

Overview of Advanced Technologies

Workshop on Modern Evaporative Cooling Technologies

Dick Bourne, PE, WCEC Director

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University of California, Davis
WCEC
WESTERN COOLING
EFFICIENCY CENTER

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Goals of this Session

- Review range of technologies
 - Multi-stage indirect and indirect/direct
 - Hybrids (evaporative + vapor-compression)
- Discuss the sources of savings
- Review field data
 - Residential: Dave Springer, DEG
 - Commercial: Howard Reichmuth, NBI



Sources of Savings

- Reduce loads by curtailing:
 - unnecessary latent cooling (10-20% savings)
 - Infiltration and ceiling heat gain (5-10% residential savings)
- Reduce compressor operation
 - Likelihood of EC satisfying cooling loads varies by climate
 - Greatest potential for cooling ventilation air
 - Opportunity for night storage in slabs or chilled water
- Reduce blower energy
 - Apply EC sump or CWS water to room surfaces
 - Combine hybrid DOAS with VS fan coils
 - Reducing blower energy further reduces loads



Major Advance #1: Indirect Plates

- Thermo-formed parallel plastic plates
- Begun by AdobeAir and Bacchus in mid-80's
- Effectiveness varies from 40-95%
- New entries include Idalex/Coolerado/Delphi, Speakman, DEG/Des Champs/Munters, 3-4 others?
- Patterns include crossflow, quasi-parallel flow, QP with pre-cooled wet air, multi-multi-stage (Coolerado)
- 80-95% effectiveness changes the HVAC equation!
- Brings variable-flow 100% OA RTU's into play in many major commercial markets



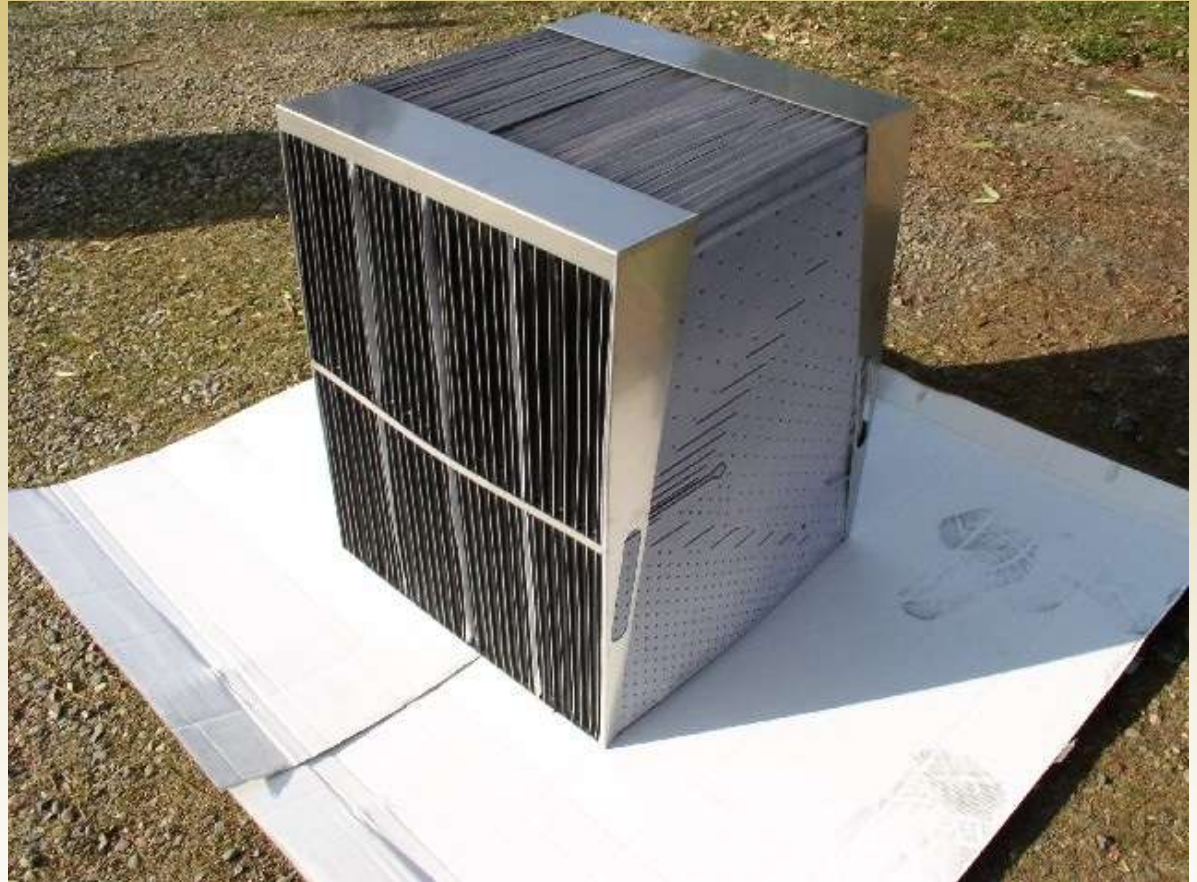
Coolerado/Delphi Heat Exchanger

- Unique multi-stage indirect design
- 90%+ effectiveness, balanced flow
- 250 cfm per module, 10" high, 20" long, 19" wide
- Used in Coolerado & Desert Cool Aire products



HyPak Heat Exchanger

- High-speed production process
- 90%+ effect. in lab test
- Delivered 4.3 tons for 2' width
- Many other applications



Exciting Advance #2: EC Radiant Surfaces

- Applied on projects by DEG, others since 1991
- Couples cooling tower, fluid cooler, or night roof spray with radiant floor and/or ceiling
- Cuts blower and compressor energy, increases sensible cooling ratio
- With massive slabs, can store “coolth” to reduce peaks, improve efficiency, facilitate demand-response
- Can be “engineered systems” or coupled with advanced 100% OA rooftop units



The Roll-out Radiant Floor

- Prior cost \$6-7/sqft
- Rollout cost ~\$2/sqft
- Tested at WM West Sac store



Advanced Indirect Systems: Status Report

- Heat Pipe and Flattened-Tube Systems: contact Des Champs Technologies
- Advanced Parallel Plates:
 - AdobeAir & Spec-Air: contact manufacturers
 - Coolerado & Desert CoolAire- ditto, some reporting here
 - OASys - ditto, some reporting here
- EC Radiant Surfaces
 - Contact WCEC for reports and BEKA for radiant ceiling info
 - Low cost radiant floor system under development by Viega with support from Wal-Mart, WCEC, DEG



Status Comments

- These technologies promise:
 - 50%+ annual HVAC electricity savings in the West
 - 50% demand reduction for simple RTU's
- Offer 85%+ demand reduction and increased energy savings if coupled with CWS
- Most face barriers and need support, as will be discussed next, and this afternoon
- Key challenge is to confront and overcome barriers so advanced systems can have impact



On With the Program!

- Technology Overview
 - Residential: Larry Kinney
 - Commercial: Nick Des Champs

- Field Results:
 - Residential: Dave Springer
 - Commercial: Howard Reichmuth

