

HVAC Energy Efficiency Technology Overview

California Electric Utility Perspective

September 30, 2009



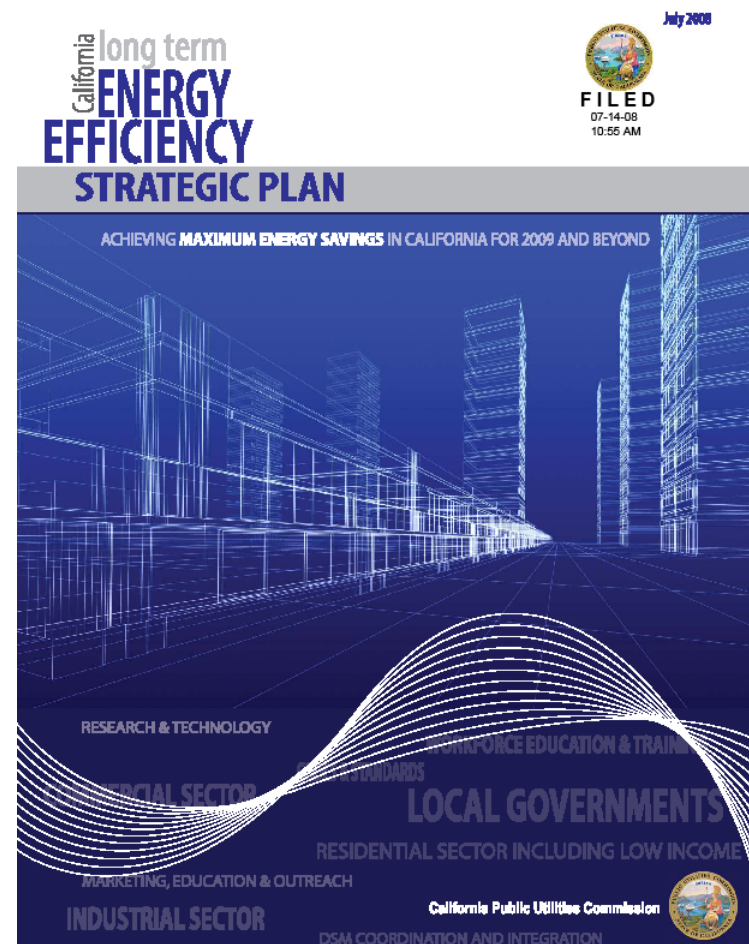
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HVAC Technology Overview

- “Big Bold” Initiatives
- Technology Needs
- Energy Efficiency Program Efforts
 - Emerging Technologies
 - Technology and Diagnostics
 - Codes and Standards

California's "Big Bold" Strategies

- All new residential construction in California will be zero net energy by 2020
- All new commercial construction in California will be zero net energy by 2030
- Heating, Ventilation and Air Conditioning (HVAC) will be transformed to ensure that its energy performance for California's climate is optimal; and
- All eligible low-income customers will have a meaningful opportunity to participate in LIEE program and will be provided all cost effective energy efficiency measures in their residences by 2020



HVAC Planning Goals

Goal	Goal Results
1. Consistent and effective compliance, enforcement and verification of HVAC-related building and appliance standards.	HVAC-related permits are obtained for 50 percent of installations by 2015 and 90+ percent by 2020.
2. Quality installation and maintenance becomes the industry and market norm.	By 2020, 100 percent of systems are installed to quality standards and optimally maintained throughout their useful life.
3. Whole building design and construction practices fully integrate building performance objectives to reduce cooling and heating loads.	Integrated design and construction practices are standard practice by 2020.
4. New climate-appropriate HVAC technologies (equipment and controls, including system diagnostics) are developed with accelerated market penetration.	At least 15 percent of equipment shipments are optimized for California's climate by 2015 and 70 percent by 2020.

Technology Needs

- Climate optimized for hot/dry conditions
- Capable of integrating into a smart grid (i.e. Zigbee enabled)
- Built-in demand response capabilities
- Support ZNE efforts
- On-board diagnostics
- Power quality/under voltage

Emerging Technologies Program

- Non-resource program
 - Supports transfer of new measures into programs
 - Increases market demand (pull)
 - Increases technology supply (push)
- Statewide program
 - SCE: \$22.9 million
 - PG&E: \$46.6 million
 - SDG&E: \$6.4 million
 - SCG: \$5.3 million
- Collaboration with CEE, ACEEE, universities (nationwide), other utilities, EPRI, etc...

Emerging Technologies Activities

- Technology Assessments
- Scaled Field Placements
- Demonstration Showcases
- Market and Behavior Studies
- Business Incubation Support (TRIO)
- Technology Development Support
- ZNE Test Lab

Technology Assessments

Evaporative Cooling

- Water Cooled Condensers
 - Aquachill
 - EER >13 in CTZ 15
- Indirect Evaporative Coolers
 - OASys (SEER 40)
 - Climate Wizard (35% lower energy use)
- Hybrid Systems
 - Coolerado H-80
 - EER of 21.7 at 105°F



Technology Assessments

Variable Refrigerant Flow

- In process of scoping statewide effort for VRF evaluation.
- Lab assessment of single zone system
 - Verify system performance, validate SEER claims
 - Evaluate cooling and heating performance for potential ZNE impacts.
 - Validate energy simulation tools for VRF systems (Energy Pro and Equest)
 - Determine energy and demand savings for incentives

Variable Refrigerant Flow

Continued

- Field assessment of commercial multi-zone systems
 - Long term instrumented evaluation
 - Comfort and behavior studies included
 - Evaluate concern about potential for increased energy consumption
- Evaluate VRF system with CO₂ as the refrigerant

Western Cooling Challenge

- Target Market:
 - RTUs from 3 – 30 tons
- Target Performance:
 - 40% reduction in energy use and peak demand
- First certified winner:
 - Coolerado H-80
 - 80% energy use savings
 - 60% peak demand reduction



Technology and Diagnostics Program

- Accelerate the market introduction of advanced HVAC technologies through targeted programs
 - Stimulate market-based solutions to widespread adoption of FDD
 - Promote hot/dry climate optimized equipment through entire HVAC distribution chain
- Benchmark and prioritize in field diagnostics and maintenance approaches
 - Low ambient charging
 - Enhanced charging protocol
 - Duct leakage practices (i.e. DeltaQ vs. ZoneDeltaP vs. 25 Pa vs. ½ system static)
- Coordinate activities with statewide C&S and ET efforts

Codes and Standards Program

- Promotes an accelerated strategy towards more stringent building and equipment codes
- Statewide budget:
 - \$37 million
- 2010-2012 goal:
 - 546,000 MWH
 - 99 MW

For More Information

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Emerging Technologies Coordinating Council

<http://www.etcc-ca.com/>