

Science for Environment Policy

Energy-efficient cooperative housing reduces bills for residents

Relatively simple, low-cost measures, such as insulating walls and installing solar collectors and efficient heaters for hot water can significantly reduce energy consumption in housing developments, according to a recent study from Portugal. Energy-efficient homes not only benefit the environment, but were found to potentially reduce residents' energy bills by over half in an apartment block studied by the researchers.

To investigate the longer-term benefits for people living in [sustainably-designed](#) housing, this study compared the construction costs and energy required to heat and cool apartments and to provide hot water in cooperative housing. In Portugal, cooperative housing is built for low and middle-income families to rent or buy. The cooperative is an association of members who purchase low-cost dwellings with above standard quality. Residents can become members of the association.

Cooperative housing regulations impose maximum limits on the size of each dwelling and the construction costs, but there is a perception that it can be challenging to build sustainable and quality housing within these restrictions. However, this study found this to not be the case. The study focused on two types of cooperative housing in Porto, Portugal: an apartment block built in the early 1990s using traditional construction methods, and an apartment block constructed in 2007/2008 using sustainable building principles.

The researchers calculated that, each year, residents living in the sustainable building require, on average, 64% less energy for heating in the winter, compared with residents living in the traditional building, thanks to the thermally-insulated walls and double-glazed windows. Furthermore, efficient gas heaters and solar collectors meant they consumed 73% less energy for hot water. They are still able to reach an accepted standard of comfort, defined as keeping a home heated to 20°C in the winter, cooled to 25°C during the summer and providing 40 litres hot water a day for each resident.

Initial construction costs were higher for the sustainable building, and increased by about 4% in order to insulate walls, and by nearly 2% to install solar collectors and efficient gas heaters for hot water systems. However, these extra costs could be returned through savings in energy costs in a payback period of 2.3 years, when energy consumption was at standard comfort levels. The payback period could be longer if residents used less energy to save money. In addition, the researchers estimated that annual carbon dioxide emissions (in tons) from energy used in the traditional building were almost three times higher than from the sustainably-constructed building.

The study also monitored the actual [energy](#) used by residents for a year. Residents in both types of buildings consumed less energy than would be expected, which the study estimated ought to be €782 for an average apartment in the sustainable building, and €1705 in the traditional building, in order to reach the standard comfort levels. This is probably because people typically living in cooperative housing cannot afford to spend much money on energy bills. For example, residents in the sustainable building spent around four times less and people in the traditional building spent around five times less on hot water than would be expected. Residents in the traditional building nevertheless spent around three times as much as those in the sustainable building on energy to heat water because they do not have solar collectors or efficient heaters.



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