COOLFACADE

Architectural integration of solar driven cooling strategies into the curtain-wall

Energy efficiency has growing worldwide relevance in the current context. The necessity of lowering energy consumption from fossil fuels demands to take action on optimizing systems currently under operation, and at the same time on developing new technologies driven by renewable sources of energy. This research project examines the feasibility of solar cooling integration in façades as a response for the current scenario, while exploring further possibilities for the development of new architectural façade products.

Solar cooling systems have been focus of attention these last years, for its potential to lower indoor temperatures using solar renewable energy. However, there is no much development regarding its architectural integration within buildings.

The research project deals with the integration of solar driven cooling strategies into the building façade, as a way to support the use of low-energy alternatives to the use of centralized AC in office buildings. Furthermore, the possibility of using the façade itself as a heat dissipation system is seen as an opportunity for the development of self-sustaining cooling façade modules to be applied either on new buildings or refurbishment projects, avoiding mechanical cooling equipment whatsoever in the line of new “nearly zero” energy standards.

The research project deals with the integration of two families of aspects as input for the design of solar cooling façades: Those related with mixed-mode facades and those related with solar cooling system possibilities. According to this, the body of the research is structured in two parallel sections and a following third section which combines their outputs for architectural façade integration.

There are two main expected deliverables from the research project: the conceptual design and evaluation of a solar cooling façade concept considering climate specific variations, and the development of a roadmap for solar cooling façade product development considering current possibilities and constraints and future scenarios.

RELATED PUBLICATIONS

- Waldo Bustamante, Sergio Vera, Alejandro Prieto, Claudio Vásquez. Solar and Lighting Transmission through Complex Fenestration Systems of Office Buildings in a Warm and Dry Climate of Chile. Sustainability 05/2014; 6:2786-2801.