

An energy-saving method for air-conditioning system by using weather forecast

**Satoshi HASHIMOTO¹, Takaaki MATSUDA², Hideo SHINBAYASHI²,
Harunori YOSHIDA³, Fulin WANG³ and Kazuhiro SHIOTA⁴**

¹ Solution Product Development Center, Daikin Industries, Ltd., JAPAN

E-Mail: Satoshi.hashimoto@daikin.co.jp

² After Sales Service Division, Daikin Industries, Ltd., JAPAN

³ Department of Urban and Environmental Engineering, Kyoto University, JAPAN

⁴ Department of Facilities and Environment, Kyoto University, JAPAN

Abstract

Field experiments were conducted to evaluate an energy-saving control method for an air-conditioning system comprising multiple packaged units. In the experiments, two approaches were evaluated:

- (1) A control method that prevented the overcooling of indoor climate by regulating the maximum output of the air-conditioning system according to weather forecast information and operation data generated by the air-conditioning system.
- (2) A control method that reset the temperature of the air-conditioning system to a recommended value (27 °C) every hour. This method was implemented along with the abovementioned control method. A record of changes in temperature settings carried out by occupants was analyzed.

The field experiments were conducted in summer 2007 using the air-conditioning system installed at Katsura Campus, Kyoto University. The experiments revealed the following:

- The control methods could reduce energy consumption without affecting indoor climate comfort.
- System control using information and communication technology is effective in achieving energy-saving operation for air-conditioning system.

Keywords

Energy saving, air conditioning, weather forecast, field experiment, indoor climate control.

1. Introduction

In recent years, global climate changes caused by global warming have become a serious issue. Carbon dioxide (CO₂) emissions produced by the consumption of fossil fuels have been considered as one of the causes of global warming. **Fig.1** shows a breakdown of CO₂ emissions in Japan ^[1]. The figure shows that CO₂ emissions from the private sector account for approximately 30% of the total emissions; the operations of air-conditioning systems account for approximately 40% of the total emissions from the private sector. From this data, it is clear that developing energy-saving operations for air-conditioning systems is essential for preventing global warming.