

NEWS & RELEASE

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Development of the model to estimate energy consumed by office tenants with 95% accuracy

Joint research by XYMAX BUILDING SCIENCE Corporation and Professor Naoki Kato Laboratory of Kyoto University Graduate School of Engineering Department of Architecture and Architectural Engineering

Background

In Japan, office buildings comprise approx. 25% (478,700,000 m²) ^{(*)1} of commercial properties in terms of floor space, and in the office buildings, approx. 60% of total energy is consumed in tenant-occupied space. ^{(*)2} It is extremely important to estimate energy consumption in addressing Japan's current and future energy problems.

However, there was not much analysis on factors that would affect the energy consumption of tenants because it was difficult to collect tenant data.

*1. "Changes in floor areas of commercial properties (2011)" The Institute of Energy Economics, Japan

*2. "Energy conservation of office buildings (2012)" The Energy Conservation Center, Japan

Summary of the model

In this analysis, the basic unit (MJ/m²) for energy consumed by tenants was estimated using XYMAX's data of office tenants (144 properties in Tokyo with 999 tenants and data quantity of 25,336).

As a result, items that would impact the basic unit for energy consumed by tenants were identified to be "average monthly temperature", "industry type", "property usage", "density of employees", "density of visitors", "leased area", "daylight hours", and "distinction between pre- and post-disaster". In particular, the impact of industry type (e.g. restaurants and convenience stores) and usage were large enough to offset respective building-related factors (e.g. building age and type of HVAC).

It was confirmed that this model would serve to estimate the amount of energy consumed by tenants with high accuracy by inputting the tenant and property data as well as climate conditions (adjusted coefficient of determination: 0.953).

The model also enables office tenants to assess whether their energy consumption is at an appropriate level, and it can be used as a tool to promote energy conservation and electricity savings. Further, building owners can understand features of their properties to plan out energy efficiency policies.

Utilization of the model

XYMAX will utilize this model when consulting on energy solutions for tenants, owners and investors of office buildings. XYMAX will continue the joint research with Professor Naoki Kato of Kyoto University Graduate School of Engineering Department of Architecture and Architectural Engineering.

* This news release was prepared based on the prepublication paper titled "Analysis of energy consumed by tenants in Tokyo's leased office buildings and electricity saving behavior under the linear mixed model" for the Architectural Institute of Japan by Research Associate Atsushi Takizawa and Professor Naoki Kato of Kyoto University Graduate School of Engineering Department of Architecture and Architectural Engineering.