



Healthy Homes Barometer 2016

European Survey by the VELUX Group

An annual study of European citizens' attitudes and behaviour regarding health perception, home satisfaction and energy consumption



The Healthy Homes Barometer research is led by Prof. Dr. Dr. h. c. Bernd Wegener and Moritz Fedkenheuer, M.A. Social Science, Humboldt University Berlin

VELUX®

In the 2015 survey, we learned that a healthy life starts at home

Last year we presented the first Healthy Homes Barometer, a pan-European survey designed to investigate the way in which Europeans link their home to their health. The answer was clear: Europeans regarded their home to be the most important arena in terms of maintaining good health, more important than a healthy diet or being physically active. Curiously enough, this concern didn't seem to spur much action. Europeans worry about their indoor climate, but do little to improve it – by frequent airing, for example.

A healthy life starts at home

In 2015 Europeans were asked how important nine factors are to their health. When ranking according to importance the order is:

- # 1 Sleeping well at night
- # 2 Ventilating my home
- # 3 Eating fruit and vegetables
- # 4 Daylight in my home
- # 5 Spending time outdoors
- # 6 Avoiding tobacco
- # 7 Regular exercise
- # 8 Avoiding chemicals
- # 9 Dietary supplements



The Home Arena

Three out of four factors clearly related to home life are top-rated according to Europeans.

- #1 Sleeping well at night
- #2 Ventilating my home
- #4 Daylight in my home
- #8 Avoiding chemicals



Our intake

Europeans put how our bodies are fueled in second place.

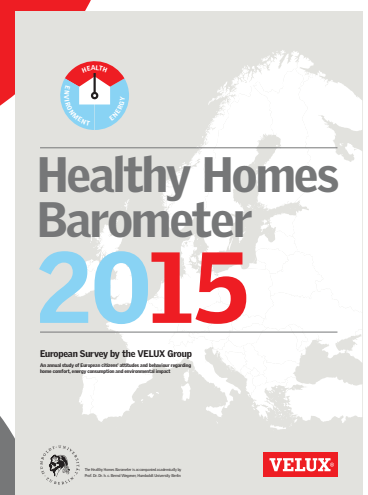
- #3 Eating fruit and vegetables
- #6 Avoiding tobacco
- #9 Dietary supplements



Being active

Europeans find it important – but not crucial – to their health to be active.

- #5 Spending time outdoors
- #7 Regular exercise



A closer look at healthy homes

We all need a place to call home – a place to feel safe, sound and comfortable. However, feeling “at home” is not as straightforward as it used to be. The growing concern for global climate change has transformed the home into something much more complex and demanding. Today, the ability to be energy efficient while ensuring a healthy indoor climate has become the number one challenge in our building stock. And since we spend up to 90% of our time indoors, it isn’t something we should take lightly. To meet this challenge, the VELUX Group built 26 Active Houses (in partnerships) in 12 countries from 2005-2015. All buildings are based on the Active House principles of a user-centric approach to comfort, energy and environment.¹ Six Model Home 2020 buildings, so-called model homes, were researched in depth; this gave a reassuring look into the potential of sustainable building design. Based on feedback from scientists and the test families, we learned that by employing our current knowledge and technology we can create a healthy and pleasant home environment and still reach the EU requirements of all new buildings being ‘Nearly Zero Energy Buildings’ by 2020”. Tomorrow’s buildings are here today.

During the test families stay in the demo buildings, we learned that only if the occupants perceived a clear benefit within the indicators, i.e. more daylight, better air quality, saving energy etc., would they change their behaviour. In other words, perception became a motivational driver for seeking sustainable solutions by way of daily conduct and even inspired plans for renovation in the normal homes of the families. So we asked ourselves, what do inhabitants really think about their indoor environment? And then we started our study on healthy homes.

Perception is reality

In the 2016 survey we try to understand what Europeans experience at home. In what way do they actually perceive the difference that a healthy home makes? Answers from 14,000 respondents in 14 countries have helped us create a comprehensive ranking of what dwellers experience as being most important in terms of home satisfaction and wellbeing. The Healthy Home Barometer 2016 is an attempt to learn what perception is of Europeans, when they make the everyday decisions that are vital to a healthy home.

The next level of knowledge

I’m excited to be able to share this knowledge. As societies, we need to protect our common future by reducing energy consumption – but also by making sure our homes remain comfortable and healthy. We need to be aware that crucial decisions aren’t always made in the EU or by our national governments, but that all Europeans can make a difference through the choices of everyday life. The report gives an overview of what Europeans want from their homes, what benefits their health and home wellbeing and which drivers motivate home investments. The good news is there is alignment between what Europeans want and what is good for them. I look forward to sharing our findings with you and hope you will engage in a dialogue with us to develop a more comprehensive understanding of what a healthy home is all about.

Michael K. Rasmussen
SVP Brand of the VELUX Group



Michael K. Rasmussen
SVP Brand of the VELUX Group

All Europeans have a say when it comes to creating a sustainable living environment through everyday decision-making and habits. With this year’s Healthy Homes Barometer we reveal the true expectations and behavioural patterns of Europeans in their homes

¹ www.activehouse.info

About the Healthy Homes Barometer

The Healthy Homes Barometer is an analysis presenting key findings from a pan-European study investigating European citizens' experiences, attitudes and behaviour regarding health perception, home satisfaction and energy consumption. This is the second Healthy Homes Barometer published by VELUX Group. The first Barometer was published in April 2015.

Barometer methodology

During October 2015 a questionnaire was answered by 14,000 Europeans in Austria, Belgium, Czech Republic, Denmark, France, Germany, Hungary, Italy, the Netherlands, Norway, Poland, Spain, Switzerland and the UK. The questionnaire and analysis were carried out by VELUX Group in cooperation with Prof. Dr. Dr. h. c. Bernd Wegener, Humboldt University Berlin and Moritz Fedkenheuer, M.A. Social Science, Darmstadt University of Technology and independent consultancies, Operate A/S and Wilke.

The number of respondents from each country was set to ensure statistical representation. This has been achieved. The fourteen countries surveyed represent more than 430 million Europeans, accounting for more than 70% of the total European population (excluding Russia). 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 fourteen European countries surveyed as a whole. For example: since the German population is 19% of the total population of the fourteen European countries surveyed, responses from Germany account for a similar percentage of the pan-European total.

Focus on comfort, energy, and the environment

The home has a huge impact on human health and wellbeing, society's energy consumption and sustainable development in terms of material use and reuse. The Barometer's underlying thesis is derived from the Active House Vision as formulated by the Active House Alliance. In this understanding, a healthy home is a home which has as little environmental impact as possible and is as energy efficient as possible, while providing healthy and comfortable surroundings for its occupants. For more information, visit activehouse.info.

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Health matters

– scientific background

Health matters. Health matters for individuals and for society. For individuals health is obviously a constituent of the human condition ranking high in the catalogue of natural primary goods. Without the enjoyment of health there is little worth living for. But how healthy we feel is not only part of our personal welfare. Since it is unevenly distributed in society, health is also pertinent to a society's social order. Issues of justice are involved concerning health inequalities. From a purely instrumental point of view, health is also an indispensable factor of productivity; if general health conditions are poor this will hamper a nation's economic functioning. Hence health is as much an asset of personal wellbeing as it is a resource of social and economic significance.

Health also matters for sociology. In the face of differences in health status and health determinants for different population groups, explaining health inequalities has always been a prominent research domain of sociology. There are many driving forces causing health disparities in a society, work, education, region, lifestyle, culture and biology. They all have been studied thoroughly. This is true, however, to a lesser extent for the housing environment and the way we shelter as a factor influencing health production. In the recent Commission report on Health Inequalities in the EU,² housing effects on health are not found to be worth mentioning at all.

However, there is convincing evidence, for instance, that lack of heating and prolonged low indoor temperatures are linked to cardiovascular diseases and respiratory ailments with negative effects on national mortality rates. Equally, a sus-

tainable living environment is seen as contributing to a person's wellbeing. People feel better at home if the construction of the building they live in is energy efficient and its building materials are environmentally friendly.

Thus the way we live determines a society's level of health and the quality of life of individuals. But is this generally acknowledged across Europe? This is what the Healthy Homes Barometer wants to find out, the first ever attempt to explore residents' health and wellbeing in Europe. It also aims at recording what, if anything, people do to improve the health conditions in their homes or what keeps them from acting correspondingly.

The endeavour is unique. It is grounded on a theoretical framework with which perceived living quality can not only be assessed, but also explained. One can locate causalities and reveal potential influence points. Moreover, the comparative European perspective allows national and cultural differences in the production of health to be identified. A picture thereby emerges of the subjective experience of living in homes across Europe, supplementing Eurostat's quality of life statistics.

The study takes the concept of housing psychophysics³ as a starting point, according to which wellbeing at home is a function of both the properties of the house and environmental factors. Together, the two act as a stimulus for user wellbeing. But wellbeing is also determined by perceptions of our own health, actual behaviour and information. Housing psychophysics thus evaluates both exogenous causes and individual influences on our sense of wellbeing at home.



About the contributors who led the Healthy Homes Barometer research 2016

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Prof. Dr. Dr. h. c. Bernd Wegener
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Only by gaining insight into explaining health, housing wellbeing and satisfaction will policies evolve that bring about change and ensure good living in homes across Europe.



² Marmot, M. "Health inequalities in the EU – Final report of a consortium", European Commission Directorate-General for Health and Consumers (2013).

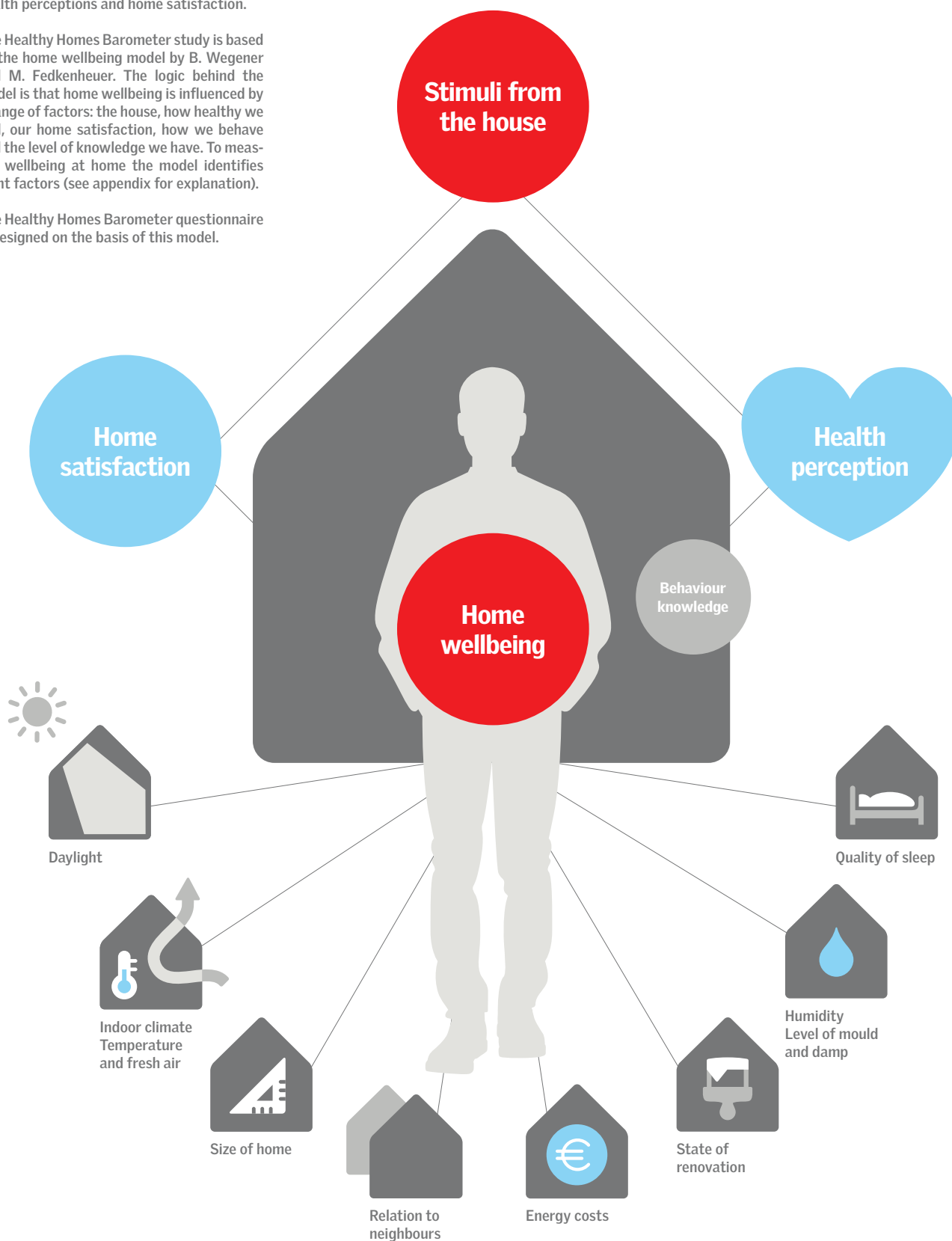
³ Wegener, B. "Die Psychophysik des Wohnens". Pp. 43-46 in Manfred Hegger et al. (eds.), Aktivhaus – Das Grundlagenwerk: Vom Passivhaus zu Energieplushaus (2013).

Home wellbeing model

The purpose of this year's Healthy Homes Barometer is to dig deeper into the home aspect; how does the home affect Europeans' health perceptions and home satisfaction.

The Healthy Homes Barometer study is based on the home wellbeing model by B. Wegener and M. Fedkenheuer. The logic behind the model is that home wellbeing is influenced by a range of factors: the house, how healthy we feel, our home satisfaction, how we behave and the level of knowledge we have. To measure wellbeing at home the model identifies eight factors (see appendix for explanation).

The Healthy Homes Barometer questionnaire is designed on the basis of this model.



How health matters – five key conclusions

No healthy Europe without healthy homes

1

Large numbers of Europeans suffer from health problems and low wellbeing every single day. This is bad for quality of life. It is also a cause of significant loss of productivity in the economy. This year's Healthy Homes Barometer demonstrates that our homes are part of the problem.

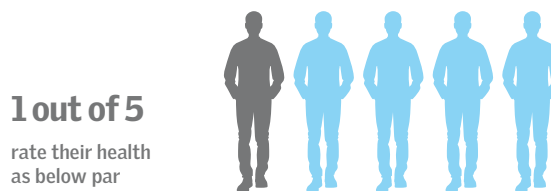
Living in a healthy home gives us a sense of being in good health, of being energised, and it helps us to avoid the minor everyday ailments of a runny nose and sore throat. Europeans experience these health impacts from their homes every day. For instance, 50% of dwellings in Nordic countries are below target ventilation standard. The result is twice more likelihood of developing respiratory illnesses such as wheezing or a dry cough and one and half more likelihood of developing allergy symptoms. The costs to society are high. Poor asthma control is responsible for significant work impairment, with productivity losses totalling €9.8 billion per annum in Europe⁴.

The Healthy Homes Barometer 2016 pinpoints five characteristics of a healthy home. If you want healthy living at home, you should make sure that your bedroom offers a good night's sleep, that your home is neither too cold nor too hot, that you let in fresh air and daylight, and that your home does not allow humidity to build up and cause mould. This year's Barometer shows the difference that these five characteristics make to the health of Europeans.

[Read more on page 10](#)

Tell-tale signs of unhealthy homes

Europeans have frequent health problems. An unhealthy home is one cause. The numbers below illustrate Europeans' own experience over a four-week period.



⁴ Grün, G., & Urlaub, S.; "Towards an identification of European indoor environments' impact on health and performance – homes and schools", Fraunhofer Institute for Building Physics (2014).

Home wellbeing and energy savings drive renovation

2

Buildings account for 40% of total energy use in Europe⁵. One important reason is that the European building stock today is not energy efficient. Renovating to save energy is important. But so is renovating to improve wellbeing at home and good health.

These two considerations actually go hand in hand. When asked about why Europeans would renovate, 75% point to a wish to reduce energy costs, but 73% point to improving overall wellbeing at home.

Improving wellbeing is a positive motivation for Europeans. Perhaps even more importantly, it ties in with what actually matters most for home satisfaction.

[Read more on page 17](#)

The healthy home is a happy home

3

Today, 50% of Europeans are only moderately or even less satisfied with their current home. If we are to improve this situation, we need to look towards the healthy home. Why? Because the five characteristics of the healthy home also affect home satisfaction.

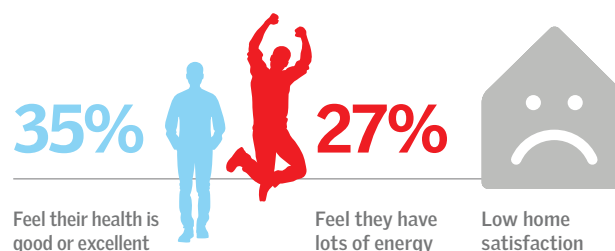
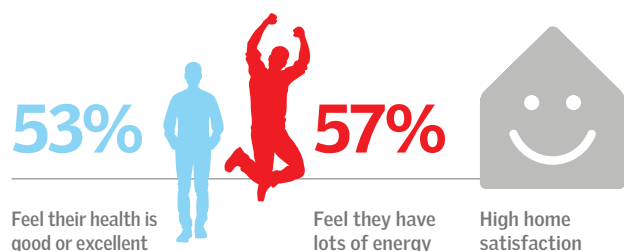
This is true for all of the 14 countries surveyed in the Healthy Homes Barometer 2016. Even if we only look at the three most important drivers of home satisfaction, 12 of the 14 countries have one or more home health characteristics on top.

Seven countries have sleep quality in their top three. Five countries have indoor climate in their top three. In other words, a healthy home also offers comfort and satisfaction.

[Read more on page 14](#)

A happy home is an energiser

Europeans who are satisfied with their home are much more likely to feel in good health and feel energised.



Europeans overlook the importance of daylight

4

Europeans do take care to make theirs a healthy home, but sometimes they are not able to. Daily routines may get in the way, or they simply do not have the opportunity to do what is needed. Europeans tend to compromise. For example, 45% of Europeans keep temperatures too low for comfort in order to save money. Also, Europeans don't always air out their homes when it is cold outside. This is costly in terms of health⁶.

Even more challenging is that we often do not know what we are missing. For instance, 76% of Europeans say they need to turn on artificial light during the daylight hours, but only 20% say that they are too dependent on artificial light. Having enough daylight in the home almost halves the risk of not feeling energised, and daylight is known to improve both mood and productivity. The findings suggest that people need to experience what plentiful daylight can do for them before they realise the true benefits.

[Read more on page 20](#)

More healthy homes require a common effort

5

There is a clear connection between what Europeans want from their homes, what benefits their health and quality of life, and what is good for society. As homeowners and occupants, Europeans benefit from healthy homes. For the building industry, design should take all parameters into account that affect home wellbeing and not just focus on a single parameter as humidity and temperature.

For politicians and authorities, healthy homes have the potential to target energy savings, health, productivity and quality of life. As societies, we should include healthy buildings in policymaking. We should remind ourselves that buildings are for people to live and work in, and we should work together based on this realisation.

[Read more on page 22](#)

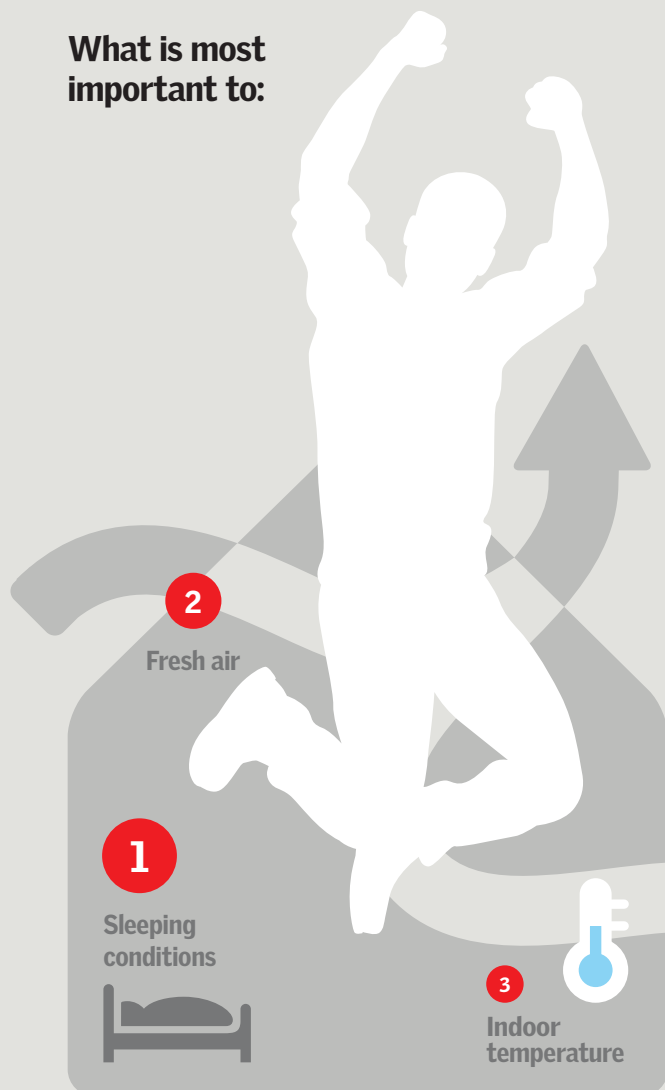
⁵ European Commission Directive 2002/91/EC of the European Parliament and of the Council of 16 December (2002) on the energy performance of buildings, European Union, (2002).

⁶ Braubach, Matthias. Et al. "Environmental burden of disease associated with inadequate housing – A method guide to the quantification of health effects of selected housing risks in the WHO European Region" WHO, (2011)

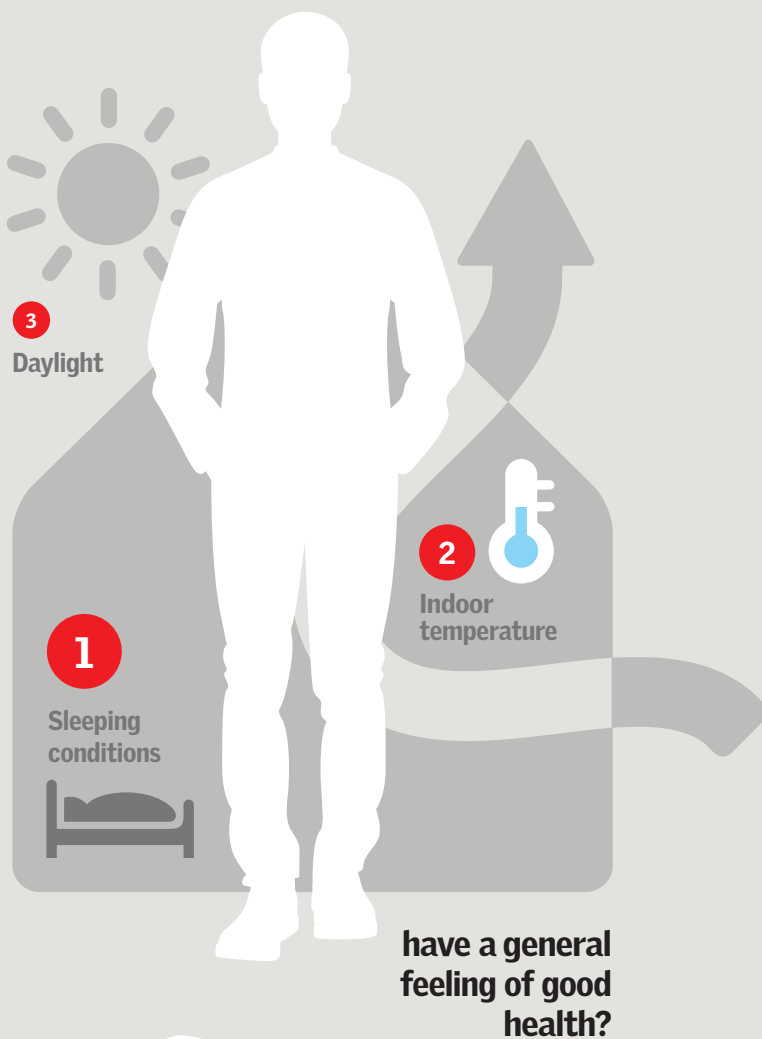
The benefits of a healthy home

Having a healthy home means feeling healthier, feeling more energised and suffering from respiratory problems less often.

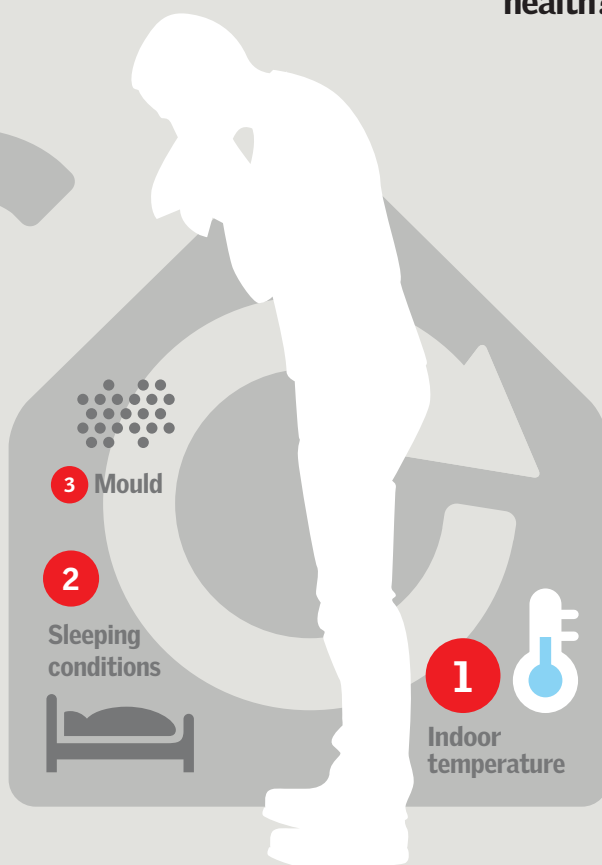
What is most important to:

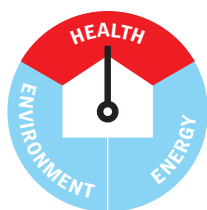


feel energised?



limit respiratory problems?





Five characteristics of a healthy home

The home has a direct health impact. For instance, Europeans who have optimal sleeping conditions are 50% more likely to experience good health and feel energised. This section takes a closer look at the different ways in which Europeans experience the health effects of their home.

A healthy life starts at home. This was the answer from Europeans in 2015, when we asked them what was most important for their health. The home was rated as more important than eating plenty of fruit and vegetables, avoiding tobacco, and exercise.

Fresh air and daylight have been linked with higher productivity and better learning outcomes for students. Minor illnesses are costing society billions in lost productivity. Europeans actually experience first-hand what living in a healthy home feels like.

Living in a healthy home gives Europeans a general sense of being in good health. It impacts the extent to which they feel good and how they consider their health compared with other people.

The healthy home boosts energy significantly. Europeans feel energised, with the drive and motivation to live active lives.

The healthy home helps to avoid some of the minor everyday ailments that everyone is familiar with: respiratory tract infections resulting in a runny nose or sore throat.

We asked Europeans to rate these three aspects of their health during the last four weeks⁷. We don't know the extent to which these experiences can be clinically documented. There is no doubt, however, that they are more than just a fleeting feeling. They are a real problem in the daily lives of Europeans.

The Healthy Homes Barometer 2016 pinpoints five characteristics of the healthy home. Unfortunately, as the results on the next page demonstrate, the situation in European homes today is far from optimal.

50%
**better chance of
experiencing good
health with optimal
sleeping conditions**

⁷ Europeans rated the three health aspects in October 2015.

Five characteristics of a healthy home

1 Good sleeping conditions

Europeans whose home allows for a good night's sleep are 50% more likely to feel they have good health and feel energised.

A total of 77% of Europeans do not have optimal sleeping conditions in their home. One in three report the quality of their sleep within the last four weeks as either very bad or fairly bad. More than half (60%) have experienced sleeping disturbances. The health consequences are clear. 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% have felt healthy. Feeling energised and susceptibility to infections are also affected.

Poor sleep at night has been linked to lower job performance, a higher risk of work accidents and difficulties in making decisions at work. Insomnia is one of the best predictors of absenteeism from work. According to one study, the monthly rate of absence due to sickness for insomniacs was 1.4 times higher than that of healthy sleepers⁸.

4 Satisfactory daylight levels

Having enough daylight in the home almost halves the risk of not feeling energised.

A total of 37% of Europeans who lack daylight in their living room never or very seldom feel energised. If daylight levels are appropriate, the percentage drops to 21%. Daylight also has a positive effect on feeling generally healthy and it reduces the risk of experiencing throat and nose infections.

Daylight is known to improve both mood and productivity. It has been demonstrated that improved daylight conditions increase office productivity by up to 15%.¹⁴ We also know that a lack of daylight may cause sleep disturbance, stress, obesity, fatigue and Seasonal Affective Disorder (SAD).¹⁵

2 Comfortable indoor temperatures

Europeans who live in cold homes are 50% more likely to suffer from nose and throat infections.

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. Overheating is even more widespread, as 87% experienced this at some point last summer, and 31% felt it regularly. The percentage of Europeans suffering from a congested nose falls from 68% to 45% when comparing homes that are too cold all the time with homes that are never too cold. Dryness and irritation of the throat shows the same pattern. Having a home that is too hot also leads to an increase in throat infections.

Deaths from cardiovascular diseases are directly linked to excessively low indoor temperatures. Research in 11 European countries has estimated that almost 13 out of every 100,000 inhabitants die every year due to indoor cold⁹; the so-called energy poverty. Excessive heat can be dangerous too, especially for the elderly¹⁰, and it leads to poor sleep quality¹¹.

5 Appropriate humidity levels

Europeans who have mould in their home are 50% more likely to suffer throat infections.

Up to 60% of Europeans with mould in their home experience dryness or irritation of the throat. For Europeans who do not have this problem, this percentage falls to 43%.

Human activities such as cleaning, cooking and showering add moisture to the indoor air. The activities of a family of four typically add 10 litres of water to the indoor air every day¹⁶. A typical effect is damp on window panes; a problem experienced by 32%. If it is not dealt with, this damp can lead to mould and more serious problems. For example, the overall risk of developing asthma is approximately twice as high in a home with mould than in a home with no mould or dampness.¹⁷

3 Fresh air

Europeans who never air out their homes are twice as likely to suffer from not feeling energised compared to Europeans who air out 2-4 times daily.

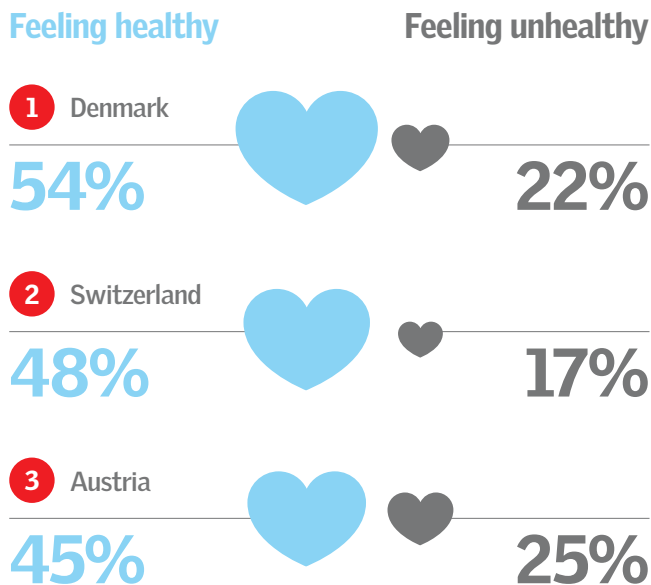
The survey shows that 48% of Europeans who never air out their homes also do not feel energised. This falls to 22% for Europeans who air out 2-4 times a day. Furthermore, the number of Europeans who suffer from throat infections increases from 36% to 50% when something prevents them from opening the windows in their home.

A Fraunhofer study suggests that 80 million Europeans live in moist or damp homes with an increased risk of developing diseases, e.g. asthma¹². Lack of fresh air and a poor indoor climate also hampers learning and working capabilities. In contrast, children's learning abilities rise by up to 15% if they are in a good indoor climate¹³. Opening windows brings in fresh outdoor air and may mitigate these symptoms⁹.

⁸ Metlaine, A., Leger, D., Choudat, D.; "Socioeconomic Impact of Insomnia", Working Populations, Industrial Health p.43 (2005). ⁹ Braubach, Matthias. *Et al.* "Environmental burden of disease associated with inadequate housing – A method guide to the quantification of health effects of selected housing risks in the WHO European Region". WHO, (2011). ¹⁰ Vandentorren, S. et al.; "Mortality in 13 French cities during the August 2003 heat wave", American Journal of Public Health, p.94 (2004). ¹¹ Urlaub, S. et al.; "The influence of the indoor environment on sleep quality", Healthy Buildings, (2015) ¹² Grün, G., & Urlaub, S.; "Towards an identification of European indoor environments' impact on health and performance – homes and schools", Fraunhofer Institute for Building Physics (2014). ¹³ Wargocki, P. "Indoor Environment and Learning in Schools", International Centre for Indoor Environment and Energy, Technical University of Denmark, (2013). ¹⁴ L. Edwards & P. Torcellini; "A Literature Review of the Effects of Natural Light on Building Occupants", National Renewable Energy Laboratory, U.S. Department of Energy, (2002). ¹⁵ Robbins, C.L.; "Daylighting Design and Analysis", Van Nostand Reinhold Company (1986) Rosen, L. N., et al.; "Prevalence of seasonal affective disorder at four latitudes", Psychiatry Research, vol. 31, no. 2, p. 131-144 (1990). ¹⁶ British Standard, BS 5250: Code of Practice for Control of Condensation in Buildings, 2002 ¹⁷ Mendell, M.J., et al.; "Respiratory and allergic health effects of dampness, mold and dampness-related agents: a review of the epidemiologic evidence" Environmental Health Perspectives, Vol. 119, p. 748-756 (2011).

Top three countries where Europeans feel most healthy

Feeling healthy is not the privilege of all Europeans. The Danes generally feel most healthy among 14 countries in the Barometer.



Unhealthy homes cost productivity

The symptoms above may sound minor, but the consequences to societies are huge.

Take the UK as an example: data from the UK Office for National Statistics shows that minor illnesses such as coughs, colds, flu and sickness accounted for 27 million lost working days in the UK in 2013¹⁸. In comparison stress, depression and anxiety together accounted for only 15 million of days lost. The direct cost to the UK economy of absence due to these minor illnesses¹⁹ has been estimated at £1.8 billion in 2013.²⁰

Add to this the hidden costs which, as the Office for National Statistics states, are harder to quantify. These include low morale among staff who have to carry out additional work to cover for those who are absent, and the cost of managing absenteeism.²¹

Similarly detailed statistics are not available for all countries in Europe, but research on the costs of influenza indicates that the loss of productivity is a far greater burden on national economies than costs of hospital treatment, medication etc.²² How much of this loss can be attributed to unhealthy homes is hard to quantify.

The national productivity case for healthy homes: the UK as an example

Minor illnesses was the number one cause of absence from work in the UK in 2013. The estimated economic cost to society is significant.

Source: UK Office for National Statistics

No. 1 reason for being absent from work
21% of all work days lost due to minor illnesses
1.8 bio. pounds of lost national income in the UK in 2013 alone

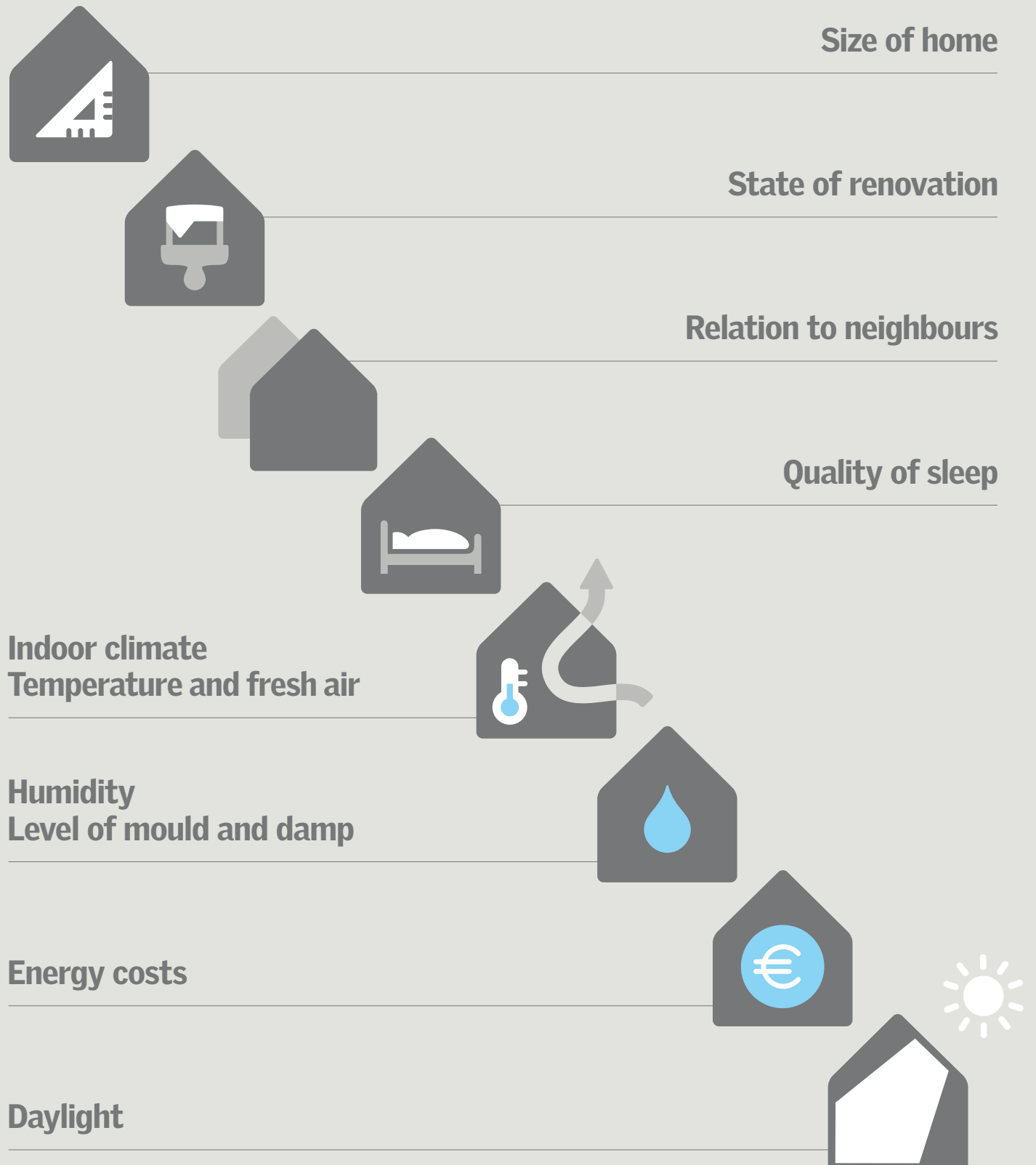


¹⁸ Office for National Statistics; "Sickness Absence in the Labour Market", (2014). ¹⁹ The direct costs include statutory sick pay, cost of replacement staff and loss of output. ²⁰ The direct cost was estimated by using data from the UK Office for National Statistics (2005). It was estimated that the direct cost of absence to the UK economy in 2003 was £11.6 billion due to 178 million days lost. On average, this amounts to £65.20 per day lost. With 27 million days lost due to minor illnesses in 2013, it was estimated that the direct cost equals £1.8 billion (fixed prices). ²¹ Barham, C.; "Sickness absence from work in the UK" Office for National Statistics, p.149 (2004) ²² Szucs, T.; "The socio-economic burden of influenza" Journal of Antimicrobial Chemotherapy, vol. 44, p.11-15. (1999).

Home satisfaction drivers

The figure shows what Europeans perceive to be most important for their home satisfaction. All eight drivers have a strong impact on both home satisfaction and wellbeing.

Perception rankings indicate that people need to know and experience true benefits of what is plentiful daylight, good indoor climate and adequate moisture levels.





Europeans want healthy homes

As many as 50% of all Europeans are only moderately or even less satisfied with their current home. If we are to improve home satisfaction, we need to understand what it is about Europeans' homes that is important for wellbeing. In this year's Healthy Homes Barometer, we have identified eight pieces of the puzzle.

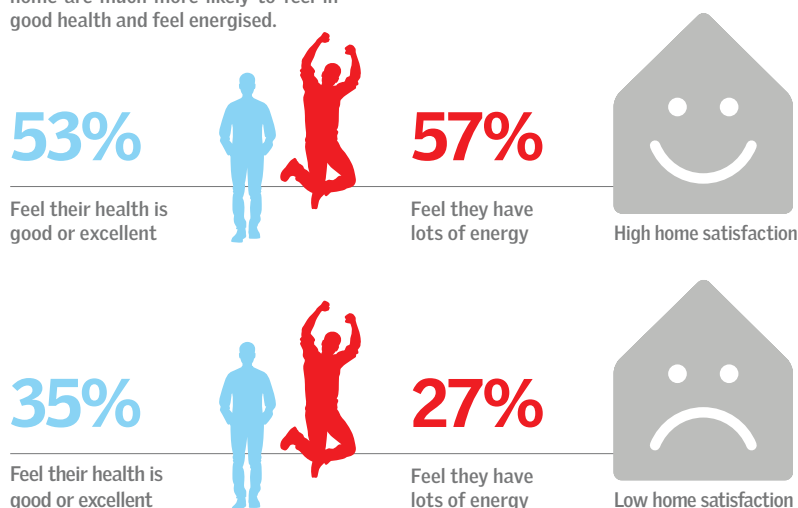
Comfort is king. This was the message from Europeans when surveyed in the Healthy Homes Barometer 2015. Home comfort was the most important factor when moving to a new home. Fresh air and daylight were seen as important for this home comfort.

With the Healthy Homes Barometer 2016, we move an important step closer to answering the crucial question: what creates satisfaction and wellbeing at home? Instead of asking directly, this time the survey looked at what actually leads to greater home satisfaction. The result is the eight drivers listed in the infographic on the left. The ranking represents the sum of Europeans in all the 14 countries surveyed.

Size of the home turns out to be the most important driver. This is followed by the state of renovation of the home, which includes whether the home is in need of renovation and whether the technical equipment is up to date. Placed third is having good relations with neighbours, this refers to the social aspects like feeling accepted by neighbours. The drivers are listed in order of importance. However, it is worth noting that the differences are quite small in terms of how important each of these are for home satisfaction. Please see page 23 for explanation of drivers.

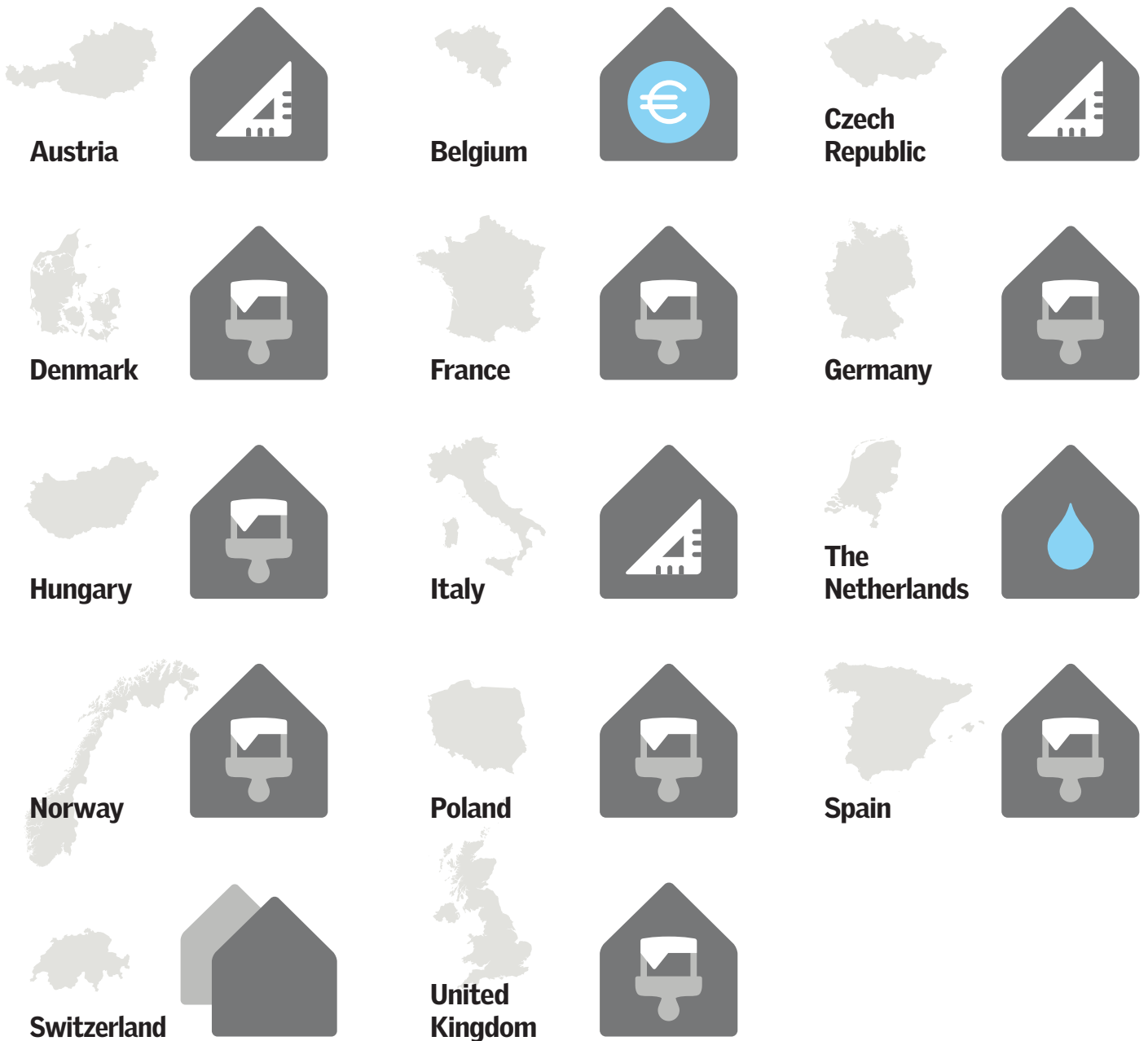
A happy home is an energiser

Europeans who are satisfied with their home are much more likely to feel in good health and feel energised.



What drives home satisfaction in each country?

The five characteristics of a healthy home presented on page 12 all contribute to higher home satisfaction. This is true for all of the 14 countries surveyed, as healthy home characteristics are important in all. The state of renovation turns out to be the most important driver of home satisfaction in eight out of the 14 countries, and number two priority overall as shown on page 14. Please see page 23 for top three drivers in each country.



Size of home



Energy costs



State of renovation



Humidity (avoid mould and damp)



Relation to neighbours

What triggers renovation and unlocks private investment?

We learned that a home's state of renovation is important for Europeans' home satisfaction. Renovating homes is also an important topic for society. We asked Europeans what they would find important when renovating their homes. Europeans agree on the answer: improving wellbeing at home and saving energy costs drive renovation.²³ This is good news. Buildings account for 40% of total energy use in Europe.²⁴ One important reason is that the European building stock today is not energy efficient. Energy presents a clear case for increased renovation. However, renovation for wellbeing and good health is also important, as the findings in this year's Healthy Homes Barometer documents. Actually, the two considerations – energy and wellbeing – do go hand in hand among Europeans.

When asked what would be their main reason for renovating, home-owners answer that reducing energy costs came out on top, as 75% would find this very or extremely important. European home-owners' second most important reason for renovating their homes is to improve their overall wellbeing at home, which 73% find very or extremely important.

Women place slightly more importance on the two factors than men. See illustration.

We also see a small increase in importance that comes with age. Europeans care slightly more about both energy savings and improving home wellbeing as they become older and start families – the nesting phase. See illustration.

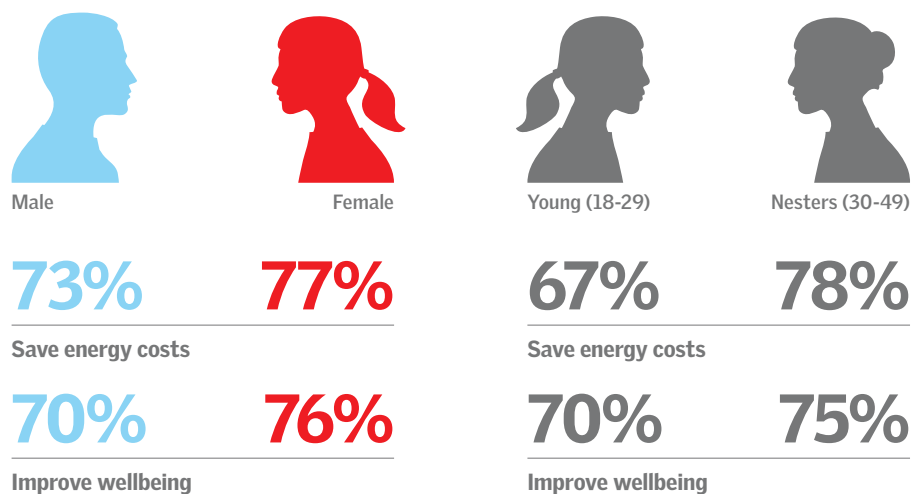
Knowing that the rate of renovation in Europe is currently below target, it becomes even more important to motivate Europeans to renovate²⁵. Improving wellbeing is a much more positive motivation for Europeans than just saving energy costs. Perhaps even more importantly, it ties in with what actually matters most for home satisfaction.

This reveals a much broader set of motivations that could play an important role in driving renovation. At the same time, this drive would lead to more energy efficiency, as in reality energy efficiency and healthy homes go hand in hand.

Two key factors motivate renovation: improve wellbeing and save energy costs

What motivates Europeans to renovate their homes

Home owners are motivated to renovate both to save energy costs and to improve wellbeing. The percentages show how many feel that the two are either very or extremely important. Other options presented in the survey – five in total – were less important.



²³ In the survey, Europeans were asked to choose between saving energy costs, improving wellbeing at home, improve indoor air quality, use environmentally friendly materials, reduce impact on environment, increase value of property or increase the amount of daylight. ²⁴ European Commission Directive 2002/91/EC of the European Parliament and of the Council of 16 December (2002) on the energy performance of buildings, European Union, (2002). ²⁵ Renovate Europe, "It pays to renovate brochure", <http://renovate-europe.eu/> (2011).

Five steps to a healthy home

The Healthy Homes Barometer can point us to five specific actions that Europeans could take in their everyday life in order to have a healthy home. However, changing daily behaviour and routines can be hard.

72%

of Europeans do not air out their bedrooms before going to sleep



Step 1

Ensure good sleeping conditions

37%

of Europeans value low energy costs over comfortable temperatures



Step 2

Strive for comfortable temperatures

59%

of Europeans air out their homes less than the recommended two times a day



Step 3

Let in fresh air

76%

of Europeans compensate for insufficient access to daylight by turning on artificial light



Step 4

Let in daylight

49%

of Europeans do not place priority on avoiding too much humidity



Step 5

Avoid humidity



How knowledge and behavior influence health at home

Keeping a tidy home is not a simple task, as numerous guides to good housekeeping will attest to. The same might be said for keeping a healthy home. If behaviours in the home are not optimal to ensure healthy living, how can we explain this and how can we address the problem?

Looking for gaps between what people ought to do and what people actually do could take an eternity. As the Healthy Homes Barometer 2015 demonstrated, Europeans might be concerned about indoor climate, but they do not always act accordingly.

It is worth noticing, however, that Europeans do take care to make their homes healthy. 84% air out. 74% avoid smoking tobacco in their home. 74% also attach great importance to cleaning in order to have a healthy home. See page 21 for more insights.

But is this really true? It is probably a bit more complicated, as Europeans are the first to admit. Half of those who attach great importance to cleaning their home admit that this is only somewhat true. A good proportion, three out of eight, of those who air out a lot see this as somewhat true. This sounds like a glass half full at best.

The question then is, what does get in the way of healthy living? Part of the answer is linked to hardware. The state of the home and systems in the home can make healthy living difficult. For instance, 24% of those whose home is colder than they would like during the winter say that heat

just disappears from their home, pointing to insufficient insulation. 17% point to an inadequate heating system as the reason. Also societal challenges, like energy poverty, can hinder Europeans from having a healthy home.

Another and very important part of the answer has to do with the "software" that Europeans are programmed with. A lack of knowledge leads to bad decisions. However, equally important are the habits and compromises of everyday life. The Healthy Homes Barometer gives strong indication that this is an important part of the explanation. The following pages summarise some of the most interesting indicators for these challenges.

What prevents Europeans from airing out?

Almost six Europeans out of ten neglect to air out at least twice a day. Europeans who do not air out sufficiently are more likely to suffer from not feeling energised, respiratory illnesses and allergy symptoms. But what prevents Europeans from opening their windows?



1 Cold from the outside



2 Noise from the outside



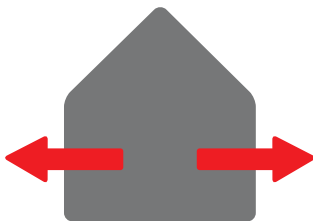
3 Heat from the outside

Cold homes for cold cash

Saving on energy costs is the number one reason for Europeans having their home uncomfortably cold. The illustration shows the three most important reasons Europeans give for having their home colder than they would like.



1 Try to keep cost of energy down



2 Heat just disappears from the home



3 Like to have open windows

Europeans do not always do what is best for their health

A total of 82% of Europeans live in homes that were too cold at some point during the winter of 2014/2015. 18% report that their homes were cold all or most of the time. Insulation and the heating system, however, are not the main culprits. 45% of Europeans with cold homes do this to save money by keeping temperatures too low for comfort. Among those who suffer the cold to save money on heating, one in four actually have their home too cold all or most of the time. This results in lower wellbeing and bad health.

The Healthy Homes Barometer tells a similar story when it comes to airing out. 47% say that cold from the outside prevents them from opening their windows. Noise and heat from the outside are also frequently stated, as is the wish to save on energy. As a result of these reservations, almost six Europeans out of ten fail to air out at least twice a day.

This is risky, as both fresh air and comfortable temperatures are important for wellbeing and health, as demonstrated in previous chapters.

Knowledge can change behaviour

In reality it is not necessary to choose between a comfortable temperature and fresh air, except for the few minutes the windows are open. Airing out for five minutes two to four times a day provides rapid air change without energy loss, since walls, floors, ceilings and furniture are not cooled down, and only the air needs reheating.

An ill-informed choice not to air out could change with better information. This does make a difference. Of Europeans who do not know about the benefits of daily airing out, only 8% air out sufficiently. Of Europeans who do know about the recommendation to air out more than once a day, 69% follow the recommendation. If Europeans are given better advice, they will change their behaviour. Sometimes.

Life gets in the way

Human beings are prone to follow their instincts, routines and habits. Even the really bad habits.

For example, 30% of Europeans think they have to adjust the temperature in their home too often during the winter. This problem leads to a much higher tendency to have a cold home. One likely explanation for this finding is that keeping a healthy home with a high level of wellbeing requires work and attention that can be hard to fit into the daily routine. Life gets in the way.

The same goes for airing out. The most important reasons Europeans have for opening the windows are that it is part of their daily routine, and that they want to let out unhealthy air. 74% and 75% give each of these reasons. 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; 28% air out before going to sleep.

It would be a good idea to let in fresh air before a long sleep. If your aim is to let out unhealthy air, failing to air out in the evening can be a problem.

Qualitative research by the VELUX Group can shed further light on this problem. People are more likely to react to a feeling there and then when deciding to air out. For example, they air out in the morning because their bedroom smells stuffy. The Healthy Homes Barometer confirms this finding, as 70% open their windows to let out smelly air.

However, even small obstacles like curtains and décor can put people off airing out. If people need to pull up the blinds, they just don't bother. It only takes something minor to get out the habit of airing out.

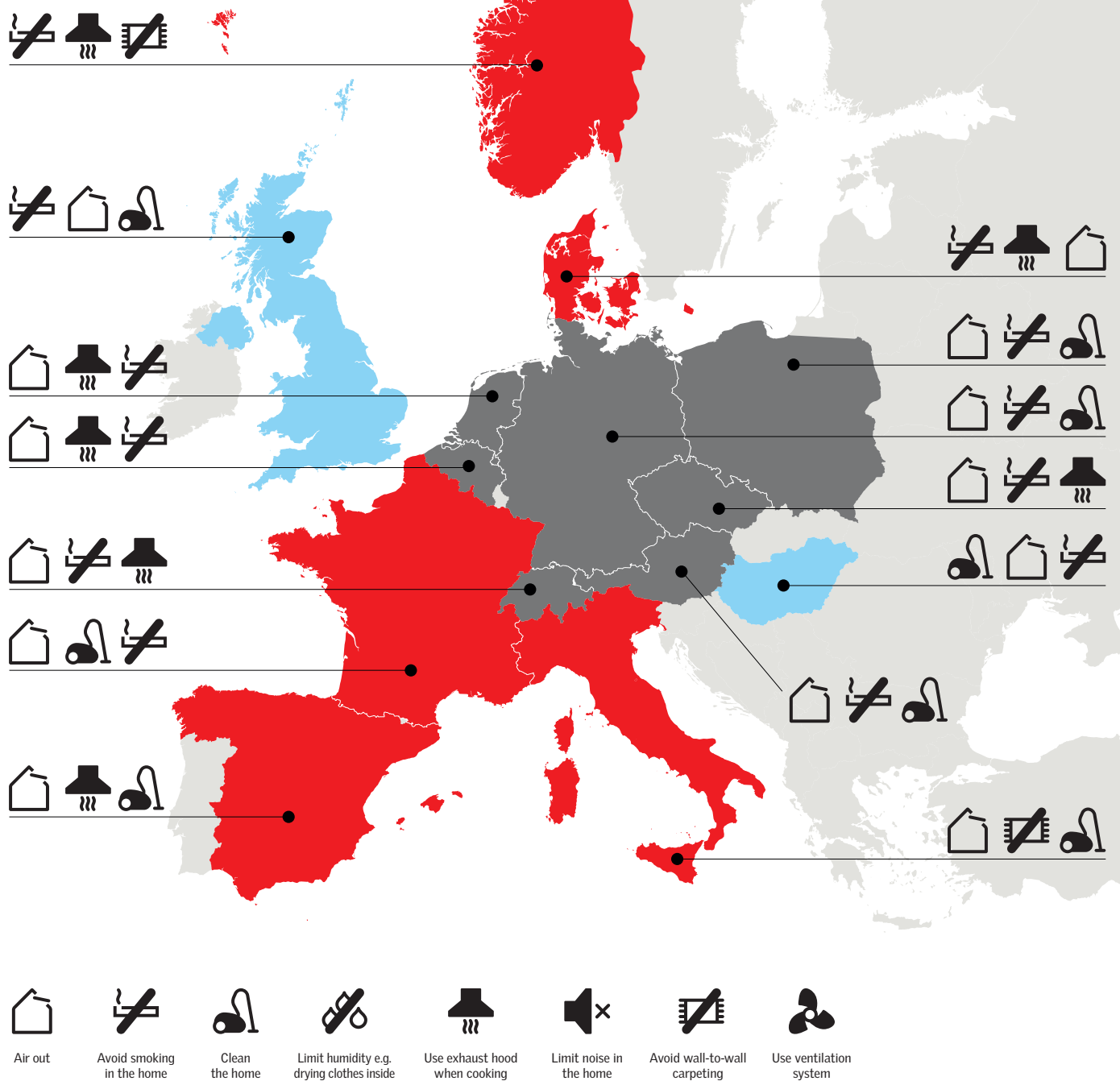
In the dark about the importance of daylight

Using your nose to detect the need for fresh air may not be the best solution, but it does help. What happens then when our senses do not give us guidance? Daylight is an example.

A total of 20% of Europeans say that they are too dependent on artificial light during the day. This in itself is a problem. Even worse, 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 but are unaware of the situation.

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% would find it very important or extremely important to ensure more daylight if they were to renovate.

These findings match qualitative research findings by Humboldt University and the VELUX Group. They show that when people move into a home with plenty of daylight, they learn to see the difference. Until we experience plenty of daylight with our own eyes, we do not know what we are missing.



Working together for healthier homes

A healthy Europe cannot exist without healthy homes. Political decision-makers, house builders, and individual homeowners and occupants need to work together to ensure healthy homes in Europe.

The Healthy Homes Barometer 2016 identifies five characteristics that make for a healthy home:



Satisfactory daylight levels

Having enough daylight in your home means that you will be almost twice as likely to feel energised, and it also has a positive effect on your general health and your risk of infections.



Good sleeping conditions

Having a home that allows for a good night's sleep makes you more likely to feel in good health and energised.



Comfortable indoor temperatures

Comfortable temperatures in your home – neither too hot, nor too cold – make you less likely to suffer from nose and throat infections.



Fresh air

Airing out your home makes you feel more energised and gives you a better chance of avoiding nose and throat infections.



Appropriate humidity levels

Mould in your home makes you more likely to suffer from throat infections.

Large numbers of Europeans suffer from health problems. This is bad for quality of life. It is also a cause of significant productivity losses in the economy. The costs to society run to billions of euros.

The future of healthy homes requires that we rethink how we build and renovate buildings. Improving wellbeing at home has to be the core ambition that drives our efforts. Building design needs to move beyond just optimizing on the basis of single parameters such as temperature, and instead we should consider all the factors that drive wellbeing and health at home.

The good news is that today there is a clear connection between what Europeans want from their homes, what benefits their health and quality of life, and what is good for society. This is a strong starting point for the journey towards healthy homes.

Selected data

How healthy do Europeans feel?

Survey question: During the last four weeks, how would you rate your health in general?

	A	B	CZ	DK	F	D	H	I	NL	N	PL	E	CH	UK
Excellent	10.4%	12.9%	8.4%	15.3%	11.7%	8.0%	8.0%	9.0%	13.4%	12.6%	7.7%	10.8%	13.9%	12.2%
Very good	34.6%	26.6%	31.9%	38.3%	27.7%	28.7%	20.1%	26.4%	23.0%	29.0%	27.8%	29.9%	34.6%	33.8%
Good	35.7%	35.2%	33.1%	24.4%	41.9%	37.2%	37.0%	41.0%	36.8%	32.2%	38.5%	34.2%	34.9%	31.3%
Fair	16.5%	20.9%	21.1%	15.8%	16.5%	21.9%	26.9%	19.8%	22.6%	16.6%	21.1%	18.9%	13.7%	16.0%
Poor	2.8%	4.5%	5.5%	6.1%	2.1%	4.1%	8.0%	3.7%	4.2%	9.6%	4.9%	6.1%	2.9%	6.6%

Home satisfaction drivers explained

The questions derive from the home wellbeing model by B. Wegener and M. Fedkenheuer. To get a comprehensive understanding of the factors some have two questions assigned to them e.g. relation to neighbours where we asked about both the positive and negative relation.

Driver	Survey questions	
Daylight	In my home I can make full use of the daylight.	In my home I am too much dependent on artificial light
Energy costs	I sometimes wonder if my home uses up too much energy.	Compared to other dwellings, the cost for energy in my home is low.
Relation to neighbours	I have nice neighbours.	I don't feel accepted by my neighbours.
Humidity	I sometimes have damp on my window pane(s).	I have a problem with mould in my home.
Indoor climate	The temperature in my home can easily be adjusted according to my needs.	My dwelling can easily be aired out.
Quality of sleep	The sleeping conditions in my bedroom allow a restful sleep.	
State of renovation	My dwelling is in need of renovation.	The technical equipment in my home is up to date.
Size of the home	My dwelling is too small.	I wish I had more room because everything takes place in the same spot.

What drives home satisfaction in each country?

Eight drivers contribute to wellbeing at home. Here are the top three drivers making a happy home in each of the 14 countries in the Healthy Homes Barometer.

	A	B	CZ	DK	F	D	H	I	NL	N	PL	E	CH	UK
1	Size of home	Energy cost	Size of home	State of renovation	State of renovation	State of renovation	State of renovation	Size of home	Humidity	State of renovation	State of renovation	State of renovation	Relation to neighbours	State of renovation
2	State of renovation	Indoor climate	State of renovation	Quality of sleep	Size of home	Size of home	Quality of sleep	State of renovation	State of renovation	Size of home	Size of home	Size of home	Size of home	Size of home
3	Quality of sleep	State of renovation	Quality of sleep	Size of home	Quality of sleep	Relation to neighbours	Indoor climate	Humidity	Indoor climate	Indoor climate	Indoor climate	Quality of sleep	Quality of sleep	Relation to neighbours

Does our home affect how healthy we feel?

What constitutes a healthy home and how does it affect Europeans' health? How does our home impact how we perform during the day, how energised we feel, and even respiratory problems?

Find out more in this year's Healthy Homes Barometer, which explores the link between our home and our health. The report reveals what Europeans do to keep a healthy home and what we as societies need to focus on to ensure a healthy Europe.

A healthy Europe needs healthy homes.

Prof. Dr. Dr. h. c. Bernd Wegener

The Healthy Homes Barometer is a unique endeavour. It is the first ever attempt to explore residents' health and wellbeing in Europe. It also aims at recording what, if anything, people do to improve the health conditions in their homes or what keeps them from acting correspondingly.

The Healthy Homes Barometer is a pan-European study across 14 countries asking 14,000 Europeans about their experiences, attitudes and behaviour regarding health, home satisfaction and energy consumption.

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