Deployment Strategies to Overcome Barriers

Workshop on Modern Evaporative Cooling Technologies

Dick Bourne, PE, WCEC Director

07/10/07

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Goals of this Presentation

- Highlight deployment strategies that build momentum and overcome barriers
- Underscore key solution strategies discussed in prior presentation
- Highlight several near-term hybrid concepts not otherwise featured at this workshop
- Discuss the long range plan

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Ex #1: Residential Evaporative Condensers

- The Technology
  - Category: Residential
  - Direct replacement for air-cooled condenser
  - Retrofittable, requires addition of water line
  - Several technologies with 5+ year demo record
- Benefit: 30-45% demand & energy savings in dry climates
- Major Barriers
  - Past maintenance issues
  - Market infrastructure
  - Capital costs
  - Lack of information

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Ex #1: Getting it Moving

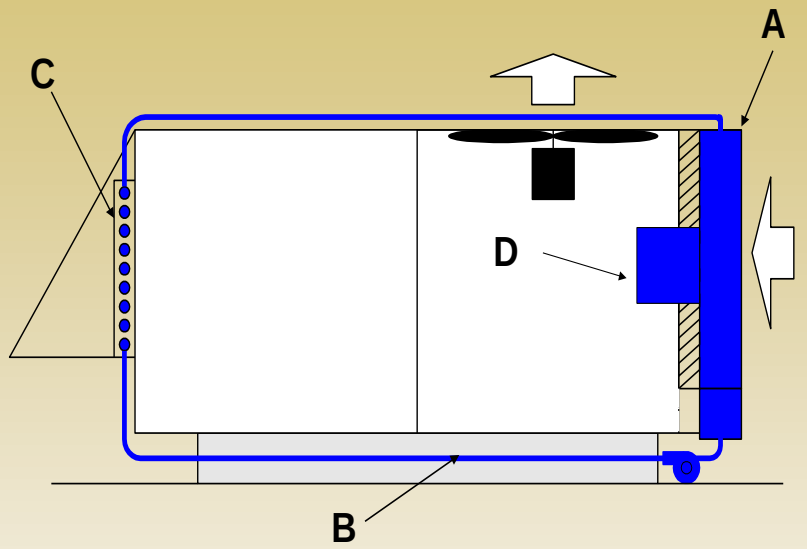
- The Partnership
  - the largest US EC-condenser manufacturer
  - Very large residential HVAC contractor
  - Two Northern California utilities
  - The WCEC, through contractor/Affiliate member
- The Plan
  - Contractor responsible for marketing
  - Utilities provide cash incentives
  - Sale includes 3 year renewable maintenance program
  - Program should achieve high volume to lower costs
- Status: “big/bold” program being developed

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Ex #2: Dual Pre-Cooling for RTU's

- The Technology
  - Category: Non-res
  - Direct condenser, indirect vent air evap pre-cooling
  - Retrofittable, requires addition of water line
  - Several technologies with 5+ year demo record
- Major Barriers
  - Past maintenance issues
  - Lack of information
  - Capital costs
- Benefit: 25-30% demand & energy savings



SYSTEM SCHEMATIC

A - High quality condenser air pre-cooler

B - Pump & copper supply/return piping

C - Ventilation air precooling coil

D - Controls

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Ex #2: Continued

- The Partnership
  - ICI, manufacturer of patented DualCool (open to others)
  - Energy Solutions, a utility “3rd Party” provider
  - PG&E, as 3rd party funding utility
  - Davis Energy Group for design and detailed monitoring
  - WCEC, for alliance-building and “maintenance maintenance”
  - 29 qualifying chain retailer alliance candidates
- The Plan: focus on chain retail
  - Utility provides cash incentives to build volume
  - ICI provides product, trains installers
  - DEG & WCEC provide technical support
- Funded through ‘08, can grow if successful

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Other Program Partnership Needs

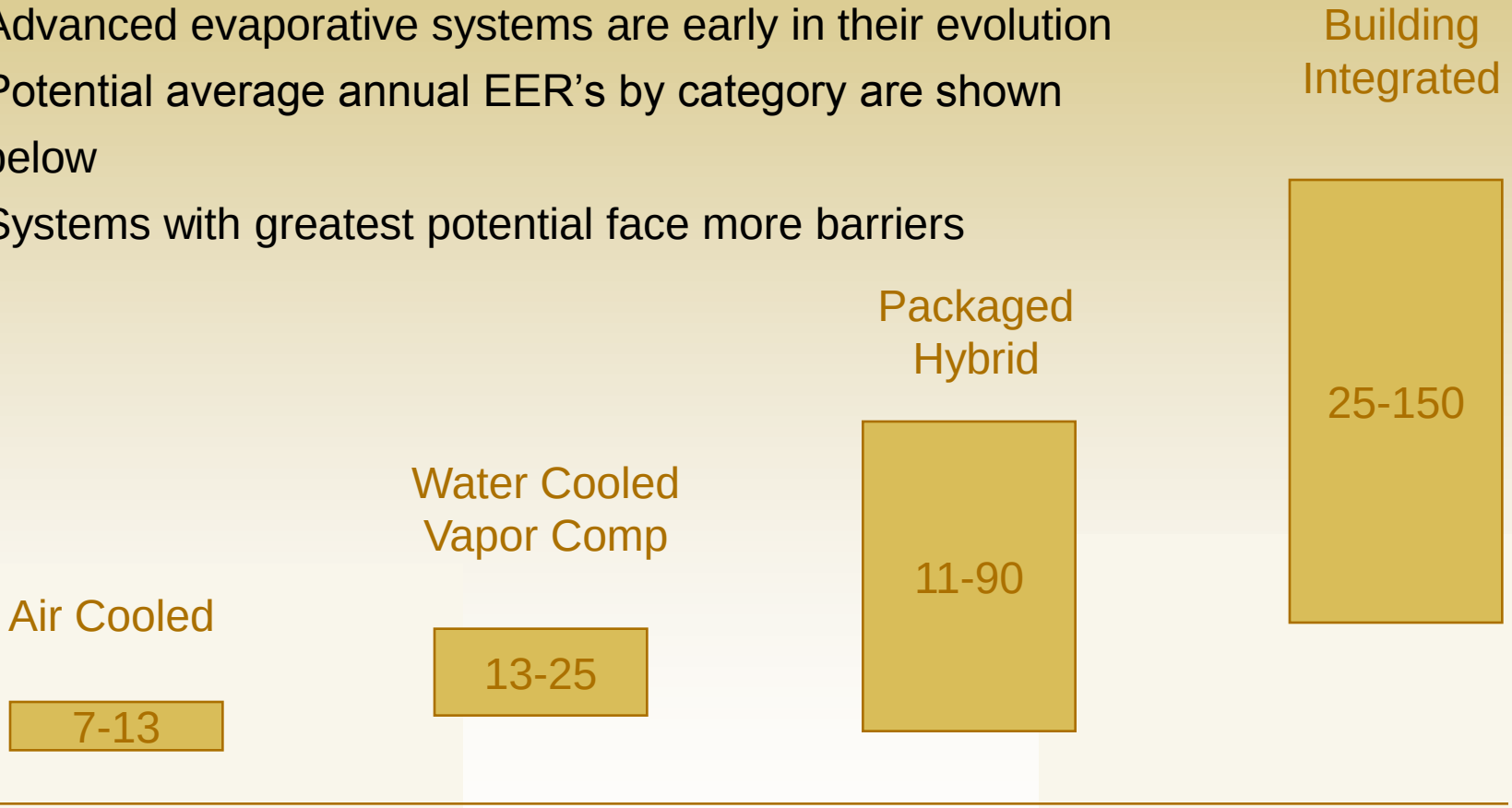
- Near-term: Dedicated Vent Air (“DOAS”) with RTU’s
- Mid-Term: DOAS with radiant ceilings and floors (new only)
- Long-term:
  - “Zero energy” cooling systems, combining PV with advanced cooling
  - building-integrated chilled water storage systems
  - heat-powered cooling with PVT solar components

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Now and the Future

- Current air-cooled technologies are near practical limits
- Advanced evaporative systems are early in their evolution
- Potential average annual EER's by category are shown below
- Systems with greatest potential face more barriers



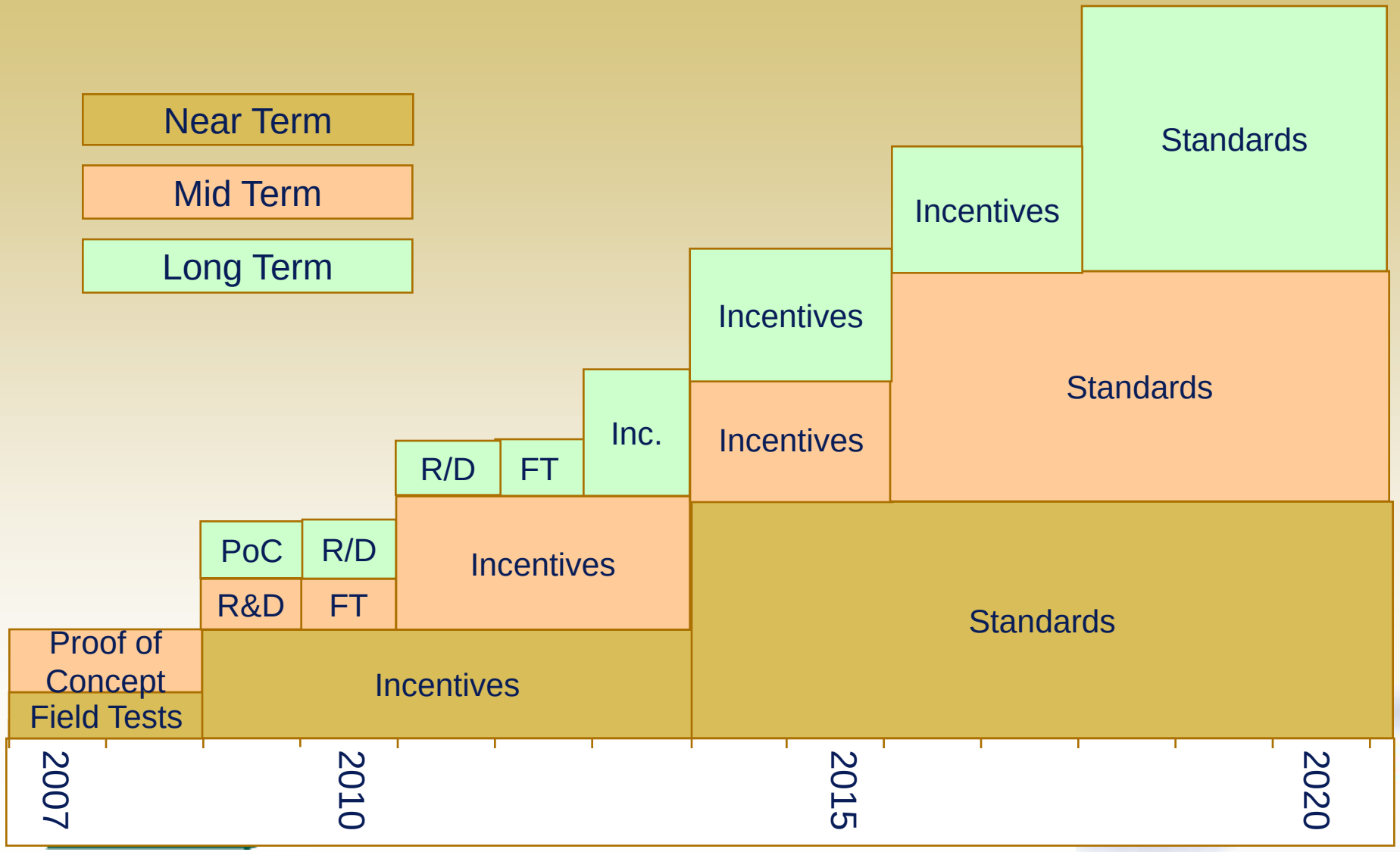
Portfolio Approach

	New	Existing
Res	Near Term Mid Term Long Term	Near Term Mid Term Long Term
Non-Res	Near Term Mid Term Long Term	Near Term Mid Term Long Term

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Timeline for Achieving Savings



The Water Barrier

- The big two-headed barrier:
  - Water use quantity
  - Water-related maintenance
- What's Needed:
  - "cradle to grave" analysis tool vs. base case: source/storage/treatment/cooling/discharge
  - Credible comparative studies of treatment options by application & sustem type
  - Partnership with stakeholders (water & waste utilities, landscape expertise, urban foresters, etc.)

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership

Conclusions: Overcoming the Barriers

- Near-term: find the “low-hanging watermelons”, assemble implementation partnerships, begin growing the market, focus on maintenance, incorporate in standards ASAP
- Mid-term: find best technologies now in advanced R&D, develop calibrated models, analyze and proceed to early implementation, then standards
- Long-term: identify key needs (materials, concepts, integration), support full R&D cycle, proceed to modeling and early implementation, then standards
- Comments & Questions????

SWEEP

University of California, Davis
WCEC
Western Cooling Efficiency Center
Research • Innovation • Partnership