

Research Study Title	Feasibility Study of Reducing Electricity Consumption by Using Energy-efficient Glazing for an Auto Showroom Building
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Abstract

This research aimed to study the feasibility of reducing electricity consumption and CO₂ emission of an auto showroom building by retrofitting the 12 mm clear-float-glass wall with 3 types of energy-efficient glazing, namely, 26 mm IGU (10 mm low-e glass/ 6 mm air gap/ 10 mm clear float glass), 32 mm IGU (10 mm low-e glass/ 12 mm air gap/ 10 mm clear float glass), and 12.38 mm low-e laminated glass (6 mm clear float glass/ 0.38 mm PVB/ 6 mm low-e glass). The amount of electricity consumption reduction were estimated based on the yearly average prediction of overall thermal transfer value (OTTV) using Building Energy Code (BEC) program. From the results, the retrofitting all existing glass walls of building with the 32 mm IGU showed the highest reduction of OTTV from 112.13 to 70.31 W/m² or 37.3% reduction, and the corresponding reduction of electricity consumption and CO₂ emission was 25,930 kWh/y and 14,002 kgCO₂/y, respectively. Financial analysis of using energy-efficient glazing was conducted in case of retrofitting and new construction building. The results showed that the retrofitting only the building's west wall with the 32 mm IGU, which can save the electricity consumption of 14,131 kWh/y and reduced the CO₂ emission of 7,631 kgCO₂/y, gave the highest return with the simple payback period and internal rate of return of 7 years and 13.77%, respectively. For the new construction case, installation of 26 mm IGU only on the building's west wall, which can reduce the electricity consumption and CO₂ emission of 13,231 kWh/y and 7,145 kgCO₂/y, respectively, showed, from all studied scenarios, the

best return with the simple payback period of 5.57 years and internal rate of return of 17.90%. Based on this feasibility study, the application of energy-efficient glazing for the showroom building gave relatively low incentive for investment.

Keywords: Auto Showroom Building/Energy-efficient Glazing/Overall Thermal Transfer Value