Chapter 5

Interim Findings (FY2014) and the Way Forward

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Chapter 5
Interim Findings (FY2014) and the Way Forward

1. Interim Findings (FY2014)

In the first year of study, the analysis focused on the potential of disseminating and deploying EMS technologies in the EAS region, especially for office buildings.

Case studies within EAS countries show that the key factors of energy savings through xEMS deployment are: *visibility* (to grasp the actual situation of energy consumption), *accessibility* (to easily check the collected date), and *comparability* (to compare with other users with similar load profile). The most efficient mix of measures are selected to optimise the economic benefit versus the cost.

Case studies were conducted in two sites: one in Indonesia and another, in Thailand. First, the desk-based research on energy-saving actions/behaviours was conducted. Second, the effectiveness of energy-saving measures was examined through the field survey on the actual status of energy consumption, and the energy-saving effect was verified in detail.

Findings show that office buildings in high-temperature and high-humidity areas have more room for energy savings from air conditioning systems. There are mainly two points to improve in air conditioners of office buildings. One is to adjust the intake volume of fresh air from outdoors. The other is to adjust the frequency of motor power using inverters.

The first suggestion (i.e. adjustment of air intake) solves problems associated with excessive ventilation. Too much ventilation causes the load to increase as chillers and refrigerators lose energy by unnecessarily exhausting cold air outside. This study suggests that the optimised volume of ventilation can be identified by monitoring the number of people in the office and CO_2 density periodically.

The adjustment of intake volume of fresh air can be made via *adjustment of air intake* and *adjustment of air exhaust*. In EAS countries, it is a common practice for air exhaust in each floor to lead to the washroom or hot water supply room, regardless of the CO_2 density. It is not feasible to control the air exhaust at these points. Therefore, this study suggests adjusting the air intake by introducing motor dampers in the ventilation to decrease the electricity load of chillers and refrigerators.

For the next step, this study recommends that the VAV be installed. While this can help decrease the power consumption, it may require additional costs.

The second suggestion reduces the energy consumption of compressors by controlling the frequency of motor power using inverters. The field survey in the EAS region showed that users allow their unit's motor to operate at maximum output even in sites where inverters were already installed and that adjustment of inverters is not yet a common practice.

This study has identified the benefits of induction motors and synchronous motors, and inverters are an essential part of these. By adjusting the frequency of inverters and optimising the rotation, high energy savings can be expected. Specifically, the energy consumption of motor power can be reduced remarkably by decreasing the rotation by half.

In the long term, more attention should be paid to energy efficiency through the introduction of advanced building structures. As references, the Green Building program in the United States, the regulation on energy savings in new buildings by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan and the Top Runner Program were discussed in the study.

2. The Way Forward: Second Year (FY 2015)

The second year of the study focuses on a more in-depth analysis of energy-efficiency potential over and beyond office buildings.

Energy efficiency in the industrial sector, which may be more complicated than the EMS in office buildings because of the variety of energy-consuming appliances and the differences among different types of manufacturing, will be discussed. This analysis is expected to drive the study on the deployment of factory energy management System and EMS technologies for the industrial sector.

The study will explore the recent trend on EMS technologies deployment such as the possibility of CEMS, which covers energy consumption in a much wider area—that is, EMS beyond that in a single building or factory.

Various types of CEMS have been pilot tested, with some—e.g. the regional cogeneration model, industrial complex cogeneration model, commercial district model (being implemented by the Ministry of Economy, Trade and Industry of Japan's New Energy and Industrial Technology Development Organization and remote-island micro-grid model—already nearing their stage of commercialisation. This study will cover those that may be applicable and effective in the EAS region. One of these is the remote island micro-grid model.

The remote island micro-grid model may be more suitable for less developed locations, while other models are mainly for relatively developed areas. This model's economic feasibility cannot be evaluated universally among different countries because there are various factors to consider such as each country's density of energy demand, availability and costs of resources for power generation (both conventional resources and new resources such as photovoltaics), and connectivity to the large main grid of power supply.

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