

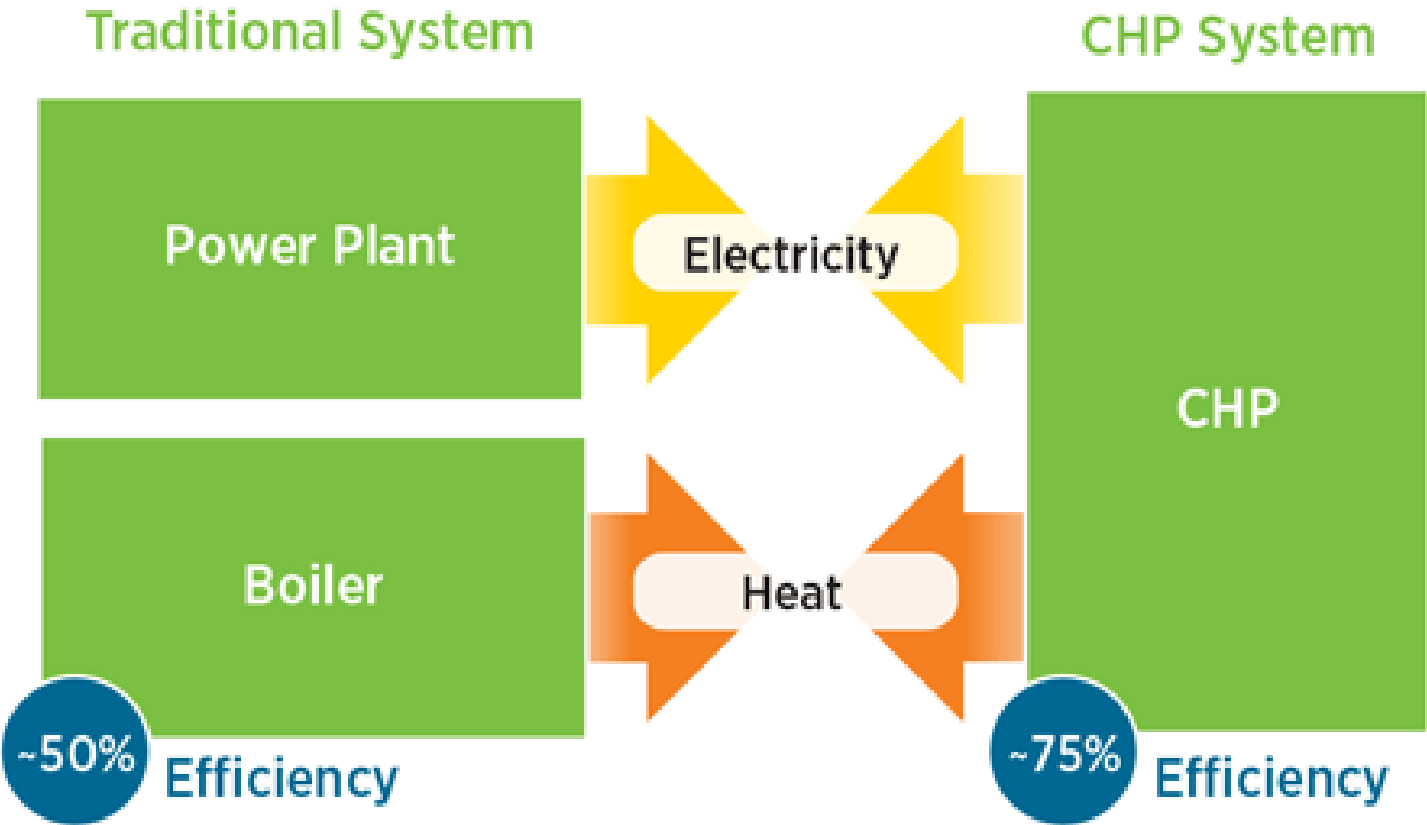
Combined Heat and Power (CHP)

August 19, 2015

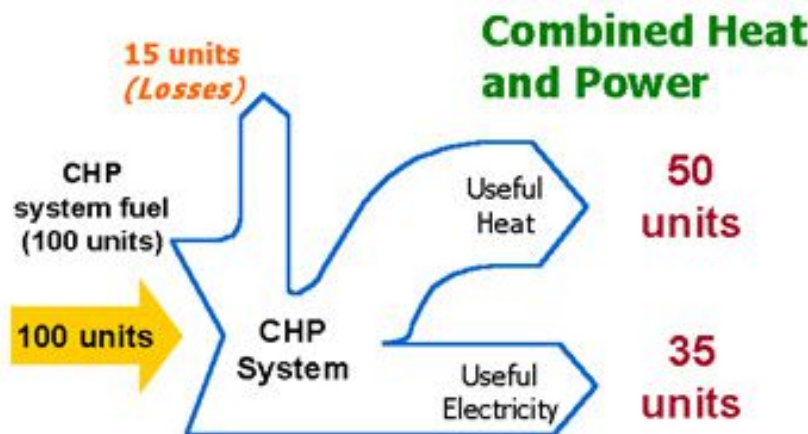
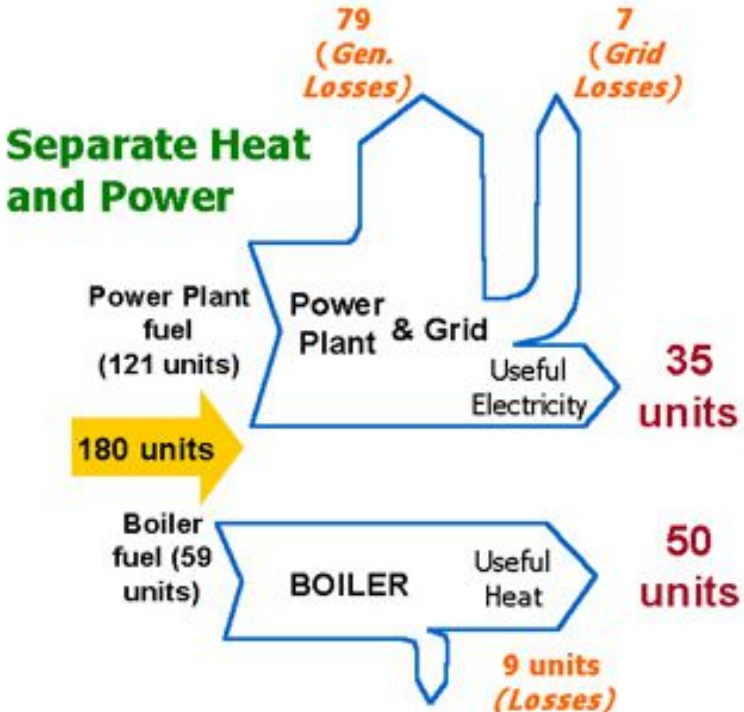
- **What is Combined Heat and Power?**
- What is District Energy?
- Key Aspects of District Energy



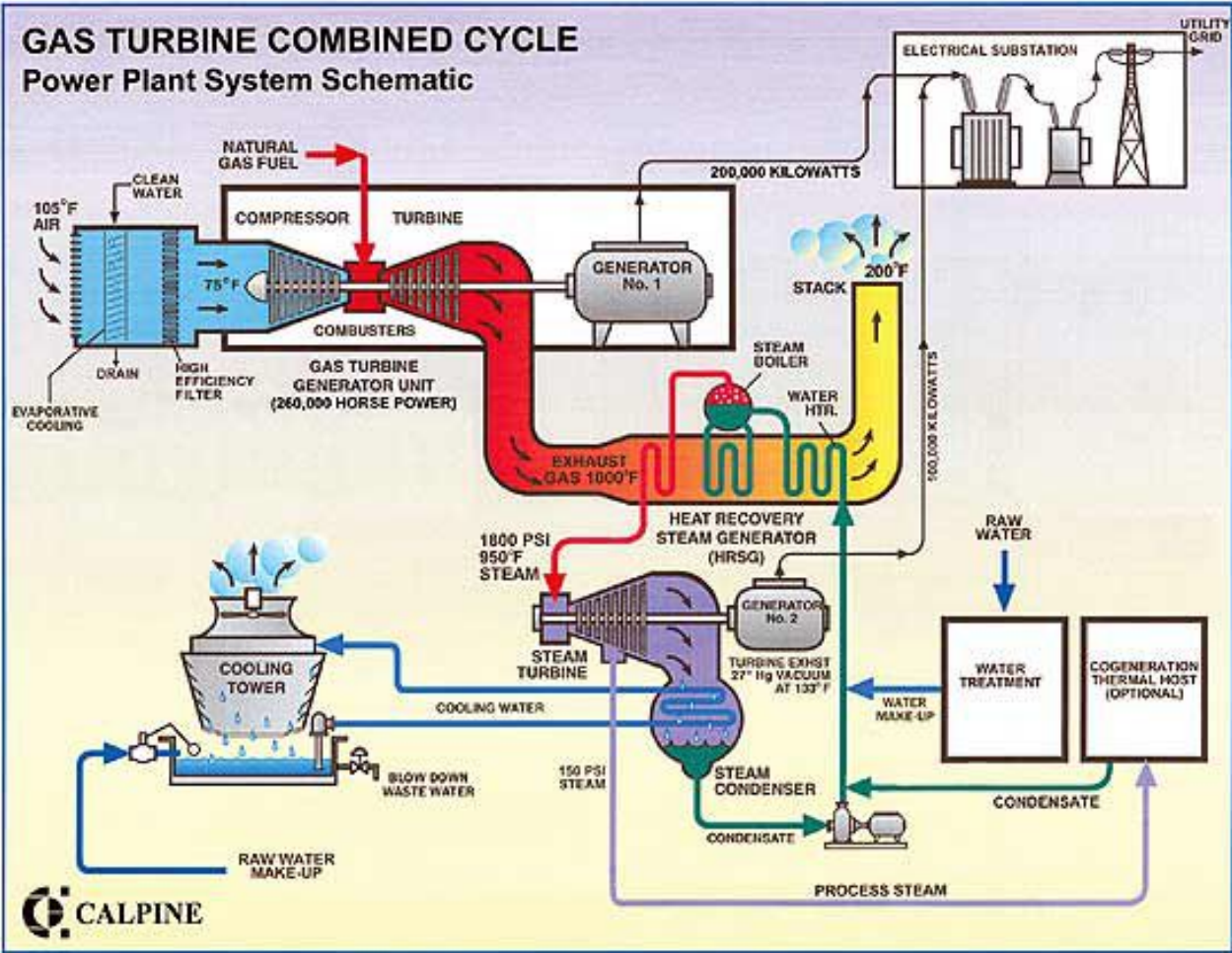
What is CHP?



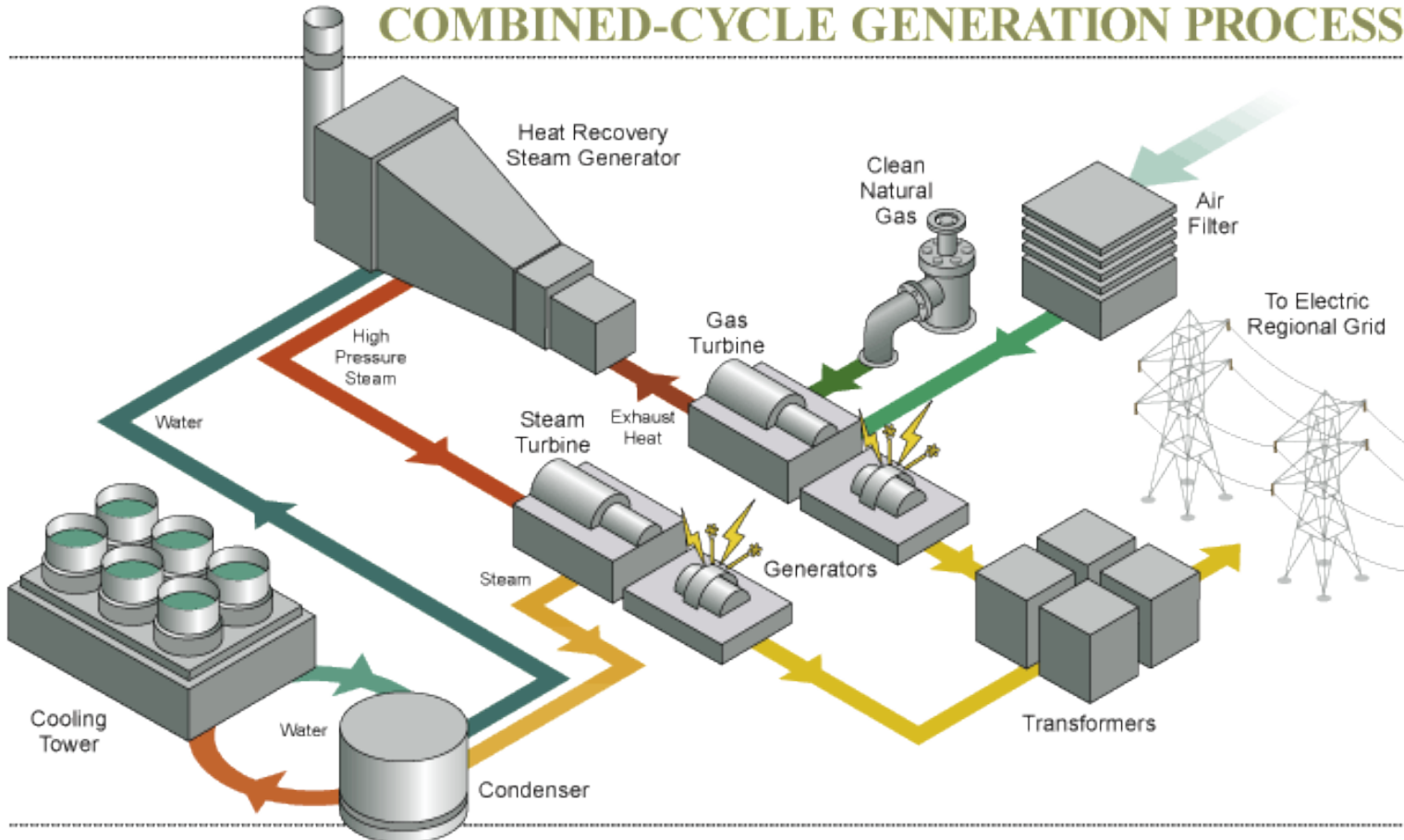
What is CHP?



Combined Cycle Gas Turbine



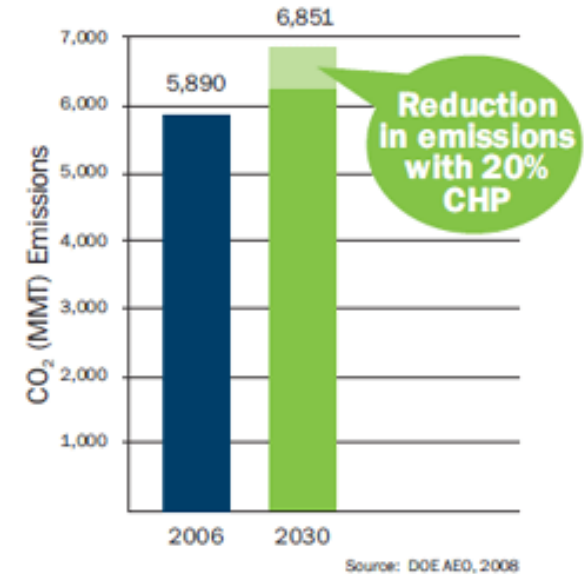
Combined Cycle Gas Turbine



Combined Heat and Power

Benefits

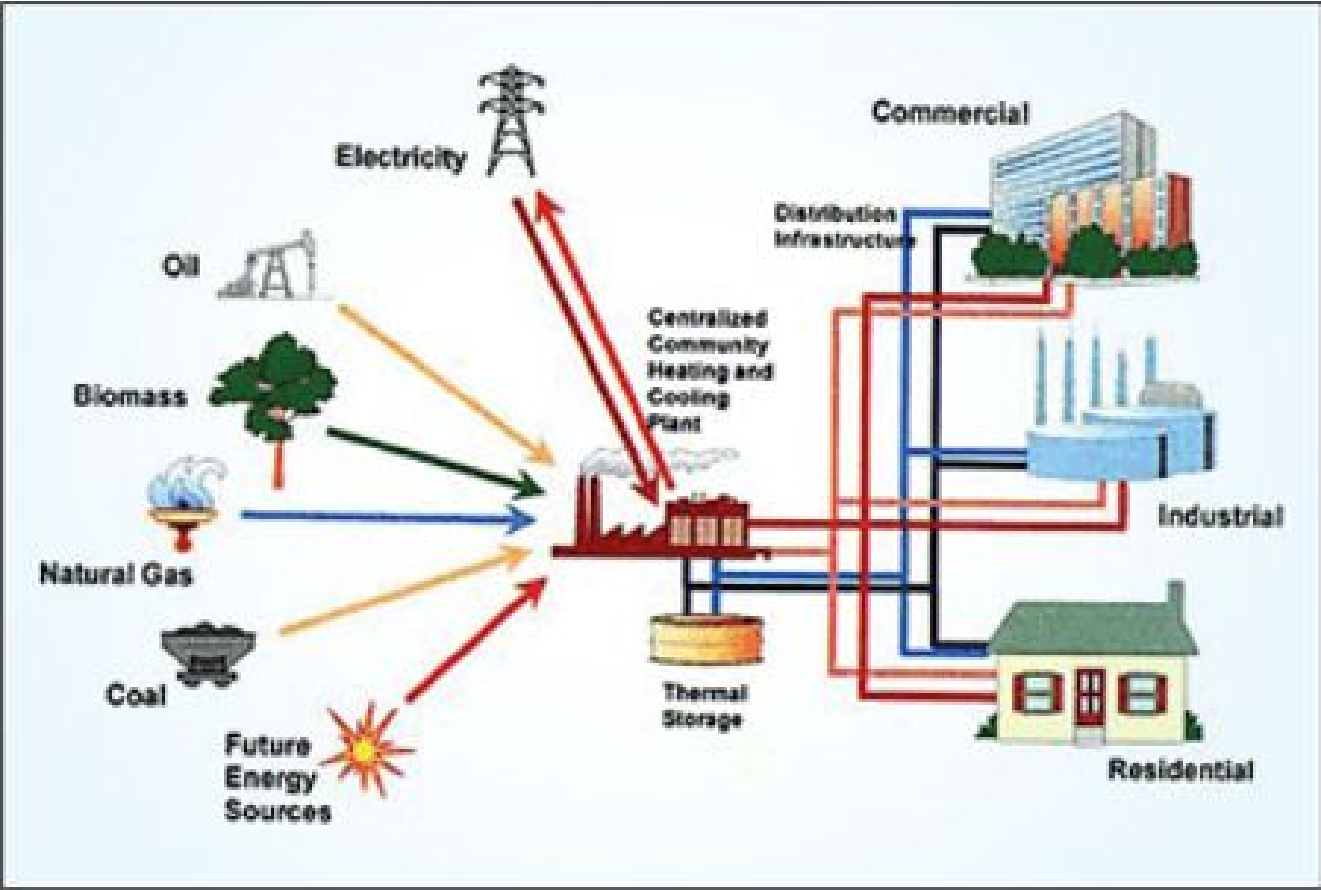
- Enhance Energy Security
- Advance Environmental Goals
- Improve Business Competitiveness
- Increase Resiliency of Energy Infrastructure



- What is Combined Heat and Power?
- **What is District Energy?**
- Key Aspects of District Energy

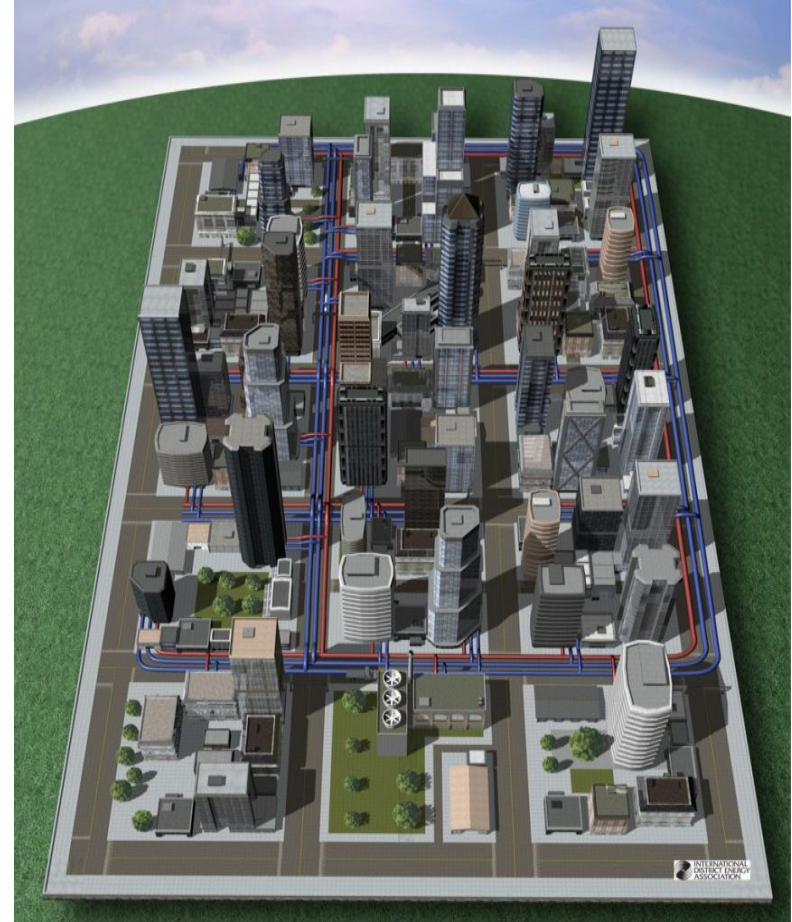


What is District Energy?



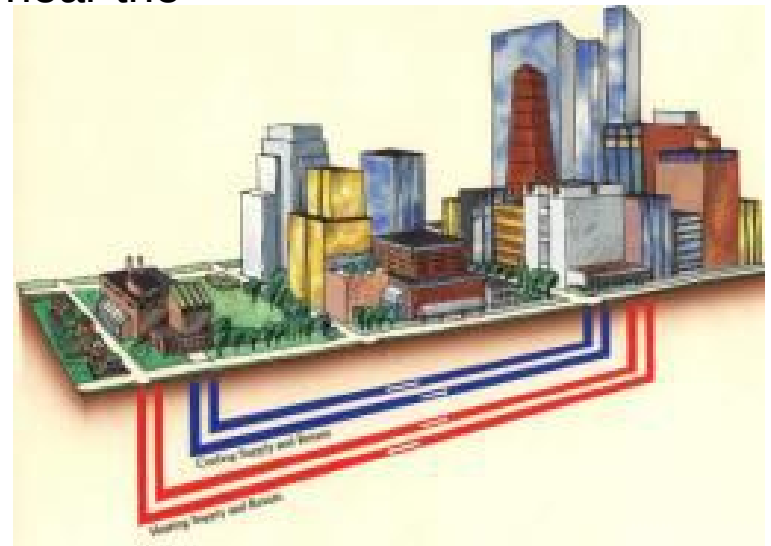
What is District Energy?

- Benefits
 - Low cost source of Energy
 - Individual Buildings do not need Boilers, Chillers or Cooling Towers
 - Decreased building's Capital Costs
 - Ease of Operation & Maintenance



What is District Energy?

- District Energy and CHP
 - Half of Fuel used in Conventional Power Plant is rejected or “wasted” up the smokestack.
 - Reject heat of a CHP plant can be used to heat buildings in the surrounding area
 - Only possible when there is an area near the plant that has a need for heat
 - College campuses
 - Airports
 - Government Complexes
 - Downtown Business Districts
 - Industrial Parks



What is District Energy?

What Form of Energy?

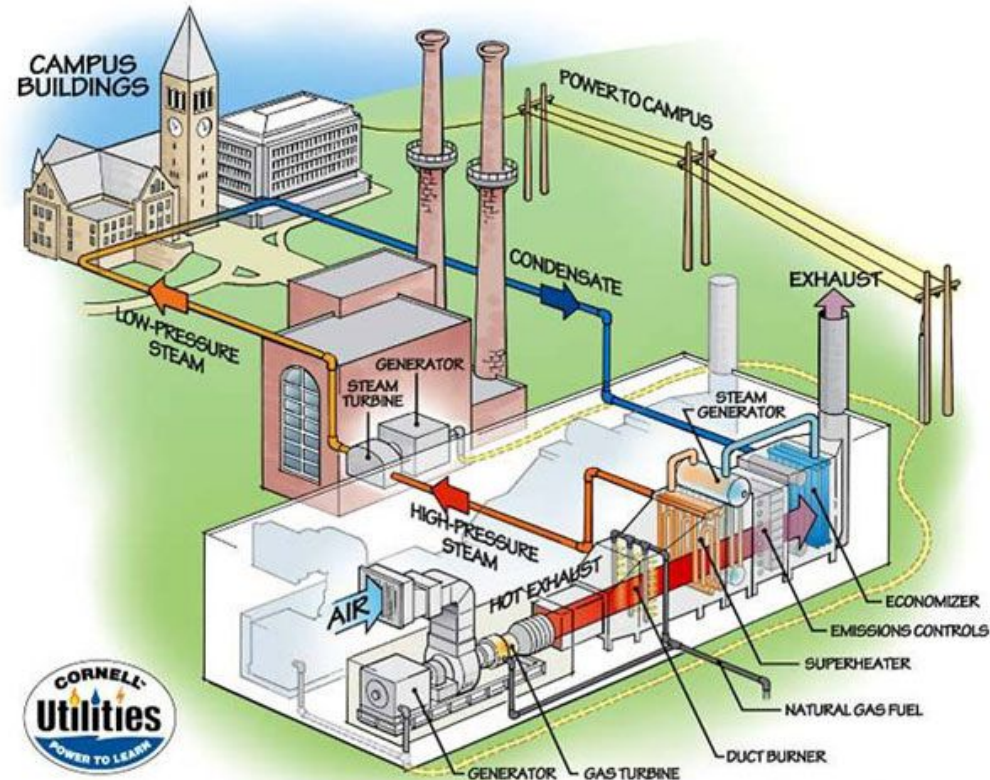
Steam

- No distribution pumps needed
- High pressure for process loads
- Process Loads are Year Round
- Chilled Water Production
- Electricity generation is sacrificed
- Heat losses limit distribution distance
- Heavier Pipes - Steel
- Higher Maintenance
- More Complex to Design, Install and Interconnect

Hot Water

- Distribution up to 15 miles
- Less Electrical Sacrifice
- Lighter weight pipes - Plastic
- Closed Loop, no wasted energy
- Low Transmission Heat Loss
- Installation Easier
- Pumps Required
- Two Pipes Required
- Cannot provide high pressure steam for process loads

- What is CHP?
- What is District Energy?
- **Key Aspects of District Energy**



Combustion Turbine with Heat Recovery Steam Generator

Key Aspects of District Energy Plants

Successful Business Case

- Electrical Load
- Process and/or Space Heating Loads
- Concentration of Large Energy Users
- Affordable and Reliable Fuel Source
- Tolerance for Longer Paybacks

Benefits

- Low Cost Thermal Energy
- Spur Economic Development
- Natural Gas Infrastructure





Questions

August 19, 2015



City of Rockland Maine
CHP Community Forum