Meeting Peak Power Needs with Evaporative Pre-Coolers

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This Talk’s Focus

- Cooling Demand Reduction (CDR) as an economical alternative to generation
- Compare campaigns for CDR and Renewables Generation (RG)
- RTU pre-coolers as a leading element of CDR
- Opportunity for utilities to improve the bottom line
The Loading Order

- California energy policy established in 2003
- What’s first: efficiency and demand response
- What’s second: renewables
- Third: “clean, efficient natural gas-fired power plants”
Cooling as Generation

- Prior talk on cooling demand reduction (CDR) instead of new generators (ICI website)
- Compared MW goals for CDR, renewables (RG) through 2020
  - RG: 66 GW proposed
  - CDR: 0.15 GW proposed
  - RG 440 times higher
RG and CDR: Peak Alignment

- **RG: imperfect**
  - PV leads peak by 3-5 hours
  - Wind more variable
  - Expensive electrical storage needed to resolve

- **CDR: perfect alignment**
  - Cooling causes peaks
  - Off-Peak storage fills valleys, increases cooling efficiency

- **Conclusion:** CDR better for utilities
RG and CDR: Utility Revenue Impact

- **RG**: major negative impact
  - 12 month performance
  - Applicable to all electric loads

- **CDR**: little negative impact
  - Most valuable in hot weather
  - Annual cooling use is low in most CA locations

- **Conclusion**: CDR better for utilities
RG and CDR: Installed Cost

- RG: expensive
  - $3,000 to $6,000/kW
  - But, halved in last 15 years
- CDR: low-cost generation
  - $800-$2000/kW saved
  - Cost-reduction opportunities

Conclusion: Utilities could help buy CDR instead of buying new generators
RG and CDR: Why the Difference?

- **RG**: satisfies public objectives
  - CA has committed $7.4B to PV
  - Value beyond CA adds more $$
  - Builds CA economy
  - Public support entices owners

- **CDR**: good for utilities but-
  - Has indirect value to public, hence low public funding commitment
  - Low utility commitment too
Conclusion: Utility Opportunity

- CDR often less costly than new generation with T&D
- With CDR, current power fleet can deliver more kWh
- Higher load factors, less maintenance
- Seems like smart business
Current Cooling Economics: Owner

- Pays high cooling energy costs
- Faces expensive equipment replacement
- Concerned about critical peak pricing
- Needs consultant and/or crystal ball to evaluate energy options
What About CDR Durability?

- Generators (and RG’s) degrade but last a long time
- CDR’s are simple and robust but require maintenance
- Owner contracts could require long-term maintenance and CDR match at replacement
- Annual savings are typically 5 to 10 times service cost
Pre-Cooler Value

Economics Vary:

- Better for:
  - New units (capacity benefit)
  - Volume (roofs, RTUs, orders)
  - 410A
- Without “power purchase payment” (PPP) paybacks are 6+ years except in very hot climates and for some chain retail applications
- Modest “incentives” have fostered current sales
Power Purchase Payment Opens Doors:

- Apply to smaller units and cooling loads
- Deliver web-based verification
- Re-use captured water
  - Condensate
  - Graywater
  - Rain water
- Grow the industry faster!
PROMISING DEVELOPMENT: 2013-2014
EVAPORCOOL SCE “IDEEA 365” PROGRAM

• $1 Million Precooler Direct Install Program
• 1 Megawatts (~ 2,000 Tons, $1000/kW)
• Program Pays 80%, Customer Pays 20%
• 1 Year Acquire / Install
• 3 Years of Performance & Persistence Services
• Exclusive performance monitoring partnership
• Opportunity to add incremental AutoDR-ready capacity
CDR as Generation: Economics

**Generic** Example Based On:
- $1000/kW “power purchase” from utility
- “30/30” metric (Robert Davis)
  - 30% demand reduction at 30 deg WBD
  - Assume 100F DB, 70F WB
- 10 ton unit using 11.4 kW at 100F: pre-cooler cuts 3.4 kW
- Proposed PPP: $340/ton.
Our 10 Yr Service/Warranty Program

Utility Terms

- Offer begins 1/1/2015
- Power Purchase Payment (PPP) based on generic $340/ton at 100F
- Utility minimum 4 kW over 4 years
- Shared data link verifies kW saved on annual utility peak day
- Annual ($100/peak kW) penalty & reward, extendable past 10 yrs
Our 10 Yr Service/Warranty Program
Owner Terms

- Pays incremental installed cost
- Receives data-based payback guarantee
- Supplier provides all service
- Supplier pays water cost
- Owner guarantees RTU service, and replacement with equal or lower peak demand equipment
Why the PPP Offer Should Work

- Guarantees:
  - kW reduction for utility
  - Payback for owner
  - Volume for supplier
  - Long-term performance
- Rewards water savings
- Requires RTU service
- Rewards persistence annually
Summary

- Let’s **attack the cause** of peak demand
- Simple concept: Like with RG, buy demand reduction, leave kWh savings to owners
- Ready for Prime Time?

**YES!**

Questions?