

DEMONSTRATING AND EVALUATING DIRECT / INDIRECT COOLING OF LARGE ROOF TOP UNITS

Does evaporative cooling work for big customers?



Dual Cool system provides roof top air conditioning units with a boost in capacity and efficiency.



Direct and indirect evaporative cooling are used to achieve efficiency.



Cool water is passed through a heat exchanger to cool supply air without increasing its humidity.



Clogged media caused by poor water quality in test areas leads to increased maintenance issues.

It is well known that as the outdoor air temperature rises, the efficiency of most air conditioning (AC) systems decreases. With most new residential and commercial new construction in California moving into hotter climate zones, this becomes more important in determining the growth in electrical use and demand in the state. One method of dealing with the more extreme temperature climates in California has been the use of evaporation technologies, using the evaporation of water to do direct cooling to improve air conditioning efficiency.

The major goals of this project were to monitor Dual Cool water use and energy efficiency on larger commercial properties, and to report performance and expected paybacks based on monitoring results. An additional goal added during the project was to evaluate water quality impacts on maintainability of the Dual Cool units.

THE DUAL COOL CONCEPT: The Dual Cool system is designed to provide roof top AC units (RTUs) with a boost in capacity and efficiency by using direct and indirect evaporative cooling. Direct cooling comes from the evaporation of water in an air stream; the process will lower the temperature of that air stream as well as humidify it. This means that for processes such as air cooled condensing, the process of heat transfer is improved by air temperature being lowered. Indirect cooling can be obtained by the fact that the evaporative process cools both the water and air. Cool water is passed through a heat exchanger to cool supply air without increasing its humidity.

Evaporative condenser-air pre-coolers have been available for RTUs for many years, offering 15-20% demand reduction and 10-15% annual cooling energy savings, depending on application. However, these basic pre-coolers have not achieved widespread use because of tenuous economics and persistent maintenance issues.

RESULTS: Project performance results are positive given that these are the first "field test" Dual Cool installations. They suggest that Dual Cool could contribute to controlling rising summer demand and energy use in California. We expect to see future implementations of Dual Cool deal with the maintenance issues rising from poor water quality that affect all evaporative cooling systems.

PROJECTED ANNUAL DUAL COOL "PER TON" SAVINGS AND COSTS

