312 HEATING PRODUCTION

AIA Continuing Education Provider

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AIA INFORMATION

Credit(s) earned on completion of this course will be reported to American Institute of Architects (AIA) Continuing Education Session (CES) for AIA members.

Certificates of Completion for both AIA members and non-AIA members are available upon request.

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

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COURSE DESCRIPTION

Higher education campus buildings are primarily heated by equipment that produces hot water or steam using commercial or industrial boilers. These boilers can be located within the building or in a central utility plant and distributed to the buildings using piping infrastructure. Heating production is typically cyclic in nature peaking in winter and plunging in summer. Depending on the climate and research needs, the summer requirements can be as low as 10% of winter peak or lower. This requires the utility plant (or individual building) to have capacity for the peak need but underutilized equipment during summer time, providing opportunity for equipment maintenance in summer time. In addition to the boilers, most boiler plants other auxiliary equipment to support the production. After the heat transfer from the hot water or steam to the buildings is returned to the utility plant as lower temperature water or condensate and back to the boiler equipment. This course will explore the various components that entail the heating production system and the challenges that go along with operations of such systems.

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LEARNING OUTCOMES

- Learning Objective 1:
  Learn the various components that entail the heating production system.
- Learning Objective 2:
  Discuss the challenges that go along with operating heating systems.
- Learning Objective 3:
  Discuss the best time of year for maintenance.
- Learning Objective 4:
  Discuss the various components that entail the heating production system.

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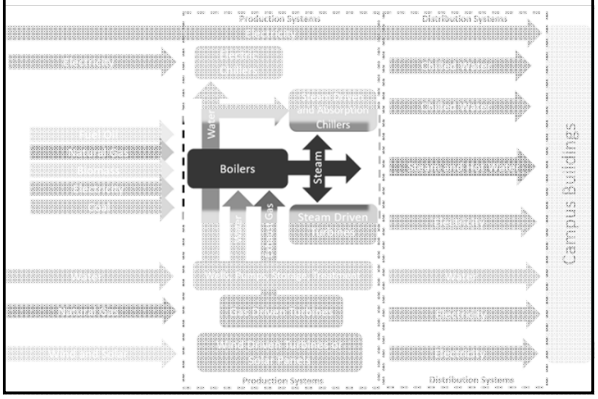
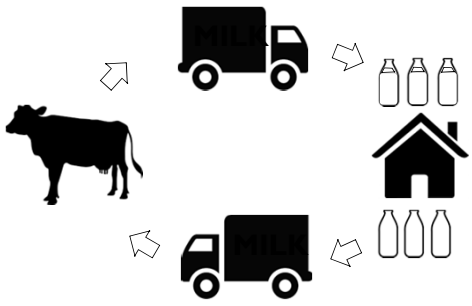
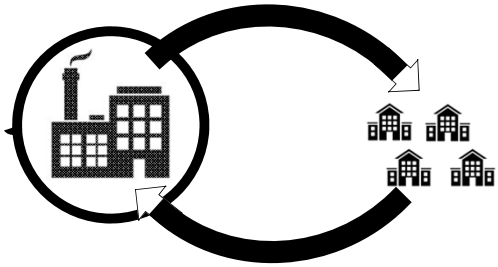
HEATING PRODUCTION



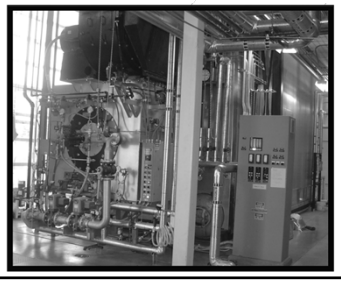
HEATING A CAMPUS



HEATING A CAMPUS



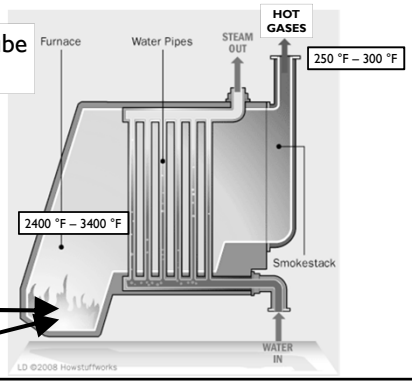
OVERVIEW



Equipment
Central Boilers
Distributed Boilers
Steam
Hot Water
Fuels
Costs

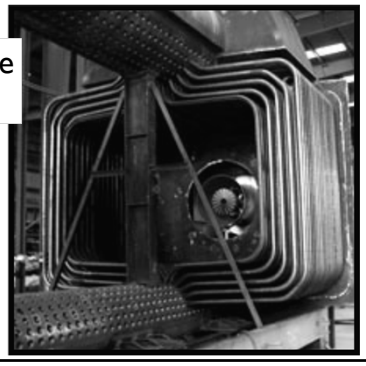
EQUIPMENT

Water Tube Boiler



EQUIPMENT

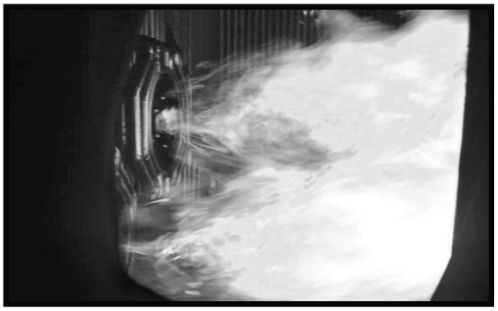
Water Tube Boiler



EQUIPMENT

EQUIPMENT

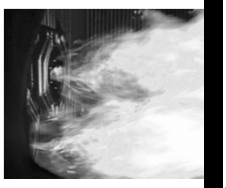
Burner



Low NOx Burner

BOILER TUBE

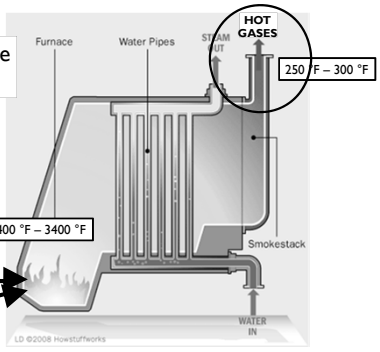
Water Quality



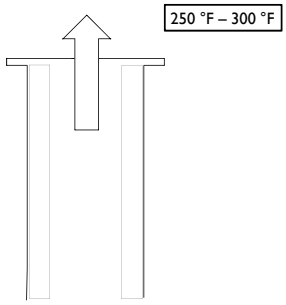
2400 °F – 3400 °F

EQUIPMENT

Water Tube Boiler



EXHAUST STACK



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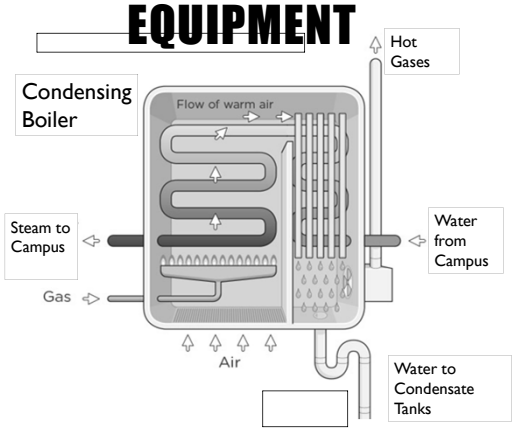

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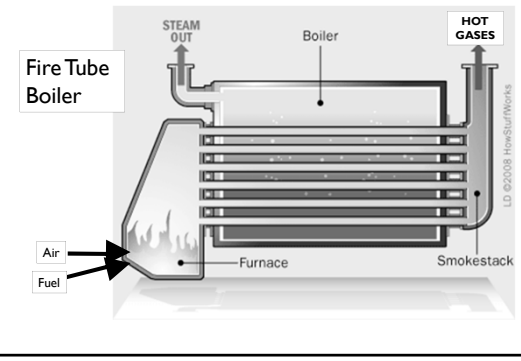

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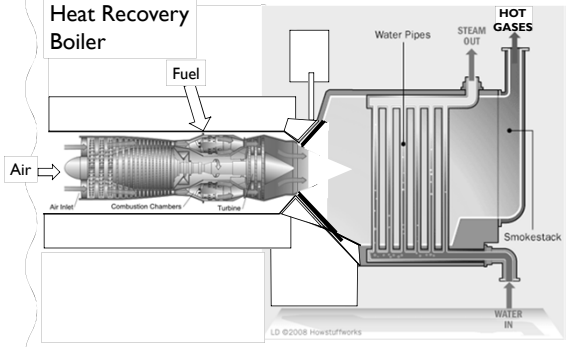

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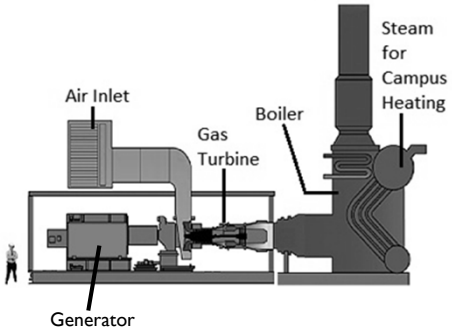

EQUIPMENT - RISKS

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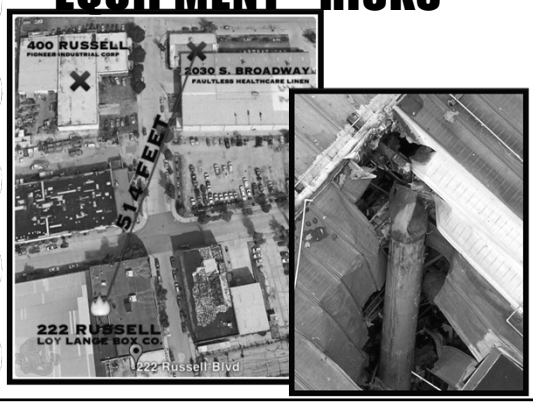


BOILER REGULATIONS

Construction
Repair
Operation

- ASME Boiler and Pressure Vessel Code
- Air Permit
- Operator Licensing
- Insurance Companies

CENTRAL OR DISTRIBUTED

Central

Distributed

CENTRAL

Pros
- Fewer but bigger boilers
- Consolidation of operations/maintenance
- Backup fuel capability
- Can last over 50 years
- Option to install Combined Heat & Power

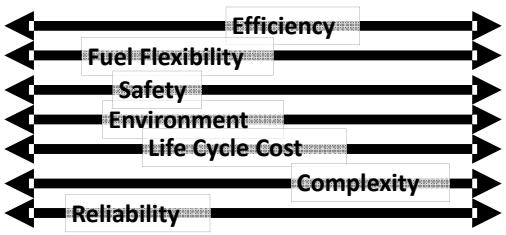
Cons
- Requires pipe distribution
- Complex systems

DISTRIBUTED

Pros
- Multiple small boilers
- Less complex systems

Cons
- Less reliable
- Limited backup fuel options
- Limited Combined Heat & Power options

CENTRAL OR DISTRIBUTED



STEAM OR HOT WATER

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Steam has "two phase flow" - mix of gas and liquid

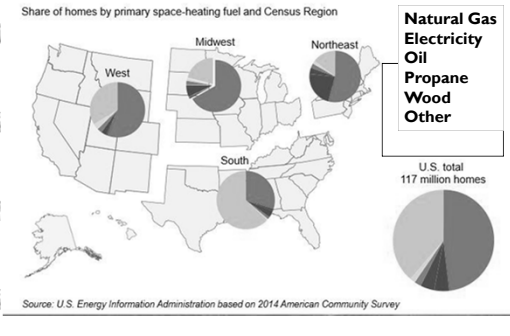
Hot Water is liquid only

WATER HAMMER

STEAM OR HOT WATER

Steam	Hot Water
Efficiency	
Safety	
	Maintenance
	Complexity
Reliability	
Fuel Flexibility	
Process Steam	
Electricity Generation	

FUELS



HEATING COSTS

	Kentucky	New Mexico
Fuel	48%	55%
Labor & Maintenance	29%	34%
Chemicals	6%	2%
Electricity	4%	5%
Water	3%	1%
Other	10%	3%

THIS CONCLUDES THE AMERICAN INSTITUTE OF ARCHITECTS CONTINUING EDUCATION SYSTEMS COURSE.

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QUESTIONS?