

## Contribution of efficient windows to achieve NZEB

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### Abstract

One-third of all global CO<sub>2</sub> emissions are brought on by energy use in buildings. Due to heat transfer with the surroundings, the building envelope accounts for nearly half of energy loss, which make building elements and solutions - such as windows - crucial when it comes to energy efficiency in our households. This study aims to create a comprehensive understanding of the role that windows play in achieving carbon neutrality by 2050. For this, we compare a standard window solution to other types of solutions, using data from the Energy Performance Certificates (EPC) and the CLASSE+ Labelling System, both created and managed by ADENE - Portuguese Energy Agency. Through the analysis of EPC data, it is perceived that almost 60% of the opportunities to improve the performance of buildings in Portugal lies in building envelope products, including the insulation of walls and roofs (48%) and the replacement of windows (12%) with more efficient ones. Using CLASSE+ algorithm it is possible to estimate summer and winter specific energy consumption in buildings with different types of windows and consequently the associated yearly CO<sub>2</sub> emissions. By relating window performance with building energy needs and emissions, it is possible to assess the role and contribution of windows towards the nearly Zero Energy Building (nZEB) standard and the reduction of CO<sub>2</sub> emissions in the existing building stock. This study intends to estimate the impact of such contribution by considering standardized solutions of windows and using CLASSE+ system to gauge energy consumptions associated to winter and summer seasons.