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Feasibility and Policy Challenges for Rooftop Solar PV During Japan's Energy Policy Transition

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1. Transitioning Policy Design Toward Rooftop Solar PV

Japan has experienced rapid growth in solar photovoltaic (PV) deployment since the introduction of the Feed-in Tariff (FIT) scheme in 2012. As of December 2025, the cumulative installed capacity approved under the FIT scheme had reached 76 GW. To date, this expansion has been driven primarily by ground-mounted solar PV. However, concerns have increasingly emerged regarding environmental conservation, landscape impacts, and disaster resilience associated with large-scale solar developments.

In response to these challenges, the Policy Research Council of the Liberal Democratic Party released a policy proposal on 16 December 2025 calling for a review of support measures for utility-scale solar projects and a shift toward a policy framework that places greater emphasis on harmony with local communities. In addition, under the Energy Conservation Act, as revised in 2023, business operators with annual energy consumption of 1,500 kL or more in crude oil equivalent, approximately 16 GWh on a primary energy basis, are required to formulate and report policies and targets for the installation of rooftop solar PV systems. Although the revised Act does not mandate rooftop solar PV installation, it establishes an institutional framework that encourages business operators to evaluate the adoption of rooftop solar systems.

Furthermore, several local governments, including Kyoto Prefecture and Gunma Prefecture, have introduced ordinances requiring the installation of solar PV systems on newly constructed buildings above a certain floor space. Taken together, these national and local policy developments indicate that Japan's solar PV policy is gradually shifting away from an expansion strategy centered on ground-mounted systems toward one that prioritizes the utilization of building rooftops.

Against this background, this report examines the potential for rooftop solar PV deployment and the associated policy challenges for non-residential and public buildings (excluding detached houses). The analysis considers technical potential, trends in new building construction, and recent cost developments to assess the future role of rooftop solar PV in Japan's energy transition.

2. Limited Technical Potential for Buildings Covered by the Energy Conservation Act

In our previous study, which used a geographic information system (GIS) to estimate the rooftop area of existing buildings across Japan, the technical potential of rooftop solar PV on public and non-public buildings was estimated at 137.2 GW. The analysis further categorized this potential by building type and size (Fig. 1).

However, the breakdown reveals that the technical potential for commercial and entertainment facilities, warehouses, and factories—building categories that are most likely to fall under the jurisdiction of the revised Energy Conservation Act—is only 13.1 GW, representing a relatively small share of the total potential.

Trends in new non-residential construction also suggest limited opportunities for additional deployment (Fig. 2). In 2024, the total floor area of newly constructed warehouses, factories, and schools amounted to 21 million m² (21 km²). Even if rooftop solar PV systems were installed on all of these newly constructed buildings, the additional technical potential would likely be limited to only a few gigawatts per year.

By contrast, the largest rooftop solar PV potential among public and non-public buildings is concentrated in general buildings, such as offices and other small- to medium-sized commercial buildings, each of which has a relatively small rooftop area. Collectively, these buildings account for approximately half of the total potential.

These findings suggest that achieving large-scale deployment of rooftop solar PV as part of Japan's carbon neutrality strategy will require policy measures that can extend its reach to the buildings not covered by the existing Energy Conservation Act. Promoting installation across a broader range of smaller buildings, including general buildings, will also be essential.

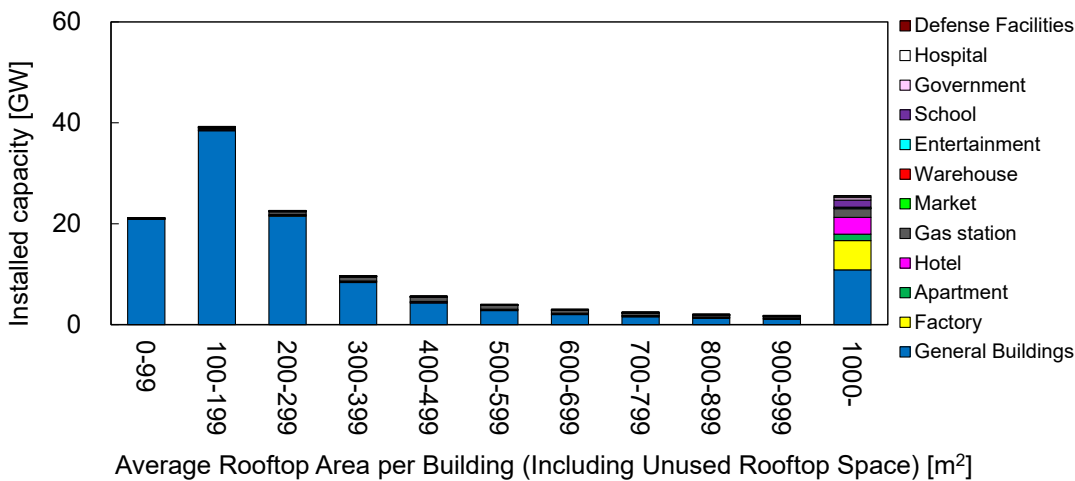


Fig. 1. Rooftop Solar PV Technical Potential for Public and Non-public Buildings, by Rooftop Area and Building Type

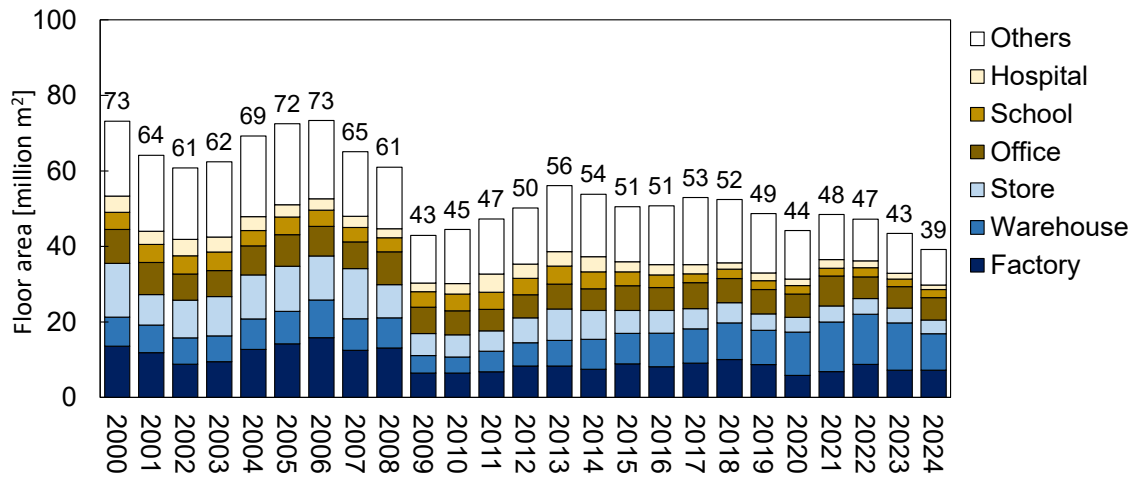


Fig. 2. Trends in Floor Area of Newly Constructed Non-residential Buildings
(Based on the Building Starts Statistics Survey)

3. Economic Challenges of Rooftop Solar PV on Small Buildings

In recent years, some large-scale ground-mounted solar PV projects in Japan have become economically viable without relying on the FIT or Feed-in Premium (FIP) schemes, making them so-called subsidy-free projects. The economic conditions for small-scale rooftop solar PV installed on buildings, however, remain markedly different.

For small buildings with a floor area of 200 m² or less, the typical installed capacity of rooftop solar PV is estimated to range from 10 to 50 kW. According to FY2024 data, the capital cost of building-mounted solar PV systems of this scale—most of which are presumed to be rooftop installations—was approximately JPY 239,000 per kW (Fig. 3). This is more than twice the 2030 cost target of JPY 100,000 per kW established by the Ministry of Economy, Trade and Industry's Study Group on Strengthening the Competitiveness of Solar Power, which identified this level as necessary for non-residential solar PV to become economically self-sustaining.

Assuming this capital cost, a capacity factor of 14%, and excluding the effects of financing costs and long-term performance degradation, the estimated internal rate of return (IRR) is only around 5%. These results suggest that the economic viability of rooftop solar PV on small buildings remains limited under current conditions.

A breakdown of the capital cost of building-mounted solar PV systems across all project sizes further highlights the underlying challenge (Fig. 4). While the cost of PV modules has declined substantially over the past decade, installation and construction costs have actually increased compared with FY2013. This issue is particularly significant for small buildings, where

economies of scale are limited and construction costs account for a relatively larger share of total investment.

Therefore, improving the economic viability of rooftop solar PV on small buildings will depend primarily on reducing persistently high installation and construction costs, rather than on further declines in PV module prices.

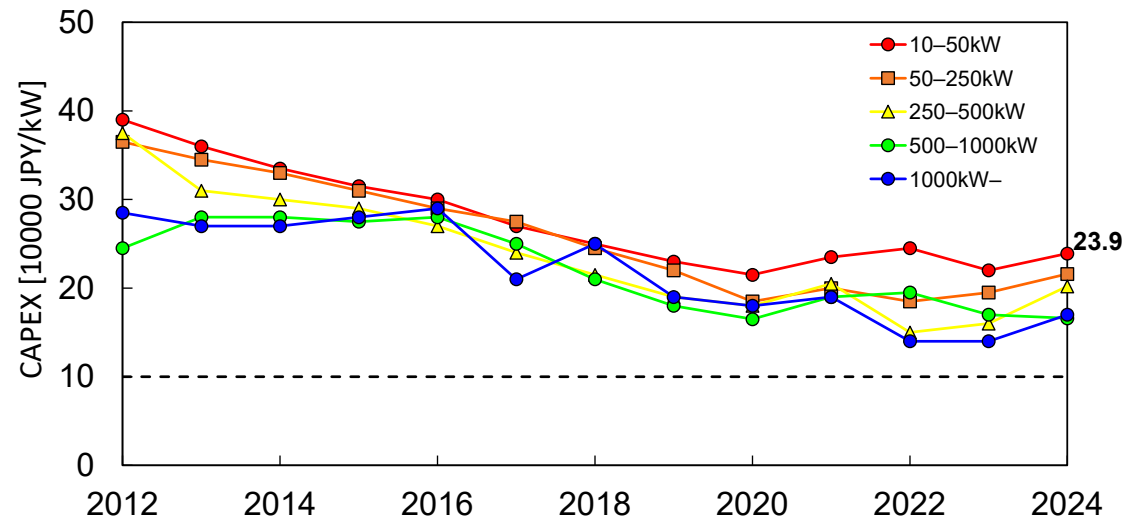


Fig. 3. Capital Cost of Building-mounted Solar PV by System Size (10,000 JPY/kW)
Source: Based on the Procurement Price Calculation Committee (2025).

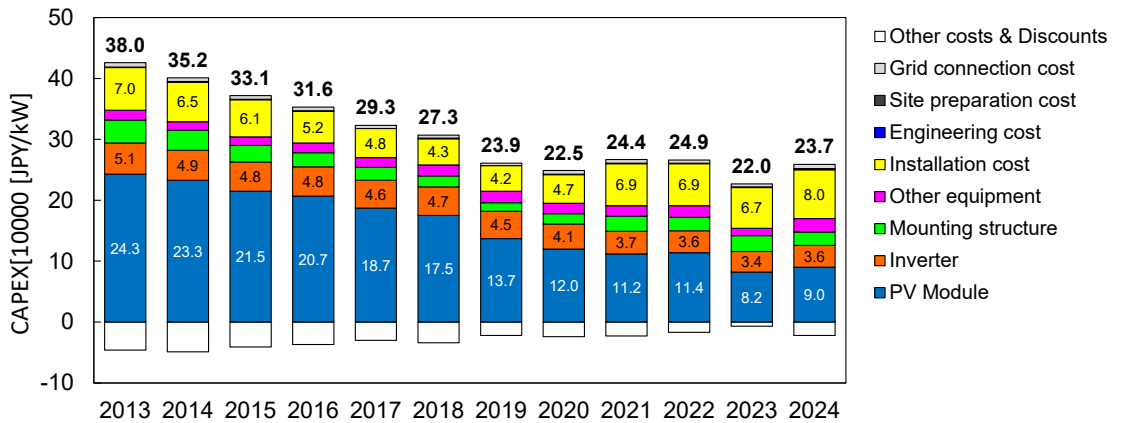


Fig. 4. Capital Cost Breakdown of Building-mounted Solar PV (10,000 JPY/kW)

4. The Need to Redesign Support Schemes Based on Cost Structure

Japan's FIT scheme was originally introduced to accelerate the deployment of renewable energy by creating market demand and reducing technology costs through learning-by-doing and economies of scale.

However, now that the capital cost of PV modules has declined substantially, a demand-driven support scheme aimed primarily at expanding deployment may no longer represent the most effective policy approach. As discussed in the previous section, the economic viability of rooftop solar PV on small buildings is constrained primarily by installation and construction costs, rather than by the cost of PV modules. Consequently, policies that merely stimulate additional deployment are unlikely to address this underlying cost structure.

Future policy support should therefore shift its focus from maximizing installation volume to reducing the costs of installation. Possible policy measures include promoting the aggregation of rooftop solar PV projects across multiple small buildings to achieve economies of scale in system design, procurement, and construction management; supporting technological innovation to improve installation efficiency; and fostering greater competition among local installation contractors through appropriate market design. Such measures would directly target the cost components that currently limit the economic viability of rooftop solar PV.

To develop effective policies, it is essential to identify the specific construction processes and cost components that constitute the main bottlenecks in rooftop solar PV deployment, using data sources such as the FIT Annual Report and other industry statistics. Based on this evidence, future policy should aim to facilitate the sustainable expansion of rooftop solar PV by lowering installation costs and improving market efficiency, thereby enabling wider deployment with progressively less reliance on government subsidies.

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