Development of Method for Evaluating Energy Saving Effects of Building Equipment Automatic Control Technologies

(Period of Study: From FY 2016 to FY 2018)

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1. Foreword

Reducing energy consumption in a building is an urgent challenge facing energy-scarce countries like Japan, which is also one of the important factors in addressing an international issue of global warming, as well as electricity demand during and after a disaster, among other issues. Energy consumption in a building is primarily caused by building equipment (such as air-conditioning and lighting facilities). Not only the adoption of high efficiency building equipment but also the popularization of technologies for operating building equipment economically and efficiently (automatic control technologies) are critical in reducing such energy consumption. **Figure 1** shows an example of flow rate control for an air-conditioning system. We consider it possible to achieve further significant energy savings with the proper popularization of automatic control technologies.

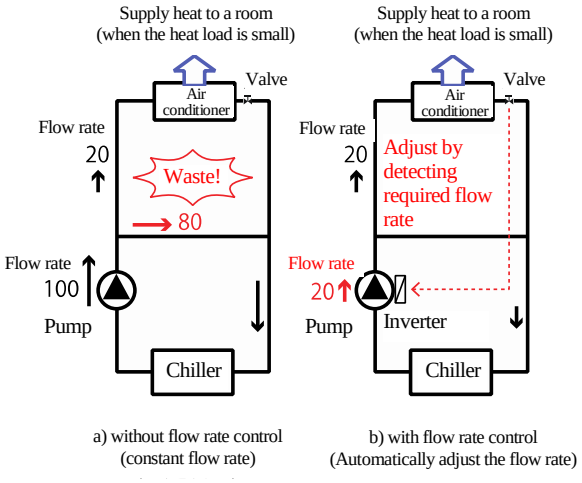

Figure 1. Example of automatic control technology (flow rate control for air-conditioning system)

2. Purpose of Study

Factors for impeding the popularization of automatic control technologies include the following: (1) As automatic control technologies are advanced and still under development, the definitions of (and standards for) these technologies have not yet been clearly specified, and (2) is not enough technological insight to support the quantitative evaluation of the effects of automatic control technologies. As such, the purpose of this study is to clearly specify the definitions of various automatic control technologies and develop methods for quantitatively evaluating the energy saving effects of each of these automatic control technologies.

3. Development of Classification and Definitions of Automatic Control Technologies

We developed the classification and definitions of automatic control technologies in FY 2016. Even the same automatic control technology has a variety of methods of operation. (For example, for the same flow rate control, some use only one sensor for flow rate control, while others use more than one sensor to finely control flow rate, and they produce different effects.) In this study, we identified the specific methods of operation for each of the automatic control technologies and classified their functions, by analyzing the engineering drawings and as-built drawings of actual building equipment incorporating automatic control technologies and by conducting hearings, etc., from the relevant designers and equipment manufacturers (**Figure 2**).

4. Next Step

Our next step is to numerically clarify the actual energy saving effects of each of the automatic control technologies by conducting demonstration tests for each method of operation and an analysis by numerical calculations. Based on the results of such analysis, we will develop a method for quantitatively evaluating the energy saving effects of automatic control technologies. The outcome of this study will be reflected in methods for evaluating energy conservation standards for buildings.

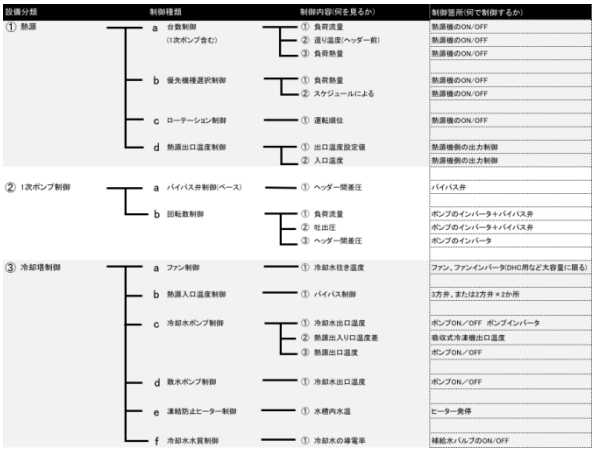

Figure 2. Classification of automatic control technologies (example of heat source equipment for air-conditioning system)