Efforts to Respond to Social Needs through the Retrofitting and Utilization of Housing and Building Stock

FUJIMOTO Shuichi, Director, Housing Department

(Key words) energy saving, carbon neutral, stock management, retrofitting

1. Introduction

Based on the changes in socio-economic statuses surrounding housing, such as an increase in demand for environmental consideration on a global scale, the arrival of full-fledged population decline, low fertility rates and an aging society, the Housing Department has been engaged in research and development towards the goal of making safe and secure housing life a reality. This paper presents major researches concerning the promotion of energy saving and the building of a housing safety net through the stock management of housing and buildings.

2. Efforts toward the promotion of energy saving

In April 2025, the amended Building Energy Conservation Act was fully enforced, and compliance of all newly constructed houses and buildings with energy saving standards became mandatory. In addition to the strengthening of standards (for new buildings) to the ZEB and ZEH levels in 2030, in an effort to realize carbon neutrality (CN) in 2050, seeking still further improvement in energy saving performance has become a requirement, not only with newly constructed buildings but with existing buildings as well.

(1) Efforts with non-housing buildings

In existing office buildings (non-housing buildings), large energy-saving effects should be obtainable through reasonable additional investments, if the current condition diagnosis and redesign plans are carried out in line with an equipment renewal schedule that is implemented every 10 to 20 years. However, under the current circumstances, the practice is limited to easy replacement of facilities and equipment, thus missing energy saving opportunities. Based on these realities, we have been engaged in research on a retrofitting design method taking into account an assessment of the current condition of the structure with

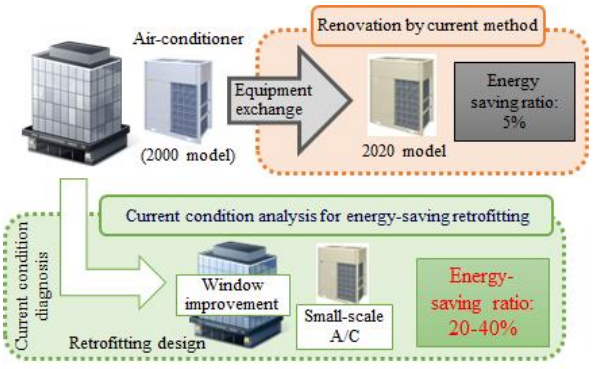

Fig.-1 Illustration of energy-saving retrofitting based on current condition diagnosis

the goal of energy saving of existing office buildings (FY 2022 to FY 2024). An additional goal is to provide guidance for more effective retrofitting. To that end we have developed technical guidelines and support tools concerning current condition diagnosis and retrofitting design.

On the other hand, in spaces use by large groups of people such as offices and schools, insufficient ventilation has been normalized and it has become a challenge to both secure a good indoor environment and achieve high energy saving performance. The nonconformity rates of offices and schools to the indoor CO_2 concentration standard in regular inspection pursuant to the Act for Maintenance of Sanitation in Buildings increased by about 3 times (38%) during the 20 years from 2000. During the coronavirus pandemic there were temporary improvements in nonconformity rates due to prioritizing "window opening" ventilation, but about 20% still continue to be nonconforming. At present after the pandemic, there remains a concern about the nonconformity rate worsening again. Based on the situation mentioned above, we have decided to engage in research concerning the securing of appropriate air environments and energy saving evaluation in office buildings and schools (FY 2025 to FY 2027). This research aims at creating technical guidelines for air conditioning ventilation equipment plans for securing appropriate indoor air environments, and at the same time developing an evaluation method for the energy saving effects of equipment having advanced ventilation air volume control that has not been evaluated under the current Building Energy Conservation Act.

(2) Efforts in housing complex (condominiums)

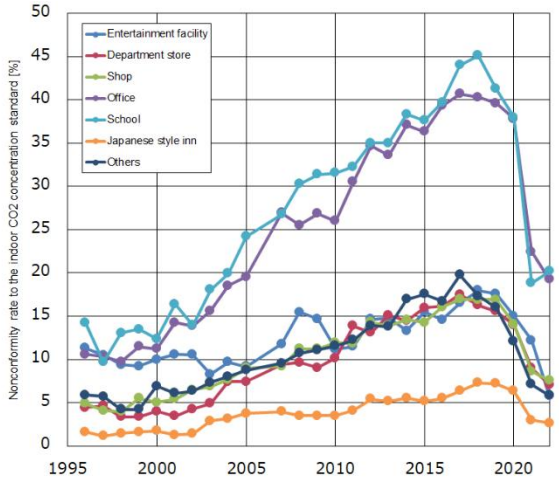

Fig.-2 Secular change in indoor CO_2 nonconformity rate by building use (CO_2 concentration standard: 1,000 ppm or less)

Increasing energy efficiency in housing has mainly been done by focusing on newly constructed housing until the present. However, the stock of condominiums

was approximately 6.75 million housing units (as of the end of 2020), in which the stock of those before the current energy saving standard (1999 standard) accounted for 60% of the entire stock. Thus, in many condominiums the building frame has low thermal insulation performance. In order to realize carbon neutrality (CN) by 2050, it has become essential to promote retrofitting to improve the energy saving performance of existing condominiums mainly focused on thermal insulation retrofitting.

Condominiums are usually systematically repaired on a large scale after about 10 to 15 years, and it is effective and realistic to use this opportunity to perform energy saving retrofitting. However, according to the condominium comprehensive survey in 2018, of the condominiums recently subjected to large-scale repair works, those which underwent energy saving retrofitting were only 2.8% of the total, thus being in a situation in which the opportunities of energy saving performance improvement and CO_2 reduction were missed.

Photo Example of external thermal insulation retrofitting of a condominium

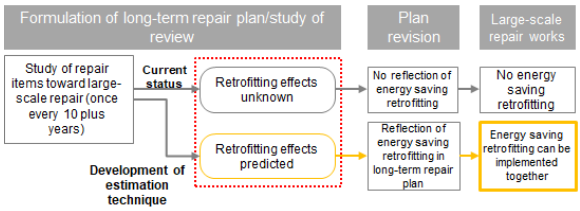

Fig.-3 Systematic implementation process of energy saving retrofitting (illustration)

Therefore, with a view to develop the quantification techniques for the effects of energy saving performance improvement retrofitting of existing condominiums, we are engaged in research concerning the quantification of retrofitting effects for the improvement of energy saving performance in existing condominiums (FY 2023 - FY 2025). At the same time that we develop a tool to estimate the cost-effectiveness by means of energy saving retrofitting, we are creating guides for positioning energy saving retrofitting in a long-term repair plan. We plan to reflect those tools and guides in the "Manual Concerning Condominium Revitalization Techniques by Retrofitting" issued by the Ministry of Land, Infrastructure, Transport and Tourism.

3. Efforts toward the strengthening a housing safety net

There is very large demand for public housing that plays a central role in the housing safety net, but partly due to financial restrictions of the national government and local governments, the number of the existing public housing units being managed has been decreasing. On the other hand, the number of vacant homes for rent in the private sector has been increasing, accounting for a majority of the total number of vacant homes. Also, there is some deviation in the demand for housing SN, depending on the municipality, but at present the demand is estimated just in the entire area of the prefecture.

In an effort to develop techniques to utilize the stock of private rental housing and to strategically set a target for the amount of public housing supply we are engaged in cooperative efforts with the housing sector and are developing techniques to estimate the demand for housing SN according to each living sphere and each municipality. We are proactively engaging in research on how to best set techniques for the target amount of supply of public housing while taking into consideration the utilization of the stock of private rental housing (FY 2024 to FY 2026).

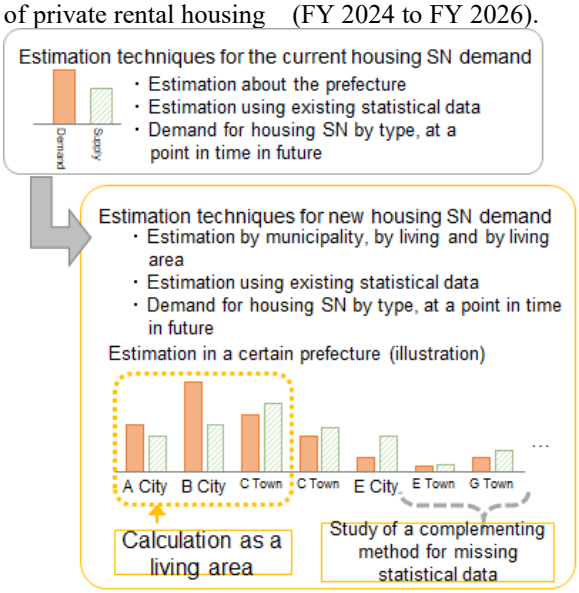

Fig.-4 Illustration of estimation techniques for housing SN demand by living area

4. Conclusion

The Housing Department would like to make efforts in the improvement of living comfort such as energy saving performance of housing/buildings and the strengthening of a housing safety net, through stock management of housing and buildings, in future as well.