DOCKETED

Docket Number:	17-EPIC-01
Project Title:	Development of the California Energy Commission Electric Program Investment Charge 2018-2020 Triennial Investment Plan
TN #:	217247
Document Title:	Carlos Duarte Comments: More focus on mechanical plant designs without the vapor-compression cycle
Description:	N/A
Filer:	System
Organization:	Carlos Duarte
Submitter Role:	Public
Submission Date:	4/21/2017 2:19:21 PM
Docketed Date:	4/21/2017

Comment Received From: Carlos Duarte
Submitted On: 4/21/2017
Docket Number: 17-EPIC-01

More focus on mechanical plant designs without the vapor-compression cycle

The energy consumption for cooling has steadily increased over the years due to more buildings becoming internally load driven, and hence the need for S1.3 (HVAC systems) of the next CEC EPIC 2018-2020 Triennial Investment Plan. However, this section focuses only on improving the efficiency of the vapor-compression cycle. The vapor-compression cycle is not only energy intensive but also requires a high capital investment to installed the needed HVAC components. We suggest to also focus on addressing mechanical plant and overall building designs that will not require the vapor-compression cycle.

The adiabatic cooling process, as seen in cooling towers, is one potential replacement for the vapor-compression cycle but is highly dependent on weather conditions and the requirements of the distribution system that it serves. Therefore, it can be coupled with the advantages of radiant systems that include: 1) larger heat transfer areas that directly cool occupants through radiation; 2) higher thermal energy transport efficiency and; 3) the ability to effectively engage the buildingâ€™s thermal mass to store and move cooling loads to more favorable weather conditions. Precedent has already been set with the David Brower Center building located in Berkeley, CA, which is a medium-sized commercial office building that does not require a compression cycle for cooling. Instead, it relies on a cooling tower and radiant system approach to provide a comfortable environment to the occupants. However, this is one case, and additional research is needed in the building design and radiant system controls to export this concept to other climates and applications in California. Eliminating the vapor-compression cycle from HVAC systems will reduce energy and water consumption far more significantly than technologies that incrementally improve the efficiency of those existing systems. Achieving Californiaâ€™s remarkably ambitious energy efficiency and net zero energy building targets requires these types of approaches. The successful application of the proposed design should have no adverse effects to occupantsâ€™ health, comfort, and productivity. There will also be reductions in both energy and costs for the HVAC system with the potential to level the electrical demand of the building as well.