Healthy Home Barometer — a survey among European citizens

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Abstract

The Healthy Homes Barometers from 2015 and 2016, present key findings from a pan-European study investigating European citizens' attitudes and behaviour regarding home comfort, energy consumption and environmental impact. The Healthy Homes Barometers are published by the VELUX Group. The first Barometer was published in 2015, based on 12,000 Europeans respondents in 12 countries (Austria, Belgium, Czech Republic, Denmark, France, Germany, Hungary, Italy, the Netherlands, Norway, Poland and the UK), while the second barometer from 2016 had two additional countries (Spain, Switzerland) giving a total of 14,000 European respondents. The number of respondents from each country was set to ensure statistical representation, and the surveys represent more than 430 million Europeans.

In 2015, the Healthy Homes Barometer showed that Europeans rated their home environment as more important to their health than a healthy diet or being physically active. Curiously enough, this concern did not seem to spur much action. Europeans worry about their indoor climate, but do little to improve it – by frequent airing, for example. The next step was to identify how the home actually affects Europeans' health. Can we "afford" not to have healthy homes? The 2016 Healthy Homes Barometer identified five key characteristics of a healthy home: good sleeping conditions, comfortable indoor temperatures, fresh air, satisfactory levels of daylight, and appropriate levels of humidity. Another finding is that the drivers for renovation is home wellbeing and energy savings. The barometer give considerable insights of what Europeans consider to be a healthy home, which should be reflected when policies, directives and legislative proposals are developed, since buildings are made for people, and targets for healthy indoor environment should be treated similar to energy performance targets.

Introduction

Today, we are certain that our homes have a huge impact on our health and wellbeing. We live 90 % of our lives inside buildings; in our homes ²/₃ of this time, with the remaining third spent in workplaces, schools, and other public spaces (World Health Organization Europe (2014). Yet, an estimated 80 million Europeans live in homes that suffer from damp, which almost doubles the risk of developing asthma (Grün & Urlaub 2016). Indoor air quality is a major health concern for Europe (Grün & Urlaub, 2014). Furthermore, Eurostat have estimated, based on the EU Survey of Income and Living Conditions (EU-SILC) database, that 52 million people across the EU are unable to keep their home adequately warm, as many as 161 million facing disproportionate housing expenditure, 87 million live in poor quality dwellings and 41 million Europeans face arrears in utility bills (Energy Poverty Handbook 2016). Other studies have indicated between 50 and 125 million people in Europe have risk of energy poverty (European Parliament Think Tank, 2016).

We are equally certain that our homes have a huge impact on the future of our planet. The European Commission state that: *Buildings are responsible for 40 % of energy consumption* and 36 % of CO_2 emissions in the EU. Currently, about 35 % of the EU's buildings are over 50 years old. By improving the energy efficiency of buildings, we could reduce total EU energy consumption by 5 % to 6 % and lower CO_2 emissions by about 5 %. Better construction of buildings in the EU would influence the use of half of all extracted materials, and could help us save up to onethird of all water for consumption (ECOFYS 2014). Residential buildings cover about 75 % of the building stock, with 60 % of European households living in single-family homes and 40 % in multi-family homes (EU SILC 2012).

Methodology

The Healthy Homes Barometer (HHB) is an analysis presenting key findings from a pan-European study investigating European citizens' attitudes and behaviour regarding home comfort, energy consumption and environmental impact. The first Healthy Home Barometer was published in 2015, and the survey was carried out during October 2014. It is questionnairebased survey and 12,000 Europeans in 12 European countries replied (Austria, Belgium, Czech Republic, Denmark, France, Germany, Hungary, Italy, the Netherlands, Norway, Poland and the UK). The second Healthy Homes Barometer, published in 2016, was sent out October 2015, and additional two countries (Spain, Switzerland) were included in the survey, giving a total of 14,000 answers from Europeans respondents. The number of respondents from each country was set to ensure statistical representation, and the surveys represent more than 430 million Europeans. The samples were drawn from national online panels that secure representative distributions of key demographic variables (age, gender, education, regional representation). It was an online questionnaire and the time for filling in the questionnaire was targeted to be about 15 minutes. Furthermore, the selected countries represent a variety of sizes and geographic locations. When concluding on a pan-European level, responses have been weighted according to a specific country's share of the population of the European countries surveyed as a whole. The objective of the Healthy Homes Barometer is to measure scores for different indicators, each addressing a key aspect of European citizens' attitudes and behaviour related to their life at home in terms of comfort, energy consumption and environmental impact. The questionnaire design and data analysis were carried out by the VELUX Group in cooperation with Humboldt University (Germany) and the independent consultancies, Operate and Wilke.

What is a Healthy Home?

We understand a healthy house as a house that promotes health by synchronising the daily (circadian) rhythms of its occupants to the 24h day-night cycle and the seasonal changes of day length (VELUX 2013). Living in a healthy house should give us a sense of being in good health, of being energised, and help us to avoid the minor everyday ailments of a runny nose and sore throat (UK Green Building Council 2016, Grün & Urlaub 2016). In this context, health is regarded (referring to the World Health Organisation (WHO)'s definition) as a state of complete mental, physical and social wellbeing, and not merely the absence of disease or infirmity. In other words: a Healthy House promotes not just physical health, but also comfort and general wellbeing (UK Green Building Council 2016, VELUX 2013). An official definition of healthy housing does not exist. However, in 1990 the WHO identified three levels of environmental conditions that might also be applied to dwellings (WHO 1990):

- 1. Desirable conditions, those which promote health;
- 2. Permissible conditions, those which are not ideal, but which are broadly neutral in terms of their impact on health;
- 3. Incompatible conditions, those that, if maintained, would adversely affect health.

EUROPEANS LINK HEALTHY LIVING TO THE HOUSE ENVIRONMENT

The results from the 2015 and 2016 barometers pinpoints several characteristics of a healthy home and the importance for healthy living. In the HHB 2015, Europeans were asked to score nine health factors from 1 to 7, where 1 is "Not important" and 7 is "Very important". All factors have a score above 4. Three of the five top drivers relate directly to the house: *sleeping well* (score 6.4), *ventilating for fresh air* (score 6.1), *plenty of daylight* (score 5.9) and *avoiding chemicals in products in my home*, score 5.4. The other health factors relate to people's intake (e.g. *eating plenty of fruit and vegetables*, score 6.0, *avoiding tobacco*, score 5.7, *eating the right dietary supplements*, score 4.1) and activity (e.g. *spending time outdoors*, score 5.9, *regular exercise*, score 5.5).

Sleep quality

According to Europeans, the HHB 2015 showed that sleeping well at night is believed to be the most important factor for their health out of the nine factors surveyed. The 2016 HHB tried to identify the importance of sleeping well and the impact on perceived personal health. The survey showed that Europeans whose home allows for a good night's sleep are 50 % more likely to feel they have good health and feel energised. However, a total of 77 % of Europeans do not have optimal sleeping conditions in their home. One out three (36 %) report the quality of their sleep within the last four weeks as either very bad or fairly bad (survey question based on Pittsburgh Sleep Quality Index (PSQI) Component 1: During the past four weeks, how would you rate the quality of your sleep overall?). More than half (60 %) stated that within the past four weeks they experienced sleeping disturbances either daily, several times a week or occasionally. Among Europeans who feel they have optimal sleeping conditions, 51 % feel they have been in excellent or very good health over the last four weeks. Where sleeping conditions are far from optimal, only 29 % stated that they felt healthy. Other factors, such as having a feeling of lots of energy or been bothered by congested or runny nose, dryness or irritation of the throat, headache or a feeling of heaviness in the head, and feeling cold were also affected by the sleeping conditions. Among the factors influence sleep quality is control over the light from outside and being able to maintain a comfortable temperature. In the Commission Internationale de l'Eclairage (CIE) "principles of healthy lighting" (CIE 2004/2009), one of the five principles stated that Healthy light is inextricably linked to healthy darkness, which emphasise that in order to ensure better sleep conditions, one

plete darkness daily. Another important factor for high quality sleep is good indoor air quality, although, no strong relationship seems to exist between valuing a good night's sleep and to open the windows to air out their homes. The problem is most apparent in wintertime, where almost 20 % who view high quality sleep as very important for their health do not air out their home at least once a day. Studies have found that the indoor temperature has an impact on sleep quality and a general conclusion is that humans prefer rather cool sleeping environments over hot environments (Laverge et al., 2011). Therefore, it is interesting that when asked, only few (28 %) air out before going to sleep. Poor sleep at night has been linked to lower job performance, a higher risk of work accidents and difficulties in making decisions at work (Harrison and Horne 2000, Folkard and Lombardi 2006). A recent report has quantified the economic costs of insufficient sleep, and estimate that at a national level, up to 3 per cent of GDP is lost due to lack of sleep (RAND Europe 2016). The results from the two barometers show clearly that the awareness of the home environment for a good night's sleep is not fully implemented by the Europeans.

Ventilation and air quality

The purpose of ventilation is to freshen up the air inside our homes in order to achieve and maintain good air quality and thermal comfort. Overall, 78 % of all Europeans are very satisfied or satisfied with the air quality in their current home. They value high indoor air quality and would have it as a priority if moving to a new house, or were considering investing to improve it. The HHB 2015 showed that fresh air, in general, is assigned high importance (51 %), with variation depending on gender (women 47 % compared to men 37 %) and age ('elderly' (aged 60 to 65) 55 % compared to young (18 to 29 year) 31 %). In the summer, 68 % air out at least one room in their home more than once a day, and another 22 % air out once a day. Less than 4 % air out less frequently than once a week. However, these figures drop significantly in the wintertime. Only 28 % air out more than once a day, and 48 % air out once a day. Almost one quarter of all Europeans neglect the daily change of the indoor air in the wintertime (World Health Organisation, 2009, Heiselberg and Perino, 2010, Grün & Urlaub 2014 and 2016). As the HHB 2015 demonstrated, Europeans might be concerned about indoor climate, but they do not always act accordingly. The HHB 2016 gave further insights. The most important reasons for opening the windows are that it is part of a daily routine (74 %) and to let out unhealthy air (75 %). However, when looking at the time of day Europeans air out, this turns out not to add up to an optimal solution; 66 % open the windows when they wake up but only 28 % air out before going to sleep. The challenge is that the Europeans who never air out their homes are twice as likely to state that they do not feeling energised compared to Europeans who air out 2-4 times daily. Furthermore, the number of Europeans who suffer from throat infections increases from 36 % to 50 % when something prevents them from opening the windows in their home or if the Europeans live in homes that were too cold at some point during the last winter (further information Braubach et al. 2011 about disease associated with inadequate housing).

The barometers showed that being unable to maintain high quality indoor climate is of great concern to Europeans. From the HHB 2015, we asked how concerned they were with Living in a building with an unhealthy indoor air quality, Being unable to afford my mortgage/rent and maintain my house, Feeling stress or fatigue, Becoming ill, My children becoming ill, Losing my job, Not being able to maintain strong friendships, we learned that living in a building with unhealthy indoor air quality is as serious to Europeans as losing their jobs, and only of slightly less concern than being unable to pay the mortgage/rent. However, despite the general concern, 65 % of all Europeans dry clothes indoors at least once a week. A recent study by Grün & Urlaub (2014) suggests that 80 million Europeans live in mouldy or damp homes with an increased risk of developing diseases. Damp homes have an unhealthy indoor climate which almost doubles the risk of developing asthma (Mendell et al 2011). According to Grün & Urlaub (2016), 2.2 million Europeans have asthma because of living in damp and mouldy homes. Therefore, it is even more noteworthy that people living in households with one or more persons suffering from asthma or allergies are only marginally more concerned about living in a building with unhealthy indoor air quality than those households with no asthma or allergies. In homes without asthma or allergies, 22 % are very concerned about their indoor climate, while 37 % of Europeans living in households with four or more persons suffering from these diseases are very concerned. What is more, surprisingly, living in a household with asthma and allergies does not make people air out more frequently than others during winter.

Daylight conditions

Increasingly number of studies has proved that daylight provides an array of health and comfort benefits that make it essential for buildings' occupants. If the Europeans were to move into a new house, how important would they consider the following nine aspects; amount of daylight, indoor air quality, energy costs, environmental impact from building materials, size, attractiveness, comfort at home, the functionality of the rooms, the view to the outside. On the scale from not important (1) to very important (7), 47 % would state that the amount of daylight is very important, and 92 % would give it 5 or above, resulting in a score of 6.1 out of 7, ranking amount of daylight as number 4 out of 9. Slightly higher score was Comfort at home (score 6.3), Energy cost (score 6.2) and Functionality of the rooms (score 6.2). Other study has shown that daylight is the single most important attribute in a home, with over 60 % of respondents ranking it as important (RIBA and Ipsos MORI 2012). Asked about specific changes that have been made within the last 5 years, more than 25 % reported they improved the amount of daylight in their home. These improvement efforts do not arise from an overall dissatisfaction with the amount of daylight in the home. On the contrary, 31 % of Europeans are fully satisfied on a scale from not satisfied (1) to fully satisfied (7),), and more than 4 in 5 express 5 or above satisfaction with the amount of daylight in their home. From the HHB 2016, we learned that daylight has a positive effect on feeling generally healthy and having enough daylight in the home almost halves the risk of not feeling energised. However, 37 % lack daylight in their living room and never or very seldom feel energised, and a total of 20 % of Europeans say that they are too dependent

on artificial light during the day. This in itself is an energy consumption challenge, but even more challenging, 76 % of Europeans report that they need to turn on the light during the day when it is daylight outside. This means that a large number of Europeans are too dependent on artificial light. On the other hand, when Europeans recognise the need for more daylight, they are very motivated to act. Of the Europeans who report that they do not have enough daylight in their living room, 74 % say there would find it very important or extremely important to ensure more daylight if they were to renovate.

Indoor temperatures

The HHB 2016 showed that, as many as 82 % of Europeans live in homes that were too cold at some point during the last winter. In fact, 18 % report that their homes are too cold all or most of the time. The EU Survey of Income and Living Conditions (EU-SILC) database, show that 52 million people across the EU report they are unable to keep their home adequately warm (Energy Poverty Handbook 2016). In the 2016 survey, overheating is also a challenge as 87 % experienced this at some point last summer, and 31 % felt it regularly. It also showed that the impact on health of those living in cold homes are 50 % more likely to suffer from nose and throat infections.

Energy costs and home improvement

Today, satisfaction with energy costs is low among Europeans. Out of eight drivers (size of home, state of renovation, relation to neighbours, sleep quality, quality of the indoor climate, humidity, energy cost, and daylight), the HHB 2016 show that for home satisfaction, Europeans are by far least satisfied with the cost of energy consumed at their current home. The wish to conserve energy and reduce energy costs is strong among Europeans, as energy cost is second highest priority (score 6.2 out of 7) when moving to a new home (see the list of factors in section Satisfactory daylight conditions above). But, those who stated that they were highly concerned with energy costs do ventilate their homes even more than those not too concerned, and they put greater emphasis on daylight and other home comfort factors than those not concerned with energy costs. When asked about specific changes that have been made within the last 5 years, more than half of the European homes have undergone changes to reduce energy costs. The amount of money spent on improving their homes varies significantly between the European countries, as well as priority of improvement projects. When asked what they would find important when renovating their homes, the main reason for renovating was to reduce energy costs (75 % stated very or extremely important), and second most important reason is to improve their overall wellbeing at home (73 %). In terms of the amount home owners plan to spend within the next 12 months, there are indications of a slight increase in spending. Thirty-five percent are planning to spend more on building materials compared to the preceding 12 months, 37 % plan to spend the same, whereas 29 % will be spending less. Although the need for home improvement could be expected to follow the age of the building, this does not seem to be the case. There is no relationship between the age of the building and how much money will be spent on building materials in the year to come. Similarly, there is no significant correlation between the age of the building and different home improvement projects such as installing new windows, heating, insulation, kitchen or bathroom. But the strongest driver for planning to spend money on home improvement is dissatisfaction with one or more of the elements above.

Conclusion

The facts that by 2050 70 % of the world's population will live in cities, and 9 out of 10 currently existing buildings in Europe will still be in use, make climate renovation the key challenge. Knowing that the rate of renovation in Europe is currently below target, it becomes even more important to motivate Europeans to renovate. Even more importantly, in the light of the quest for energy efficiency, it is important never to lose sight of the Europeans health and well-being. The Healthy Homes Barometers clearly show that improving home comfort and wellbeing or reducing energy costs by energy efficient solutions, are both a positive motivation factor and equally important for Europeans in their decision to improve their homes. The barometers give key directions of what actually matters most for Europeans to improve their health, comfort and the indoor home environment, as well as key drivers for improving home satisfaction:

- Ensure good sleeping conditions; 72 % of Europeans do not air out their bedrooms before going to sleep.
- Strive for comfortable indoor temperatures; 37 % of Europeans value low energy costs over comfortable indoor temperatures.
- Let in fresh air; 59 % of Europeans air out their homes less than the recommended two times a day (WHO Europe, 2009).
- Let in daylight; 76 % of Europeans compensate for insufficient access to daylight by turning on artificial light.
- Avoid humidity; 49 % of Europeans do not place priority on avoiding too much humidity.

These drivers reveal a set of motivation elements which can play an important role in the Europeans decision for products and solutions when renovating. It also shows that renovation solutions and mechanisms to increase public awareness need to include the importance of the energy efficient homes in the view of Europeans daily lives and its added value of improved indoor comfort parameters as supplementary information. However, successful implementation of energy efficient policies need to be targeting new build or renovation separately, since our existing building stock is the majority, and in need for drivers, both on policy levels as well as program level. And further step towards success within the building sector, is that the majority of European homes are private owned, and therefore could implementation of energy efficient policies be challenged by the homeowners' interest and willingness to invest. The Healthy Home Barometers show that initiatives to reduce energy costs or improve overall wellbeing at home are equally important drivers, especially when moving into a new house. Furthermore, the analysis also shows that within the last 5 years, more than half of the European homes have undergone changes to reduce energy costs. For homeowners to take further action of energy efficiency investments would be to ensure attractive financial solutions that to some extent secure the value of the property, and support homeowners comfort and health.

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