Integrated Energy Systems

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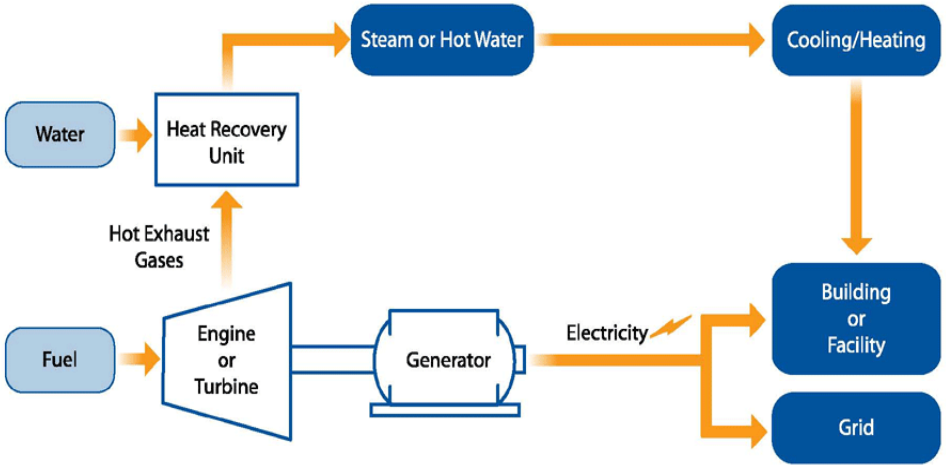
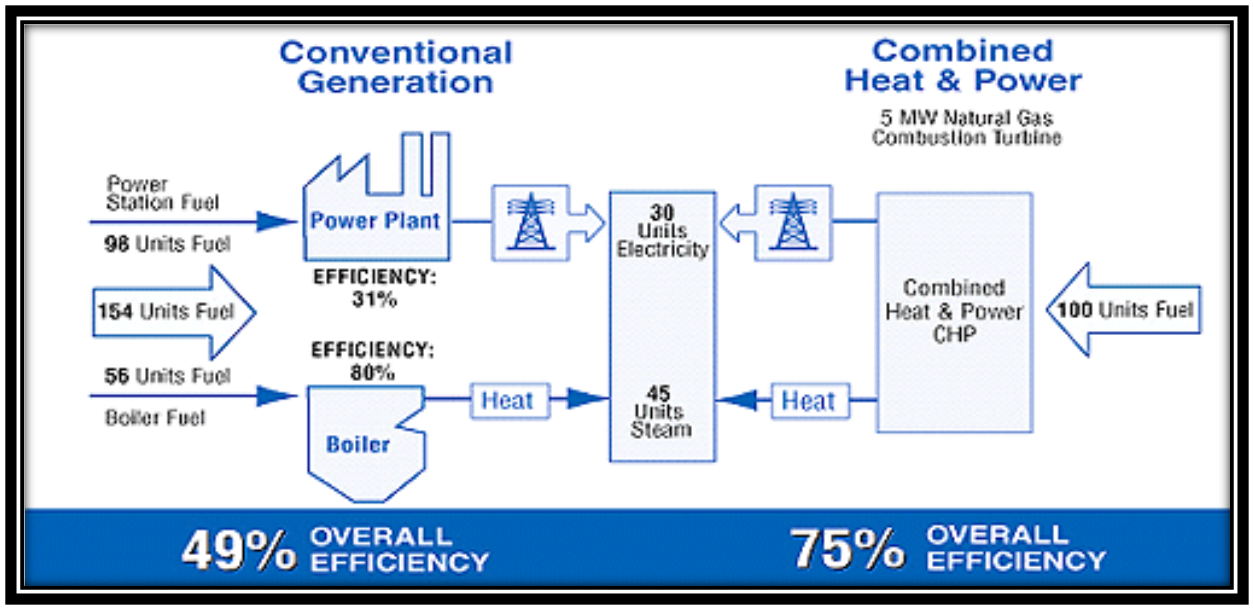
Research Interests:

- Modeling, control, and optimization of integrated CHP/thermal storage systems in a smart grid environment





This work is done in collaboration with the smart grid demonstration project carried out by Pecan Street Project, Inc.

Integration of Cold Thermal Storage

- Cooling system of a 5 building complex in Austin, Texas, modeled using dynamic building energy simulations (eQUEST)
- Used Austin Energy's Electricity Rate Structure
- Thermal Storage can significantly reduce both operating costs and energy usage via peak demand reductions

System Type	Objective Function	Annual Operating Cost	Annual Energy Usage (MWh)
No Thermal Storage	-	$222,500	2489
Thermal Storage (No Optimization)	-	$147,000 (-34%)	2495 (+0.2%)
Thermal Storage (with Optimization)	Minimize Operating Cost	$128,700 (-42%)	2443 (-1.8%)
Thermal Storage (with Optimization)	Minimize Energy Usage	$156,400 (-30%)	2391 (-3.9%)

Education & Outreach

- Coursework
  - Modern Control
  - Optimal Control Theory
  - Numerical Methods in Optimization
  - Linear Programming
  - HVAC Design
  - Building Energy Simulation
  - Courses to take: Integer & mixed integer programming
- Outreach
  - Texas School for the Deaf
  - Girls Exploring Science & Young Scientists