Indoor Environmental Quality og the first European ModelHome 2020

Home for Life

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Indoor Environmental Quality of the first European Model Home 2020: Home for Life

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Introduction

Based on the Acton House vision it was the intention to develop buildings that give more than they take by uniting carbon neutral buildings with good IEQ adapted to the surrounding environment. The ModelHome 2020 project was started as an extensive living laboratory to test the vision. The purpose of the project is to demonstrate different solutions and approaches to the challenge of combining a healthy and comfortable indoor environment with carbon neutrality. The project is fulfilled through design and construction of six demonstration buildings in five European countries from 2009 to 2011.

Method

A mixed methods approach was used, which combine quantitative methods from natural and engineering science with qualitative methods from the arts and humanities. The analysis focus on the main kitchen/dining room as this is representative for the results obtained, and is also the most used room of the house.

Results

Daylight

The daylight factor calculations show an average daylight factor (DF) above 5% in the main rooms on the ground floor and in most of the bedrooms at the upper floor. Especially the kitchen/dining room at the ground floor receives high daylight levels. Through the semi-structured interviews the occupants verbalise the quality of having high daylight levels: “The best thing about the new house compared to the old is the daylight. The daylight is better” and “What characterizes the house is the huge intake of daylight – and that is what I want!”

Thermal environment

When evaluated against EN 15251 the kitchen/dining room meets cat. III when both overheating and under heating is considered, while it meets cat. II when only overheating is considered. The family experiences large temperature swings relating to whether the sun falls directly into the house or not and expresses this experience as a deterioration of the indoor climate: “Too temperature fluctuations are much more dependent on whether the sun or not is outside.”

Indoor Air Quality

The CO2-level is used as indicator of air quality. The CO2 concentration in the kitchen/dining room was above 1200 ppm for 210 hours during the measured year. The kitchen/dining room meets cat. III of EN 15251. The natural ventilation scheme during summertime provides low CO2 levels, whereas the CO2 levels goes down. It improves the CO2 levels. “There is much more CO2 since we do not get aired out automatically. And it is health, but they are not able to judge if a specific CO2 level is too high; they of-...”

Discussion

The adaptive evaluation approach of EN 15251 of thermal environment seems to be a challenge of combing a healthy and comfortable indoor environment with carbon neutrality. The project is fulfilled through design and construction of six demonstration buildings in five European countries from 2009 to 2011.

We present measurements of the IEQ of the first realised ModelHome2020 through considerations and analysis of both quantitative and qualitative aspects. This first house, Home for Life, is constructed in Denmark and has been tested for a one year period by the Sørensen family.