
De-Carbonizing the Campus: Planning, Tools & Technologies
CampusEnergy2023
February 27 – March 2, 2023
Gaylord Texan Resort & Convention Center | Grapevine, Texas
INTERNATIONAL
DISTRICT ENERGY
ASSOCIATION

Energy Efficient Absorption Chiller Technology For Campuses

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THERMAX

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Challenges Campuses Want To Address

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Resiliency and reliability in severe weather Events

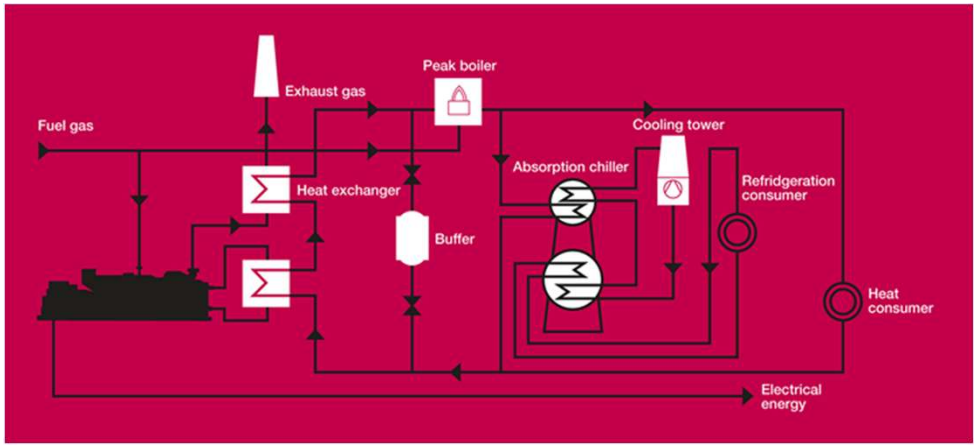
Lower Emissions , Decarbonization

Improve Efficiency And Reduce Operating Cost

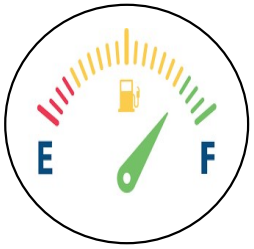
Reduce Global Warming Potential And Ozone Depletion Potential

THE “TRIGENERATION / CCHP” CONCEPT

- Trigeneration or combined cooling, heat and power (CCHP), is the process by which some of the heat produced by a cogeneration plant is used to generate chilled water for air conditioning or refrigeration.
- An absorption chiller is linked to the combined heat and power (CHP) to provide this functionality.

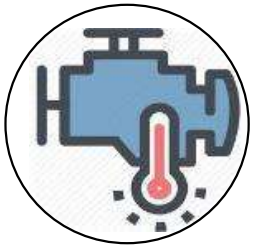


Onsite, high efficiency production of electricity and heat



Reduced fuel and energy costs

Lower electrical usage during peak summer demand



Engine heat can be used to produce steam of hot water for onsite use

Significant reductions in greenhouse gas emissions

No harmful chemical pollutants since water is used as the refrigerant

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WHY ABSORPTION CHILLERS

Lower Operating Costs
Low on Maintenance Costs

Environment Friendly Refrigerant (Water)
Zero Ozone Depletion Potential
Zero Global Warming Potential

No Moving Parts
No Vibration
Silent Operation

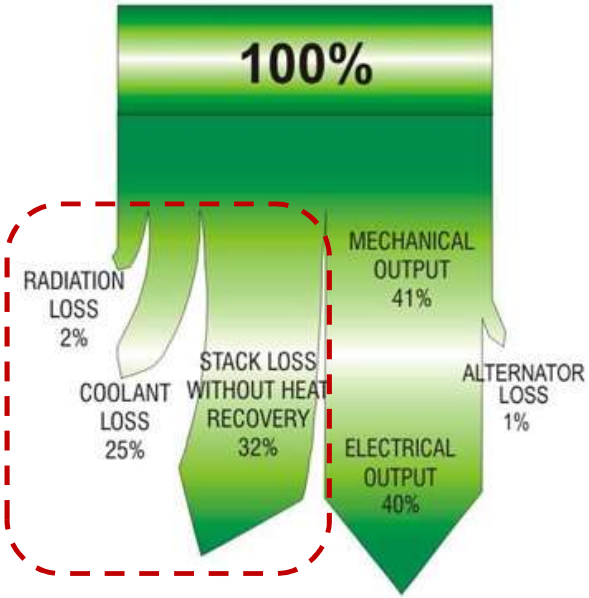
Waste Heat can drive an
Absorption Chiller

Very Low Electric Power
Consumption

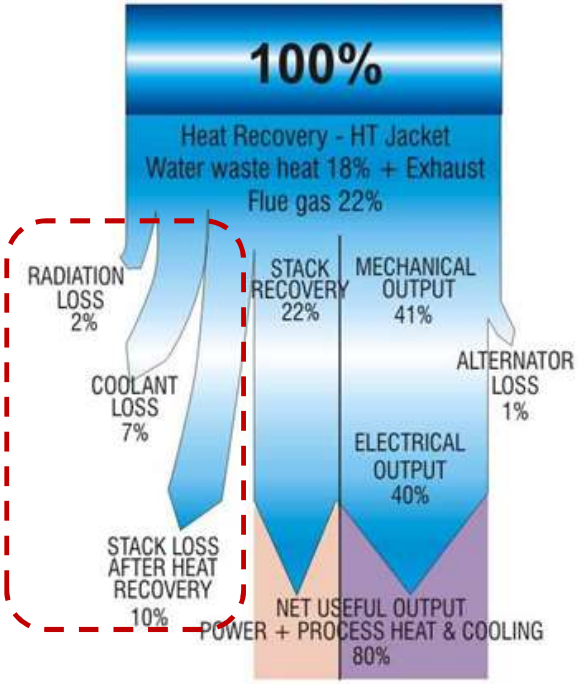
No Refrigerant Leakage – No Top Up Requirement
No Wear & Tear – Low Down Time

SYSTEM EFFICIENCY

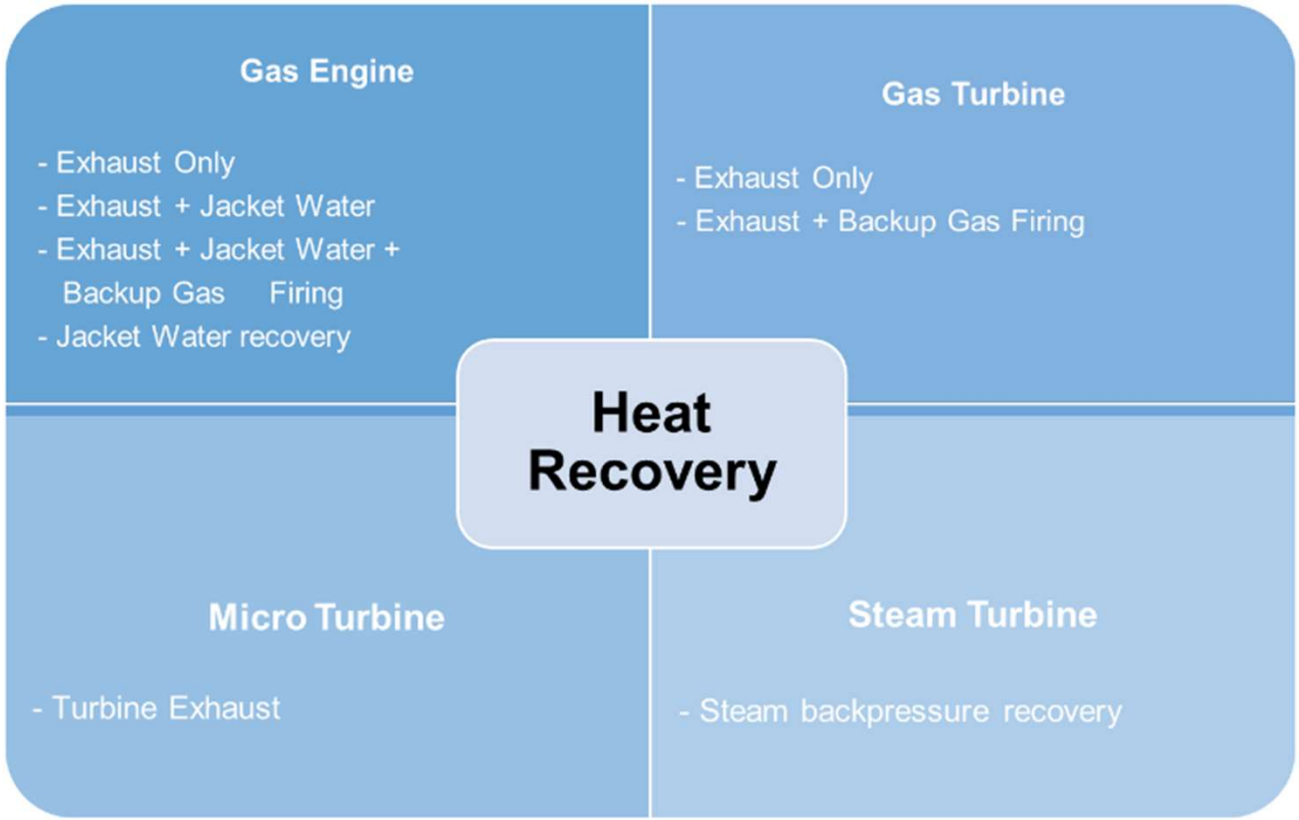
Overall System Efficiency without Heat Recovery = **40 %**



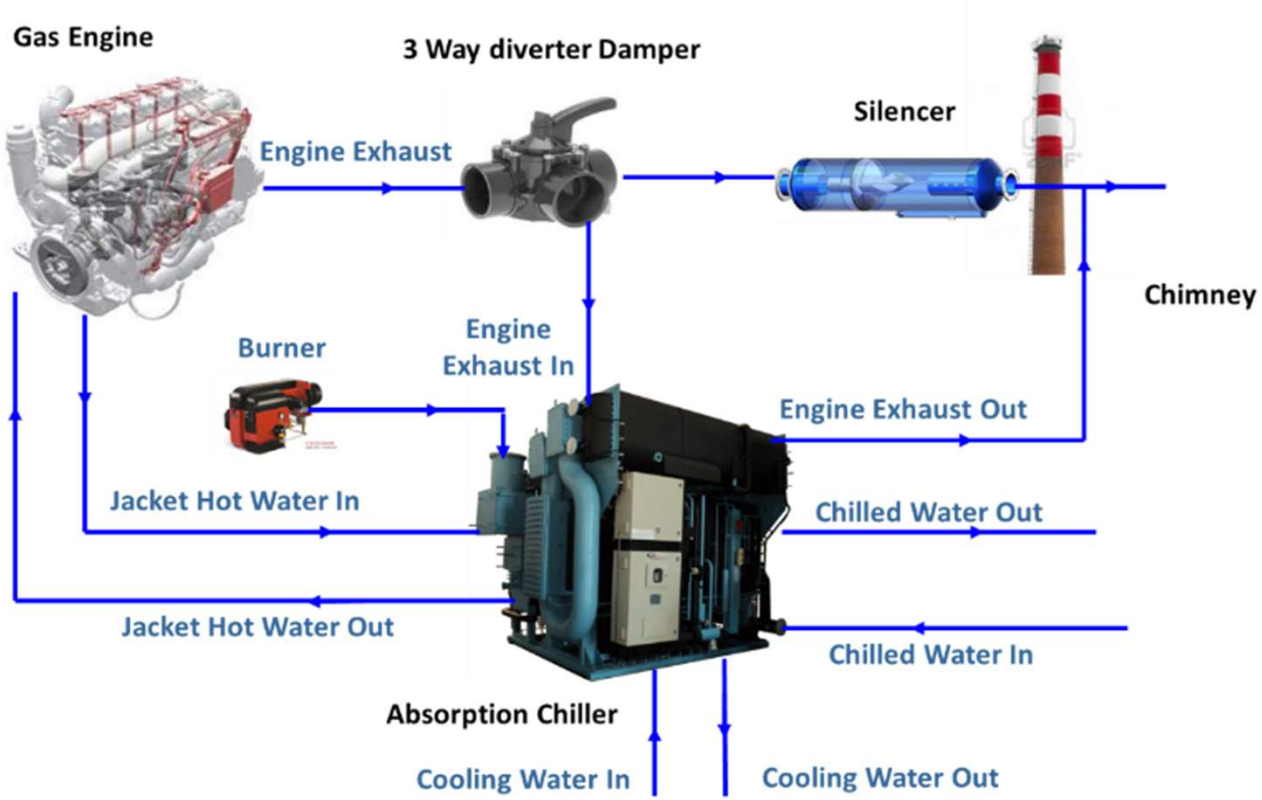
Overall System Efficiency with Heat Recovery = **75 - 80 %**



COGENERATION & TRI-GENERATION SOLUTIONS



Typical Schematic



Multi Utility : Cooling And / OR Heating

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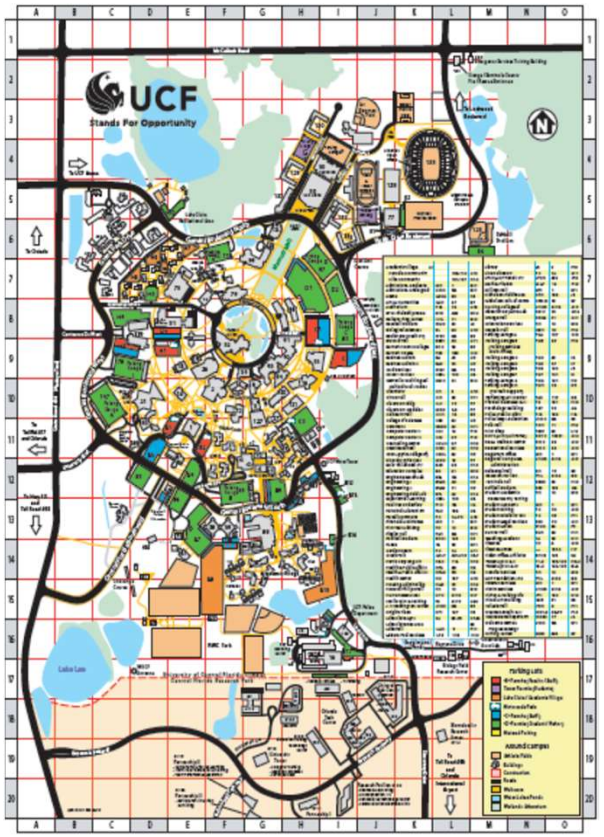
TRI-GENERATION – MEETING POWER AND THERMAL DEMAND

- 2 nos. x 1300 TR Multi energy absorption chiller
- Both chillers in parallel providing flexibility in operation: Two units as chillers in summer, One chiller + One heater in shoulder months and two heaters in winter months.
- Heat Source : Exhaust Gas + Supplementary Firing. Exhaust gas from turbine is split and fed to two chillers
- Exhaust from 4.4 MW Natural Gas Turbine
- Simultaneous production of Chilled & Hot Water possible

Highlight: **High Temp difference in Chilled water loop = 13°C** (18/5 deg C), which helped change the scheme from two chillers in series to parallel giving great flexibility in operation

University Of Central Florida, Orlando Campus



University of Central Florida, Orlando Campus:

The UCF Orlando, Florida with campus of spanning 1415 acres. Campus has unique layout with a series of concentric circles

Installation has:

- 1000 TR Multi energy absorption chiller
- Heat Source : Exhaust Gas + Jacket Water
- Exhaust from 5.5 MW Mitsubishi Natural Gas Engine

UNIVERSITY OF TOLEDO, OHIO

THERMAX

Datacentre cooling + Air-conditioning + Pool Heating

- 96 TR (336 kW) cooling + 275 kW Heating capacity Exhaust gas driven chiller-heater
- Exhaust gas recovered from 6 nos x 65 kW C65 Capstone micro-turbines.
- **Comfort Cooling & Data center air conditioning & pool heating**

Thank You!

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