Combined Heat and Power for Military Installations

PRESENTED TO

IDEA Campus Energy 2017

PRESENTED BY

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Summary

Combined Heat and Power – Applications

Campus or Building

Unique Considerations

Reliability / Resilience

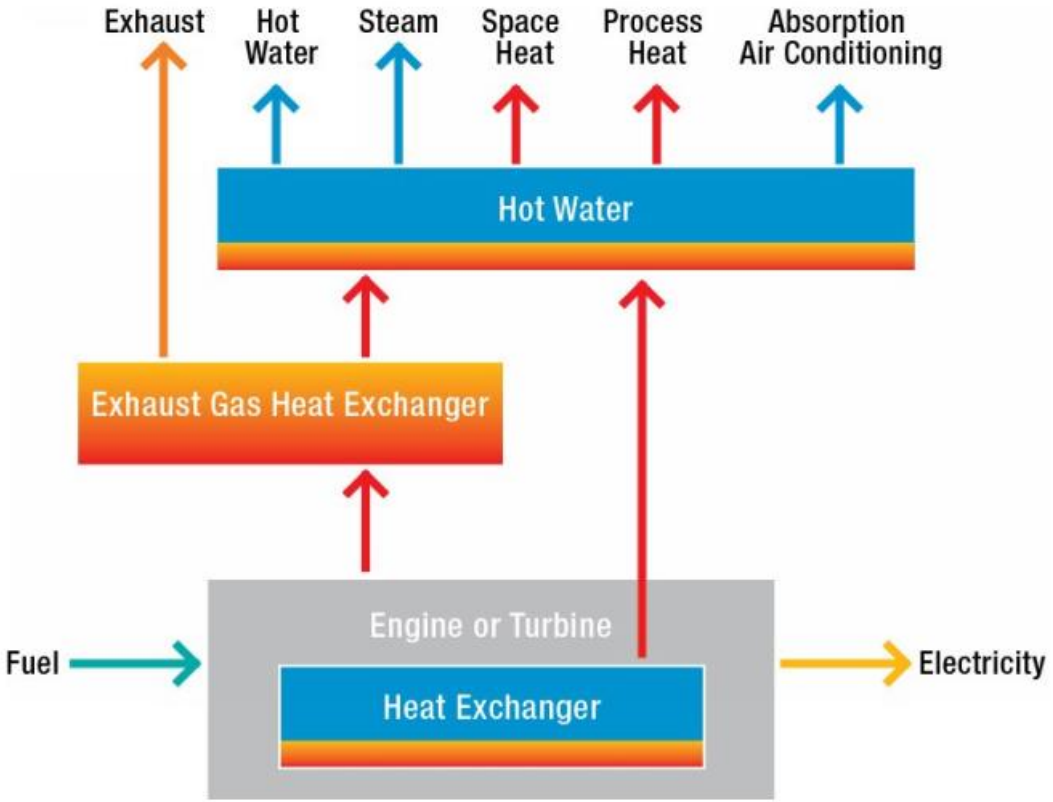
Types of Equipment

Loads and Applications

Various Fuels and Options

Combined Heat and Power

- What is it?
- How do we apply it?



Combined Heat and Power

Typical Installation Applications

- Standalone Building/Structure
  - Embassies
  - Homes
- Campus
  - Barracks
  - Hangers
  - Hospitals

Unique Considerations

- Continuous vs. Emergency Operation
- Reduce Impact of Fuel $$ Increase
- Greenhouse Gas Reduction

Unique Considerations

- Weather Conditions
- Storm Events

Unique Considerations

- Terrain
  - Mountain
  - Waterway
- Utility Outages
  - Brownout
    (Power Reduction or Loss)
  - Blackouts

System Readiness

- Reliability
  - Testing
  - Maintenance
- Resilience
  - Black Start
  - Island Mode

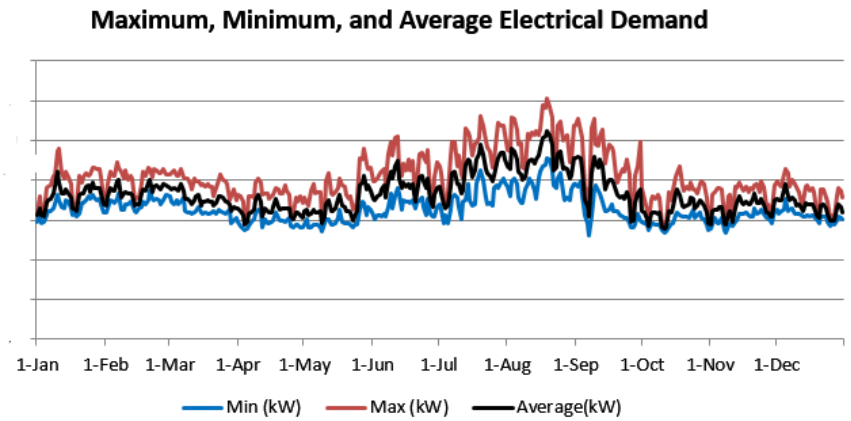
Loads and Applications:

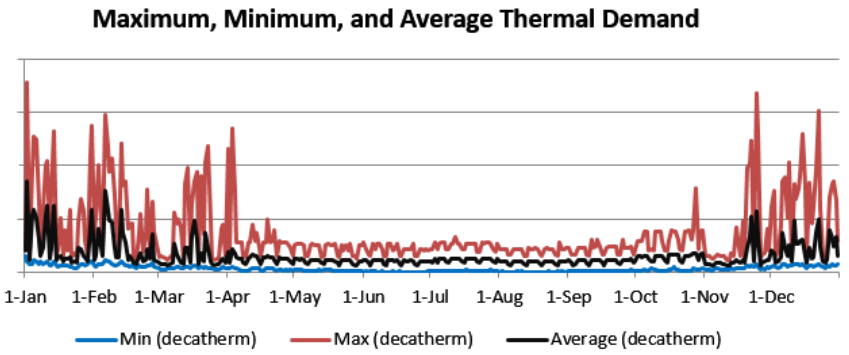
Electrical

- Base/Peak Load
- Peak Shaving

Thermal

- Steam
- Hot Water
- Domestic Hot Water
- Absorption Cooling

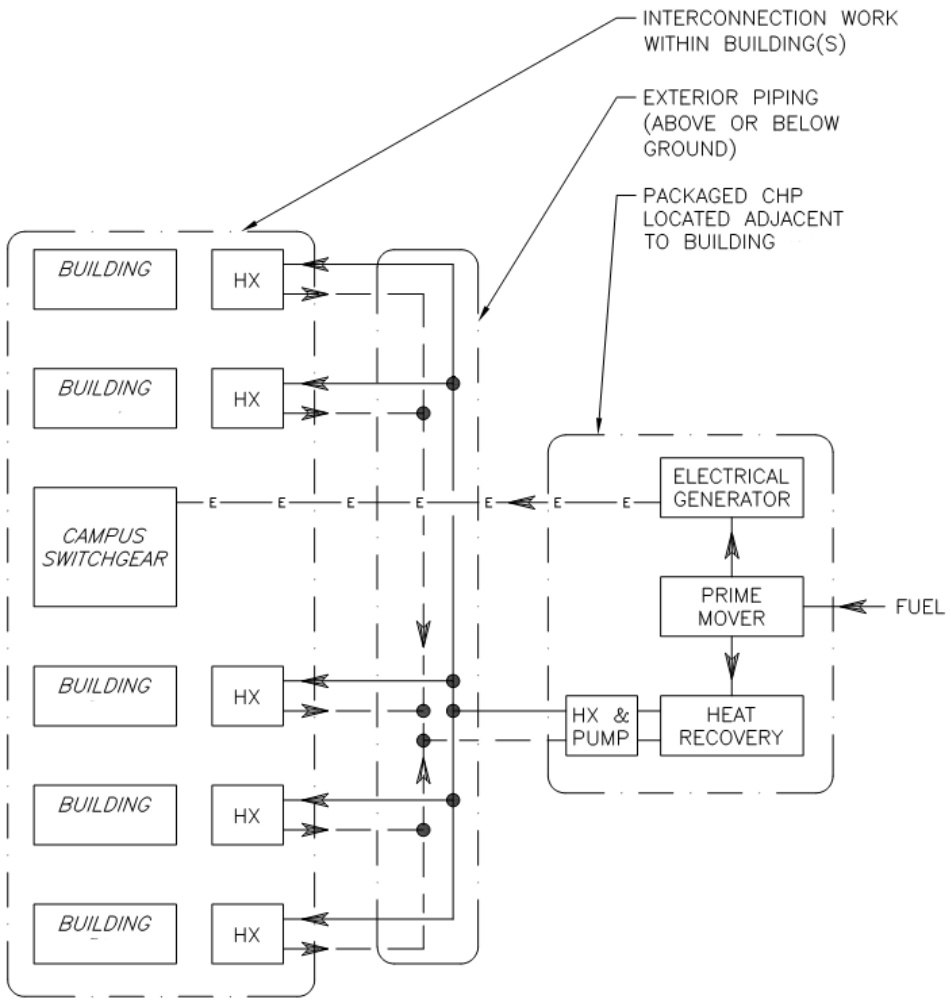




Combined Heat and Power

System Analysis

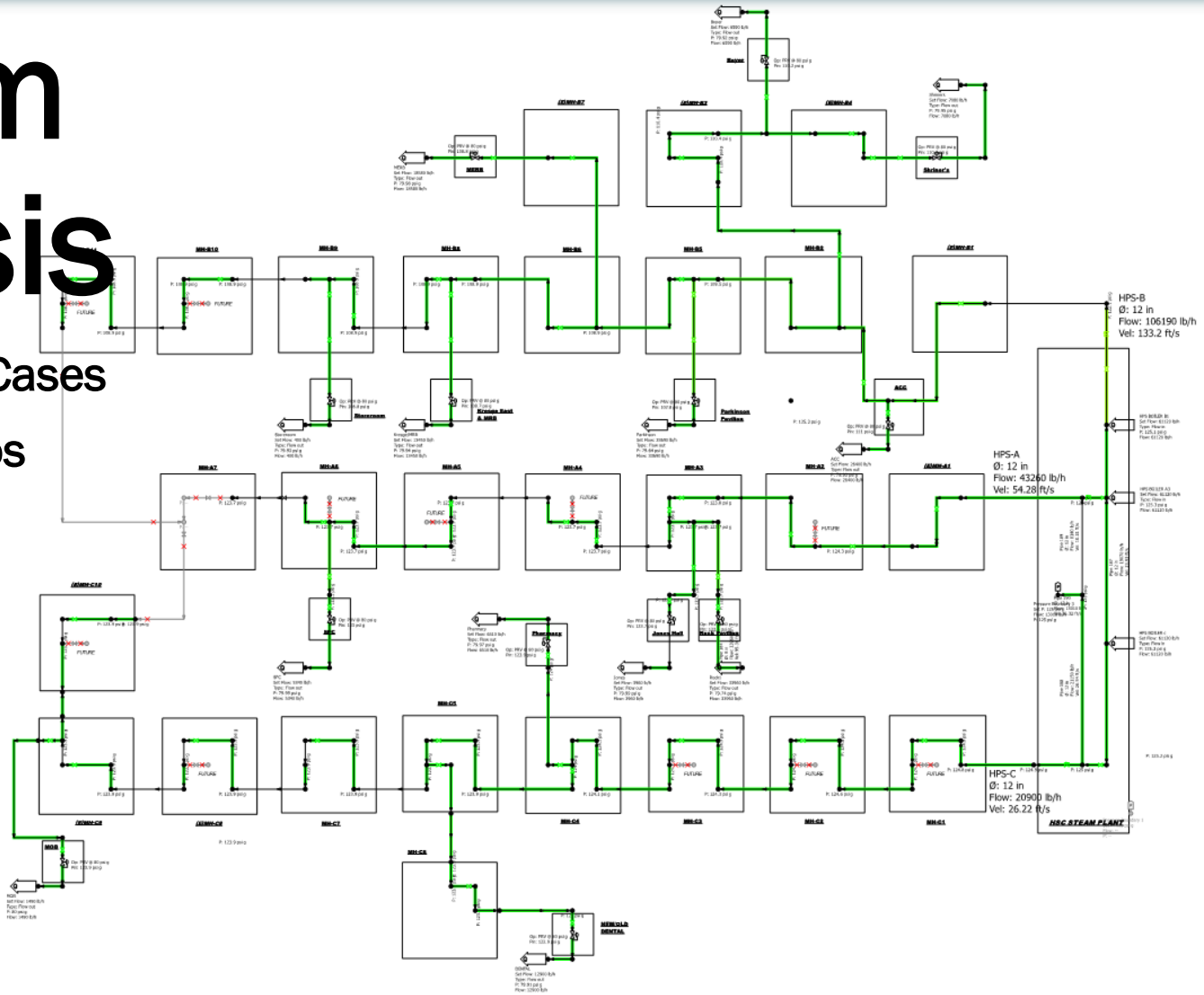
- Thermal Distribution
  - Steam
  - Hot Water
  - Chilled Water
- Electrical Interconnection
  - Centralized
  - Decentralized

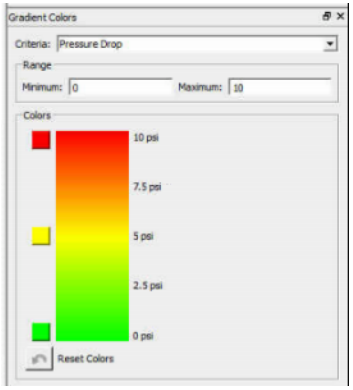


Combined Heat and Power

System Analysis

- Current/Future Cases
- Outage Scenarios





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Combined Heat and Power

Equipment Interface:

Electrical

- Generators

Thermal

- Boilers (Supplemental)
- Heat Exchangers
- Pumps

Combined Heat and Power

Systems:

Engine Generator

Turbine

- Microturbine
- Combustion Turbine

Fuels

- Natural Gas
- Diesel
- Propane

Combined Heat and Power

Fuel

- Delivery
- Storage
  - Above/Below Ground
- Utility
  - Transmission
  - Local

Energy Monitoring and Controls

- Campus Metering
- Building Metering
- Smart Metering
- Utility Interface

Q & A

Any Questions?