Energy Efficiency

through

Energy Saving Ventilation

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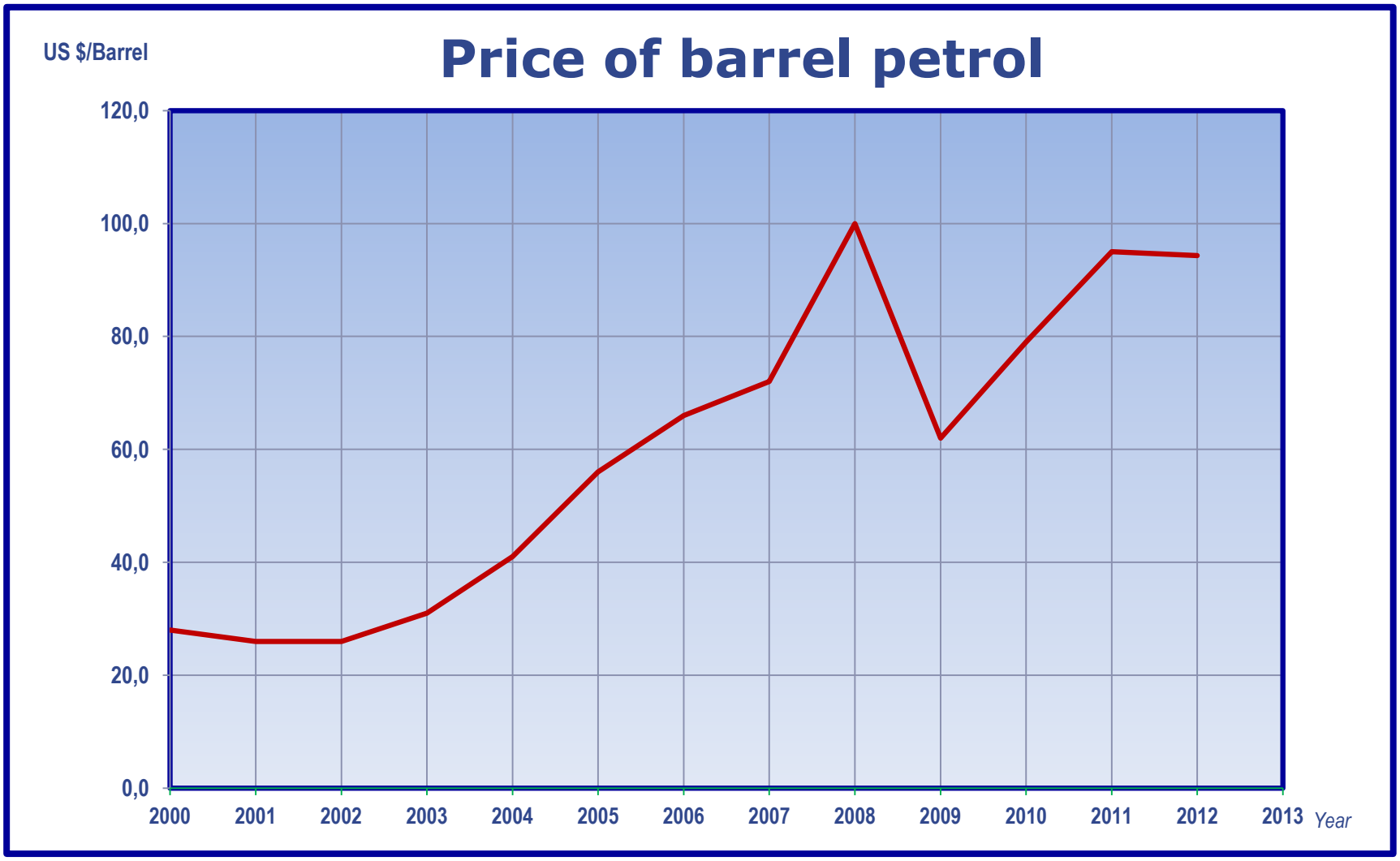
What we will speak about today?!

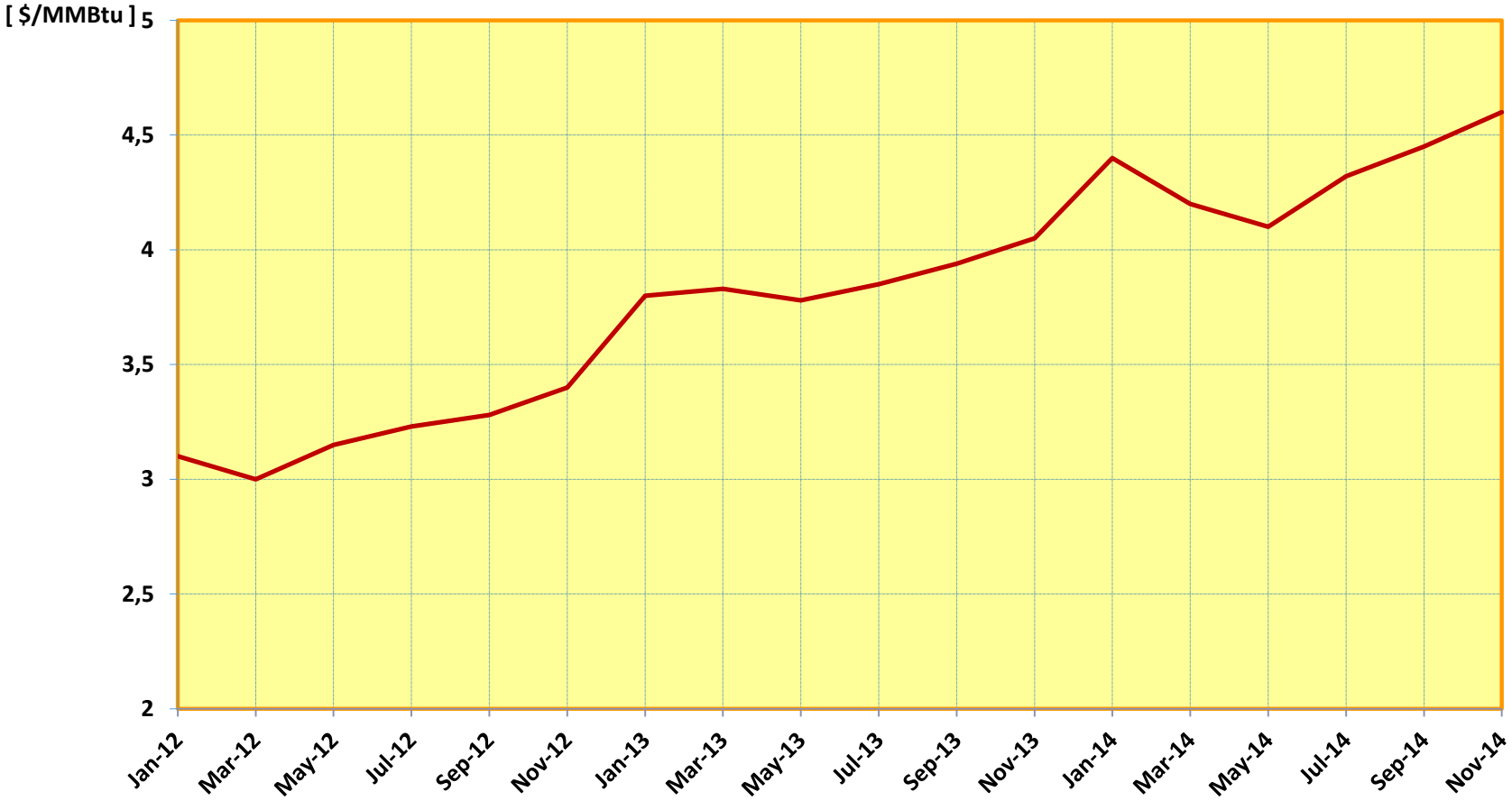
- Money ?!
- Comfort ?!
- Environment ?!
- What our colleagues in West and North Europe do ?!
- How engineers and architects can work together and design better houses ?!

The price of the energy rise constantly!

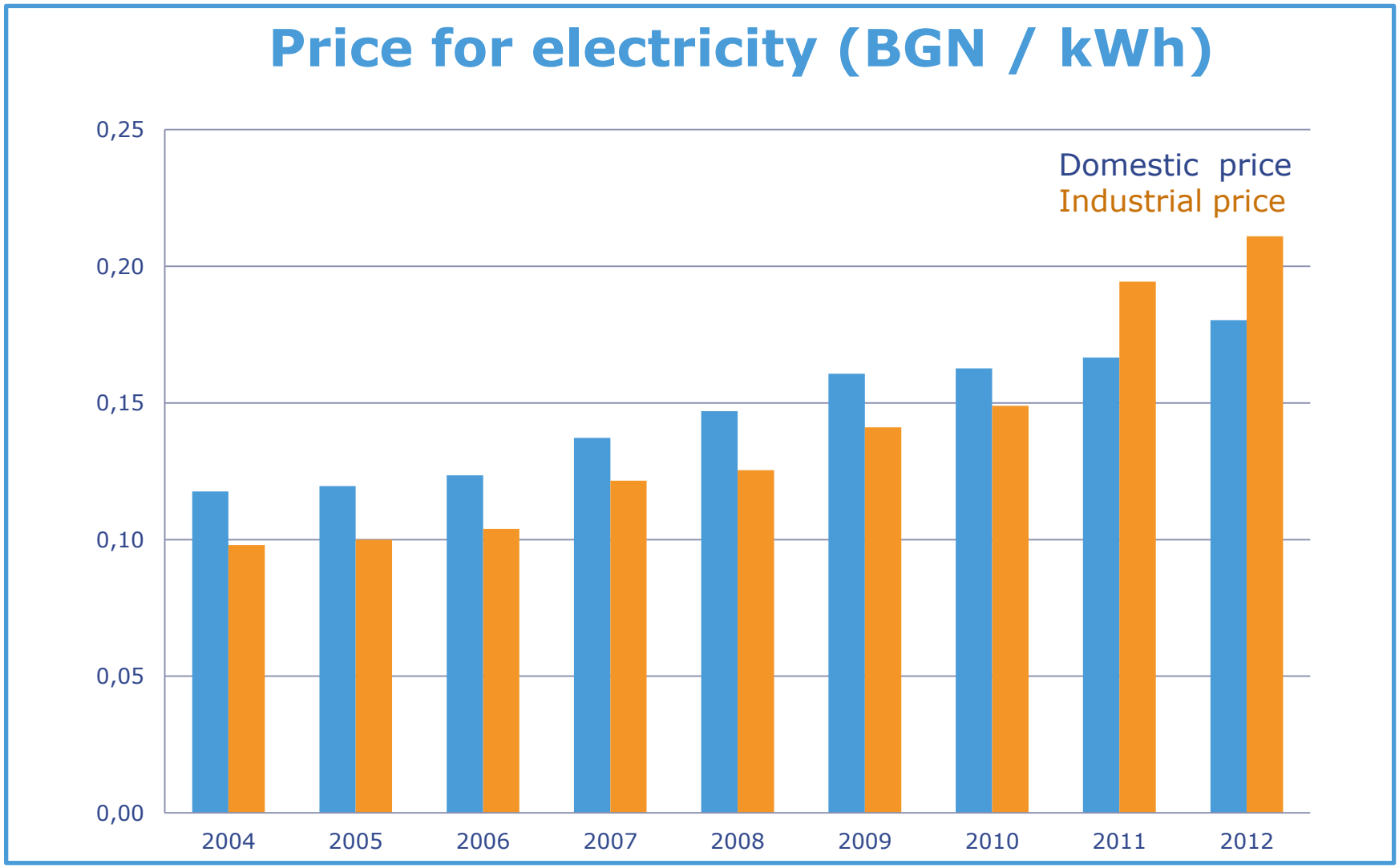


The price of the energy rise constantly!

Futures price for natural gas for the period 2012 - 2014



The price of the energy rise constantly!

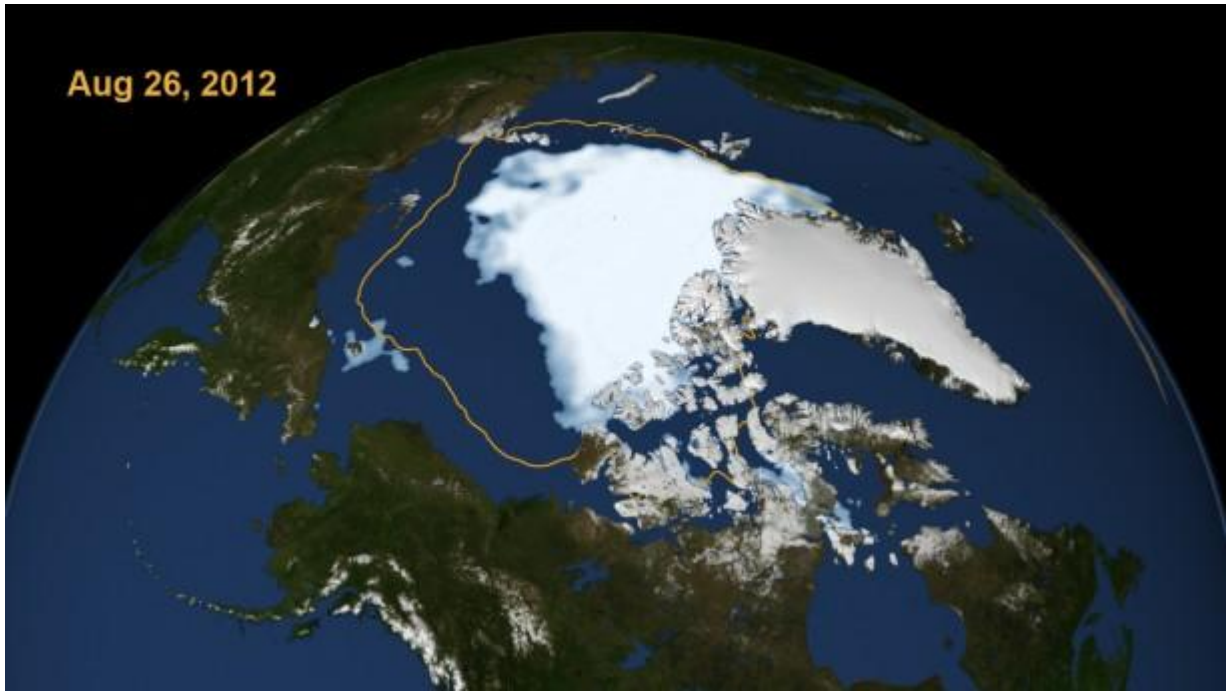


Source: Eurostat

The methods currently used for energy production leads to pollution of the environment

This pollution leads to increased sickness and allergies!

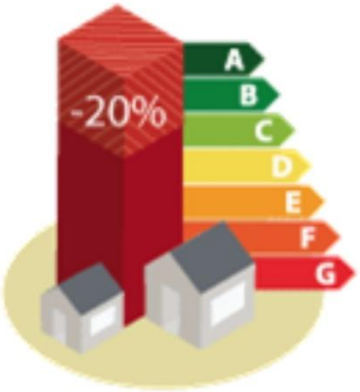
The greenhouse gases harmful affect our world and the environment



The incentives for energy saving are obvious!

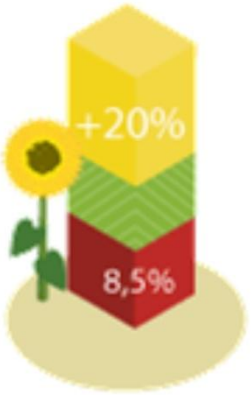
CONCERTED ACTION
EPBD

EUROPE 2020
A European strategy for smart, sustainable and inclusive growth



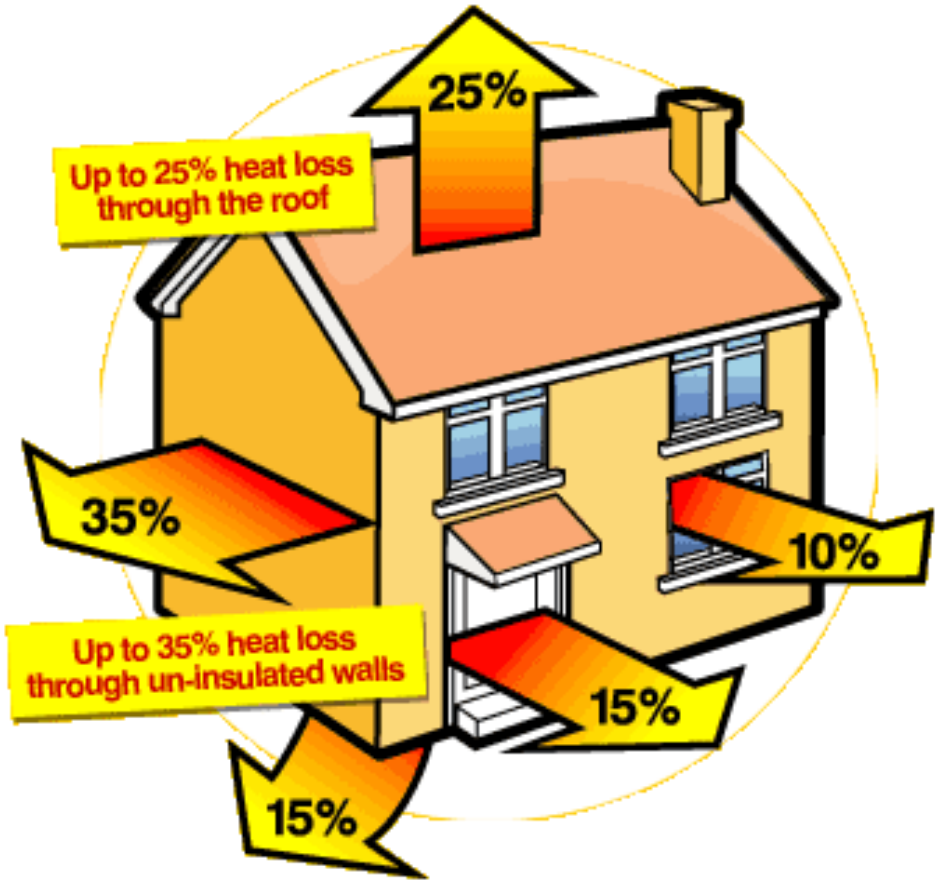
Energy consumption

Green House Gases



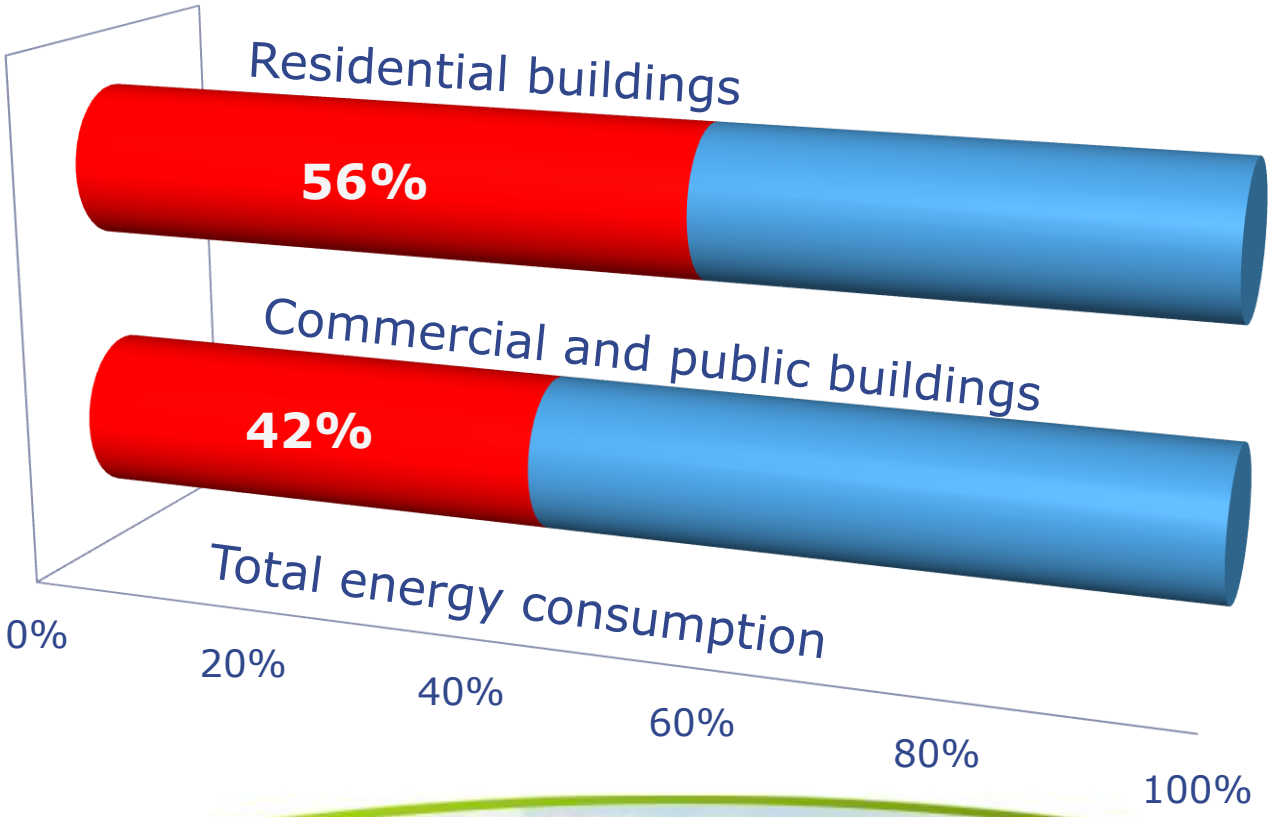
Renewable energy
in the energy mix

Buildings are one of the most significant energy consumers!

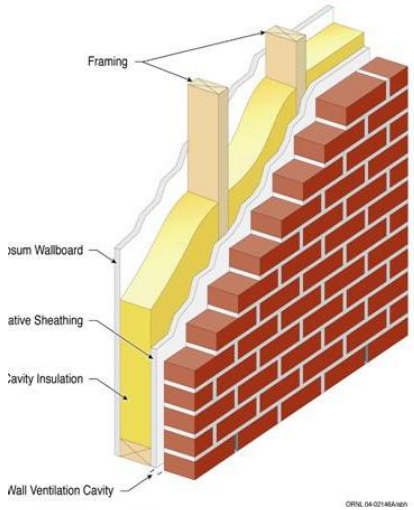


- *Heating*
- *Cooling*
- *Ventilation*
- *Domestic hot water*
- *Lightening*
- *Other domestic needs*

Expenses for heating, ventilation and air conditioning in residential buildings are 56%, and in commercial and public buildings are 42% of the total energy consumption. (Wigenstad. and. Grini,. 2010)



Buildings are becoming “thermos”



A newly build house in Europe consumes usually 2-3 times less energy for heating, than building made in the 70’s

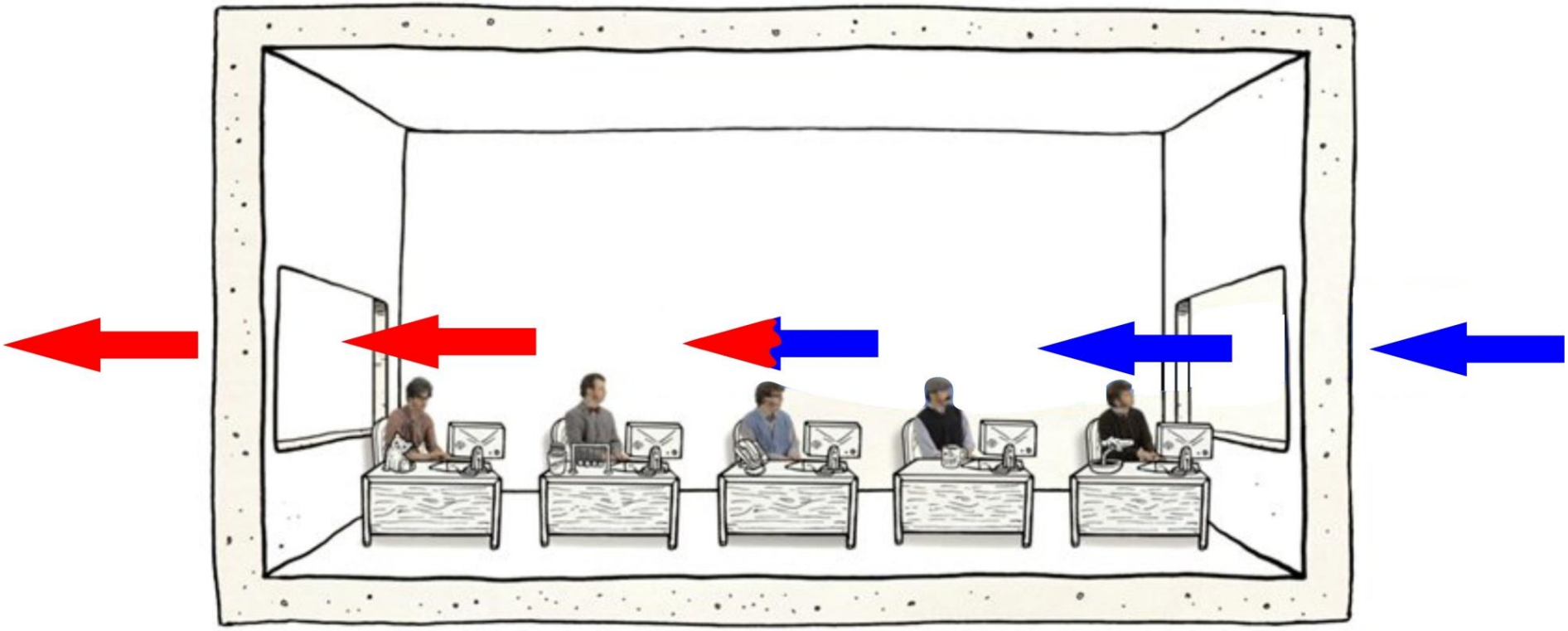
Norms and regulations regulate the minimum quantity of fresh air, needed for people.

Building category (class)	Air flow per person ($m^3/h.$)	Air flow per $1m^2$ ($m^3/h.$)
A	36.0	6.1 ÷ 57.8
B	25.2	4.3 ÷ 40.3
C	14.4	2.5 ÷ 23.0

EN 15251

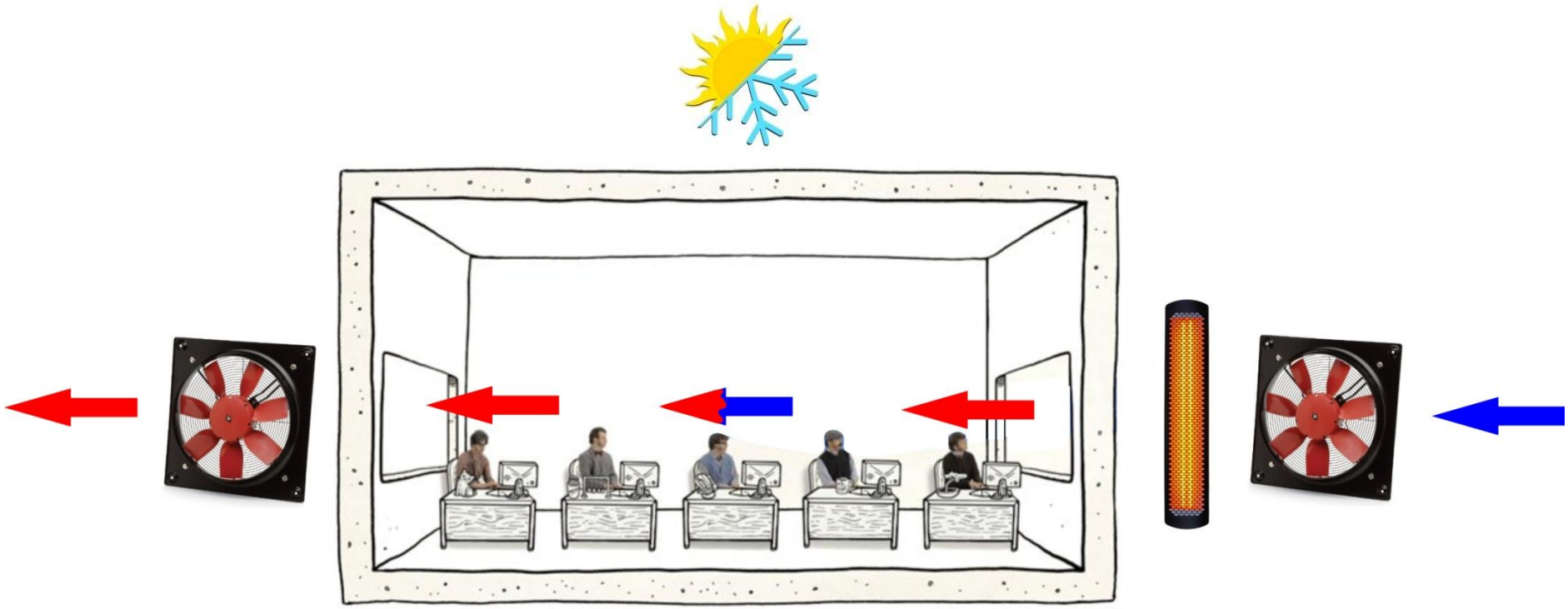
The lowest requirements for fresh air of $1m^2$ are for open offices and the highest are for auditoriums kindergartens and restaurants.

Do you imagine that opening windows can solve the problem with ventilation in modern building?!

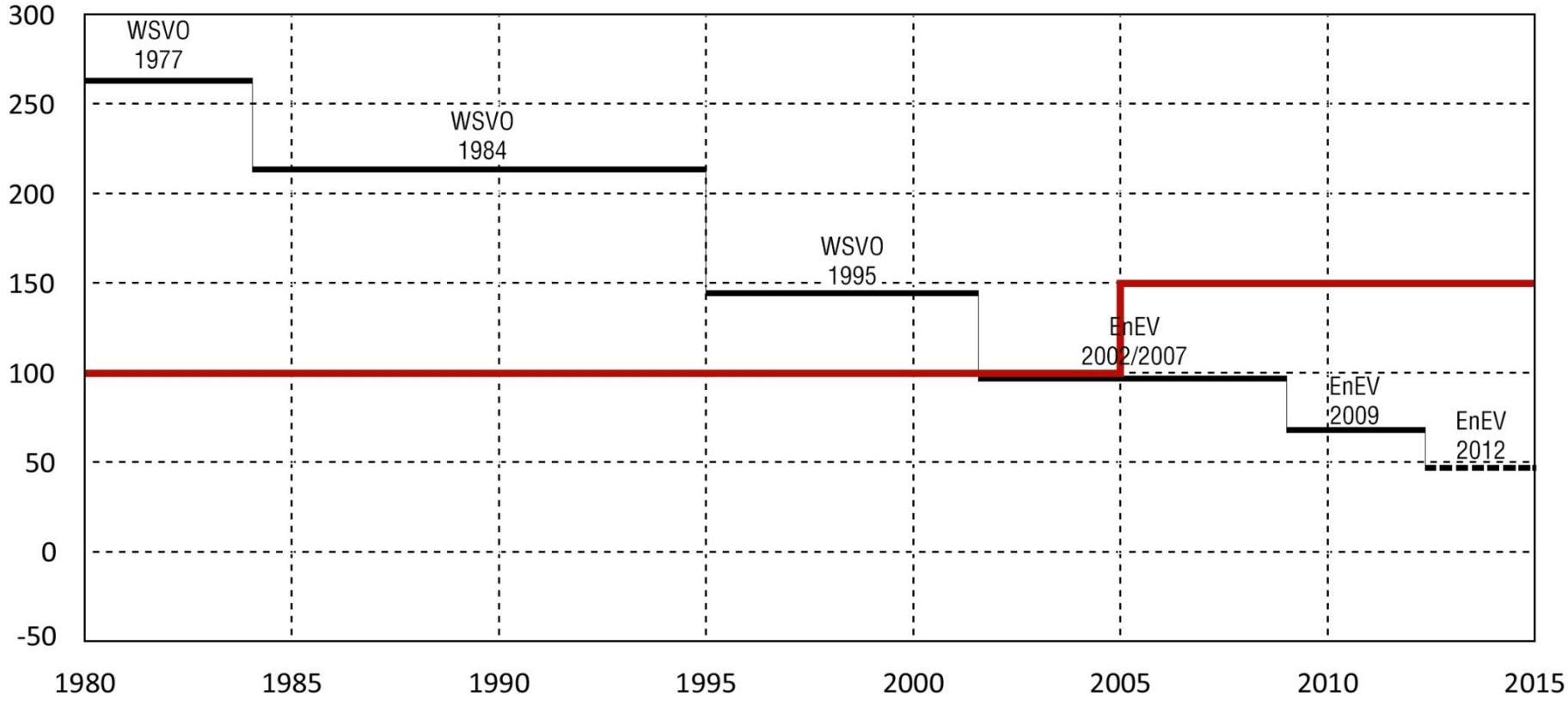


Mechanical ventilation is needed!

In our climate zone, fresh air needs to be heated in winter and cooled in summer.

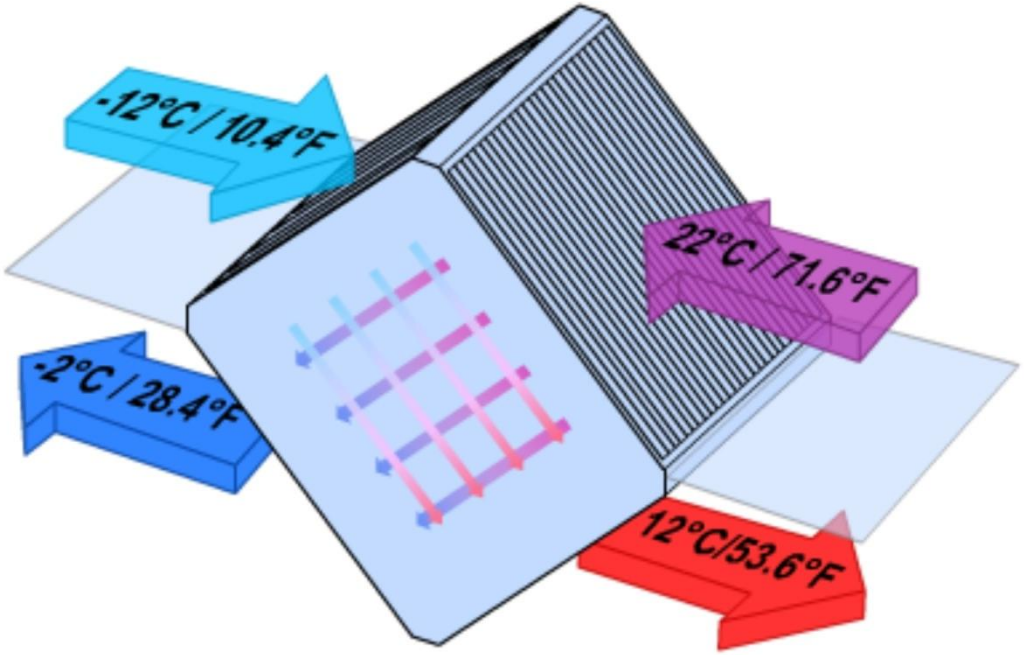


The energy needed for preparing of fresh air may exceed the energy needed for heating

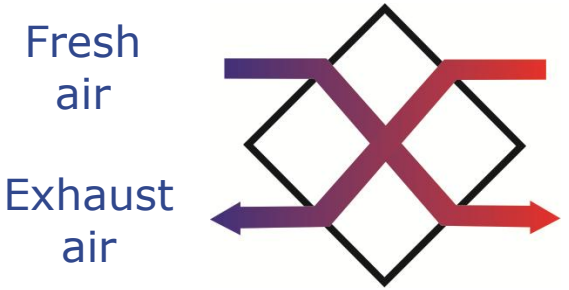


- Development of energy saving construction materials in Germany
- Energy for heating of fresh air, without recuperation

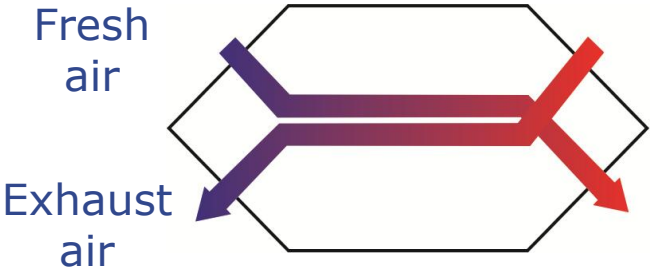
Energy Saving Ventilation is based on heat exchange between exhaust and fresh air.



E = 45 ÷ 55 %

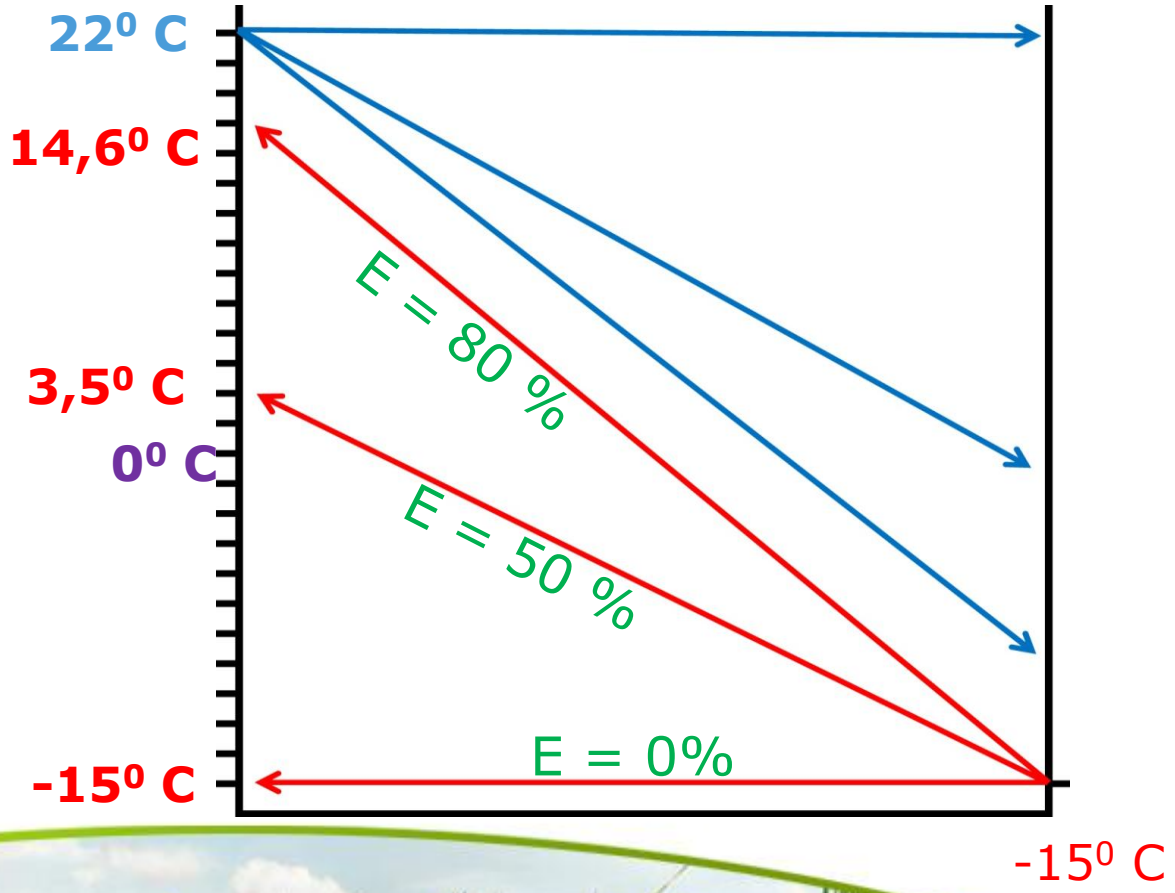


E = 75 ÷ 85 %



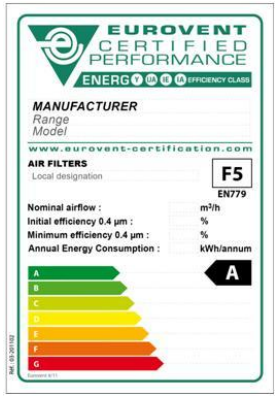
The efficiency of the process is defined as ratio between the real transferred energy and theoretically possible transferred energy.

$$E = \frac{Q_{exchanged}}{Q_{theoretical}}$$



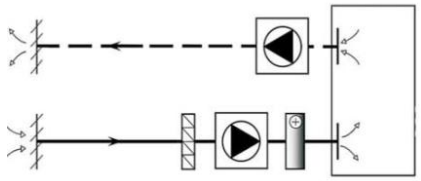
There is a tendency in the recent years for increasing energy saving and implementing more energy saving devices.

Building class	2008	2010
A	47 % ÷ 69 %	75 %
B	43 % ÷ 63 %	67 %
C	-	57 %
D	-	47 %
E	-	37 %



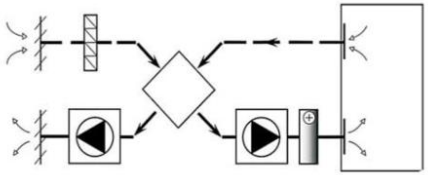
The payback period of initial investment for energy saving ventilation is between 1.5 and 3 years.

AHU-A - System without recuperation



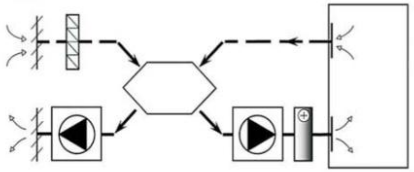
E = 0 %

AHU-B - System with cross-flow heat exchaner

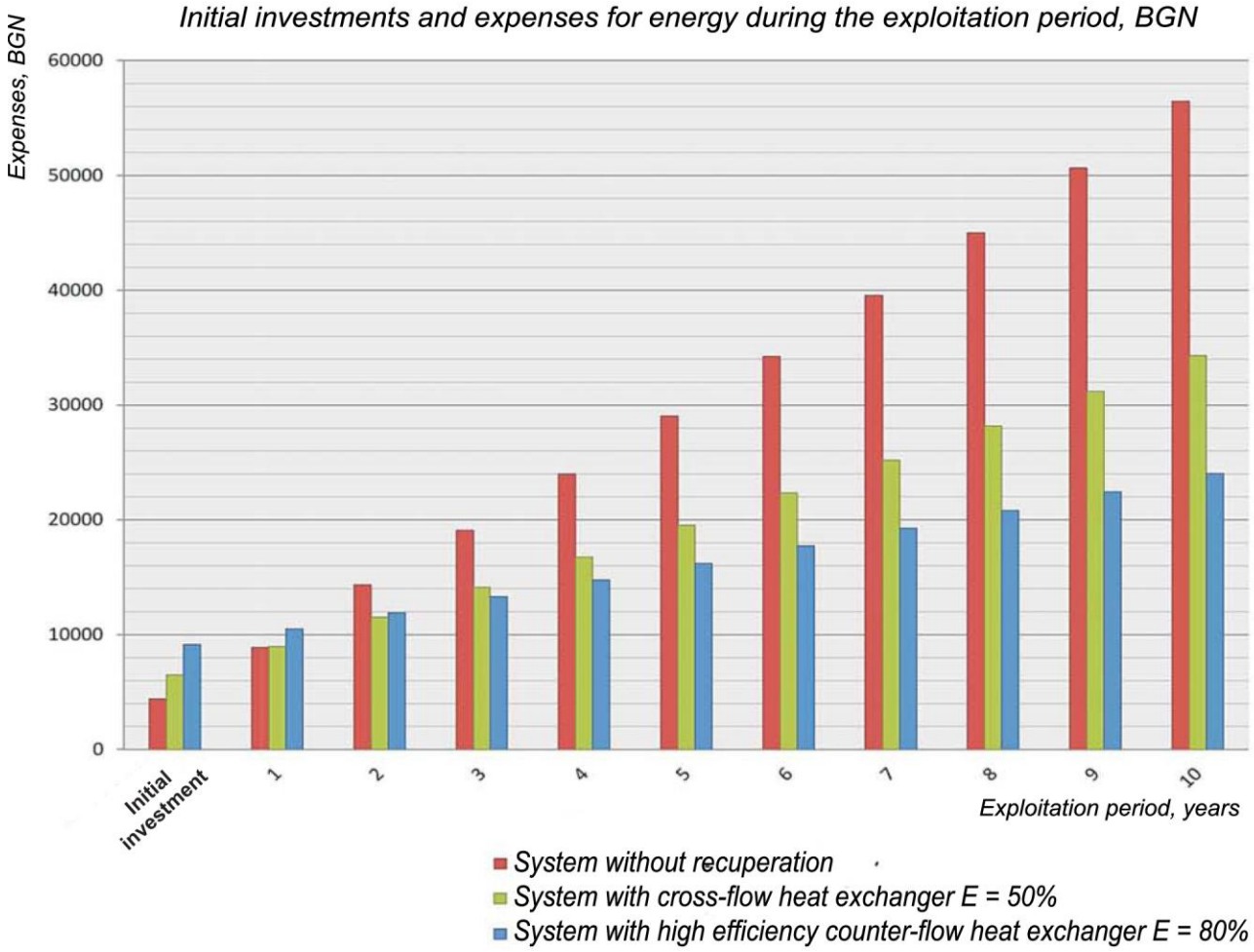


E = 45 - 55%

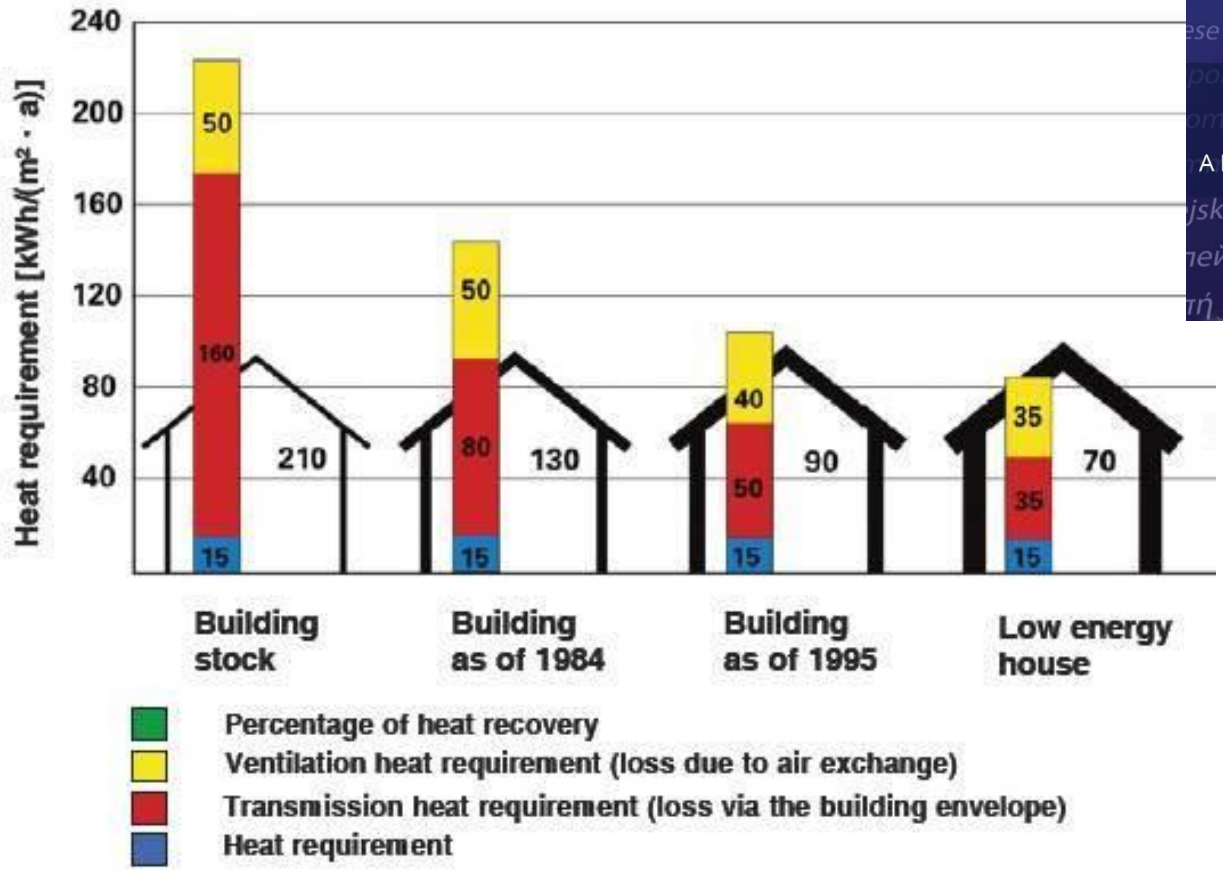
AHU-C - System with counter-flow high efficiency heat exchanger



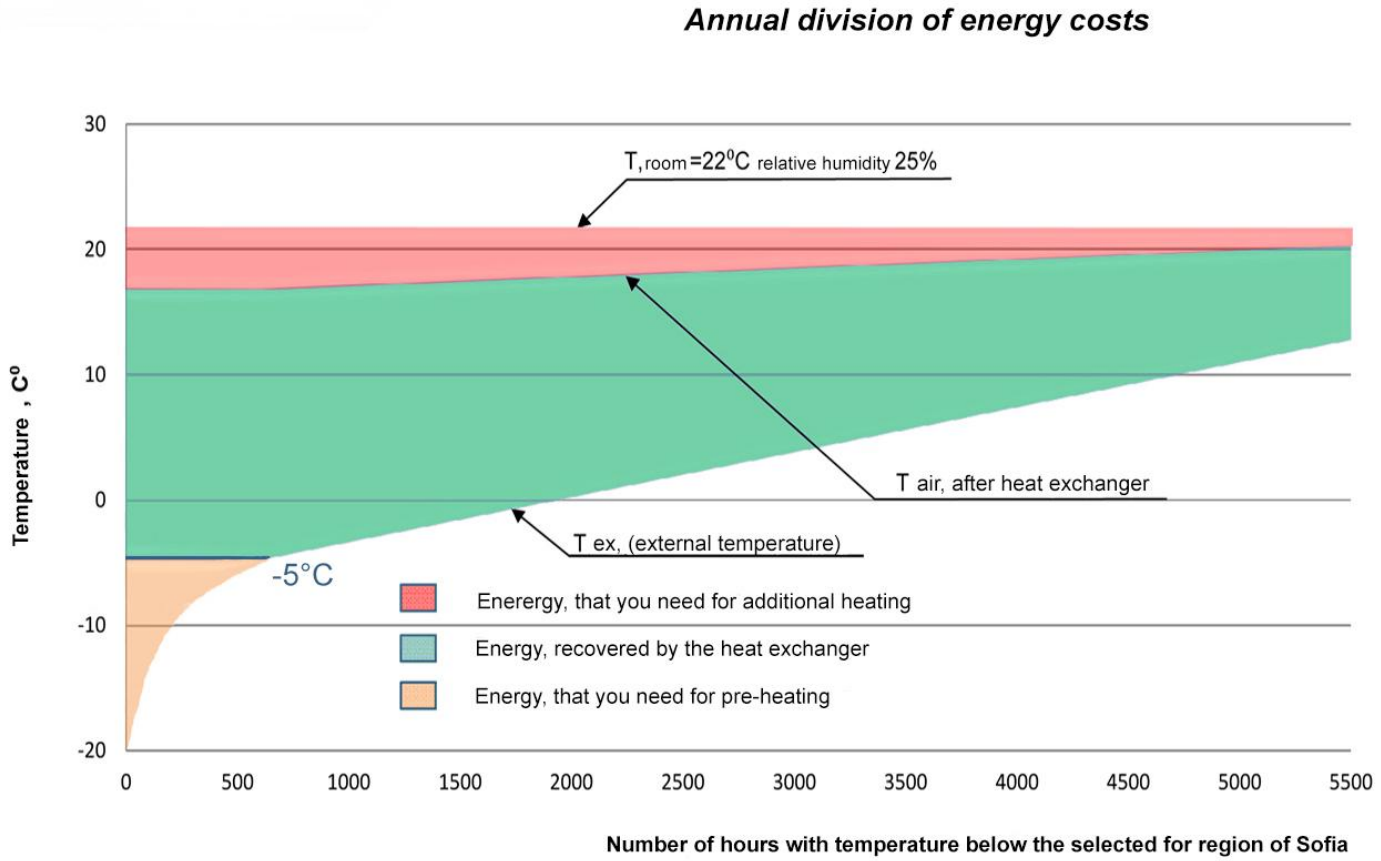
E = 75 – 85%



The discussion for installing more expensive, but energy saving ventilation is already in the past.



The economical advantages of Energy Saving Ventilation are unquestionable



There are circumstances for freezing of the heat exchanger when the external air temperatures is below -5°C, which requires the installation of pre-heater.

Installation of Energy Saving Ventilation create problems, but in the same time it save energy, provide fresh filtrated air and prevent pollution of the environment