Active House

Healthy Buildings for People & Planet

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Next Generation EU

#NextGenerationEU #EUBudget

2

A budget for European recovery and resilience

SURE / ESM Pandemic Crisis Support / EIB Guarantee Fund for Workers and Businesses	EUR 540 billion
Next Generation EU	Temporary reinforcement EUR 750 billion
Multiannual Financial Framework	EUR 1100 billion

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European Commission

Renovation Wave

The European Green Deal

To reduce emissions by at least 55% in 2030 and build the foundations for a climate neutral Europe by 2050, the Renovation Wave aims to **renovate 35 million inefficient buildings by 2030**.

85-95% of buildings in the EU are expected to still be standing in 2050. **Renovating them is essential to reducing emissions and energy use**.

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Buildings account for :

40% of energy consumed

36% of energy-related greenhouse gas emissions

Cutting emissions, boosting recovery, reducing energy poverty

- A **response to energy poverty** which will bring down bills for citizens
- Creation of **160,000 green jobs** in the construction sector by 2030
- **Reduced emissions** and **energy use** to support climate targets
- **Improved quality of life**, **health** and **well-being** for residents

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Building age

- BE = 5 Mio existing homes
- 82% is older than 34 years ! (2014)
- Futureproof buildings(<100kWh/m²):

  Flanders 5%
  Wallonia 1%
  Brussels 0,6%

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Building activity

- Yearly new building permits +/-50 000
- Yearly renovations +/- 30 000 (1% renovation rate)

Target 2050

- 5% is future proof
- 4 750 000 homes to renovate from 2021-2050
- 4 750 000 / 29 = 163 793/year homes to renovate

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Barriers to success

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Barriers to success

- Capacity (workforce + materials)
- Private ownership
- Cost of renovation :
  Flanders: 52 000 €
  Wallonia: 67 000 €
  Brussels : 46 000 €
- Return on investment 38-64 years (SERV)

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Barriers to success

- Financial capacity ?

  47 % to 59% of current owners cannot afford a deep renovation

- Those who can afford: only 1% actually renovates
- Who renovates rental homes ?

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Solutions ?

- Review definition of a deep renovation

  100 kWh/m² (incl. specific insulation values for walls/floors, etc)
  Focus on energy-saving: why not focus on CO_2 emission ?

- Development of new technologies that reduce CO_2 emissions ?
- Do not focus on current owners, but on transition moment (sale)
- Financial support + Legislative framework (keep promises !)
- Scale-up and reduce cost

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- Designing a energy-efficient house is relatively easy.
  Most of the technology is available
- Renovation = emotion (fear, stress,…)
- Professional guidance is required (poor knowledge)
- Energy-efficiency is greatly determined by the user.
  The user ALWAYS goes for comfort
- User centric design is the next step in durable building

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Building = Protection from the elements

- DRY when it is WET outside
- WARM when it is COLD outside
- COOL when it is WARM outside

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Fit for purpose ?

- ✓ DRY when it is WET outside
- ✓ WARM when it is COLD outside
- ✓ COOL when it is WARM outside

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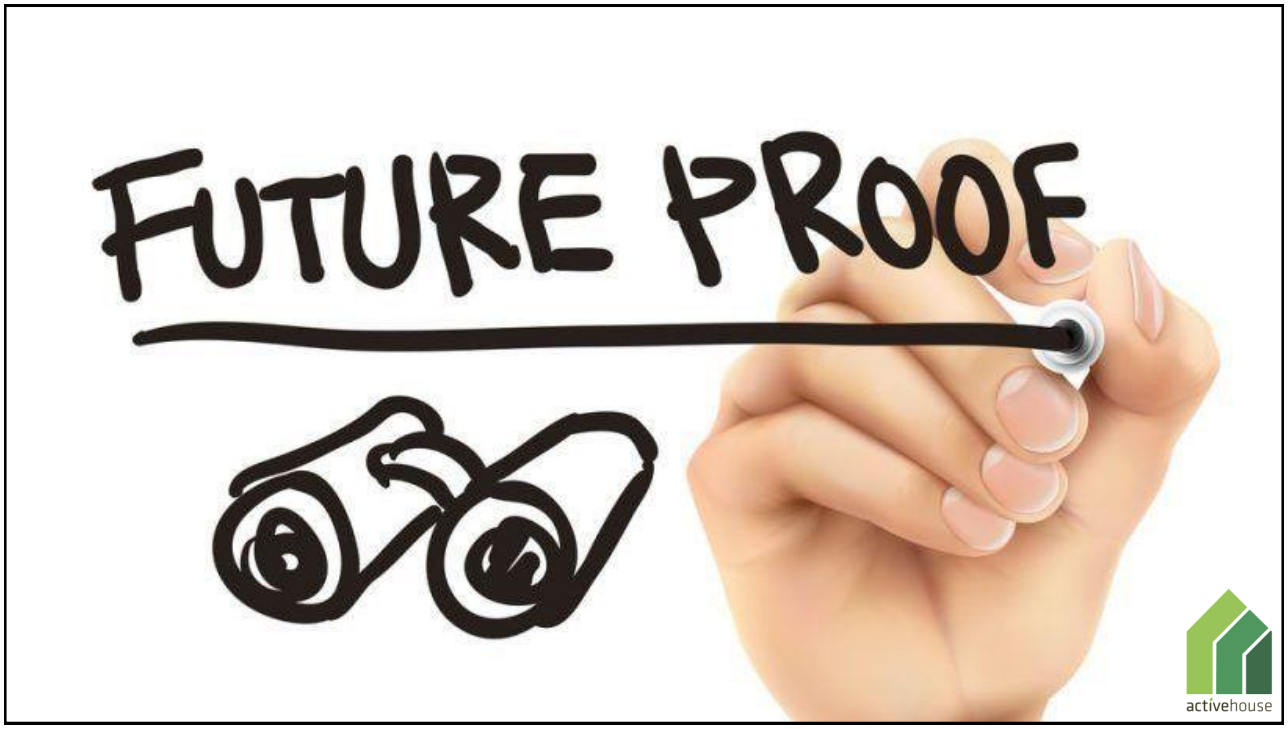

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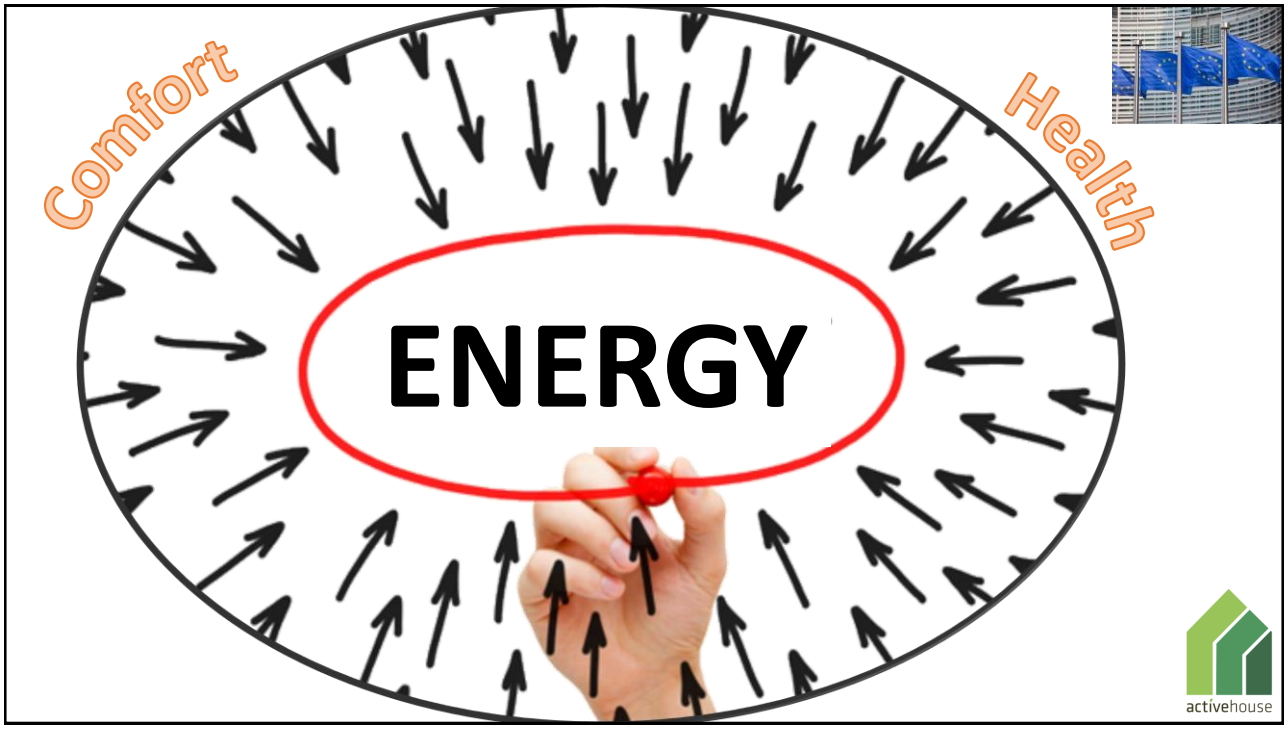

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Key feature of any NZEB = high performance building envelope

High level of insulation

High level of airtightness

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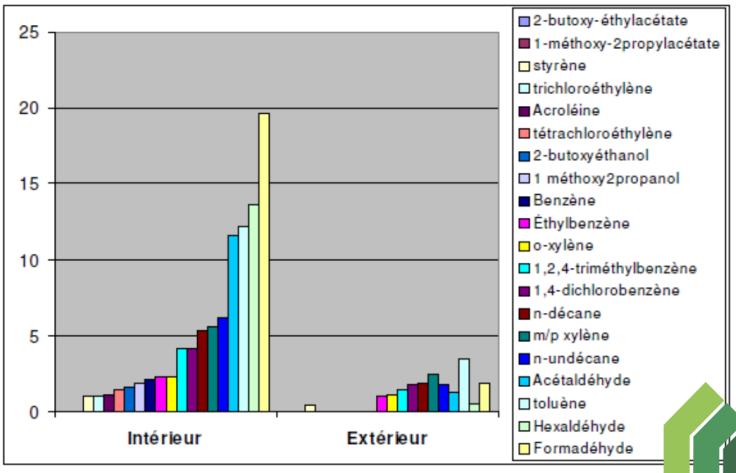
IAQ



Volatile organic compounds

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Airtight new homes creating serious health problems

Evidence of poor ventilation in 200-home study

High levels of airtightness and poor ventilation are building up major health problems in new housing, according to a study by Glasgow School of Art's Mackintosh Environmental Architecture Research Unit (Mearu).

Researchers uncovered serious indoor air quality (IAQ) problems in a wide range of new homes that had been built to be 'airtight' and, as a result, were increasing instances of asthma and other respiratory problems in occupants.

Mearu studied 200 modern homes and found 'widespread evidence of poor ventilation, with bedrooms being a particular problem'. The unit has produced a public awareness film urging people to ventilate their homes properly by 'keeping vents or windows open when cooking, showering and cleaning; drying laundry near an open window; and opening windows at night'.

'Poor indoor air quality is hard for people to detect,' said the head of Mearu, Professor Tim Sharpe, who added that people with chronic obstructive pulmonary disease and asthma were at particular risk. 'There are clear links between poor ventilation and ill health, so people need to be aware of the build-up of CO_2 and other pollutants in their homes, and their potential impact on health.

'Modern homes are increasingly airtight and can also contain a great number of pollutants and chemicals, many of which can have serious health effects.'

Hoare Lea partner, Ashley Bateson, said: 'The research shows the importance of ensuring occupants understand the impact of ventilation in a healthy home environment. Designers and builders also need to implement ventilation systems that are intuitive and easy to operate.'

BRZMAKER / SHUTTERSTOCK

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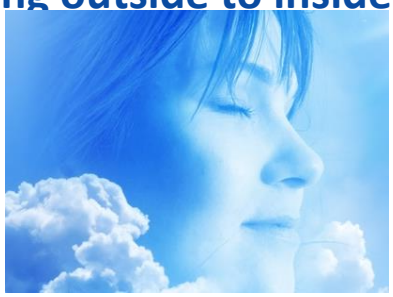
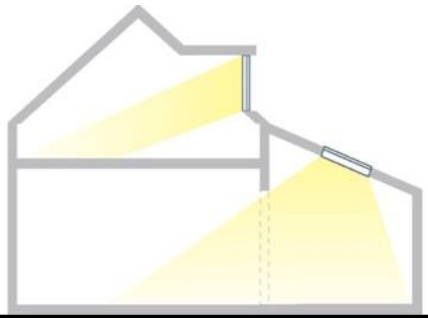
Bring outside to inside





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IAQ in schools and offices

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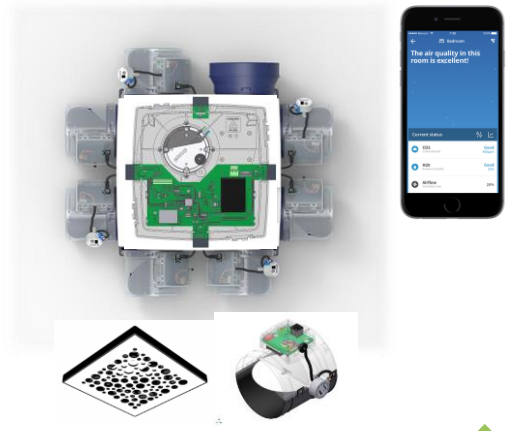
Demand controlled ventilation

Central Processing Unit



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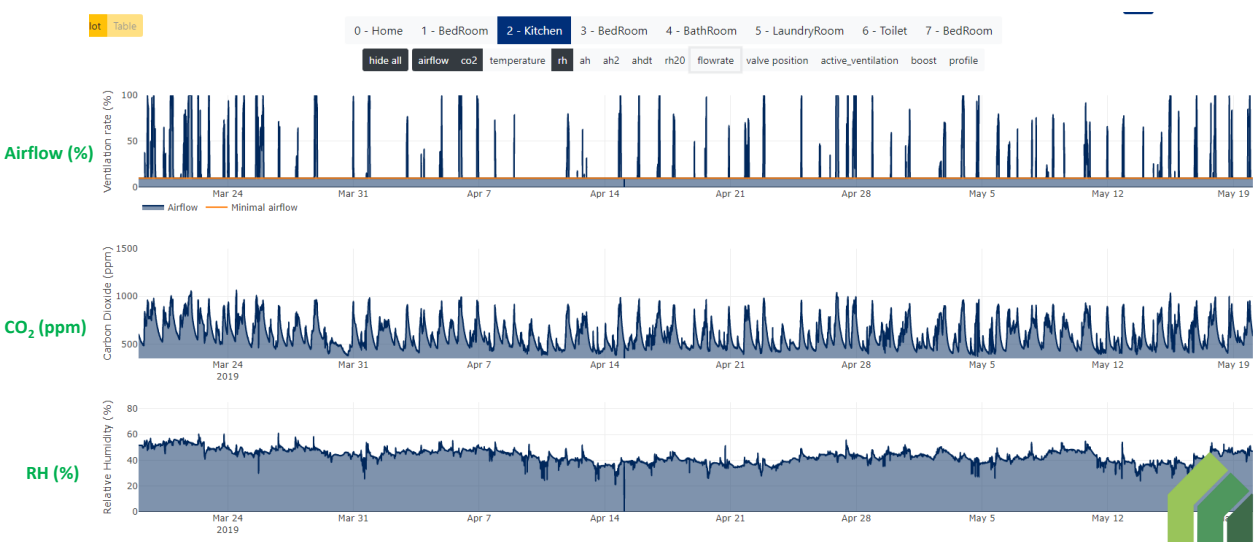
Live IAQ monitoring & historical data



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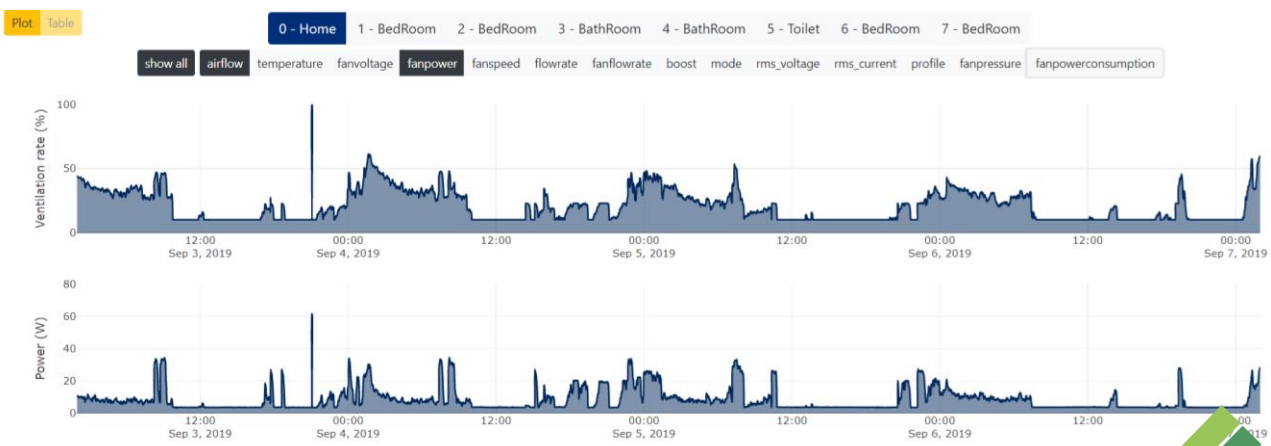
Live energy performance monitoring & historical data



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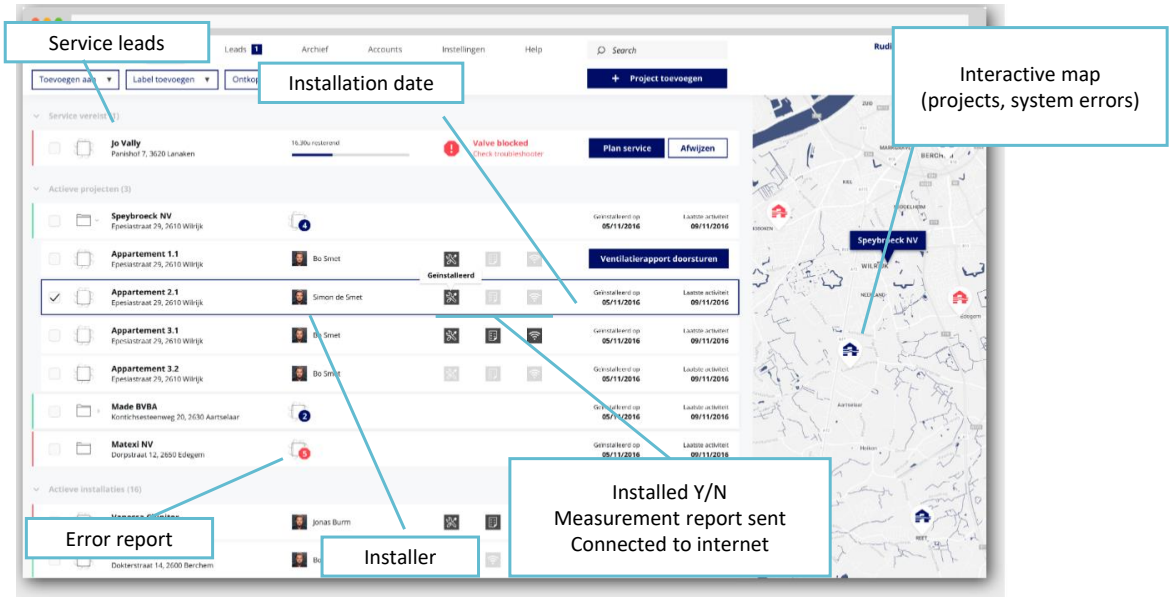
Webportal installer



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Next step : “connected” systems + interoperability

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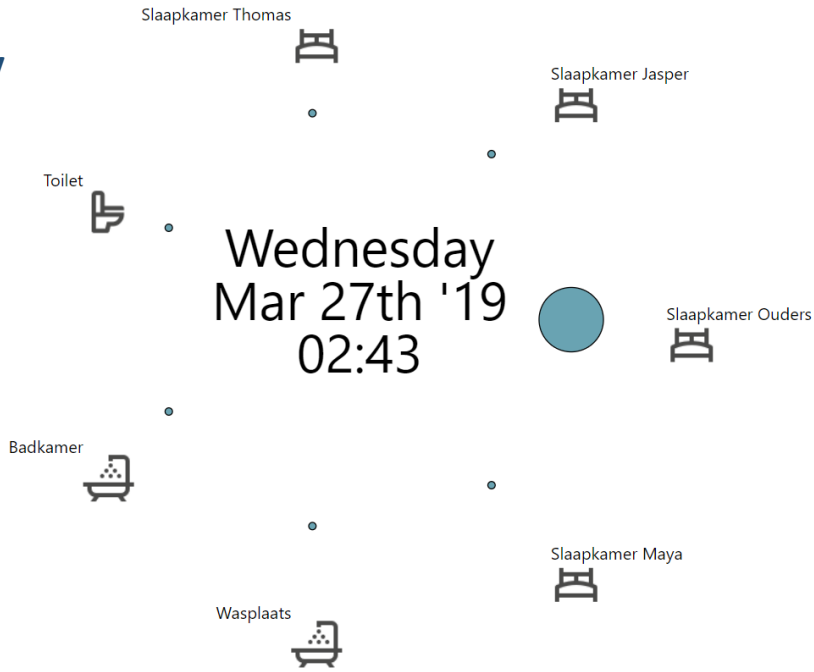
Beyond IAQ/energy



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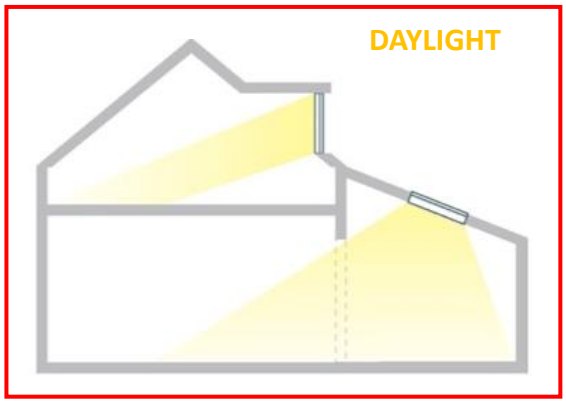
Healthy home / building



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Daylight is essential for life on earth

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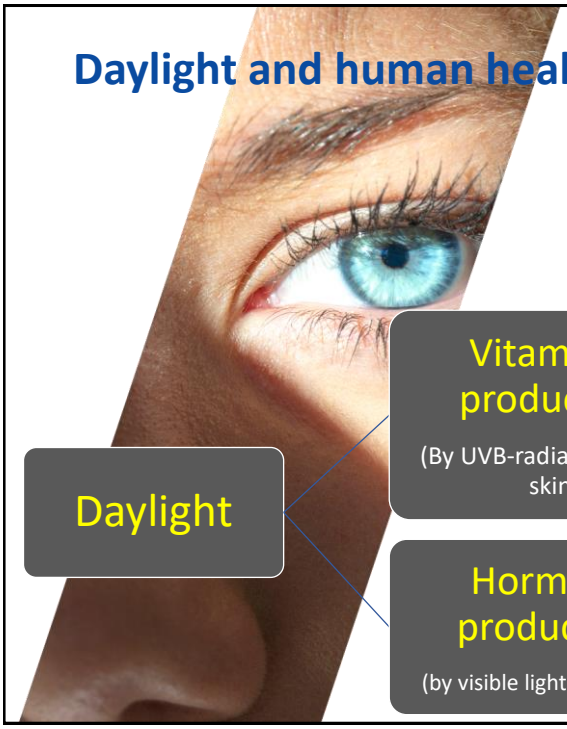
Daylight and human health



Daylight

Vitamin D production

(By UVB-radiation on the skin)

Hormone production

(by visible light on the eye)

Not enough daylight ?

- Problems biological clock
- Depression
- Disturbed sleep-awake rythm
- Bad concentration
- Problems with appetite
- Reduced energy-levels
- Etc

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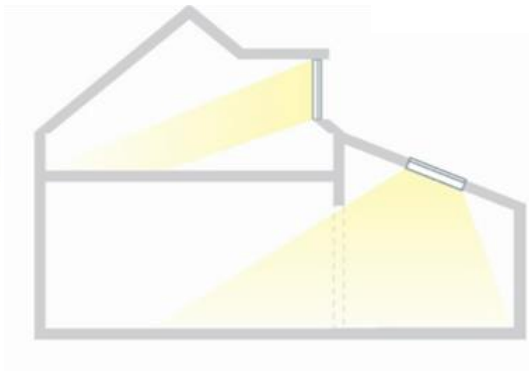
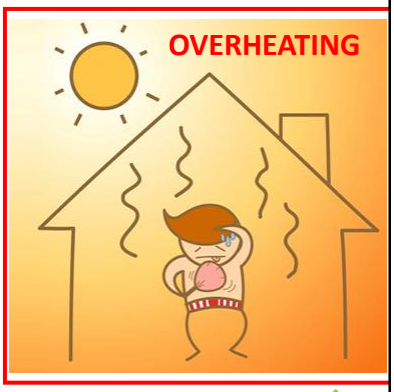
Healthy home / building





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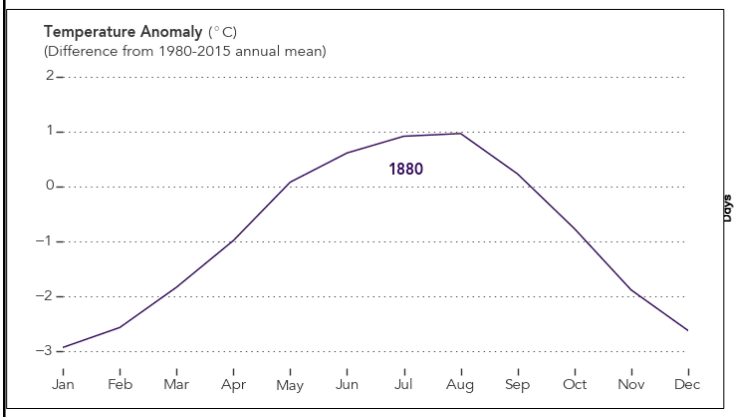
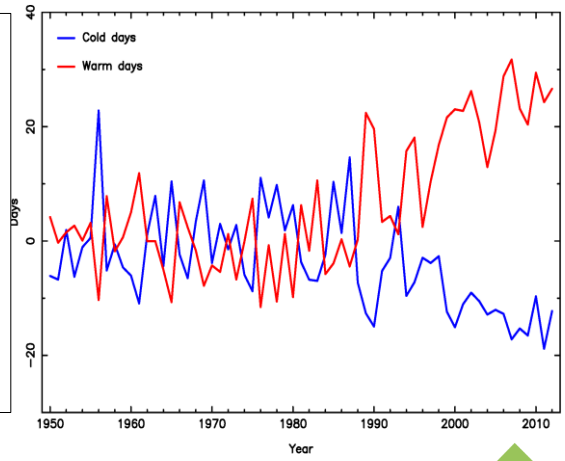
Climate change





Source: NASA Earth Observatory chart by Joshua Stevens

Source: Euro4M Climate Indicator Bulletins

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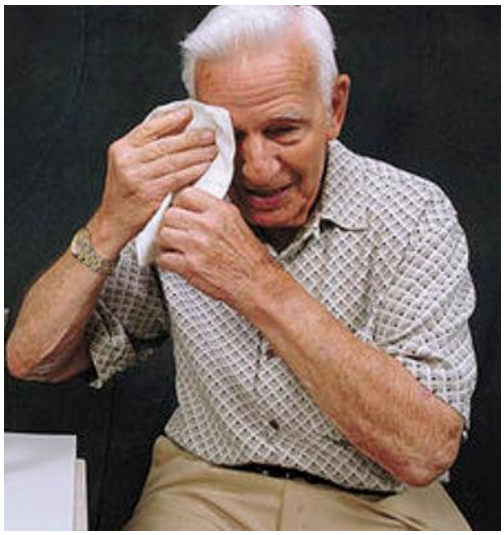
Vulnerable groups



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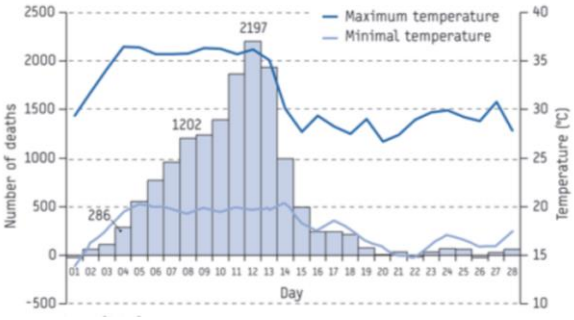
Facts and figures

Daily excess of deaths during August 2003 and minimal and maximal daily temperatures, France



Source : Summary of the mortality impact assessment of the 2003 heat wave in France, Pirard P, Vandentorren S, Pascal M, Laaidi K, Le Tertre A, Cassadou S, Ledrans M.. 2005

During the sweltering summer of 2003, **over 35000 people died across Europe from heat-related causes**. The heat-related illness and death cases mentioned above resulted not only from unusually high peak outdoor temperatures, but also from a failure of buildings to successfully mitigate the external environment. High indoor temperatures can also increase sleep fragmentation, which is directly linked to poor health. **Epidemiological studies have shown that mortality begins to rise above a heat threshold of around 24.7 °C of the maximum daily temperature**.

Source: The impact of climate change on the overheating risk in dwellings, Mohamed Hamdy, Salvatore Carlucci Pieter-Jan Hoes, Jan Hensen, Elsevier 2017

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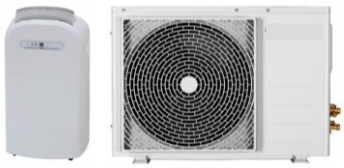
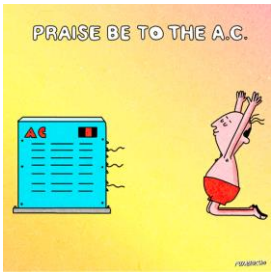
Solution ?





Cooling makes the planet hotter

Worldwide power consumption for air conditioning alone is forecast to surge 33-fold by 2100 as developing world incomes rise and urbanisation advances. Already, the US uses as much electricity to keep buildings cool as the whole of Africa uses on everything; China and India are fast catching up. By mid-century people will use more energy for cooling than heating. It took 15 years for the number of air-conditioned homes in the US to grow from 64mio to 100mio – but 50mio new domestic AC units were bought in China in 2010 alone.

And since cold is still overwhelmingly produced by burning fossil fuels, emission targets agreed at the international climate summit in Paris risk being blown away as governments and scientists struggle with a cruel climate-change irony: cooling makes the planet hotter.

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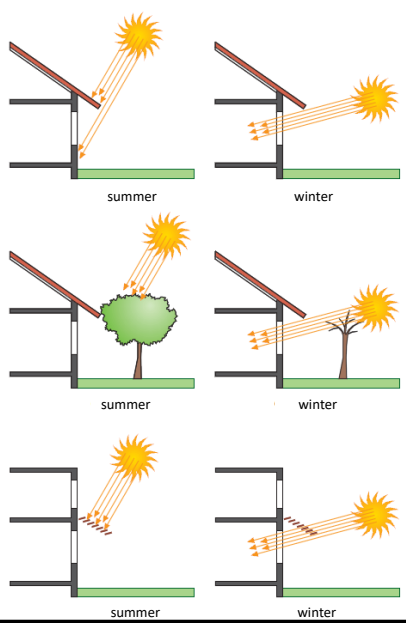
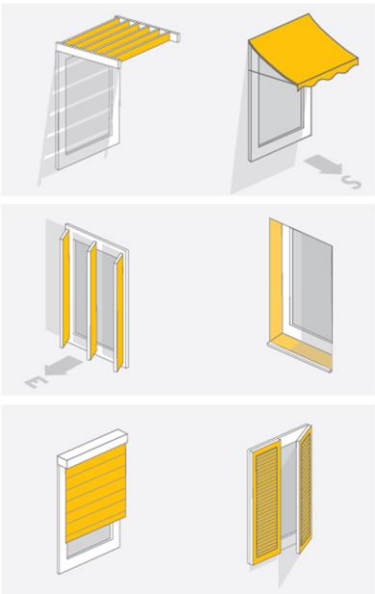
Solar shading





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Nightcooling

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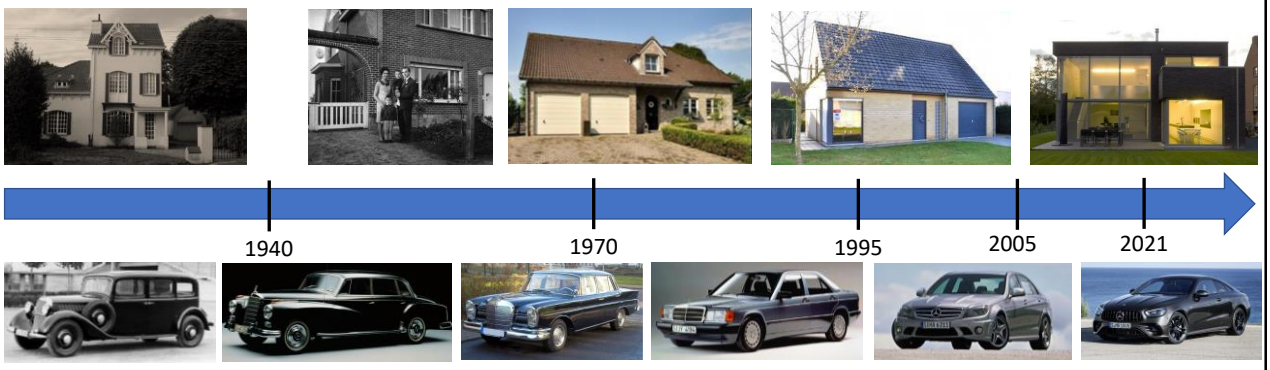
Evolution housing construction versus cars



Evolution in :

- Technology
- Materials
- Design
- Safety
- Comfort

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Vehicle inspection versus Renovation advice

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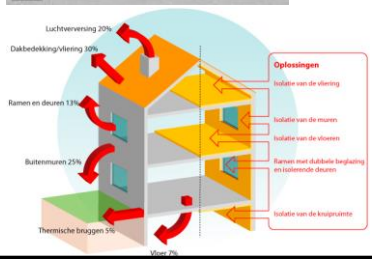

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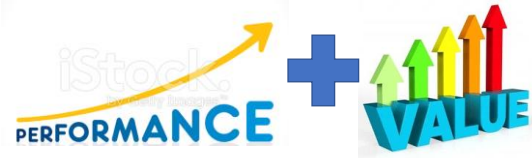
Results of a deep renovation



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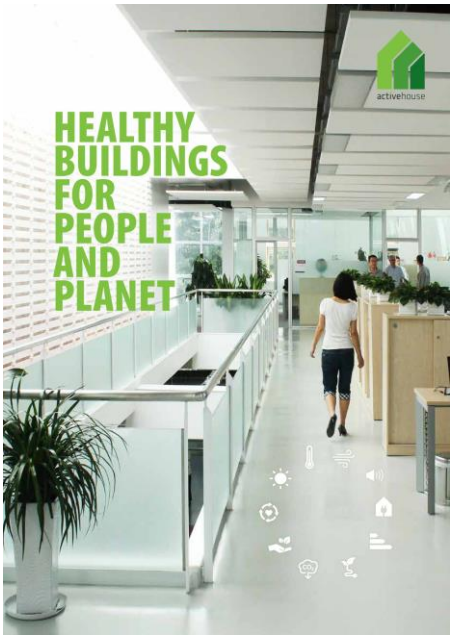
NETWORK AND KNOWLEDGE SHARING



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