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best climate

Always the best climate for

HEALTHY LIVING

Read the White Paper to find seven steps that will make your home a feel-good place.

How housing conditions and health are linked

More jobs, improved leisure time, better transport connections: there are many reasons why ever more people are moving into our cities. Urbanisation – the growth of towns and cities – has risen dramatically throughout the world since the 1950s.¹ In Germany, for example, the surface area taken up by settlements and roads is increasing by about 56 hectares each day.² The number of households is growing³ while the average living space is getting smaller.⁴ In other words, **we are all living closer to each other.**

As a result, our housing situation has changed massively – and the fact that the climate is undergoing great change is contributing too. Even in northern regions, it is now often becoming unbearably hot inside houses. To slow down climate change, the construction sector has devised various approaches such as the passive house design and particularly thick insulation materials; however, both of these examples have the side effect of hardly allowing any exchange of air between inside and outside, meaning allergens and pollutants cannot escape.

A "healthy climate" is therefore a slogan of our times. This makes us think of clean air, blue skies and green forests, or else the opposite – belching factory chimneys, endless traffic jams and the smell of car exhausts. But the indoor climate rarely features in our thoughts – even though it is essential to our health.

We spend 90 per cent of our lives indoors.⁵

In addition to the indoor climate – in other words, humidity, temperature and air quality – factors such as noise levels, relaxation and security contribute to healthy lives.

The following seven chapters show how, despite the evolving circumstances, **you can stay healthy at home and give yourself your own feel-good climate.** We have put together the best tips for you: from the latest scientific findings to Grandma's home remedies. **Just have a browse – and enjoy a healthier life.**

1 <https://www.statista.com/statistics/672054/change-in-urbanization-worldwide-by-region/>

2 https://www.destatis.de/DE/Themen/Branchen-Unternehmen/Landwirtschaft-Forstwirtschaft-Fischerei/Flaechennutzung/_inhalt.html

3 <https://de.statista.com/statistik/daten/studie/349055/umfrage/privathaushalte-in-eu-und-euro-zone/>

4 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Housing_statistics/de#Wohnbesitzverh.C3.A4ltnisse

5 Harvard, T.H. CHAN School of Public Health 2019: Homes for Health, 36 expert tips to make your home a healthier home. p. 8

1. Synergy for healthy living

To live healthily you need to bear a number of aspects in mind. The most important factors for healthy living are set out in the illustration below. Their influence on various aspects of life are described in the following chapters.



|| We spend 90 per cent of our lives indoors.⁵ ||

2. Let the air in – and take a deep breath

Humans need air to breathe. That's obvious. But did you also know that we breathe in about **11,000 litres of air each day?**¹ That's about 50 bath tubs full of air!

Measuring the air quality

Even as far back as 1858, the chemistry professor Max von Pettenkofer recognised the importance of fresh air for our health.² Even today, "his" Pettenkofer number is in many instances regarded as the **upper limit for safe CO₂ levels inside rooms: 1,000 ppm**. That is the same as 1,000 molecules of carbon dioxide in a million air particles. **But air for breathing is only really good at levels lower than 800 ppm CO₂.**³ Certain sensors, for example those made by [Netatmo](#), enable you to measure the air quality in your own home.

This is how polluted our indoor air is

Studies show that the air inside buildings is often **two to five times more polluted than outside.**⁴ More than one third of all European households experience CO₂ values exceeding 1,000 ppm at least once each week. Especially during the winter, concentrations of carbon dioxide, fine particles and pollutants are seen to rise.⁵ The reason for this lies in the fact that we open our windows less often for fear of the cold. Moreover, modern, highly insulated buildings also reduce the

levels of air exchange⁶, and occupants have to help themselves by airing regularly. **According to the WHO (World Health Organisation), raised CO₂ levels and contaminated indoor air increase the risk of numerous illnesses ranging from asthma to heart attacks⁷ – and also involve side-effects such as fatigue, lack of concentration and headaches.**

From breathing technique to ventilation technology

Our bodily organs need fresh air in order to function properly. The same applies to our mental health – note that many forms of relaxation use a particular breathing technique with fresh air. Most experts recommend **opening your windows wide for five to ten minutes at a time, and several times a day.**⁸ Some even recommend opening them for 15 to 25 minutes at a time.⁹

Ventilation systems clearly have the advantage

Nevertheless, fine particles and other pollutants can still get in, as can road noise and pollen. Unwelcome guests such as mosquitoes and wasps also love to take advantage of an open window. The answer is to install automatic ventilation systems. **These bring fresh air into your home but keep the noise, pollutants, allergens and insects outside.**

1 Kishore J. Green Development for Healthy Air. *Epidem Int* 2019; 4(3): 1–3

2 Publication by the Umweltbundesamt in 2008: *Gesundheitliche Bewertung von Kohlendioxid in der Innenraumluft*. p. 1363

3 <https://www.umweltbundesamt.de/sites/default/files/medien/publikation/long/3689.pdf>

4 Harvard, T.H. CHAN School of Public Health 2019: *Homes for Health, 36 expert tips to make your home a healthier home*. p. 9

5 https://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf?ua=1

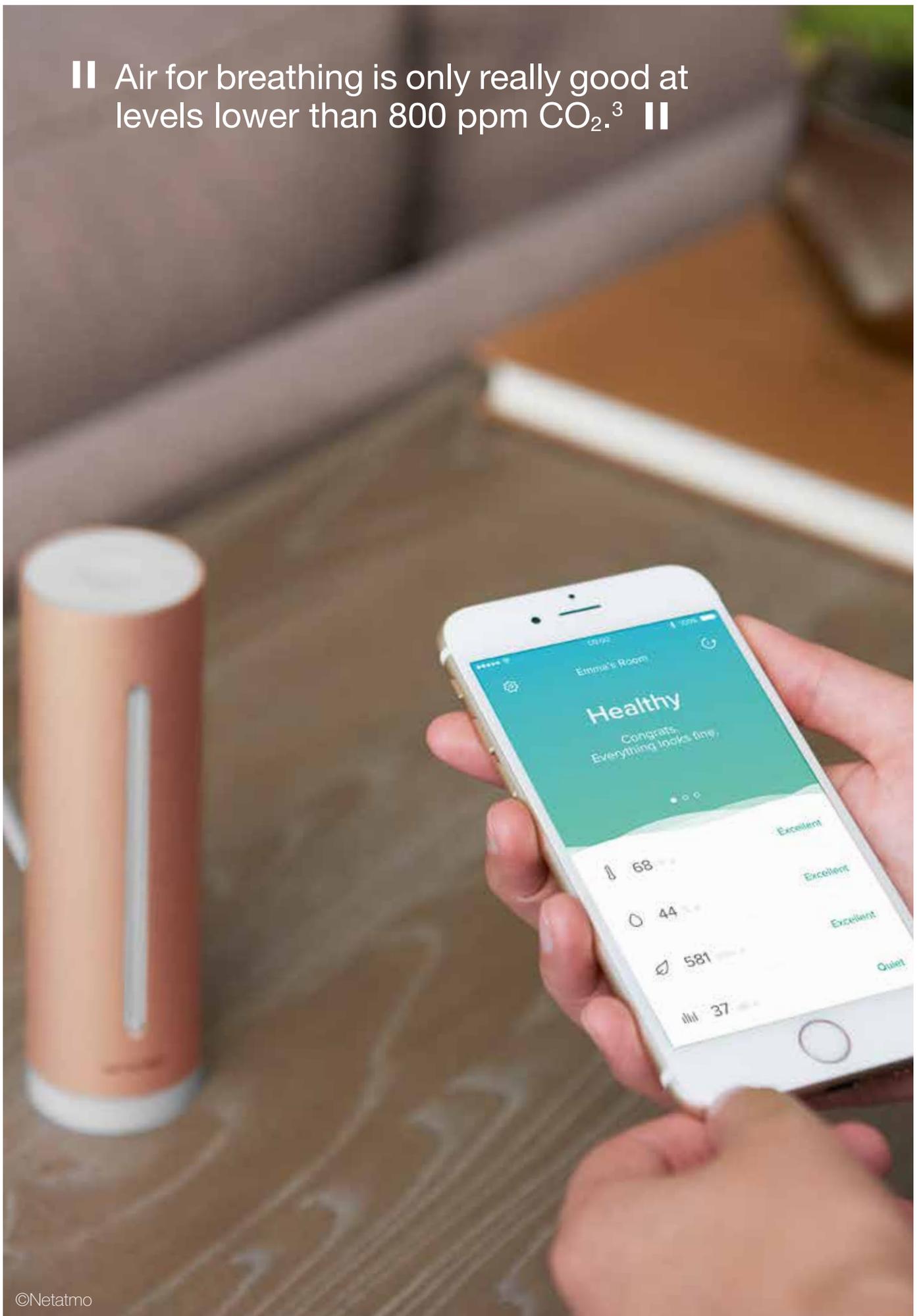
6 Publication by the Umweltbundesamt in 2008: *Gesundheitliche Bewertung von Kohlendioxid in der Innenraumluft*. p. 1358

7 <https://www.who.int/airpollution/household/pollutants/combustion/en/>

8 Umweltbundesamt 2005: *Gesünder Wohnen – aber wie? Praktische Tipps für den Alltag*. p. 12

9 <https://gesund-wohnen.com/schlafzimmer/luftfeuchtigkeit-der-unsichtbare-gesundheitsfaktor/>

|| Air for breathing is only really good at levels lower than 800 ppm CO₂.³ ||



■ FINE PARTICLES ■ POLLUTANTS ■ CO2 ■ TEMPERATURE ■ NOISE

3. Concentrate on your work – and enjoy success

Covid-19 and lockdown have brought schooling and work home. **Originally conceived as a solution for emergencies, working from home has at least proven a relatively practical option:** it removes the need for long commutes, we get hold of our deliveries more effectively, and the route to the coffee machine is much shorter.

Fresh air for fresh ideas

Fresh air at the right temperature is just what the brain needs for you and your children to be full of ideas. **Doubling fresh air increases your performance by 8 to 14 per cent.**¹ A study has also shown

that schoolchildren lose concentration and suffer from fatigue, headaches and giddiness when CO₂ levels reach more than 1,500 ppm.² Excessive temperatures have similar effects. **So make sure you ventilate regularly and keep a cool head.**

Working undisturbed

Unfortunately, working from home does not always guarantee you peace and quiet – your neighbour could start drilling and you might find the sound of car engines distracting. **This is where noise-cancelling headphones can help. Alternatively, earplugs will do the same job.** If your environment is constantly

1 Wargoeki P, Wyon DP 2006: Research report on effect of HVAC on student performance. ASHRAE JI 48 (October 2006): 23–26

2 Myhrvold AN, Olsen E, Lauridsen O 1996: Indoor environment in schools – pupils' health and performance in regard to CO₂ concentrations. Proc Indoor Air 196 4: 369–374



too loud, you could incorporate special building elements that dampen the noise. **Incidentally, Zehnder ventilation systems run extremely quietly, banishing street noise to outdoors.** The resulting peace you find can actually help your heart, since constantly high noise levels can literally make you ill. Traffic noise above 65 decibels (dB) – or even above 55 dB at night – has been shown to increase the risk of cardiovascular disease.³

Give yourself a break

To achieve top performance at home, we need not only good working conditions but also breaks in which we can relax. It is extremely important for

you **to make a clear distinction between your workplace and the rest of the house.** If there is no space for an office, you should at least set up your desk as far away from your bed as possible. Even though it might be tempting, **do not work from the sofa.** Otherwise you will begin to feel that your relaxing sofa has become your workplace, and also working in this position will not be good for your back. **Mentally, too, you should also separate your work and private lives.** This is helped by rituals such as having a cup of coffee before you start work or wearing your work clothes in your office – this doesn't necessarily have to be your best outfit.

³ Umweltbundesamt 2005: Gesünder Wohnen – aber wie? Praktische Tipps für den Alltag. p. 31



|| Doubling the fresh air increases your performance by eight to fourteen per cent.¹ ||

4. Cook properly – and relish the effects on your health

Healthy cooking is more than just paying attention to the nutrients. The right tools and materials are crucial for your health.

No chance for mildew, fine particles or odours

Pay special attention to the humidity in your kitchen. When cooking, switch on the extractor fan and make sure you change the filters regularly. Afterwards, ventilate properly so that the remaining steam and odours can escape. Right after you have been cooking up tasty pancakes or a cutlet, there will be fine particles in the air – ventilation will deal with this. This can be handled even more quickly with automatic ventilation systems.

You should also leave a gap between items of furniture and the walls. This allows air to circulate behind the furniture, thereby removing the chances of mould occurring. According to WHO, mildew and certain moisture-loving micro-organisms can increase the risk of respiratory illness by up to 50 per cent.¹

Do your cooking without pollutants

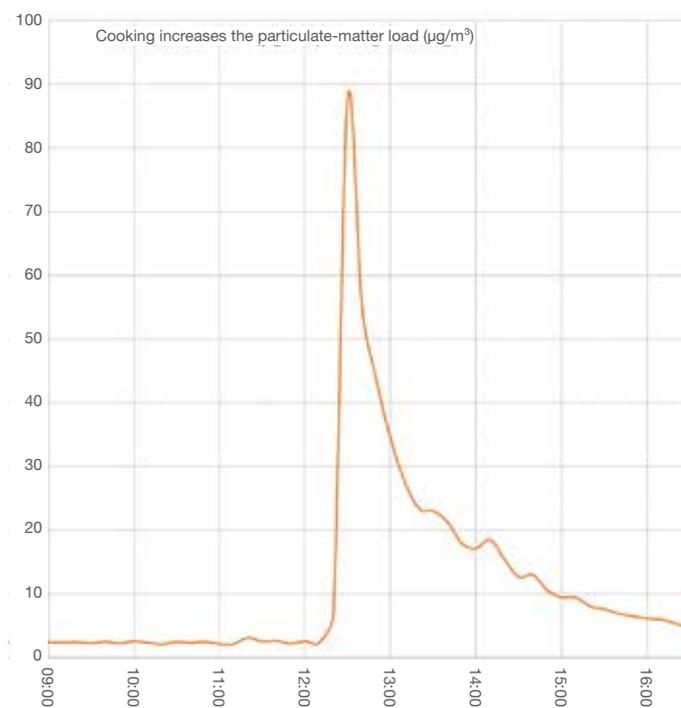
Only use utensils made of stainless steel, cast iron, glass or ceramics for cooking. Many other materials release pollutants when heated or when in contact with acids or grease. This can lead to irritation of the conjunctiva and the mucous membranes of the respiratory tract.²

Drink copiously – but safely

Filter tap water before drinking it. The water quality in many European countries is very good and is regularly tested by inspection authorities. Unfortunately this is not the case throughout the world and, moreover, quality is only guaranteed as far as the household supply connector. Filter systems can be counted on to remove the residues of metal pipes and fertilisers.

1 <https://www.euro.who.int/en/health-topics/environment-and-health/air-quality/data-and-statistics>

2 Umweltbundesamt 2005: Gesünder Wohnen – aber wie? Praktische Tipps für den Alltag, p. 10



5. Sleep well – wake up refreshed

After a lovely day, sink gently into soft cushions – how relaxing! There are various tricks to induce sleep quickly.

Pleasantly cool

Your bedroom should be kept relatively cool: **the ideal temperature is around 17 to 20°C.**¹ It is best if you consider the orientation of this room before you move in, because a south-facing room will warm up much faster. **When sunshine is coming in, close the blinds or curtains** to keep the heat out.

Sleep better thanks to fresh air

Make sure you ventilate adequately. Where they had a supply of fresh air, test subjects in a study stated in their own words that they **found it approximately 25 per cent easier to fall asleep.**² They also felt about 12 per cent fitter the next morning.³

Go to sleep with no worries

A further aspect that promotes quality sleep is safety, since you will benefit from a much better night's sleep if you aren't feeling worried. **Fit a smoke alarm** so that you will be alerted in good time if there is a fire.

Choose burglar-proof windows and close your roller blinds at night to deter burglars. An automatic ventilation system will ensure you have a sufficient supply of fresh air even when the windows are closed.

Technology can wait

Set your mobile phone and other devices to night mode. Otherwise, the blue light will prevent the formation of the hormone melatonin that regulates sleep rhythms. Also put aside your mobile phone, tablet or other devices at least an hour before going to sleep: this means you will avoid the stress and sounds of incoming messages.

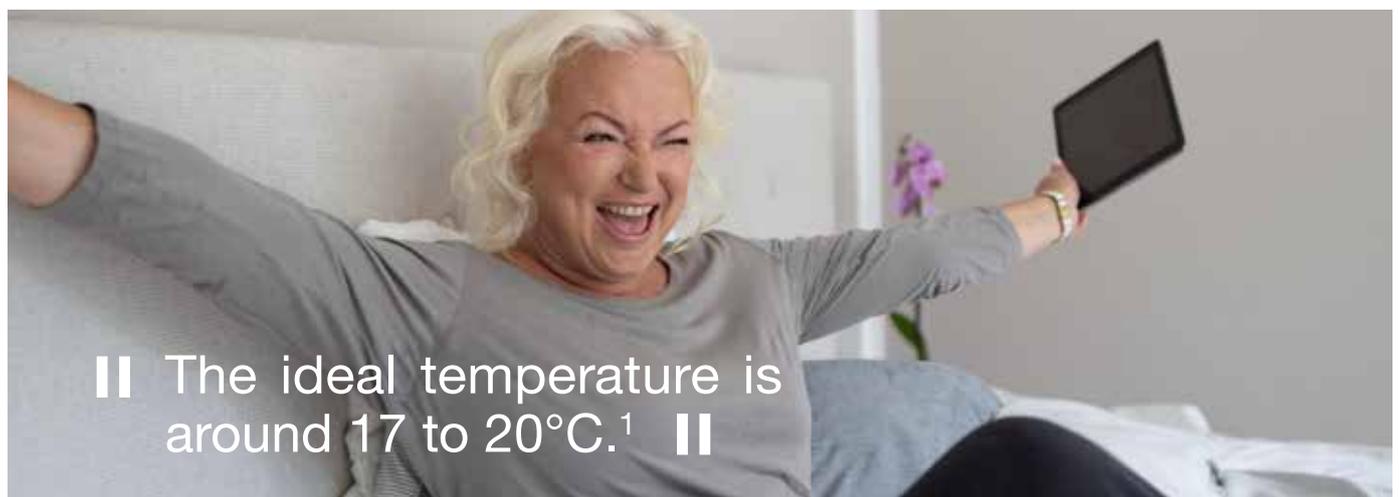
Romantic mood with LED

Make use of LED candles instead of the real thing. This will remove the chances of fire, fine particles and soot. In addition, the flames of real candles consume oxygen and so reduce air quality.

1 Ibid.: p. 8

2 https://orbit.dtu.dk/files/118308283/Str_m_Tejsen_et_al_2015_Indoor_Air_1_.pdf

3 Ibid.



|| The ideal temperature is around 17 to 20°C.¹ ||

6. Have fun together and all stay healthy

There is nothing better than spending a pleasant evening with friends. **But do ask your guests to leave their shoes and jackets at the door.** This is not rude, just healthy, as it will ensure that dust, outside dirt and allergens remain outside.

Celebrations and stowaways

Did you know that three people in a room give off as much heat as a bathroom radiator?¹ **So be sure to think of fresh air if you have a party that lasts into the small hours:** the more people occupy a room, the faster the rise in CO₂ levels, temperature and humidity.² In addition, every one of us unintentionally carries germs, and possibly viruses, as stowaways. With a constant **supply of fresh air, both the viral concentration and risk of infection decline significantly. The moisture balance improves and the temperature drops.**³ Comfort ventilation systems also stop viruses and germs from reaching other rooms – additional humidity recovery ensures that the indoor humidity remains constant at a perfect 40 to 60 per cent.

Feet up by the fire

Are cosy evenings by the fire your thing? Then make sure the fireplace is well ventilated. This means you can be sure that the dangerous carbon monoxide is removed.⁴ The best thing is to install an alarm as well to warn you if levels rise. **Only use recommended fuels such as dry wood.** The weather should also be suitable: in calm weather where there is fog, it is best to do without the fire since smoke cannot

escape in these conditions.⁵ If you are investing in a new stove, **make sure you only buy one with the approved test mark.** Incidentally, your chimney sweep should inspect wood-burning stoves and their flues before you start using them – and thereafter about every two to three years, but every year is best.

The day after

Biologically degradable cleaners made of natural ingredients are ideal for cleaning up the following day without causing pollution. They are good for your health as well as the environment. **Also make sure to use a vacuum cleaner with a HEPA filter:** these filters safely lock away even the finest pollen, dust mites and dust particles instead of circulating them up in the air. Allergy sufferers can breathe a sigh of relief.

1 Umweltbundesamt 2005: Gesünder Wohnen – aber wie? Praktische Tipps für den Alltag. p. 9

2 Ibid.

3 Ibid. p. 13

4 Ibid. p. 10

5 <https://www.milieucentraal.nl/energie-besparen/energiezuinig-huis/verwarmen-op-gas-of-hout/houtkachel-of-open-haard/>

7. Feel good through the year - whatever the season!

Cool in summer

Climate change and modern construction methods are making our homes ever warmer. The temperatures in buildings with large glass frontages and thick insulation materials are often intolerably high during summer. Overheating like this is detrimental to our health and well-being. For older people or those with pre-existing conditions in particular, a heat stroke can be deadly. **Make sure there is an adequate supply of fresh air and protect yourself from direct sunlight with blinds or awnings.** Ventilation systems with automatic cold recovery and dehumidification will also slightly cool the incoming air. This way you can save on the electricity for air conditioning.

Warm in winter

In contrast, anyone who quickly gets cold in winter and prefers to leave the windows closed does not have to go without fresh air. **Automatic ventilation systems ensure regular air exchange and remove pollutants – when fitted with enthalpy exchangers, these systems even regulate humidity.** This means there is no risk of viruses taking hold through dry, irritated mucous membranes – a bonus point for your immune system. Systems with heat recovery even conserve energy and carry pre-warmed air into your rooms. **To prevent this cosy heat from being lost through areas of glass, you can hang thermal curtains.**



Conclusion: your home will become a healthy feel-good place

Our architecture has developed over the centuries – from simple huts to skyscrapers and on to environmentally sound passive houses. Nevertheless, our living conditions are still not yet perfect for our health. **Using the tips contained in this White Paper, you will be able to turn your house into a healthy feel-good place.**

Many factors such as stress levels, feelings of safety and noise levels influence a healthy living situation. Several investigations have shown that fresh air plays a central role. Its composition, humidity and temperature are decisive factors affecting our well-being. **With good ventilation, we can provide the basis for a vibrant life.**

Our automatic ventilation systems bring fresh air into your home. **Pollutants, germs, allergens and aerosols have no chance thanks to the finest filters.** Regularly changing the filters also guarantees indoor air that is always clean. What's more, our special comfort-enhancing systems remove the moisture from the incoming fresh air, cool it slightly or even warm it. Incidentally, some of our products have won design awards – **demonstrating healthy and attractive conditions for contemporary living.**

Take note of these tips and trust the automatic ventilation systems manufactured by Zehnder – the expert for healthy indoor climates!