International Journal of Mechanical Engineering (IJME)
ISSN(P): 2319-2240; ISSN(E): 2319-2259
Vol. 3, Issue 6, Nov 2014, 53-62

International Academy of Science, Engineering and Technology
Connecting Researchers; Nurturing Innovations

SCOPE AND POTENTIAL OF ADVANCED EVAPORATIVE COOLING TECHNIQUES FOR ENERGY EFFICIENT COOLING IN COASTAL MEGA CITIES OF INDIA

M. M. KULKARNI[1], K. N. VIJAYKUMAR[2], P. A. PATIL[3] & MANISH KULKARNI[4]

[1,4]SKN College of Engineering, Vadgaon, Pune, University of Pune, Maharashtra, India

[2]D. J. Sanghavi College of Engineering, Vile-Parle, Mumbai, University of Mumbai, Maharashtra, India

[3]JSPM College of Engineering, University of Pune, Maharashtra, India

ABSTRACT

This paper presents feasibility index method that indicates scope and potential of evaporative cooling systems for replacement of high power consuming air conditioners, partially or completely for maintaining thermal comfort in multi climatic locations without compromising indoor air quality. And then it is applied to three coastal mega cities in India, characterized by different climatic conditions over entire months of the year. Initially, it represents the principles of direct and indirect evaporative cooling and effectiveness of the system. Later on, it determines feasibility index for all months for three cities and decides whether the system is efficient for particular city and its weather for particular month. It is found that evaporative cooling technique can replace air conditioners in all three cities only for January and February and for rest of months it can work as pre cooler achieving sensible heat drop followed by air conditioner rendering energy efficient cooling as compared to use of sole air conditioners. The advancement of dew point evaporative indirect cooler has ability to work as precooler and can provide outlet air temperature in the range of 17°C to 26°C, 20°C to 28°C and 12 °C to 28°C for Mumbai, Chennai and Kolkata respectively. It can be concluded that energy efficient air conditioning system that is a combination of indirect evaporative cooling which is capable of taking sensible heat almost throughout year and air conditioner that only takes latent heat loads can be developed for these cities resulting reduced power consumptions for building cooling.

KEYWORDS: Air Conditioning, Chennai, Dew Point Indirect Cooler, Evaporative Cooling, Feasibility Index, Kolkata, Mumbai