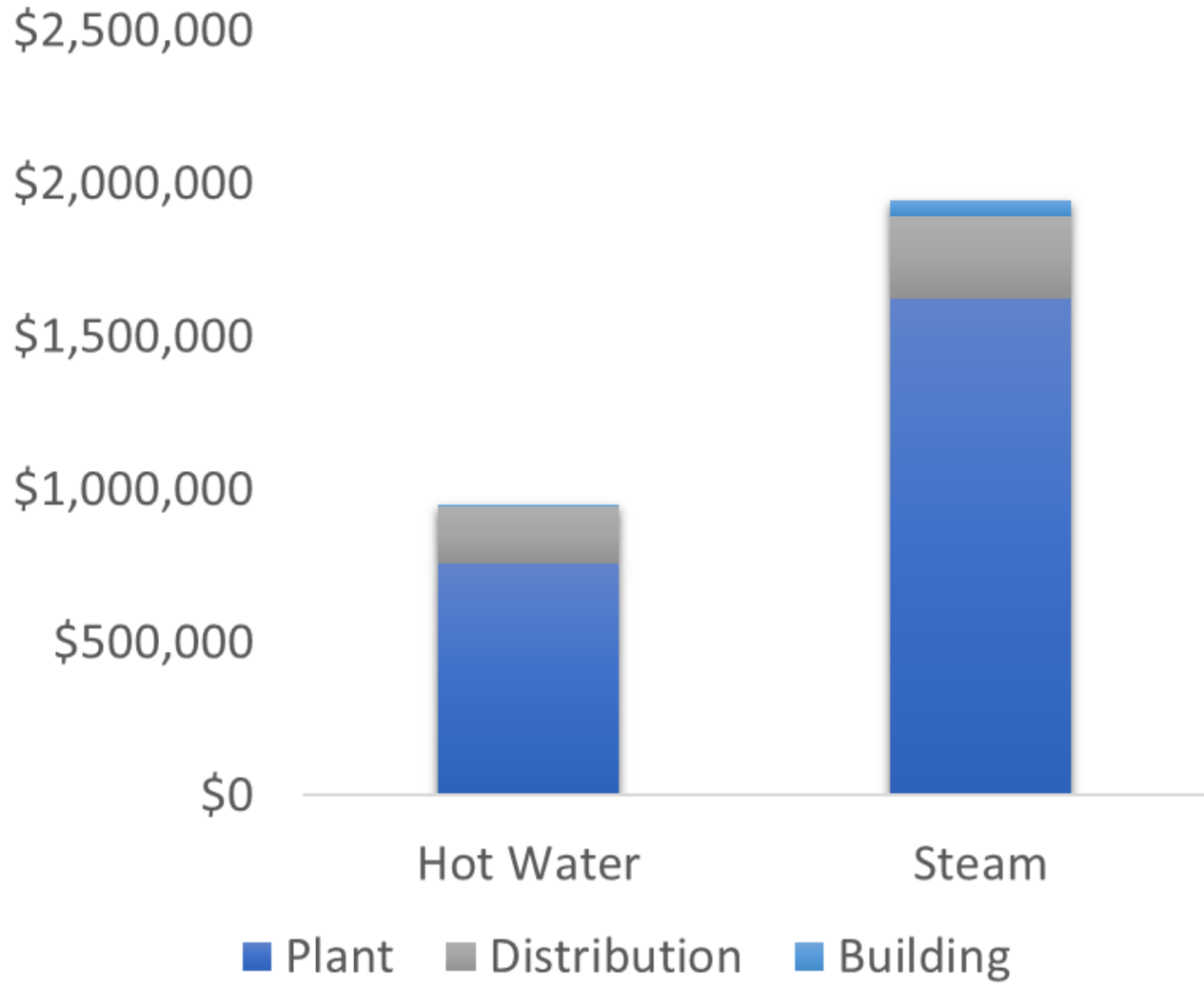


Hot Water CHP

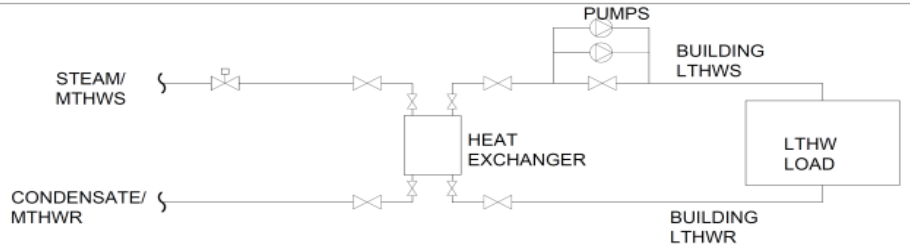
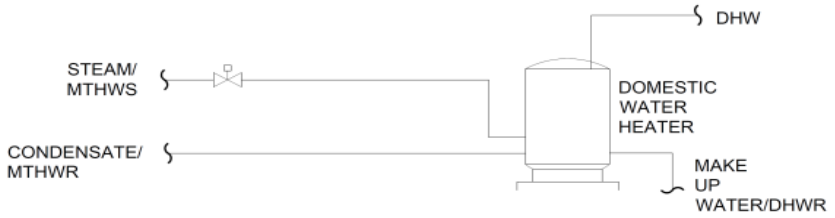
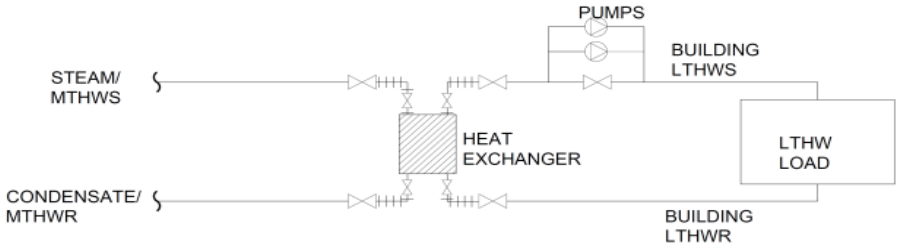
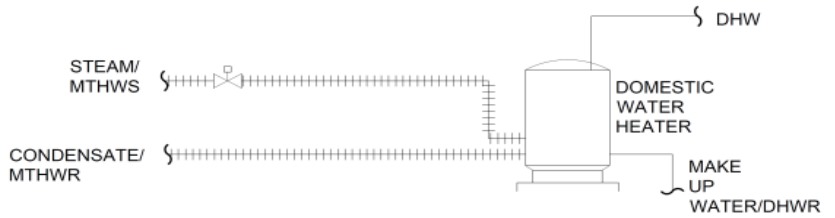
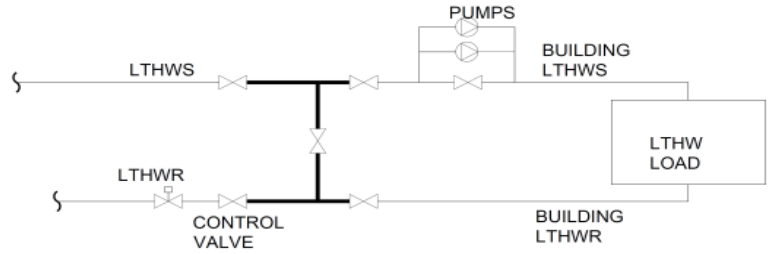
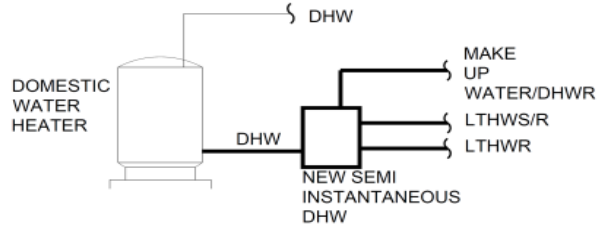


By the Numbers: Maintenance

- Components
- Failures
- Staffing



Building Conversion Diagram

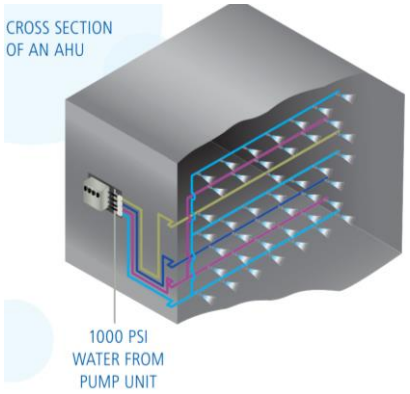
	HEATING HOT WATER	DOMESTIC HOT WATER
EXISTING		
DEMOLITION		
NEW		

EXISTING DEMOLISH NEW

Building Level Hot Water

DOMESTIC HOT WATER

FOOD SERVICE



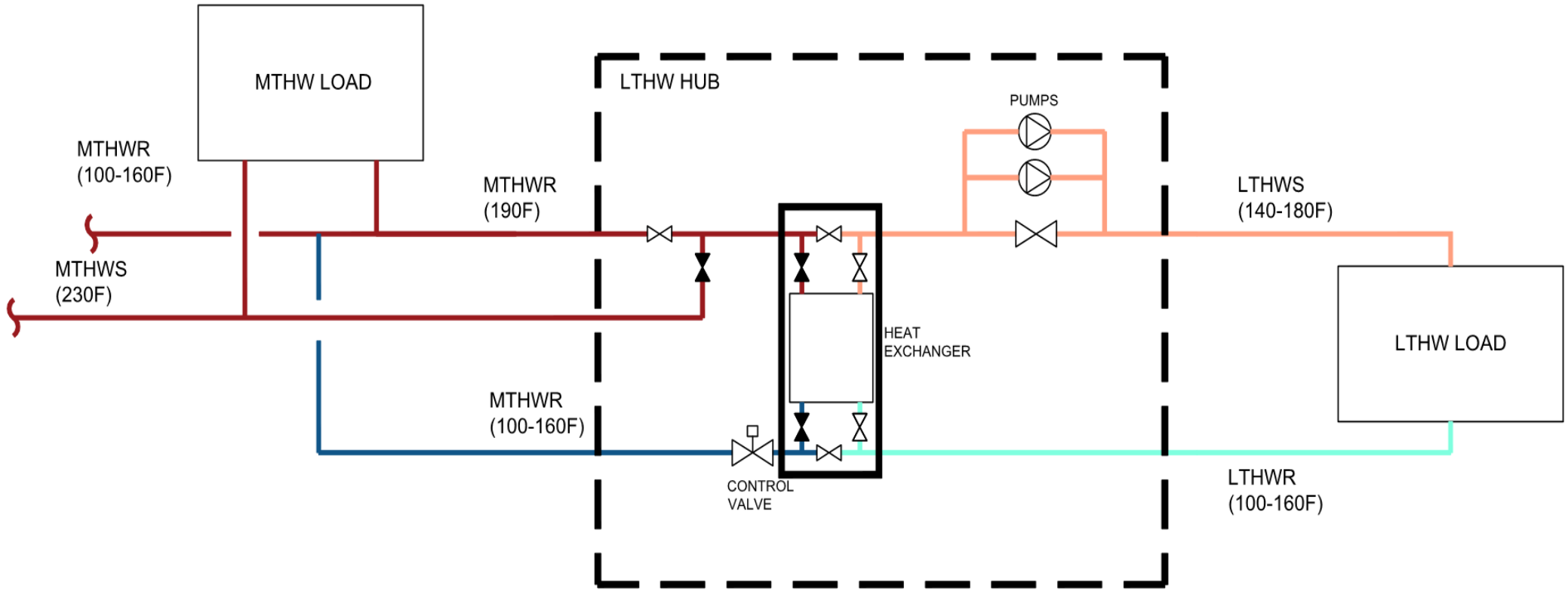
HUMIDIFICATION

HEATING COILS

PROCESS / STERILIZATION

Phasing

- Targeted approach: dormitories, remote locations, renovations
- Build consensus

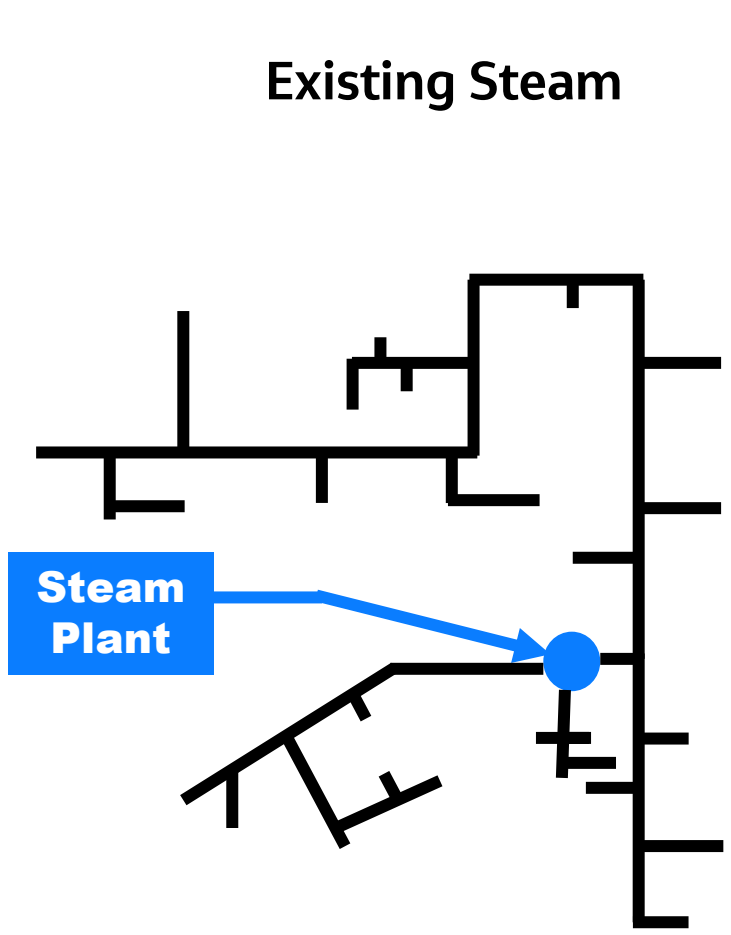


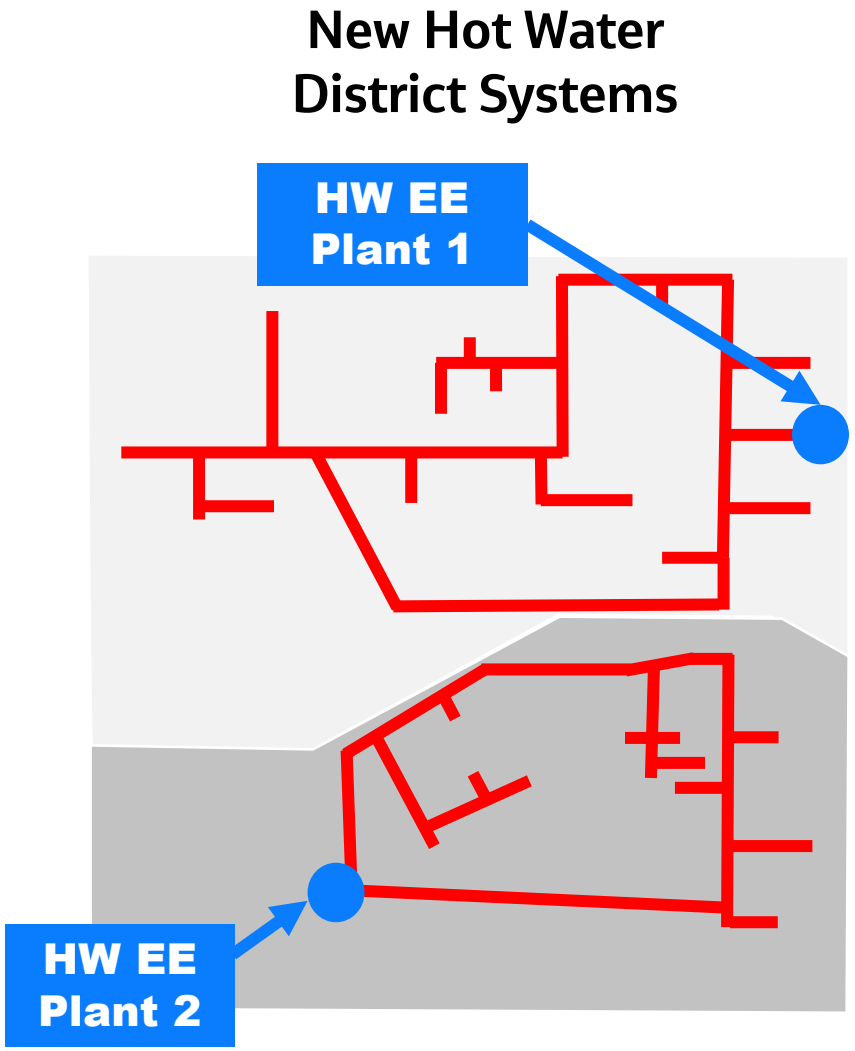
Case Study

DC Metro Area Campus

Solution: Energy Exchange

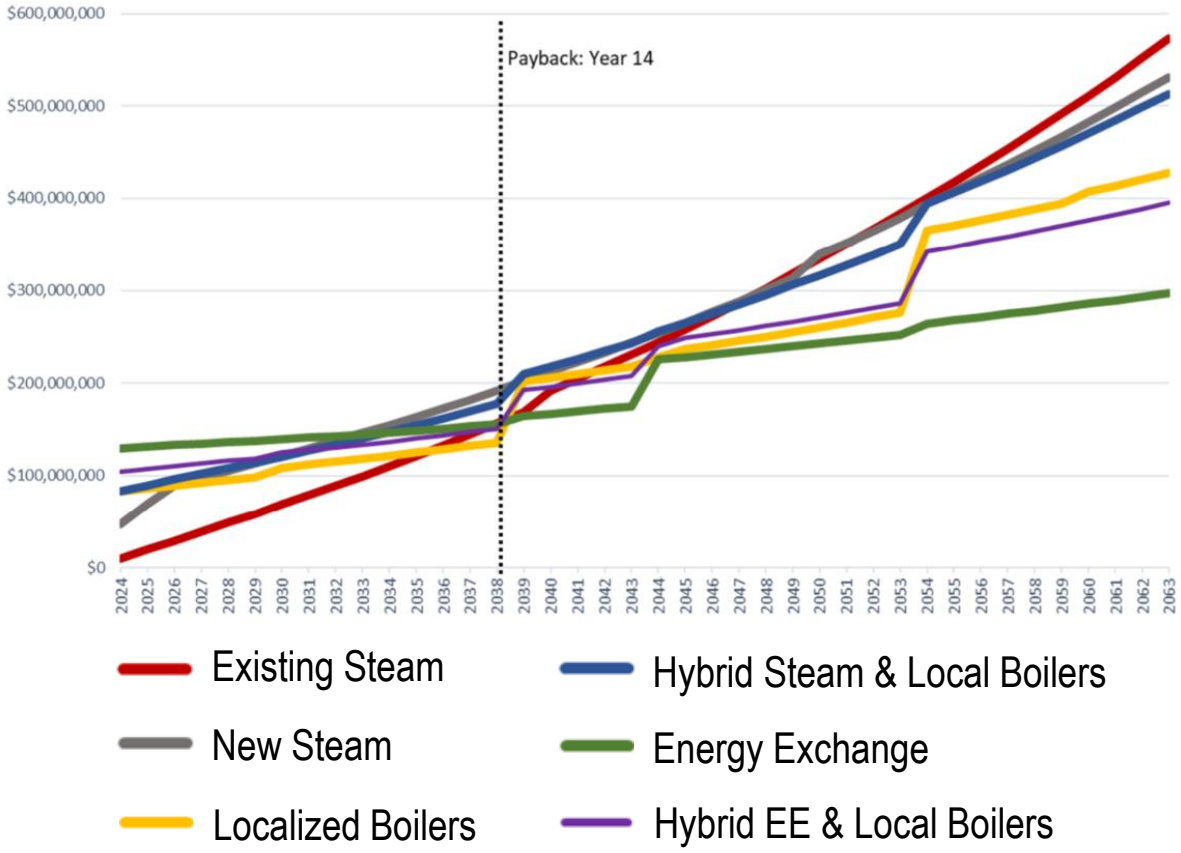
- Split existing steam system into two hot water districts
- Each district optimized to capture full benefits of a heat recovery chiller and energy storage tank
- Looped configuration for resiliency



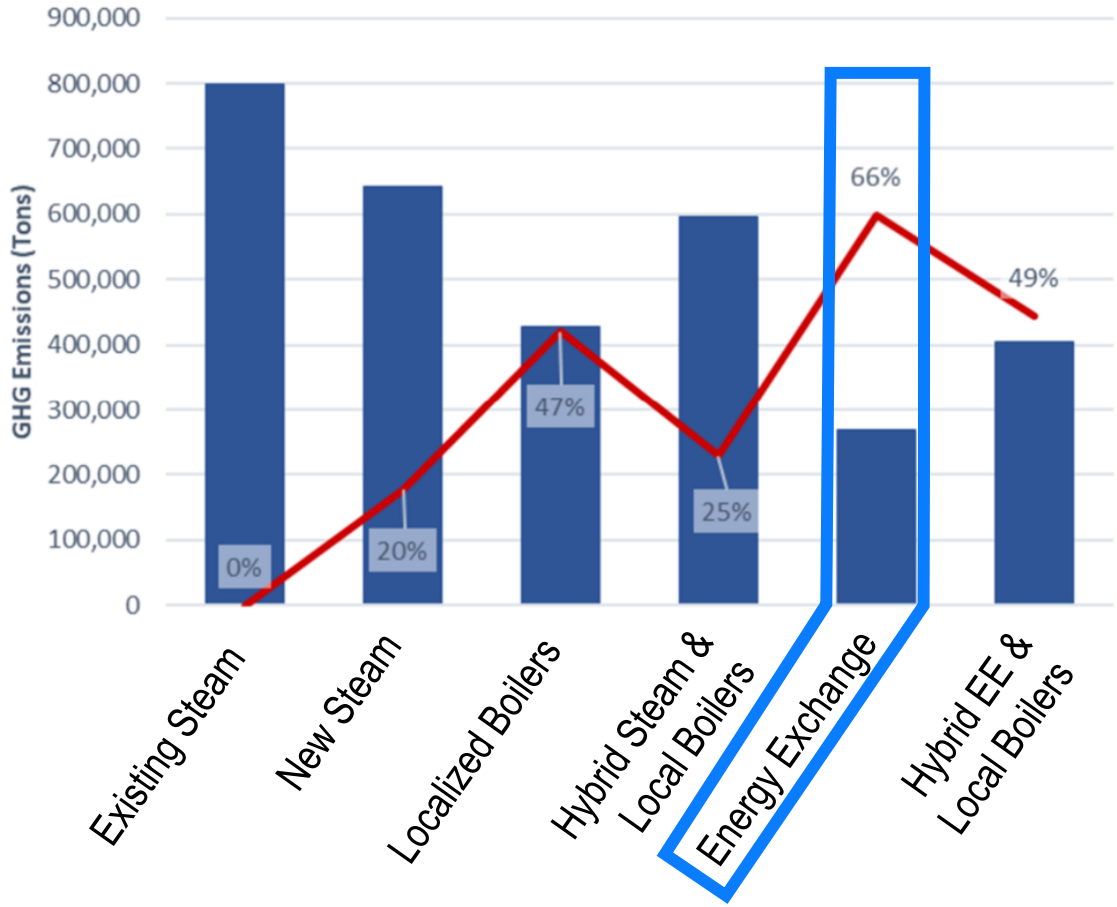


Life Cycle Savings

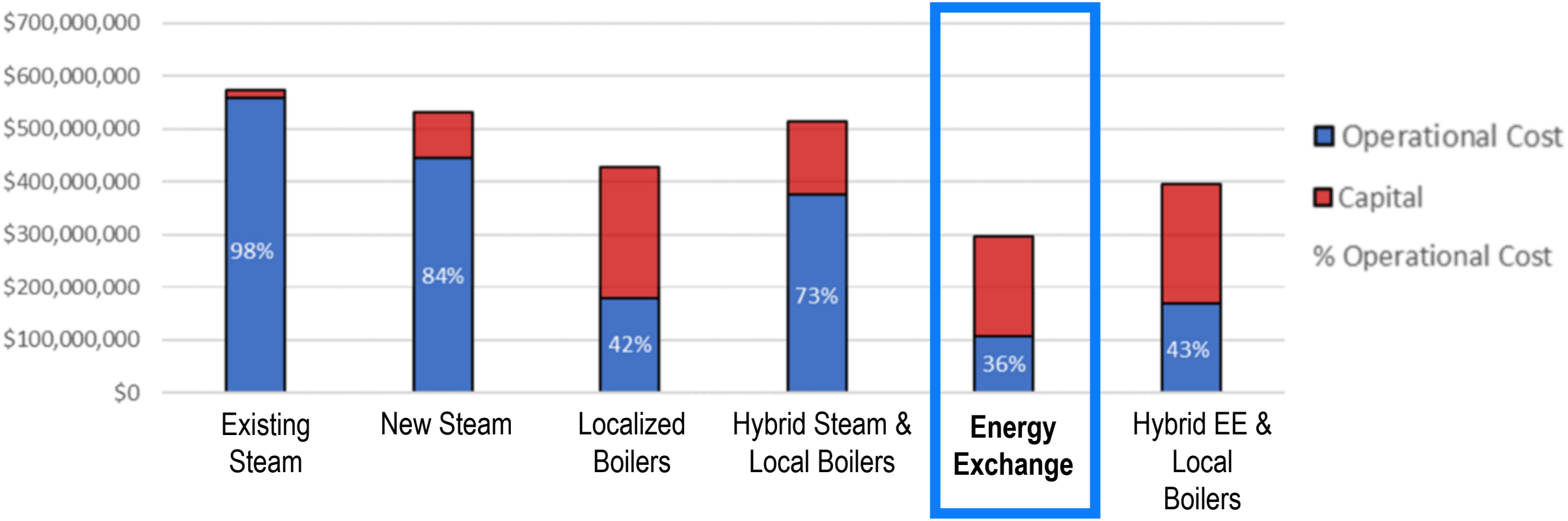
Rolling 40-year LCCA
48% savings



40-year Greenhouse Gas Production
66% savings



Budget Resiliency



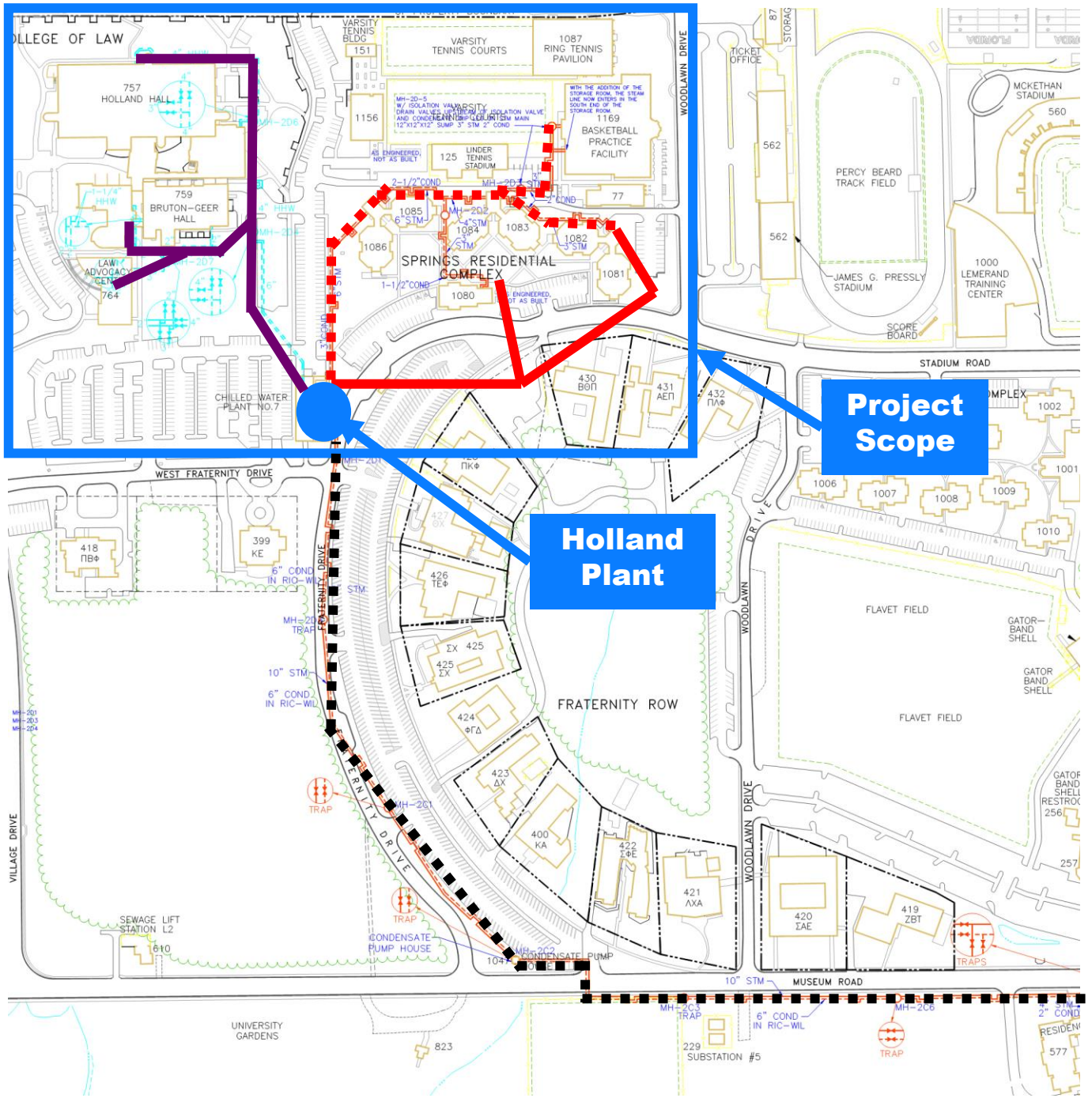
Low yearly O&M costs protect system from future budget cuts

Case Study

University of Florida:
Holland Law

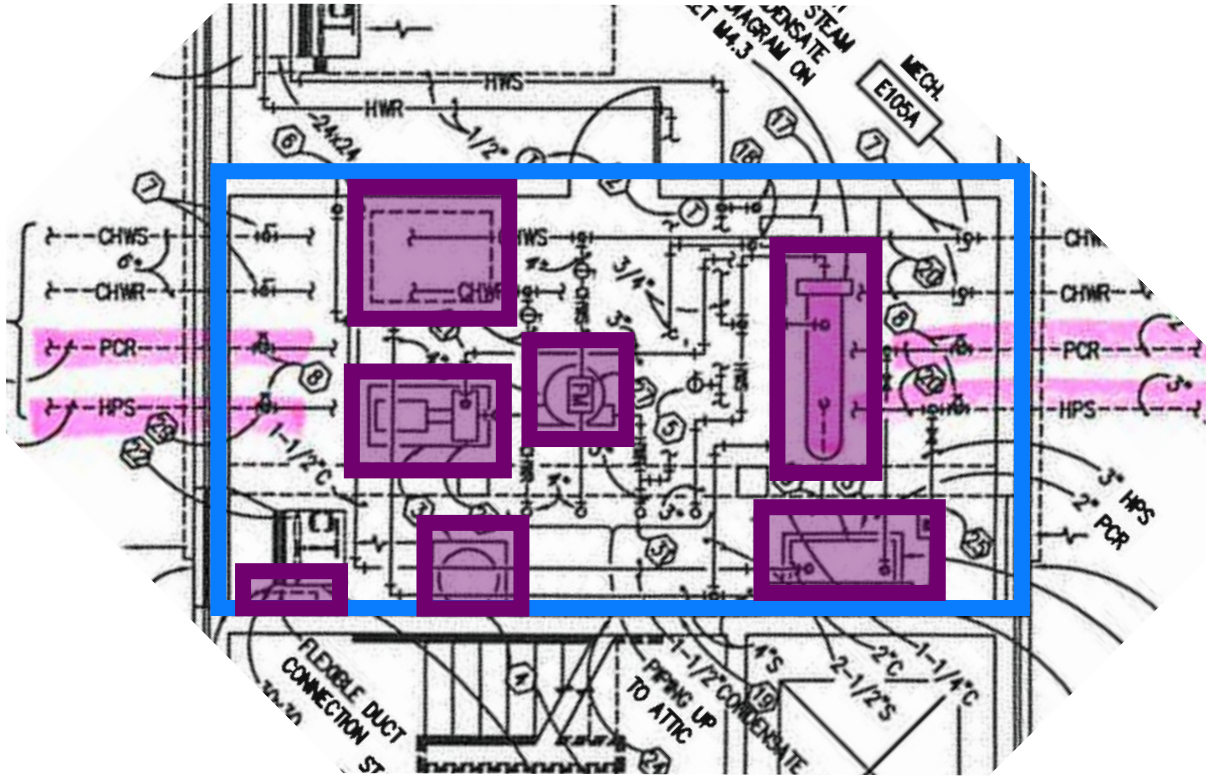
Site Plan

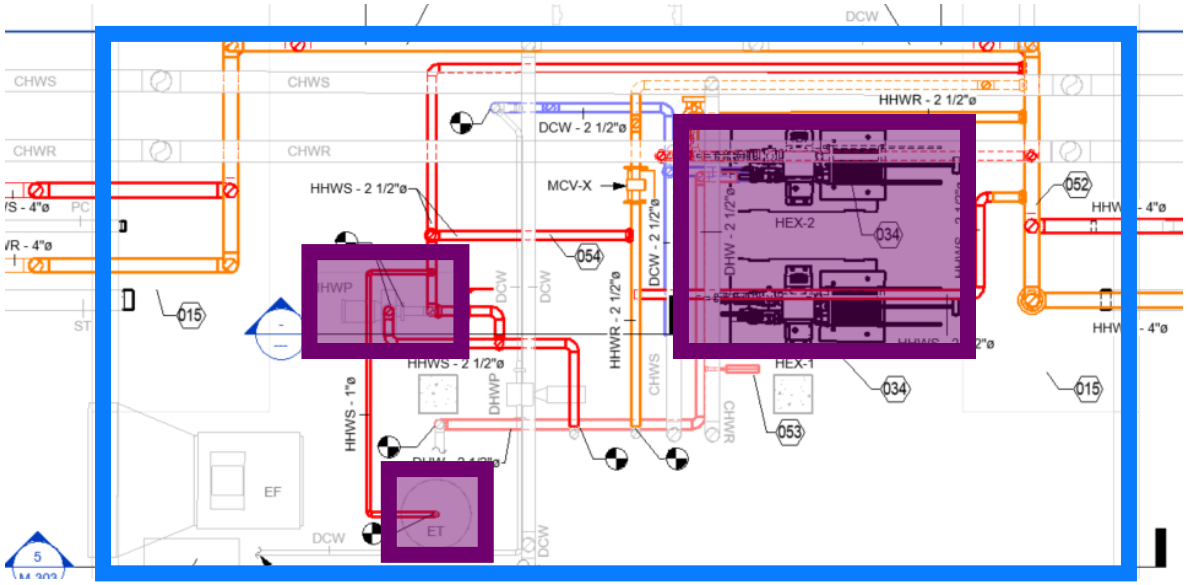
- **Existing**
  - 3000’ distribution piping requiring replacement
  - Mixture of hot water and steam service
- **Proposed**
  - New condensing boiler plant and HHW distribution



Mechanical Room Conversion

- Remove PRV, Condensate Receiver/Pump, Air Separator, DHW Steam-to-HW HEX
- Configuration allows reuse of existing equipment and phasing of construction to reduce system down time





Thank You

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