

EPA Webinar

**CHP for Data Centers
BP Helios Project**



September 17, 2009

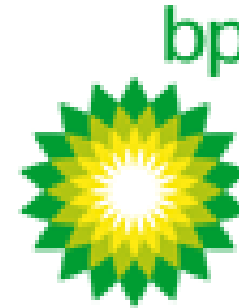
**Presented by:
Tom Pierson**



MISSION CRITICAL DATA CENTER

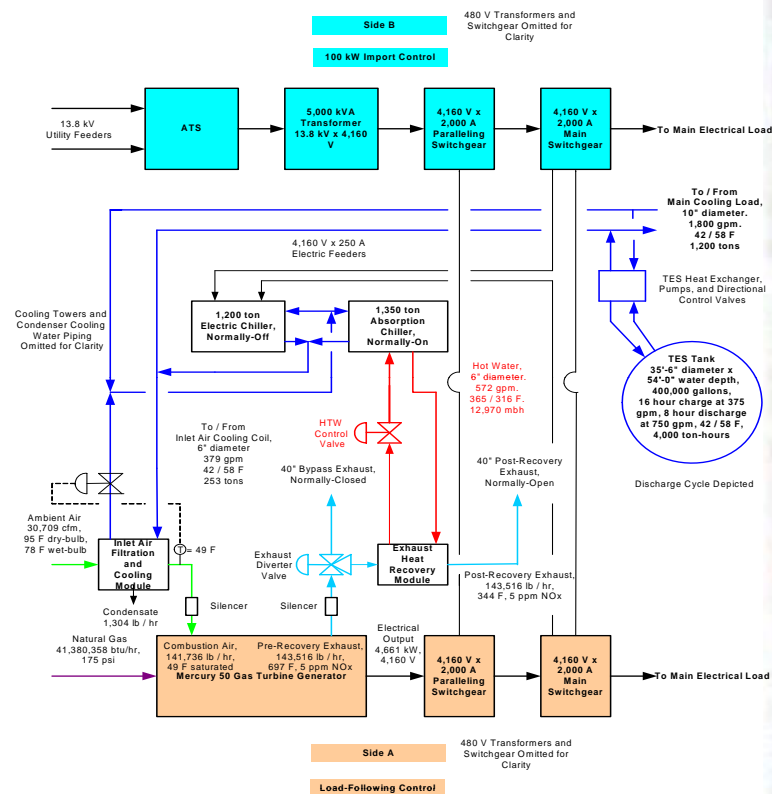
CHP-Reliable, Clean Power & Cooling

- Clean Heat and Power Plant
 - 4.3 MW Solar Gas Turbine with Heat Recovery
 - Turbine Inlet Air Cooling
 - Chiller Plant
 - 1200 Ton Electric
 - 1350 Ton Steam Absorption
 - 4000 Ton-Hour Chilled Water TES Tank
- Key Decision Criteria
 - LEED Platinum
 - Reliable Power
 - Environmental Benefits
 - Corporate Training

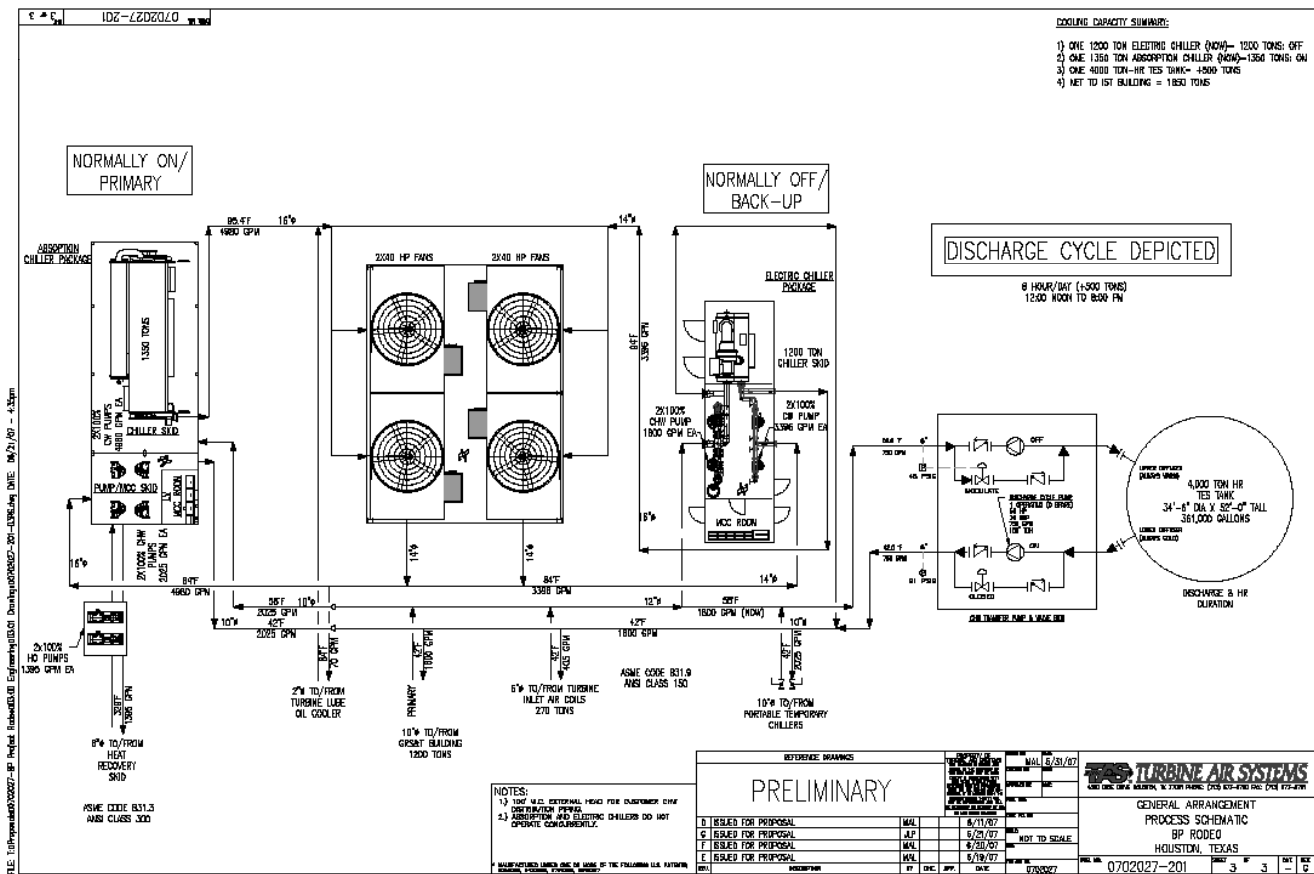


Modular CHP Scope of Supply

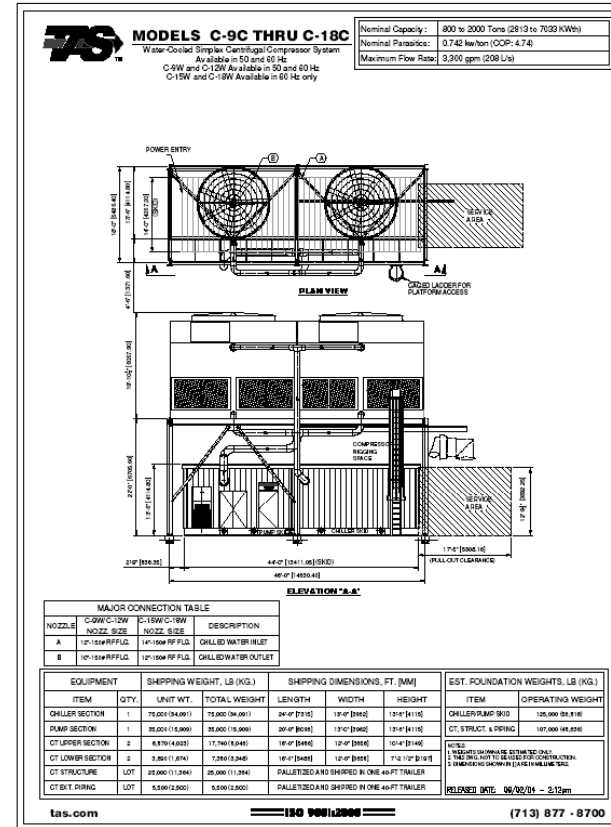
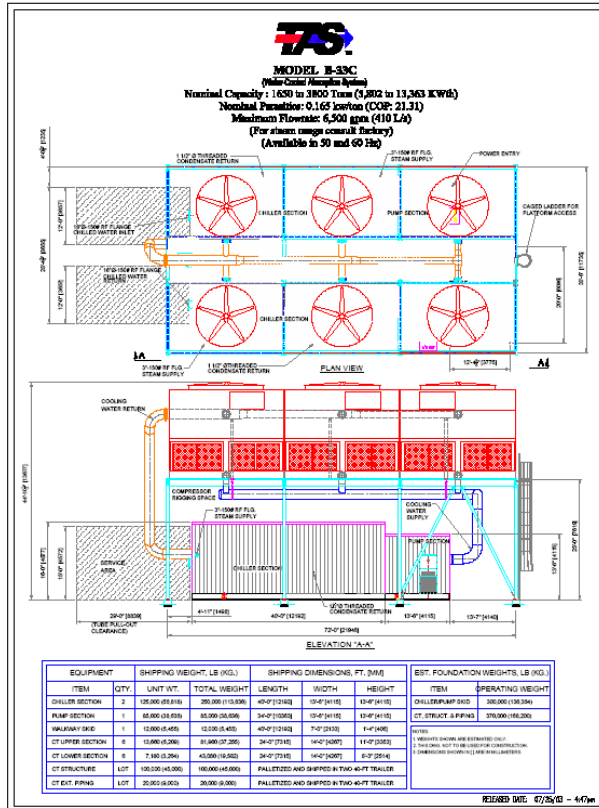
- Mercury 50 GT (4.3MW)
- Heat recovery on turbine
- Modular absorption chiller plant (1350 TR)
- Modular mechanical chiller plant (1200 TR)
- Thermal Energy Storage Tank (4,000 TR-hrs)
- N+1 Reliability
- >75% efficiency



Chilled Water Flow Diagram



Chiller Plant Arrangements



Data Center Challenges

- Thermal Load Balancing—Need to match Power and Cooling demand
- Redundancy of Power & Cooling
 - CHP Power is Primary with Grid as Backup
 - Thermal Chiller is primary with Electric chiller backup
- Power Plant & Chiller Plant are not core competencies of Data Center personnel



Lessons Learned

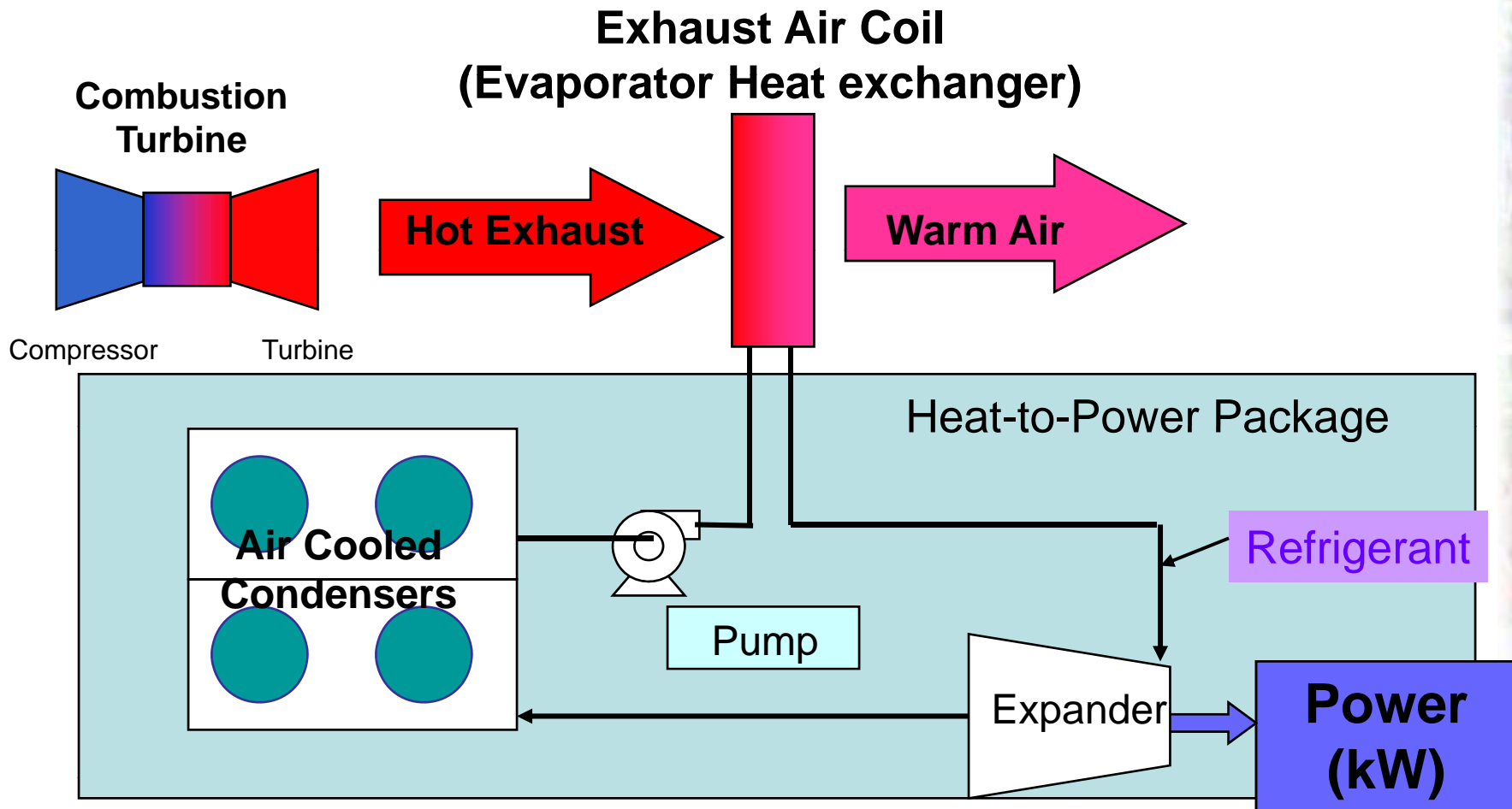
- Modularity is key—need greater standardization & even less field construction
- Early involvement with the owner is essential—must be involved before a design spec is written (modular vs stick-built)
- Very well defined scope is essential



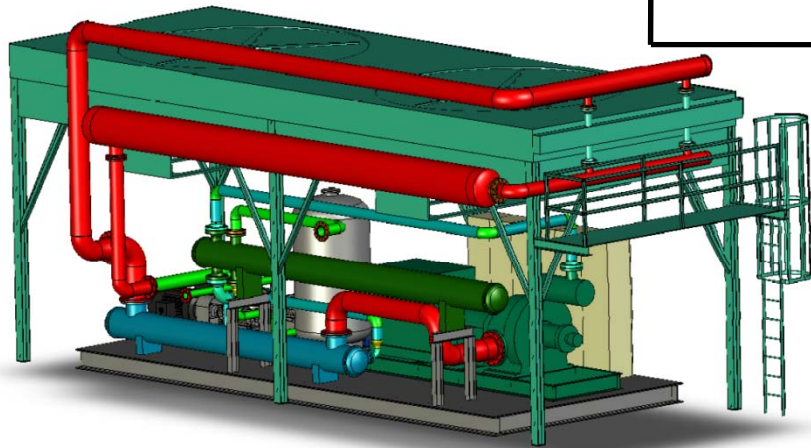
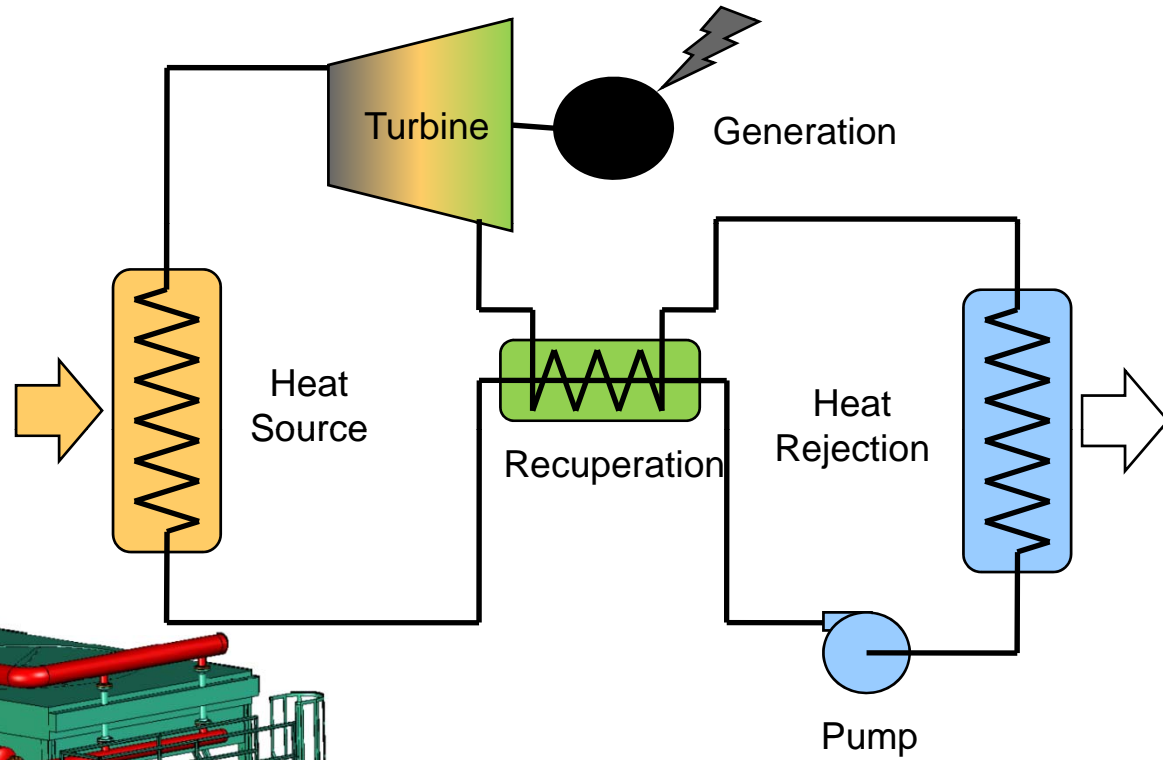
The Future for CHP in Data Centers



Heat-to-Power Process



Technology



MODULAR SYSTEM BENEFITS

- **Reduced First Cost**
 - 10% to 20+% Compared to Field Construction
- **Guaranteed Performance / Delivery / Cost**
- **Reduced Construction Cycle**
 - Months Versus Years
- **Minimal Site Time**
 - Weeks Versus Months/Years
- **Unique Financing Options**
 - Equipment Not Real Property
- **Information to Make Better Financial and Technical Decisions in Conceptual Phase**

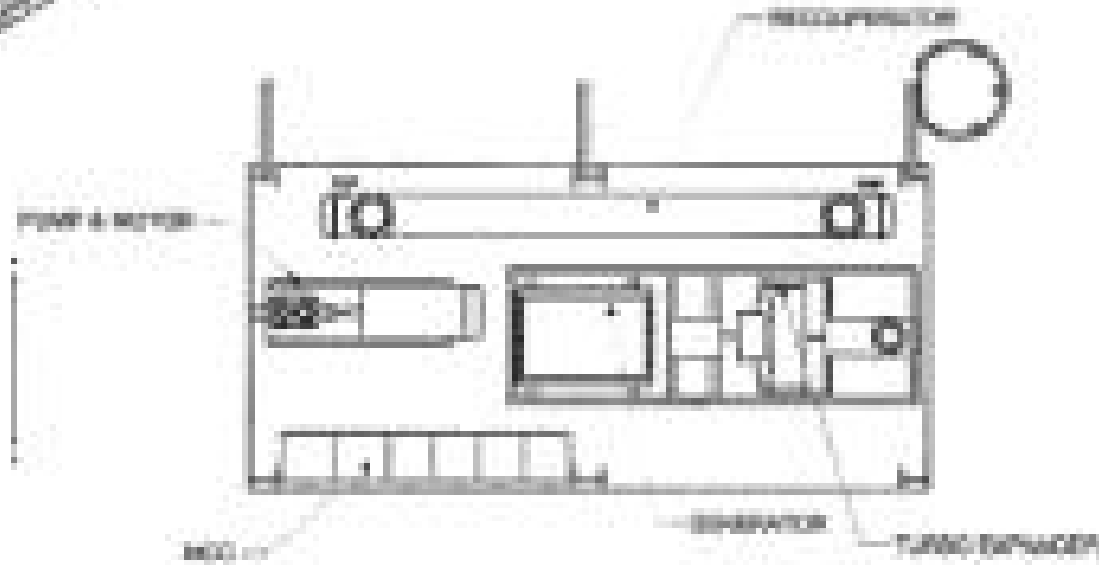
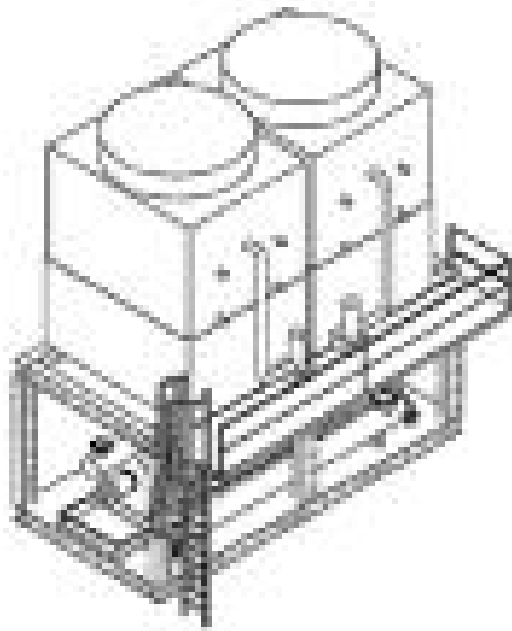


MODULAR SYSTEM BENEFITS

- **Scalability / Modularity**
 - Increment Plant Growth to Match Project Growth
- **Reliable & Skilled Labor Force**
 - Not Dependent on Location of the Project
- **Single Source Responsibility**
 - No Finger Pointing
- **Lower Overall Risk**
 - Schedule & Cost Guarantees
- **Attention to Serviceability / Maintainability**
 - Overhead Lifting Devices
 - Removable Walls / Roof
 - Continuous Process Improvement



Modular Heat Recovery



Fast-Track Construction/ Shovel Ready



Scalable to meet variety of load requirements



Modular Electric Chiller Plants



Modular Data Center



Extending Modular Benefits to the Entire Data Center



Questions

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