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· August 15-18, 2010 · Dallas, Texas ·
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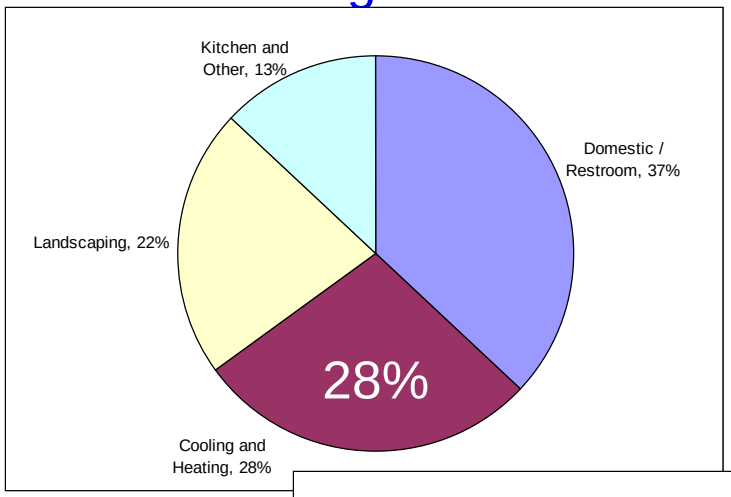
Alternate Sources of Water for Cooling Tower Make-up

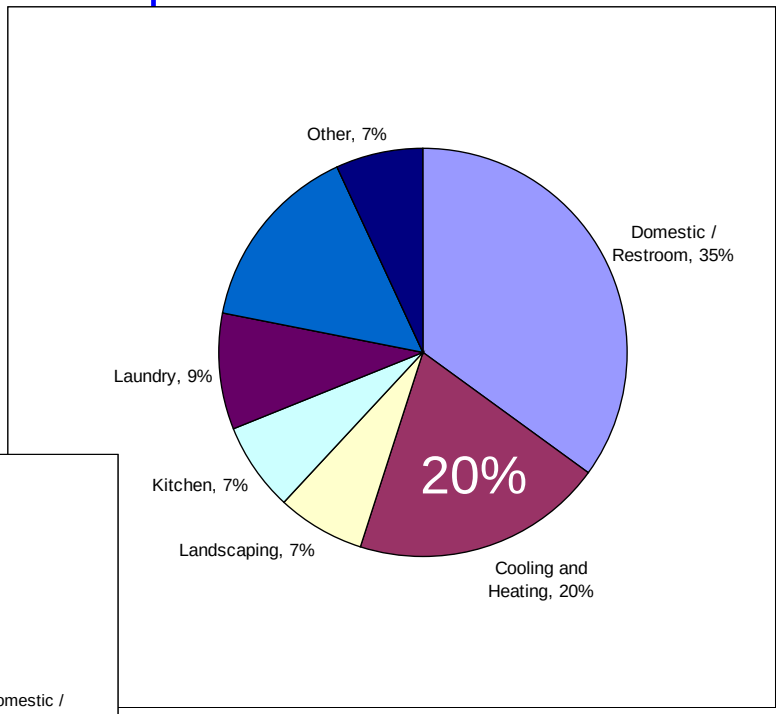
Roy Sieber, ERG

Why are cooling towers important?

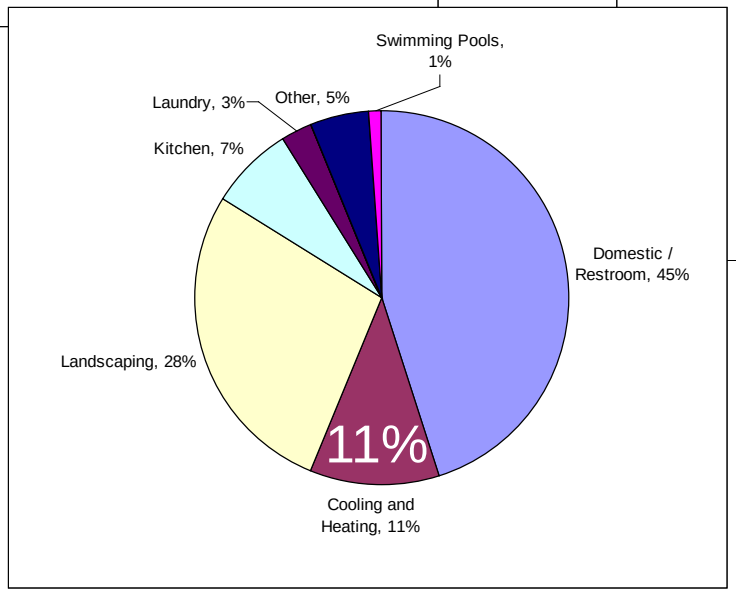
Office Buildings



Hospitals



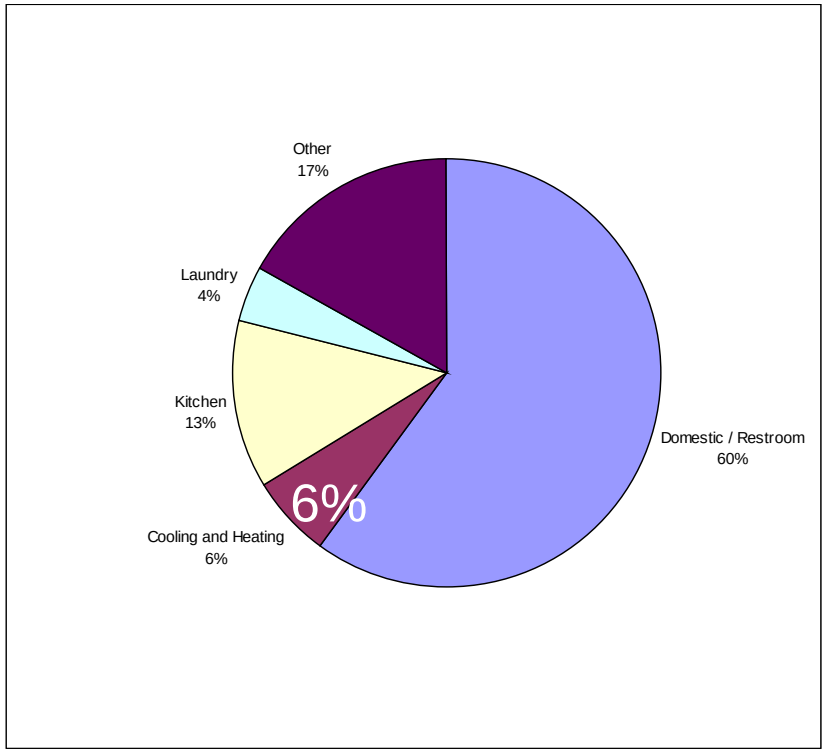
Schools



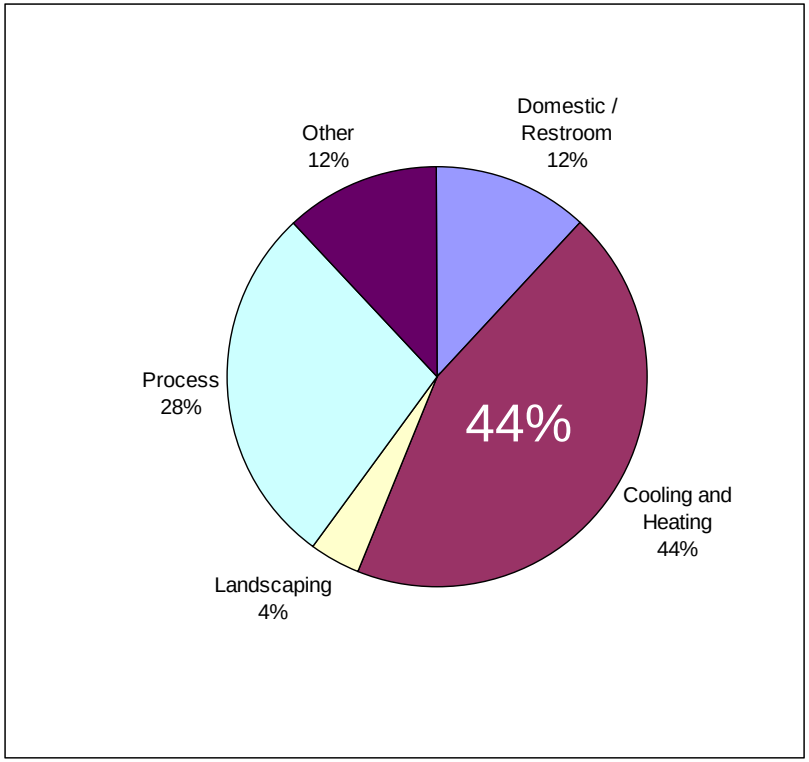
Source: Water Efficiency in the Commercial and Institutional Sector: Considerations for a WaterSense Program, US EPA

Why are cooling towers important?

Prisons

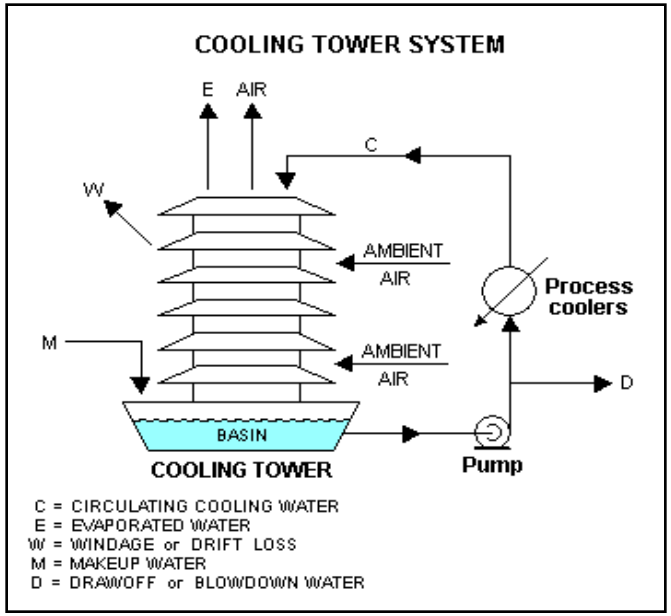


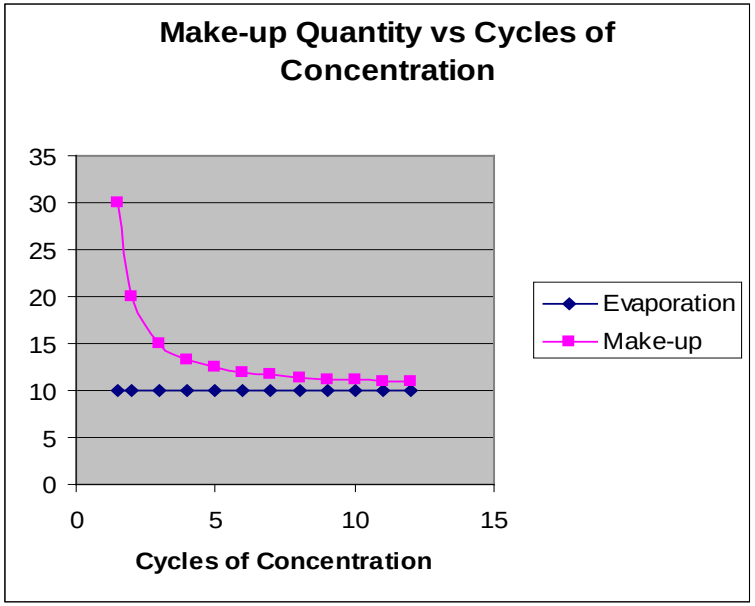
Research Laboratories



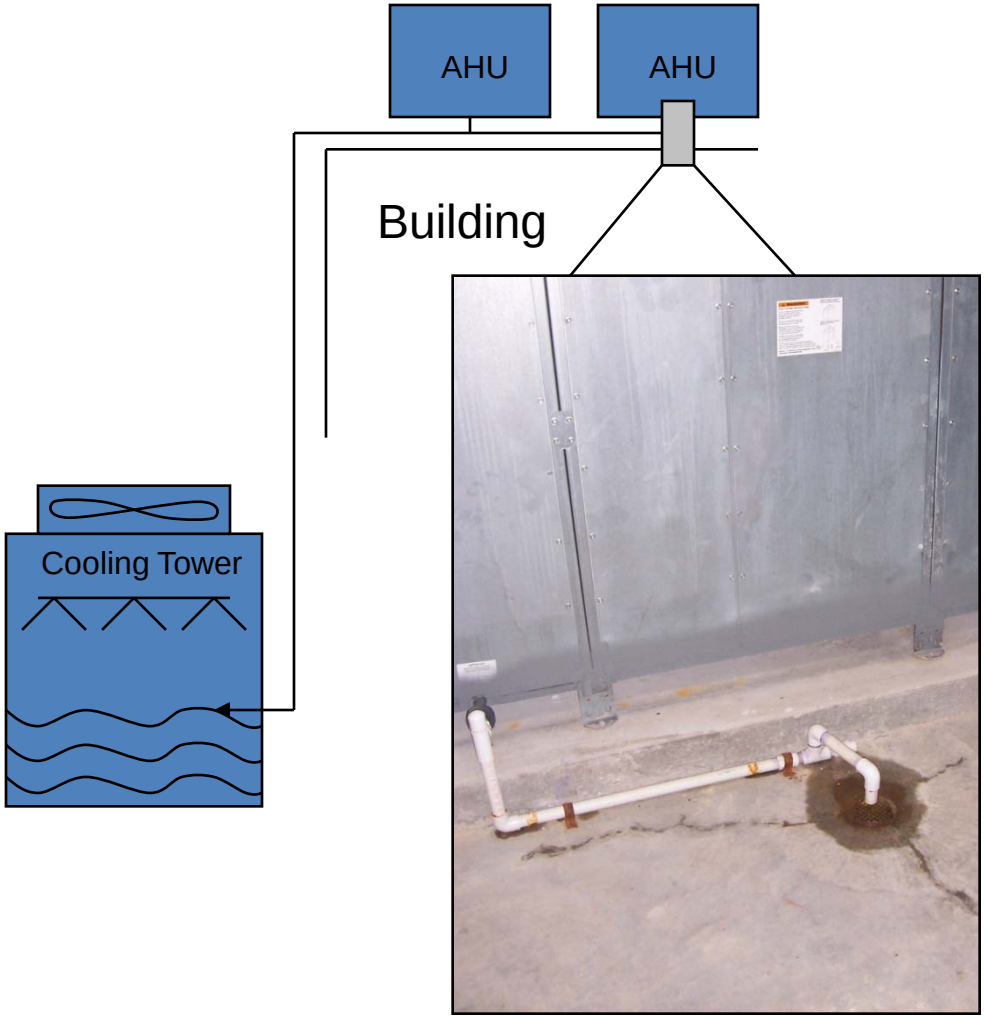
Cooling Tower Water Use Efficiency

- Energy saving projects that reduce cooling tower load
- Careful control to maximize cycles of concentration
- Alternate sources of make-up water

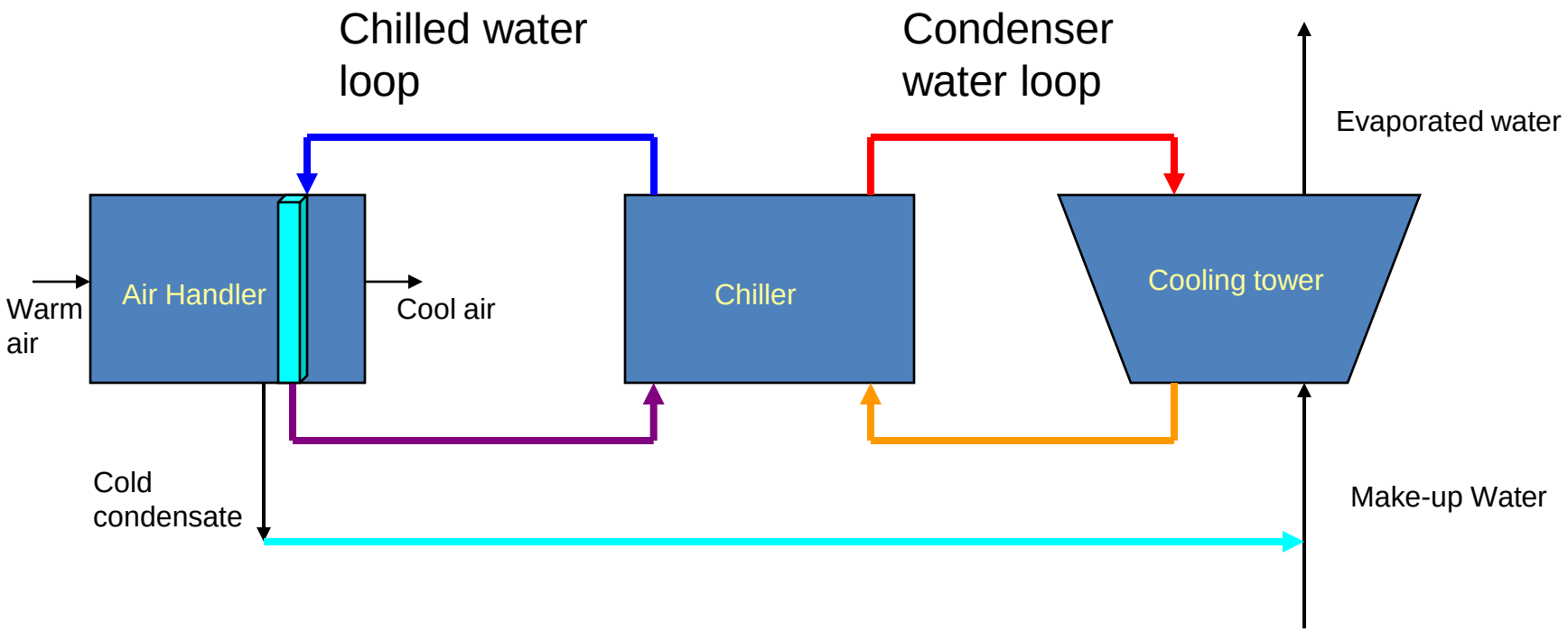




Air Handler Condensate Recovery



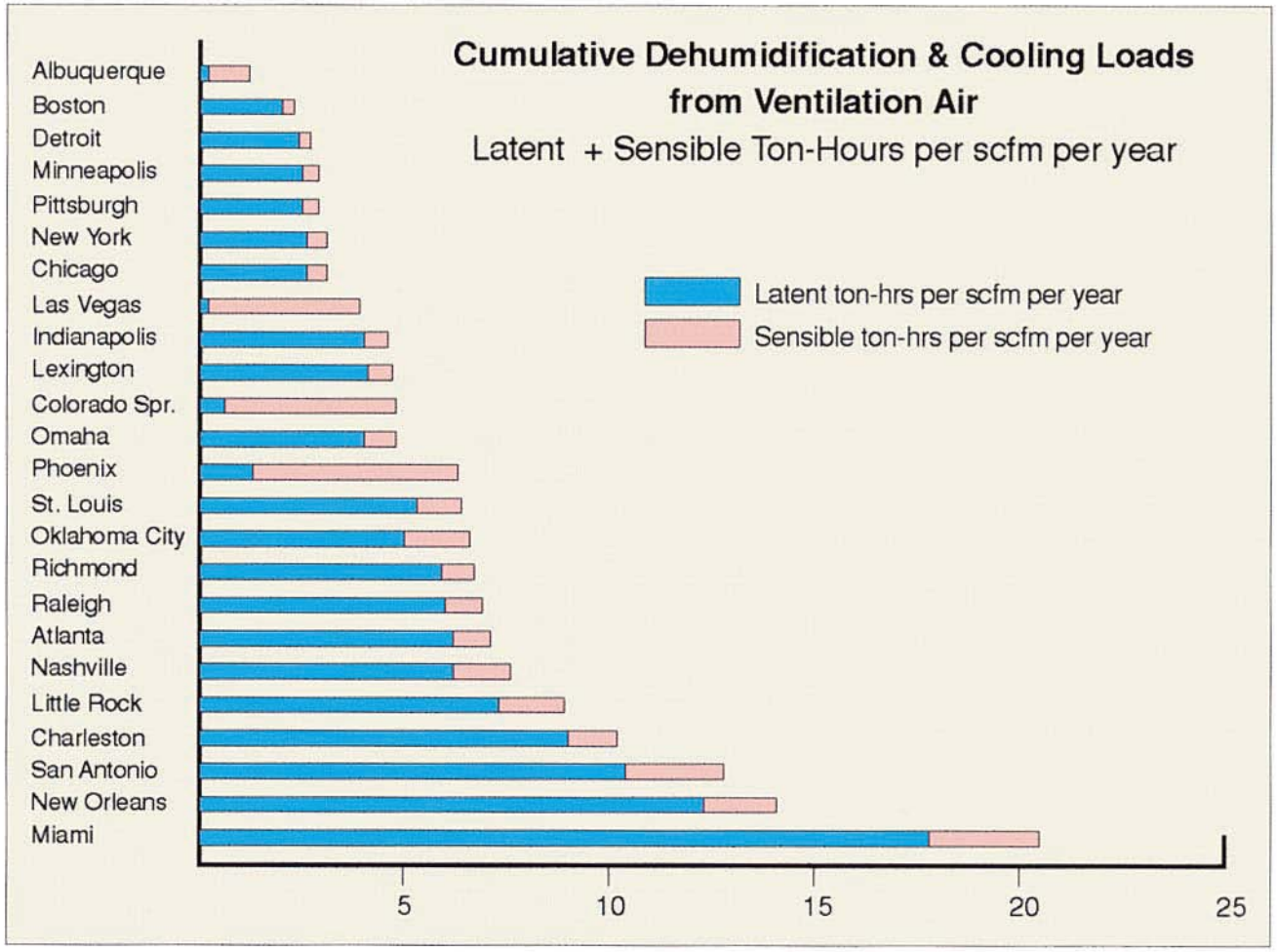
Condensate Recovery – Why is it a good idea?



Where is condensate recovery effective?

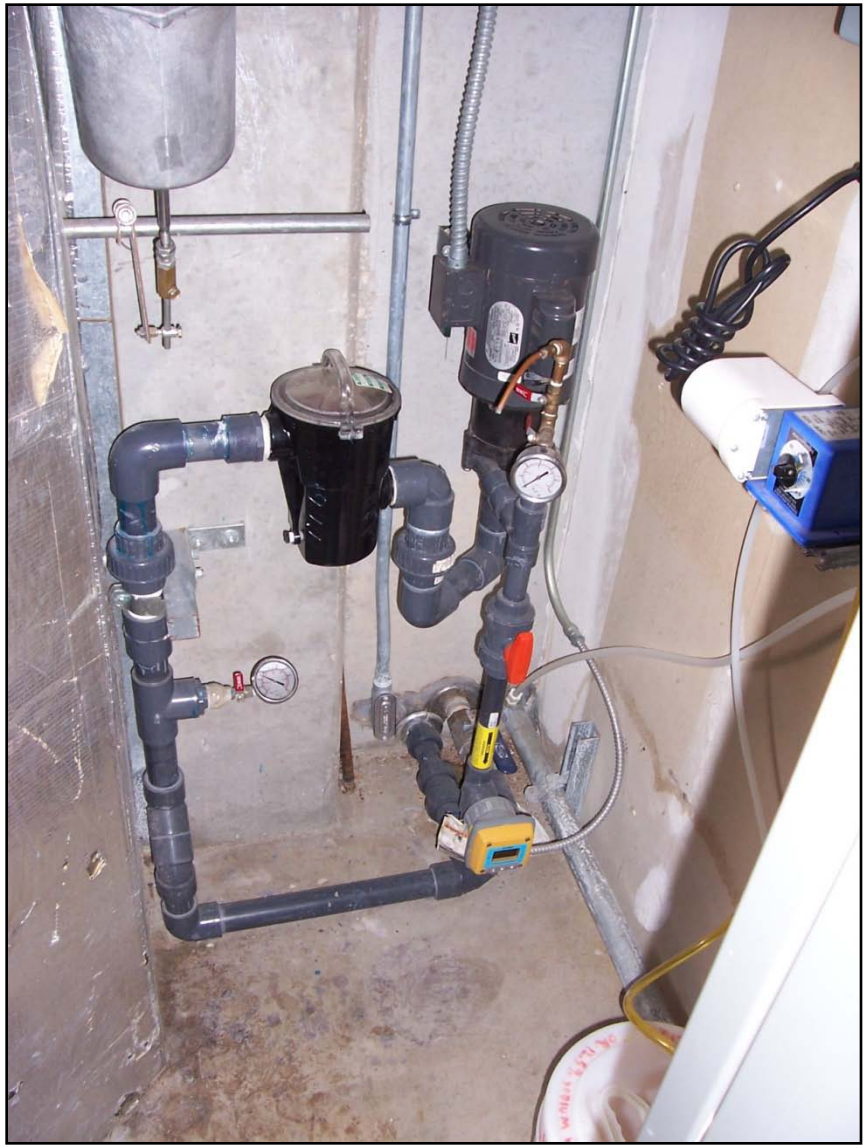
- Types of cooling loads:
  - Ventilation air
  - Infiltration air
  - Solar gain
  - Equipment loads
  - Occupancy loads
- Thermodynamic considerations
  - Sensible heat - energy which is related to a change in temperature
  - Latent heat – energy which is a related to a change in phase

Where is condensate recovery effective?



Source: Harriman, L.G., D. Plager, D. Kosar. 1997. Dehumidification and Cooling Loads From Ventilation Air. ASHRAE Journal. November 1997: 37-45

Example 1 – Texas



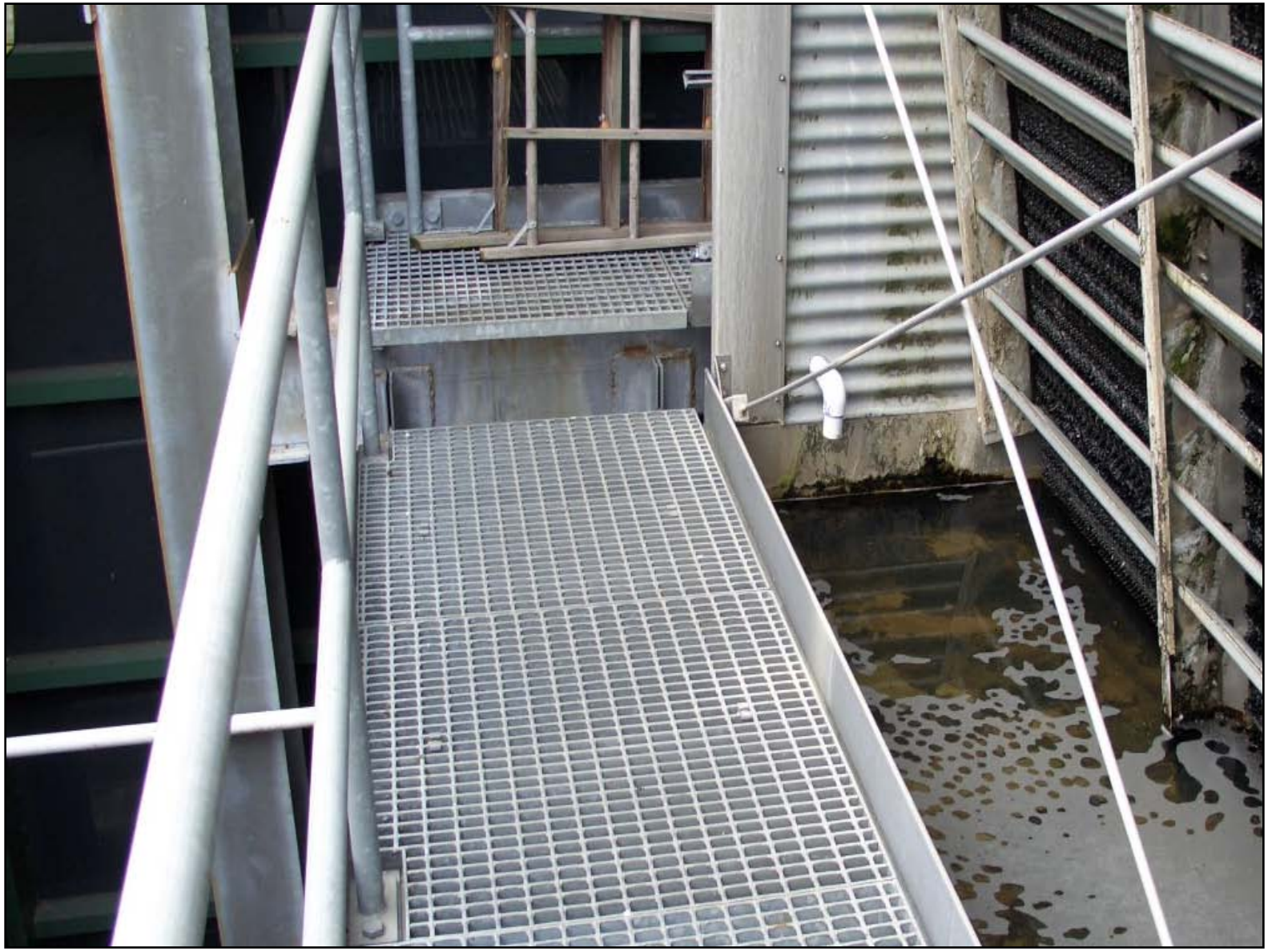
860,000 gallons per year

Example 2 - Georgia

540,000 gallons per year

Example 3 - Maryland

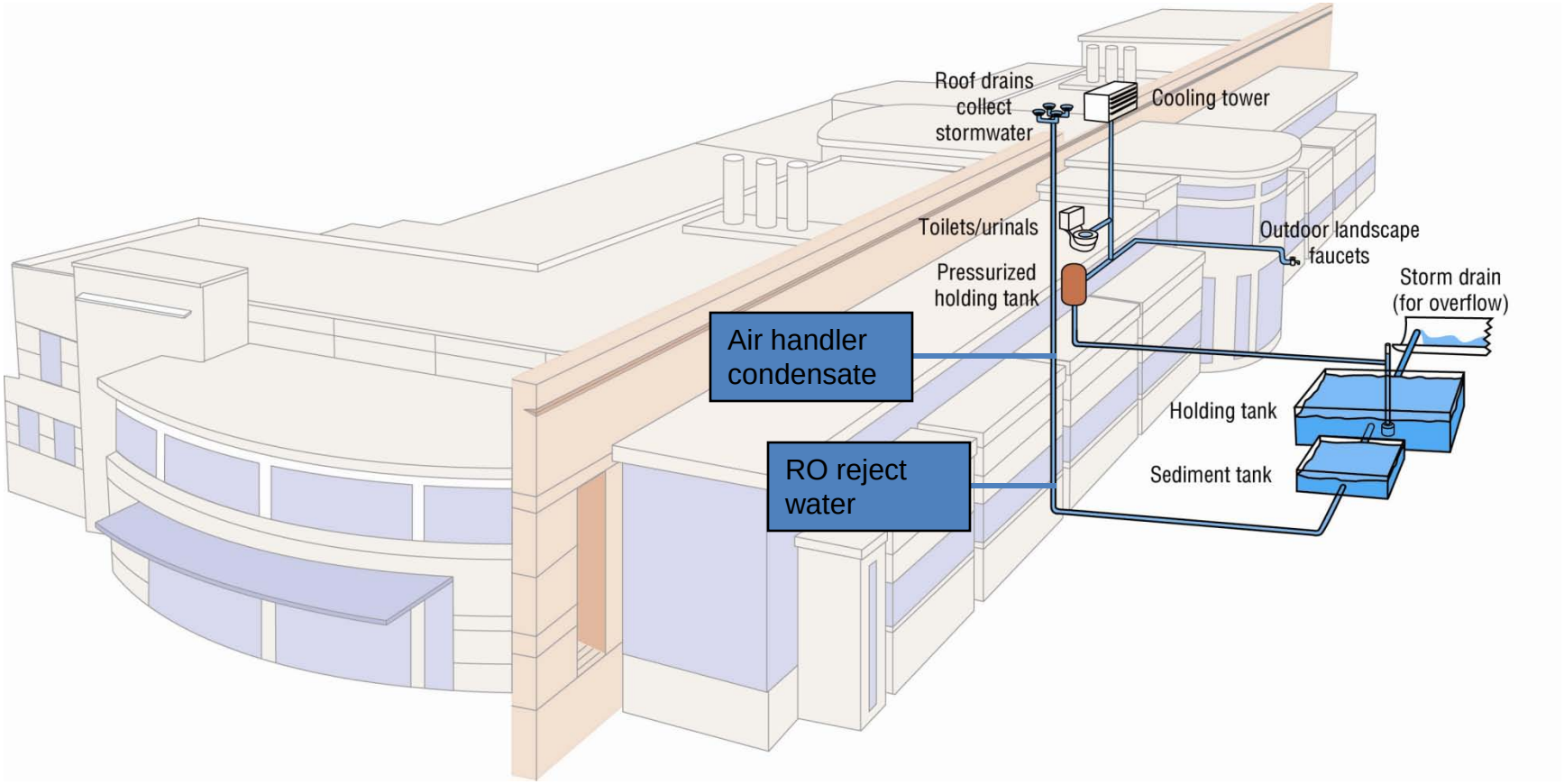
440,000 gallons per year



Example 4 - Georgia

430,000 gallons per year

Example 5 - Kansas

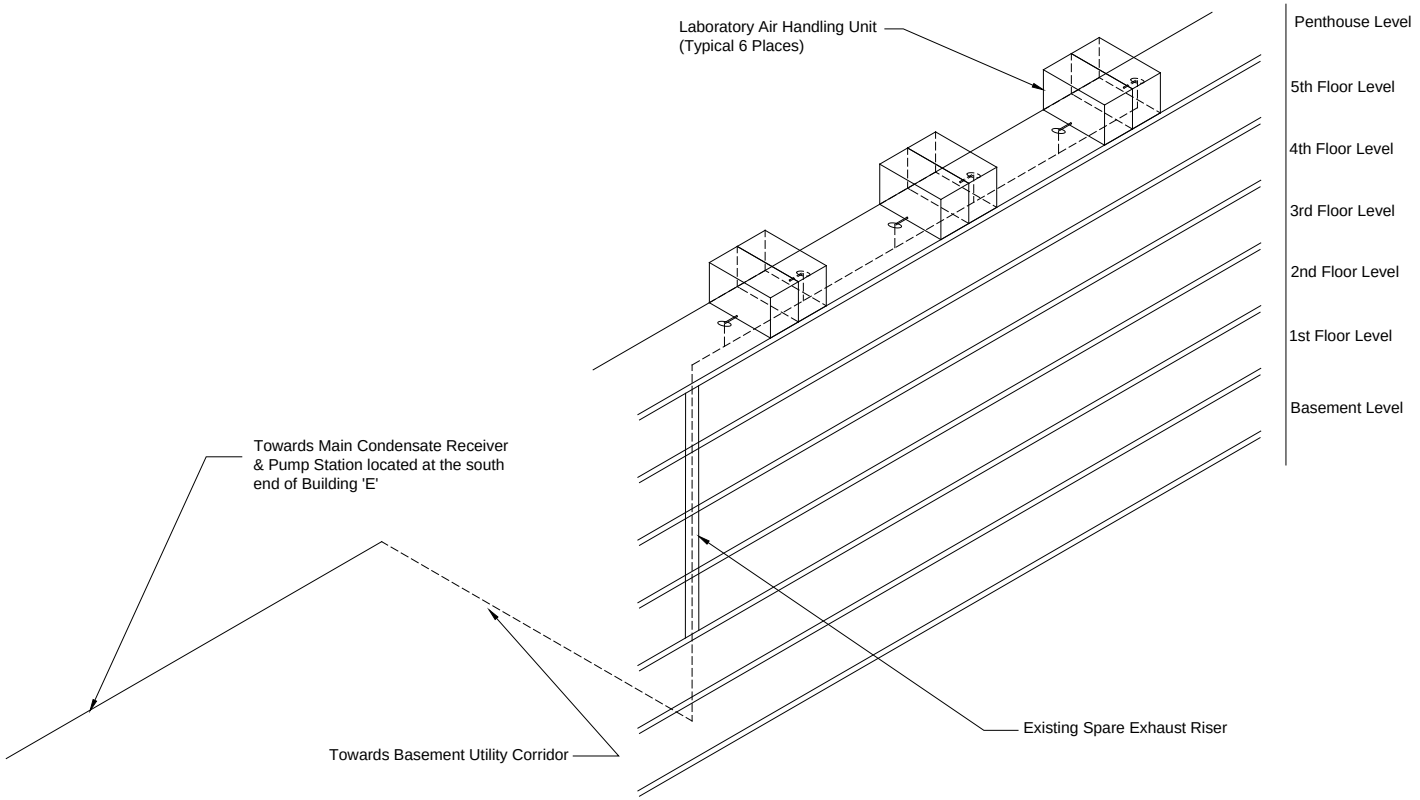


Example 5 – North Carolina

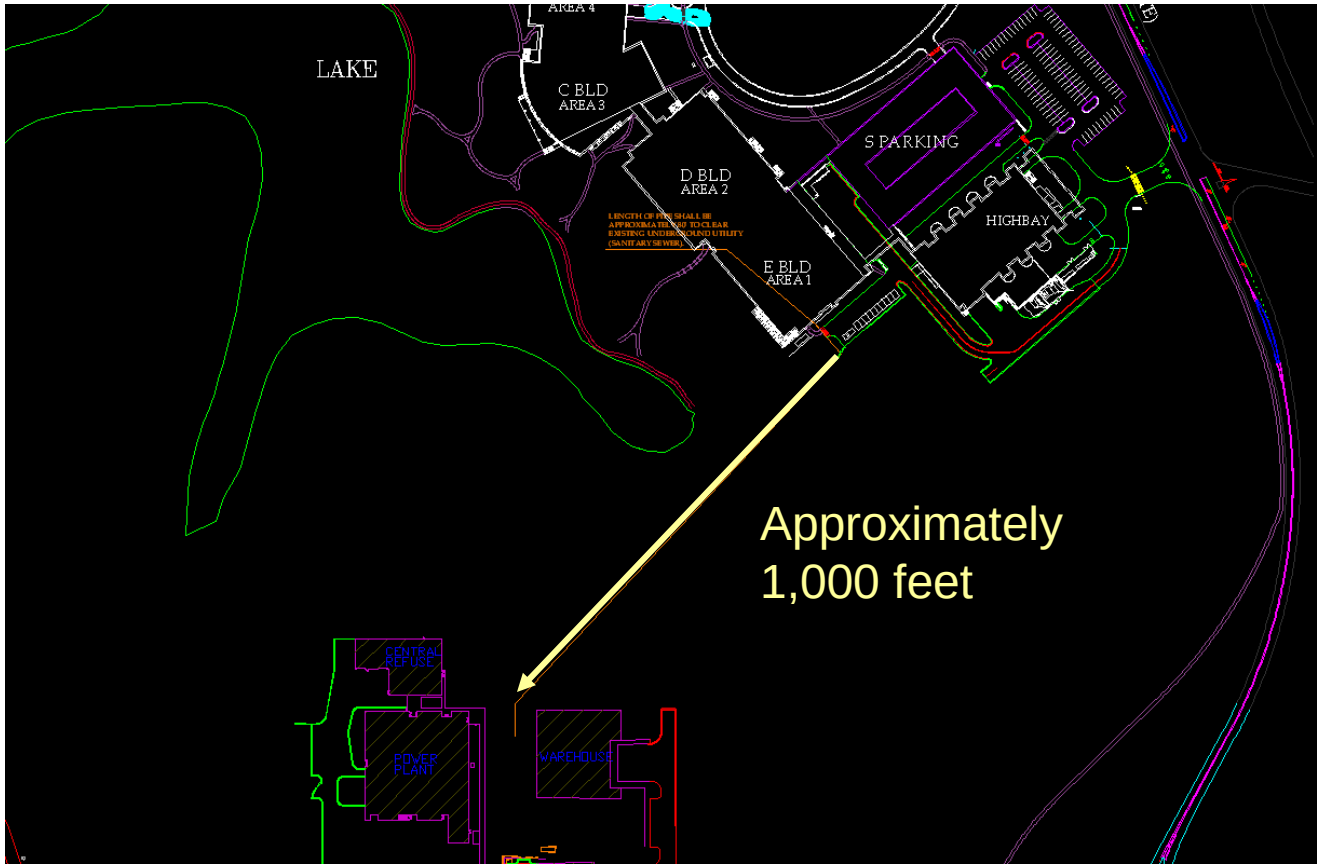
Central Utility Plant Cooling Towers

- Cooling Tower Make-Up Water
  - 32 million gallons in 2009
  - Represents ~65% of 2009 potable water consumption
- Two FY10 Projects Designed to Reduce Make-Up Water Demand
  - Air Handler Condensate Recovery
  - Cooling Tower Blowdown Reverse Osmosis (RO) Recovery

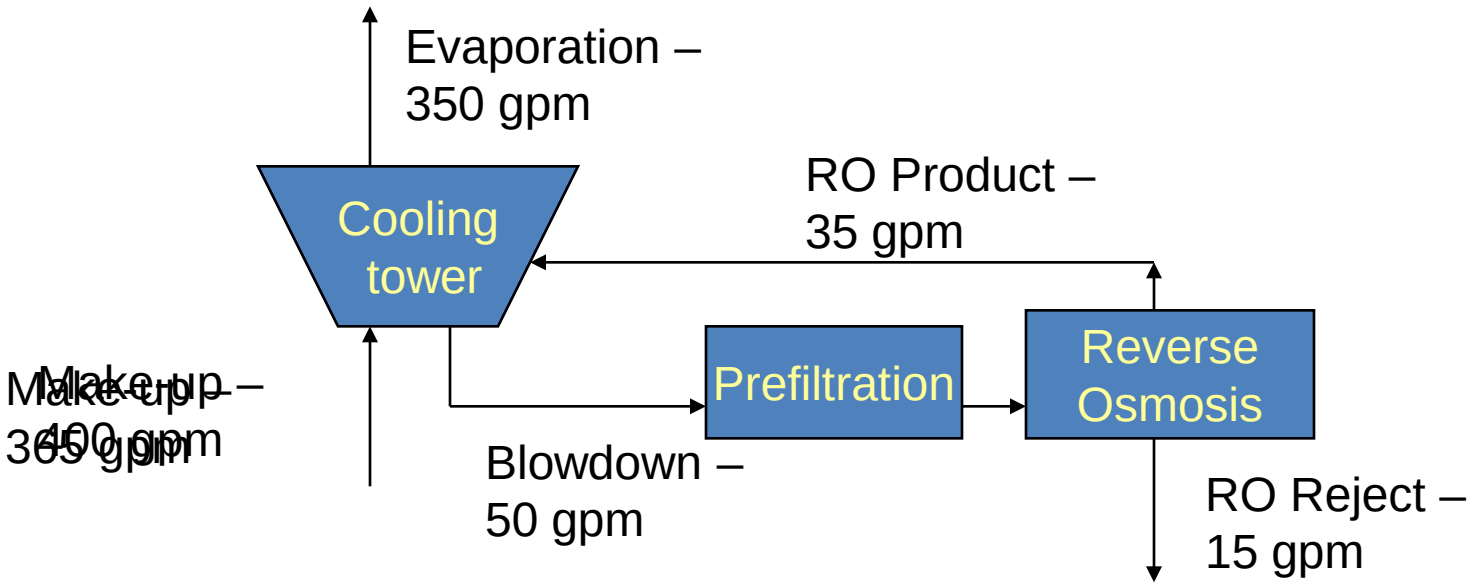
AHU Condensate Recovery Concept



AHU Condensate Recovery Concept



Cooling Tower Blowdown RO Recovery Concept



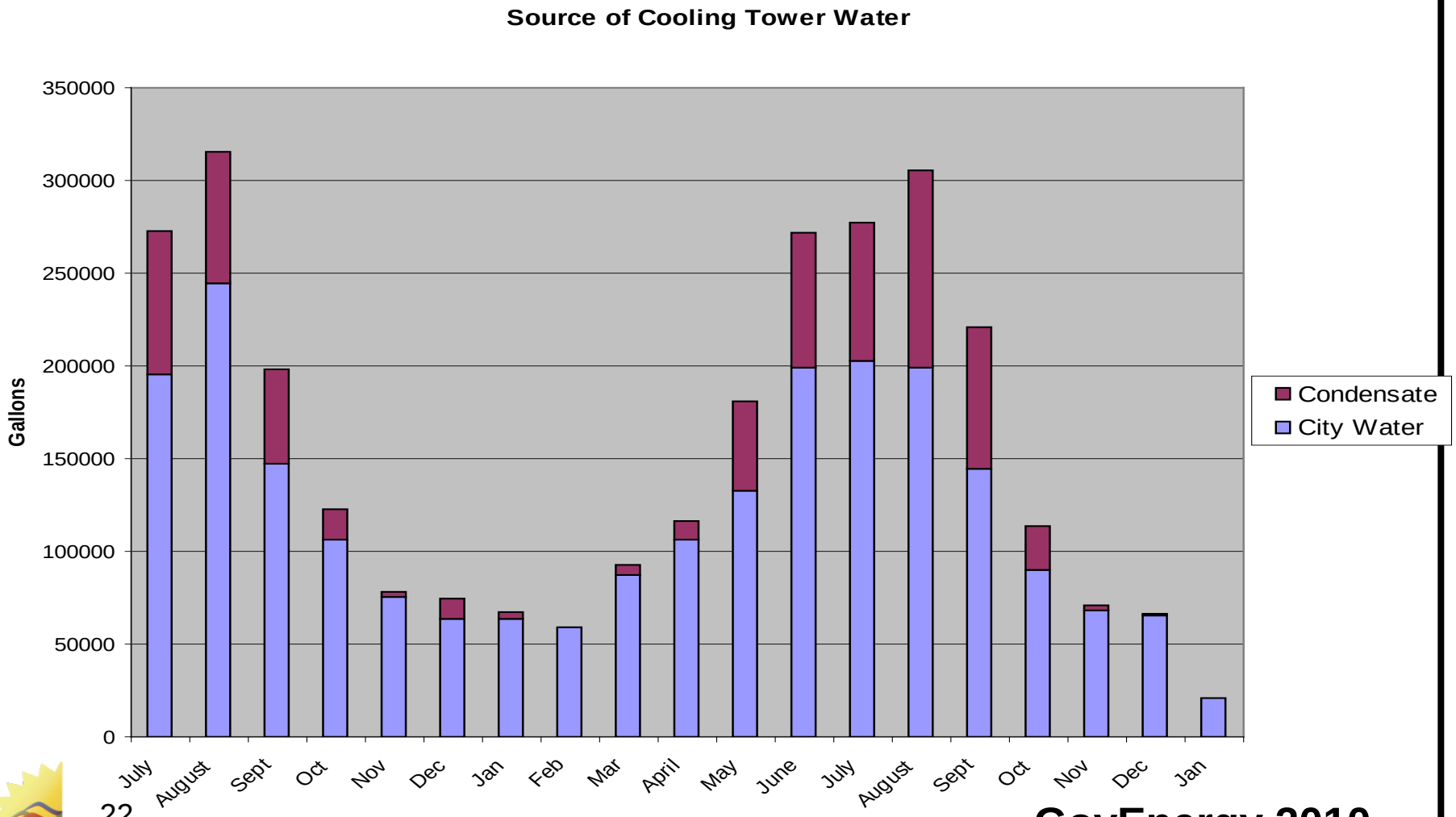
9% Reduction in water use
70 % Reduction in sewer discharge

Cooling Tower Blowdown RO Recovery

Condensate Recovery Rates – Research Labs with High Ventilation

Location	CT Demand (gallons)	Condensate Recovered (gallons)	Percentage of CT Makeup
Georgia	1,800,000	540,000	30%
Georgia	1,300,000	430,000	33%
Maryland	2,700,000	440,000	16%
Texas	1,900,000	860,000	45%
Kansas	1,900,000	240,000	12%
North Carolina	32,000,000	8,000,000 (projected)	25%

Air Handler Condensate Seasonal Generation, Athens, Georgia



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Operational Details

- Complex control schemes are not required
- Good maintenance practices are required
  - Water chemistry
  - Float valves
  - Overflow drains

Alternate Sources Checklist
Air Handler Condensate Recovery

- Matched quantity of supply and demand
  - Long term (seasonal)
  - Short term (daily, weekly)
- Matched quality
  - Chemistry
  - Temperature
- Logistics

Questions?

Contact

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