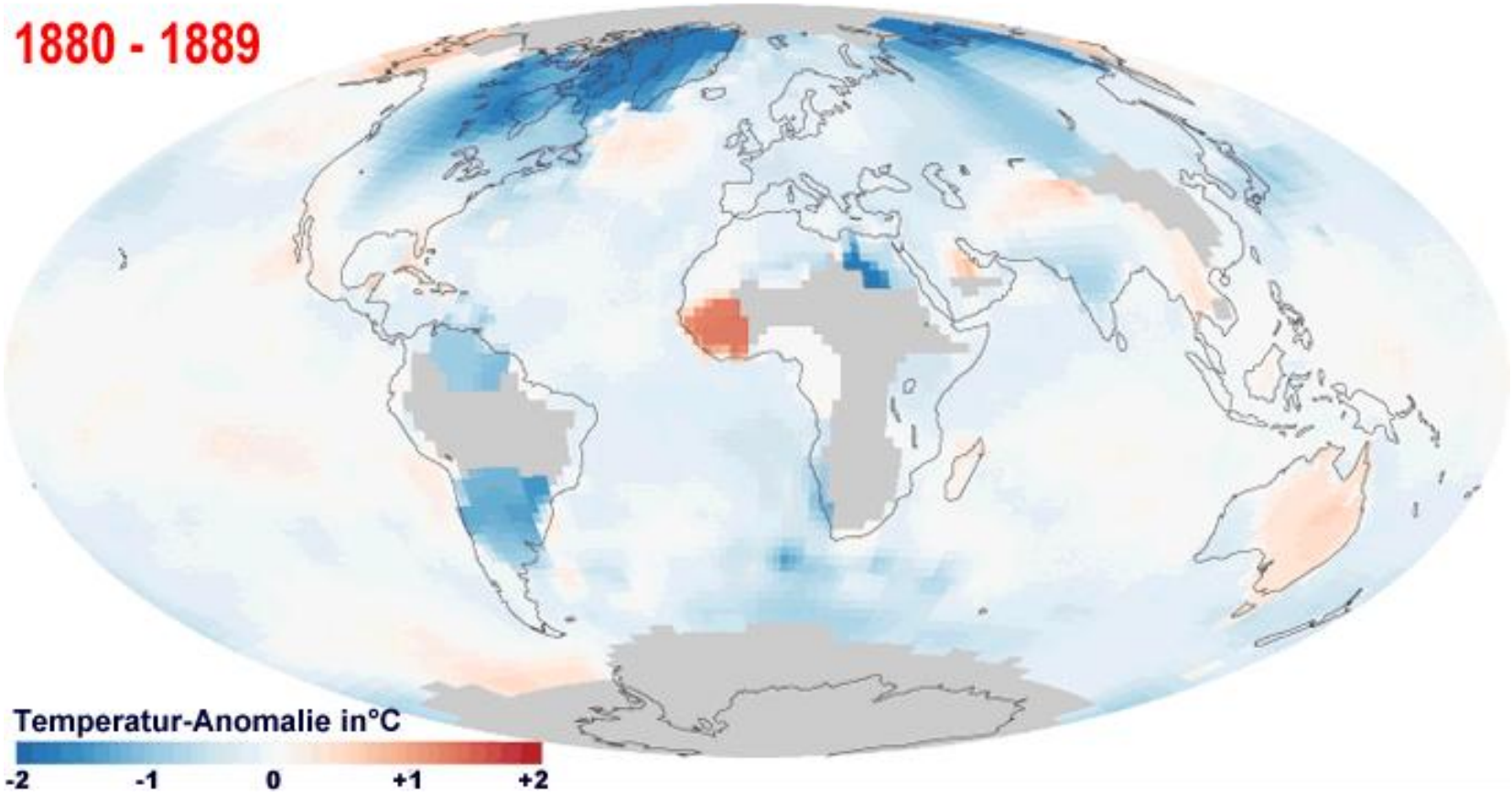
EC Technology

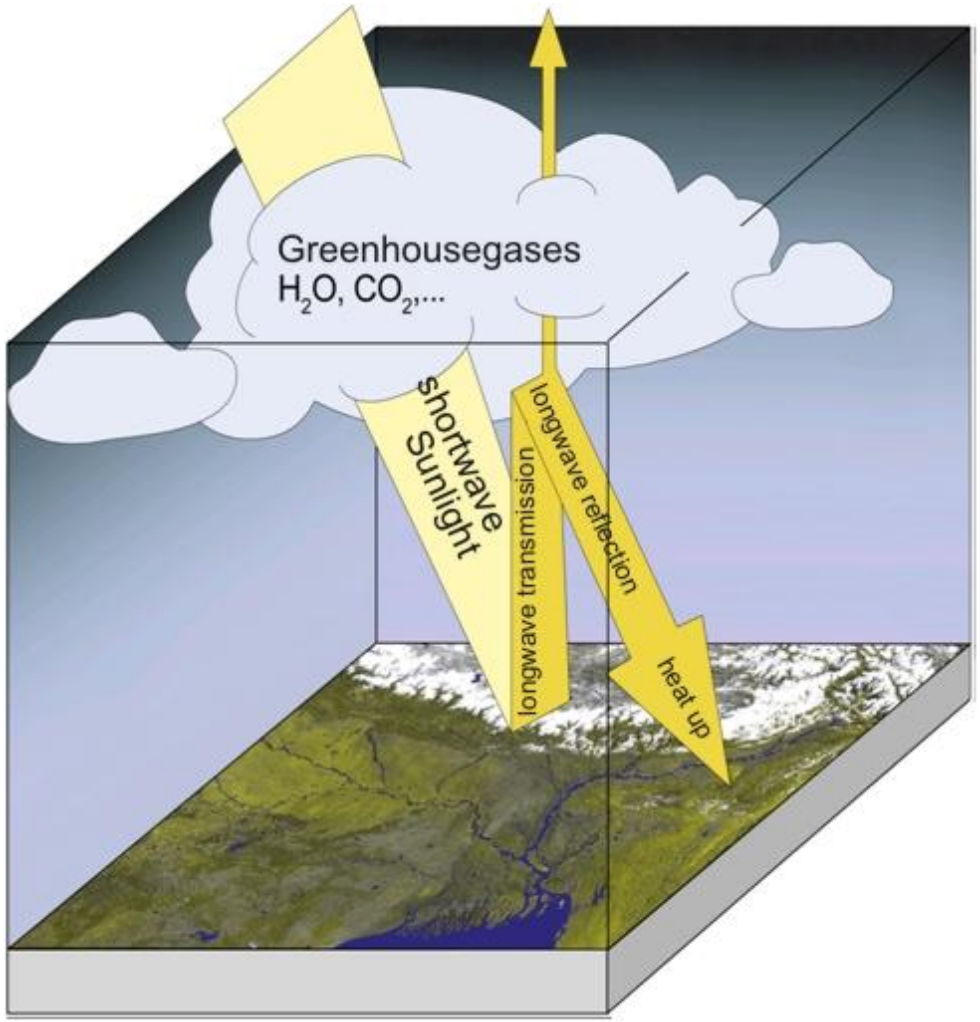
Agenda – EC-Technology

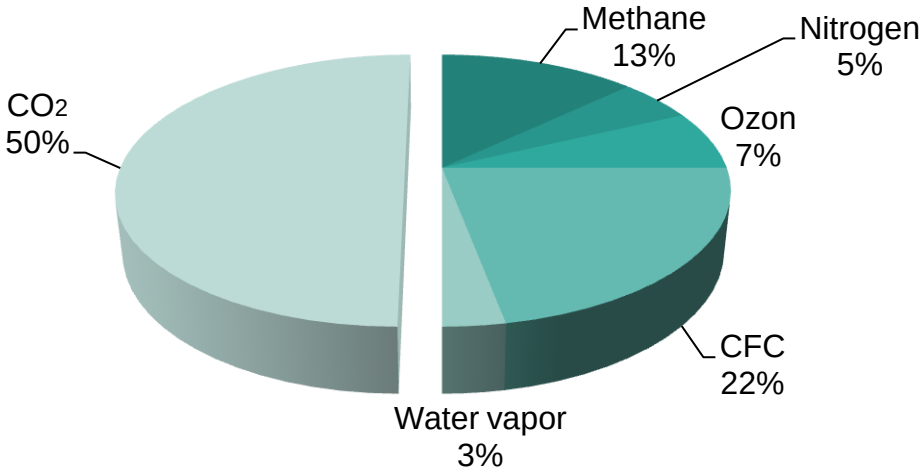
- Global-Warming – Green-house affect
- Climate change
- Actual situation
- Our goals
- Function of EC-motors
- Energy saving using EC-motors
- Energy saving and and correct operation load
- Energy saving with Demand Control
- Summary

Global-Warming 1880-2012



Greenhouse effect



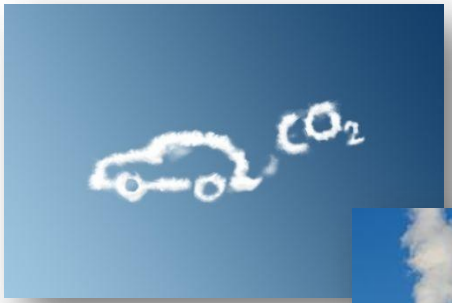


The natural greenhouse gas raises the average temperature at the earth's surface by approximately 91F to 59F.

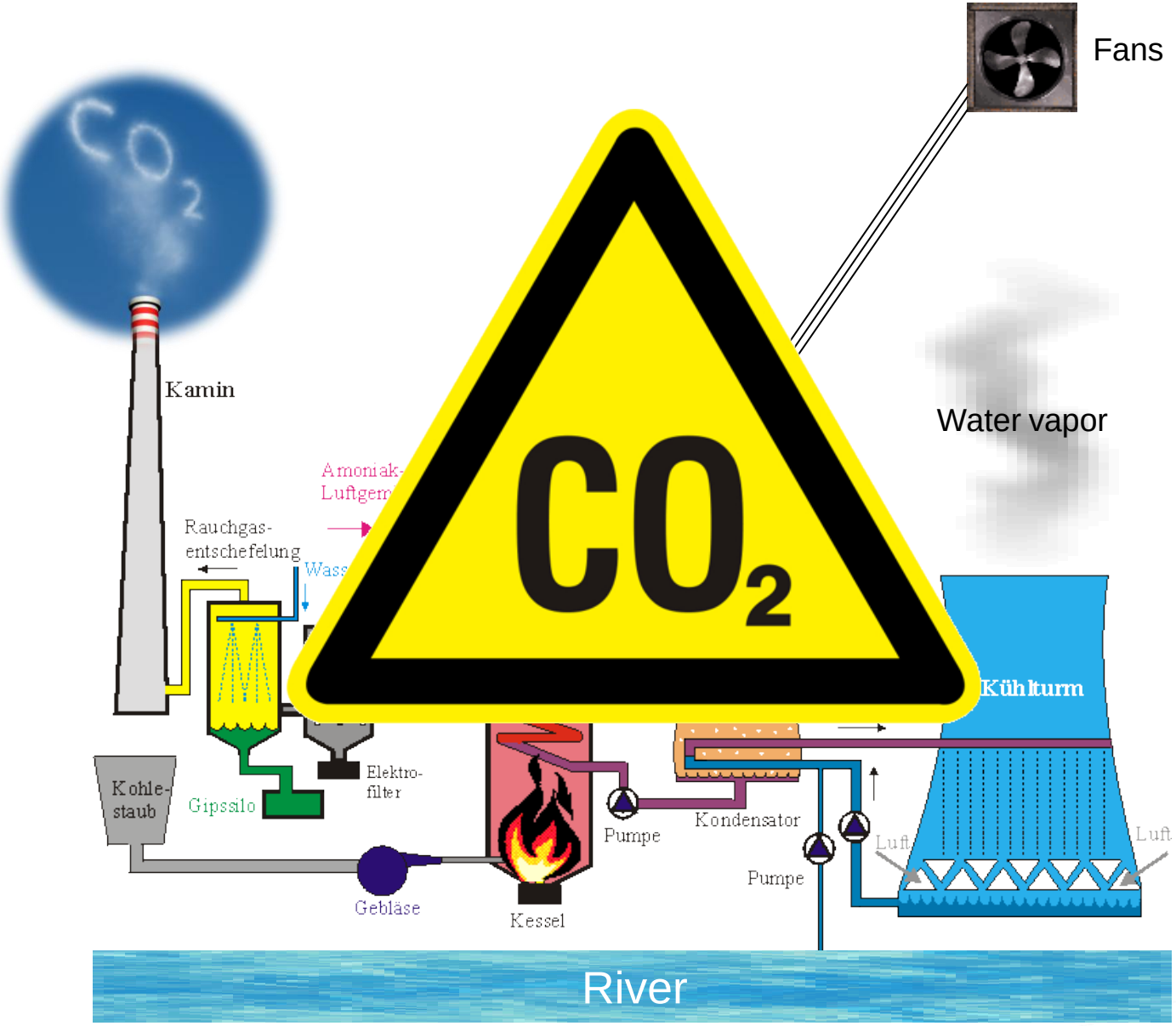
Without this natural greenhouse effect we would have a global average of only 2F, which would make life on Earth almost impossible.

Greenhouse gas CO_2

Each fire produce CO_2



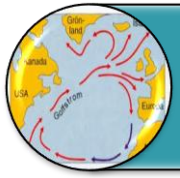
Coal-fired power station



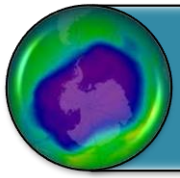
Climate changes

Melting of the poles

Rise of sea levels



Disappearance of the gulf stream



Hole in the ozone layer

Shift in climate zones
desertification

Higher energy content of the atmosphere

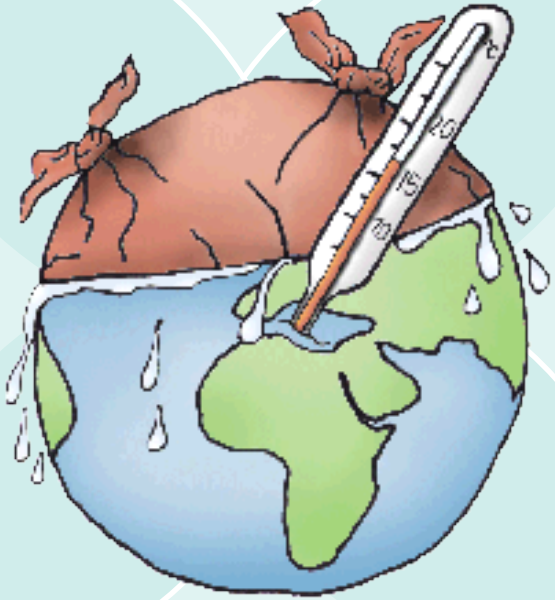
Climate change

1.5TWh = 1.500.000.000 kWh

Actual situation

In the U.S. alone, ventilation consumes about 1.5 TWh

Even a 12–15 % increase in efficiency could reduce CO_2 emissions by 42 Million pounds

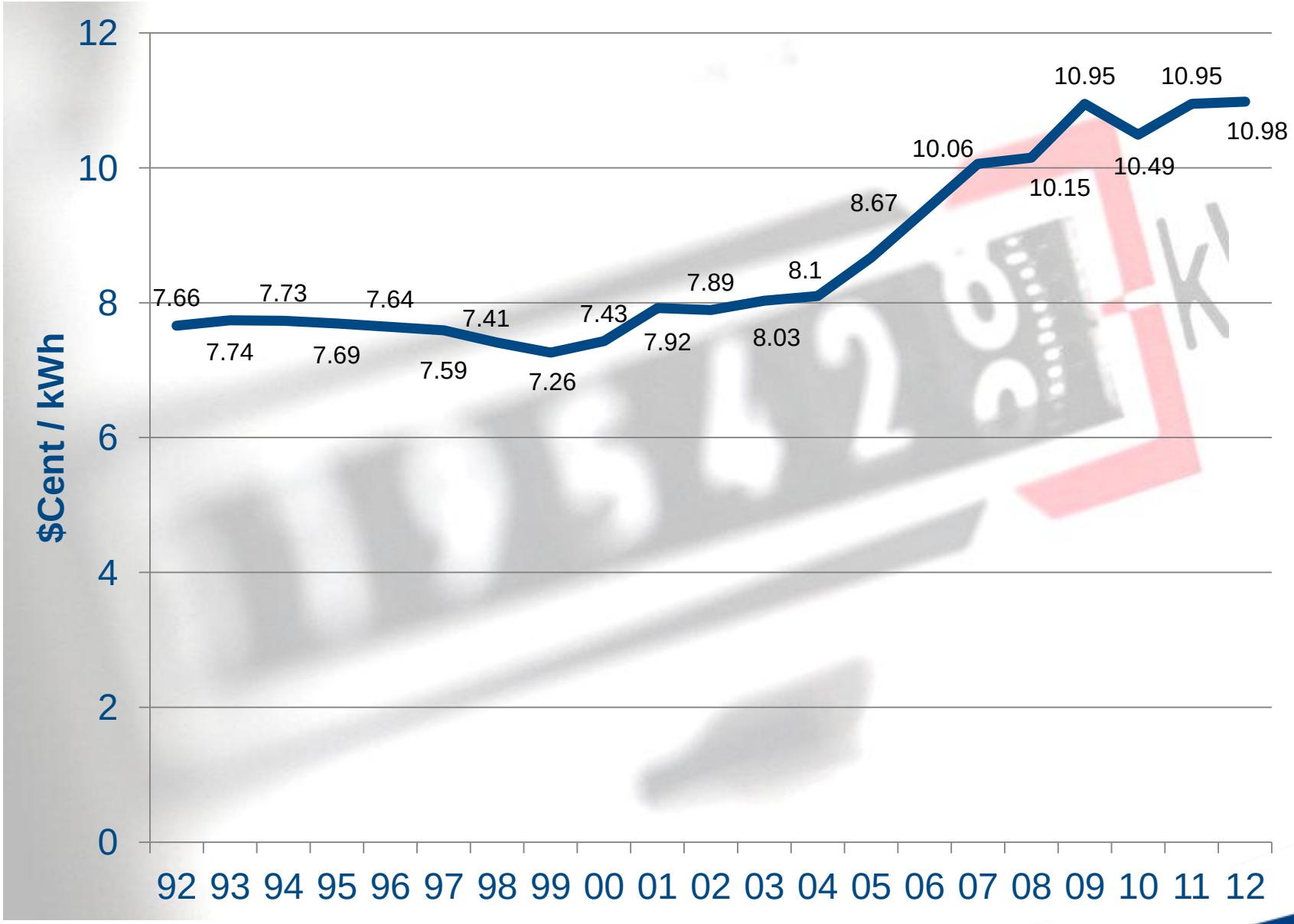


Fans operate at an efficiency of about 8–28 % (axial) or 40–55 % (centrifugal)

Fans are among the largest electricity consumers overall

Emission according to EPA's eGRID; status April 2011

Electricity Average Price in the USA



Energy Information Administration, USA

Our goals

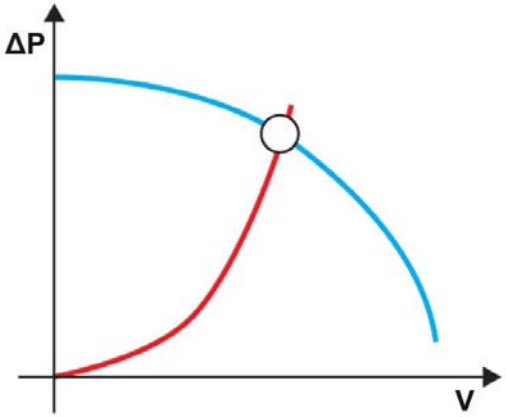
Energy saving

Reduce CO_2

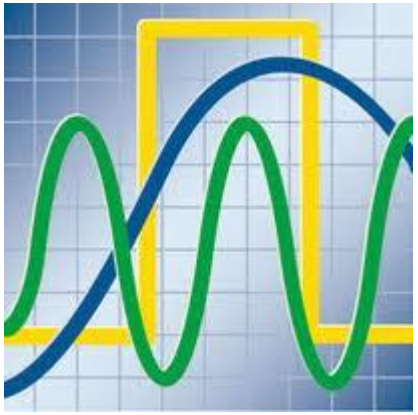
Save money

Possibilities of energy saving

Use of energy-saving EC-products



Set the fan to the optimal operation load



Demand control

Energy saving with:

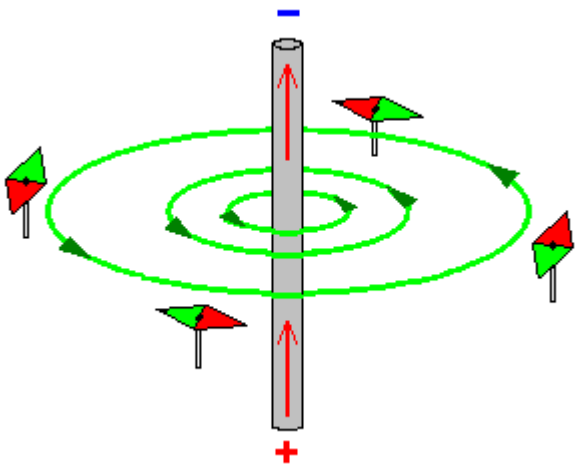
Driven by EC

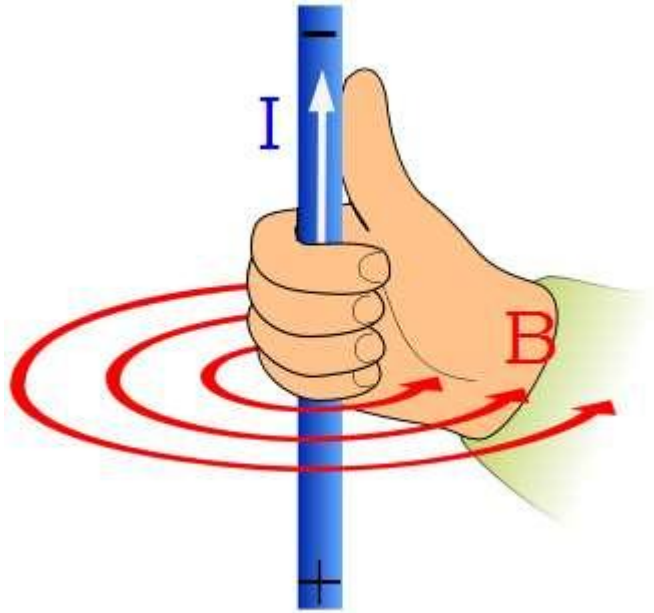
An EC-motor	= electronically commutated motor

Definition: **Commutation** in power electronics describes the process through which a current passes and flows from one branch to another.

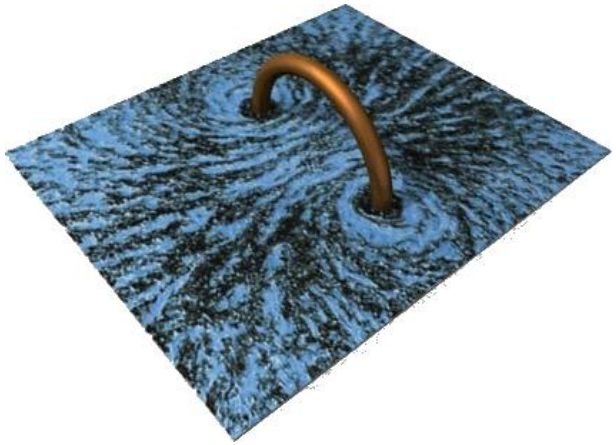
Products that meet Systemair's 'high energy-efficiency' classification are marked with the Green Ventilation symbol.

Magnetic field



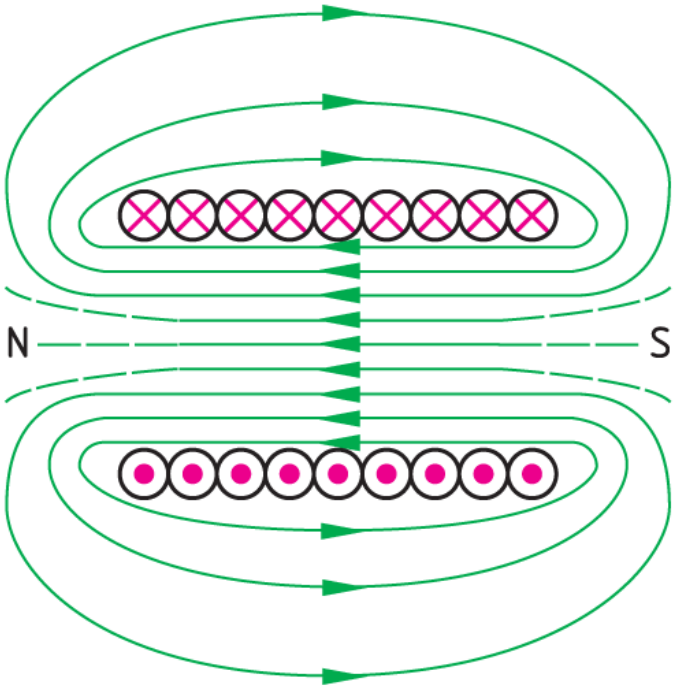


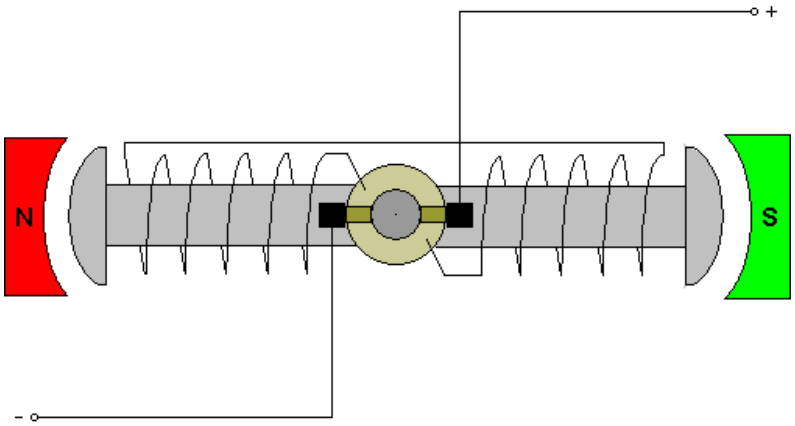
Each current-carrying conductor (I) generates a magnetic field (B).



Representation of a magnetic field of a current-carrying conductor

Movement of a motor



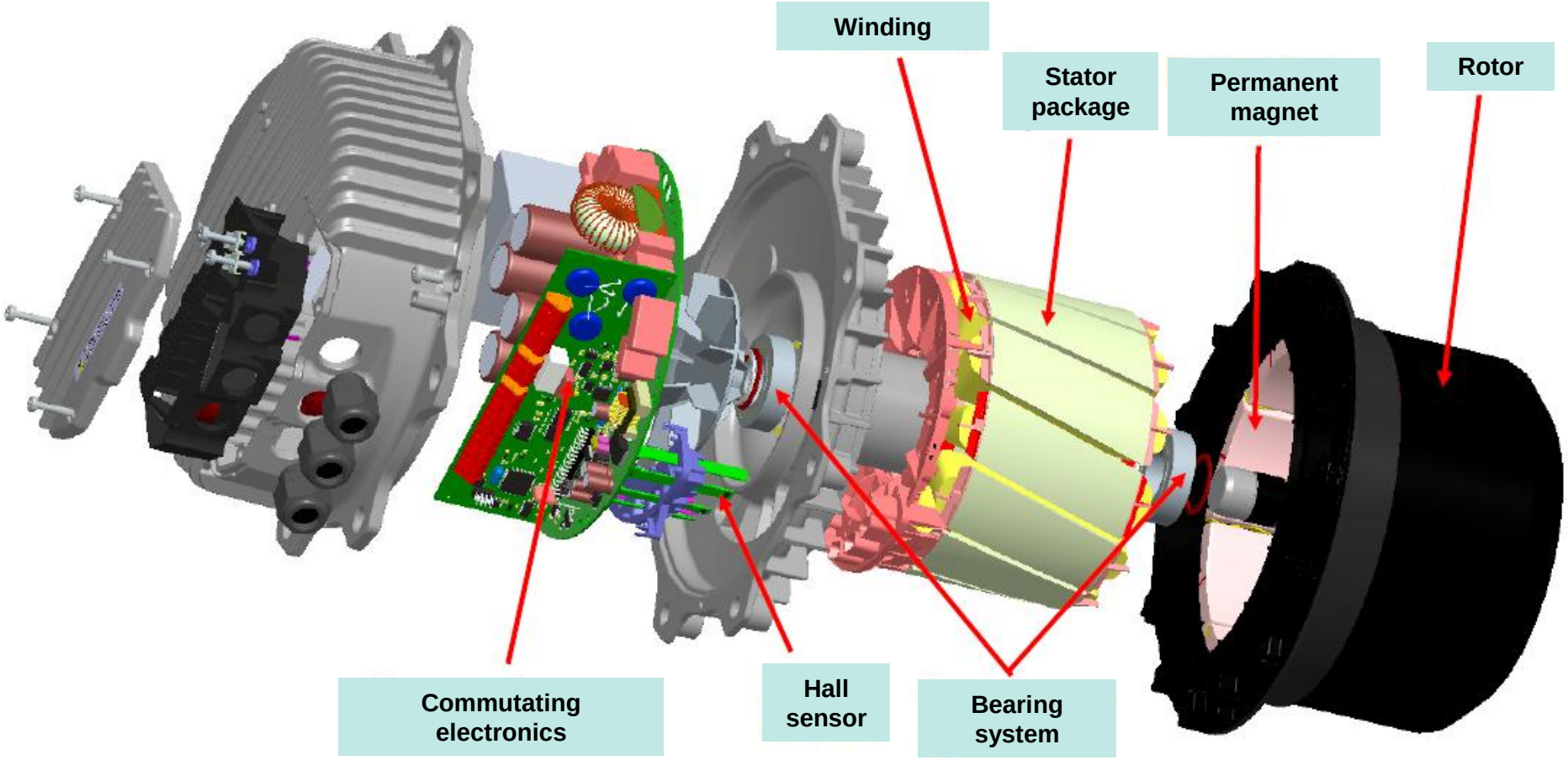


Increasing the magnetic field with windings.

Changing the current direction for changing the magnetic field.

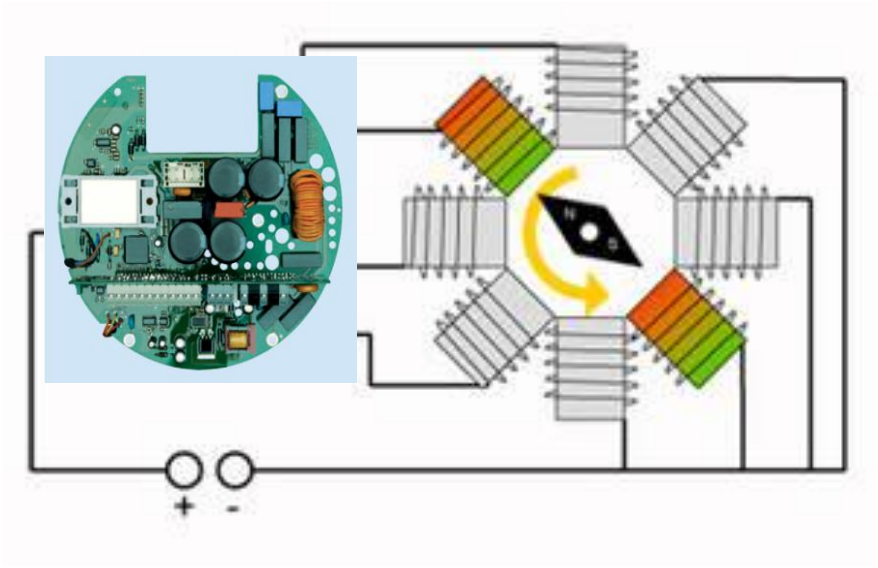
Same magnetic polarity propels

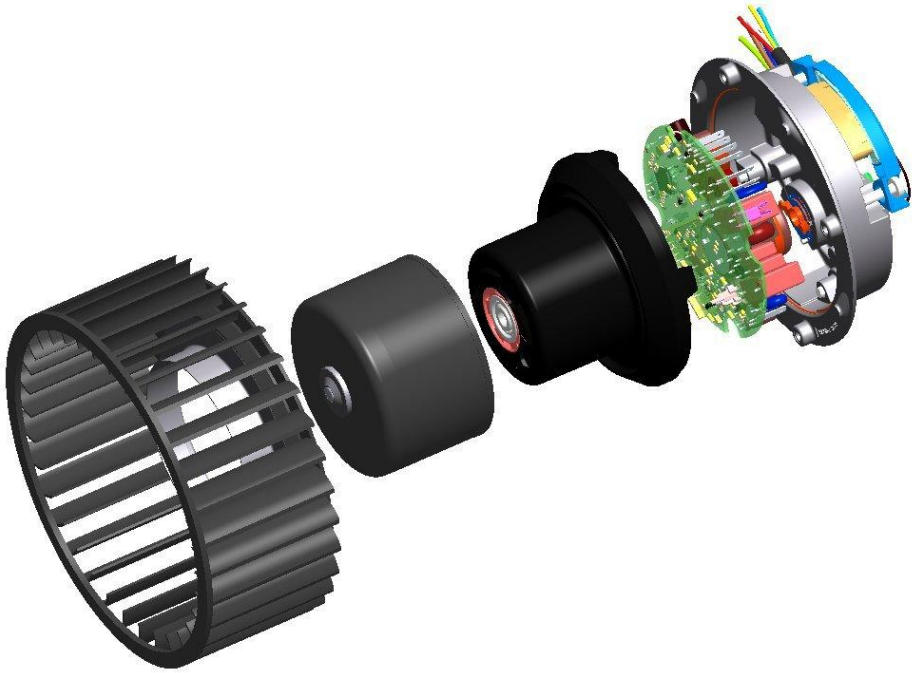
Construction of an EC-Motor



EC-Motor

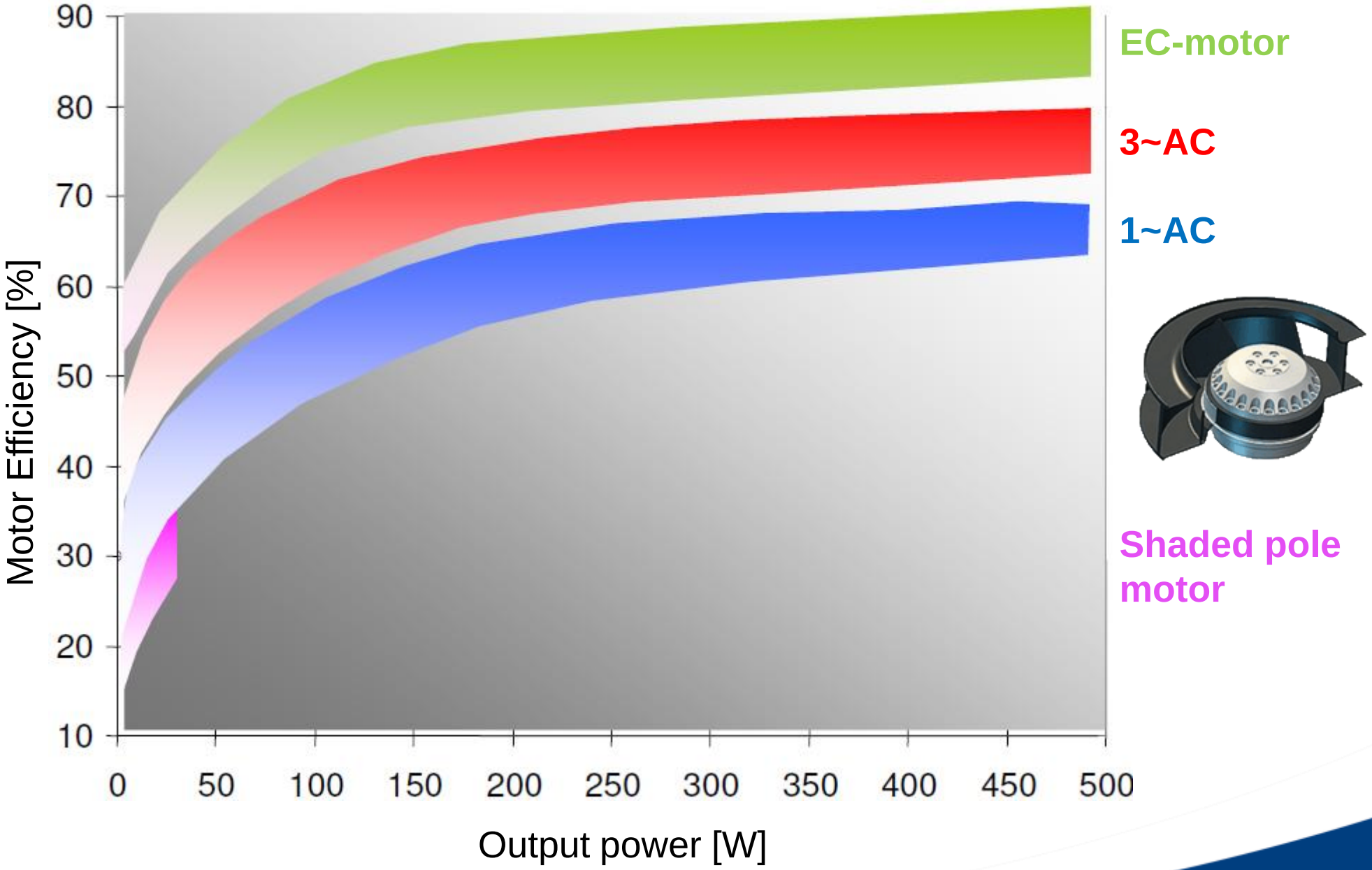
- steplessly at the required air volume and have a high efficiency.





- the power saving is not only at maximum power, but also especially in lower power operation dependant on demand.

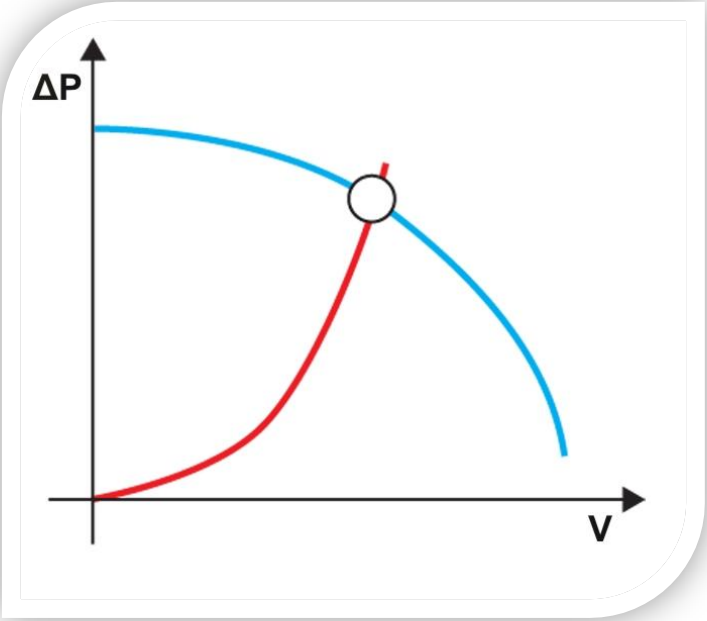
Efficiencies of external rotor motors



Advantages of EC over conventional motors

- Stepless control setting the operation load
- No chance of sparking unlike brushed motors
- No friction losses
- Cool operation leads to much-improved life of the fan's bearings
- Higher lifetime if the motor is speed controlled
- Integrated motor protection
- Working voltage range 1~ 100...130V or 200..277 VAC or 3~ 380..480 VAC

Energy saving with:



The correct operation load

Proportional laws of fans

The Airvolume (V) changes proportional to the fan speed

$V1/V2 = n1/n2$

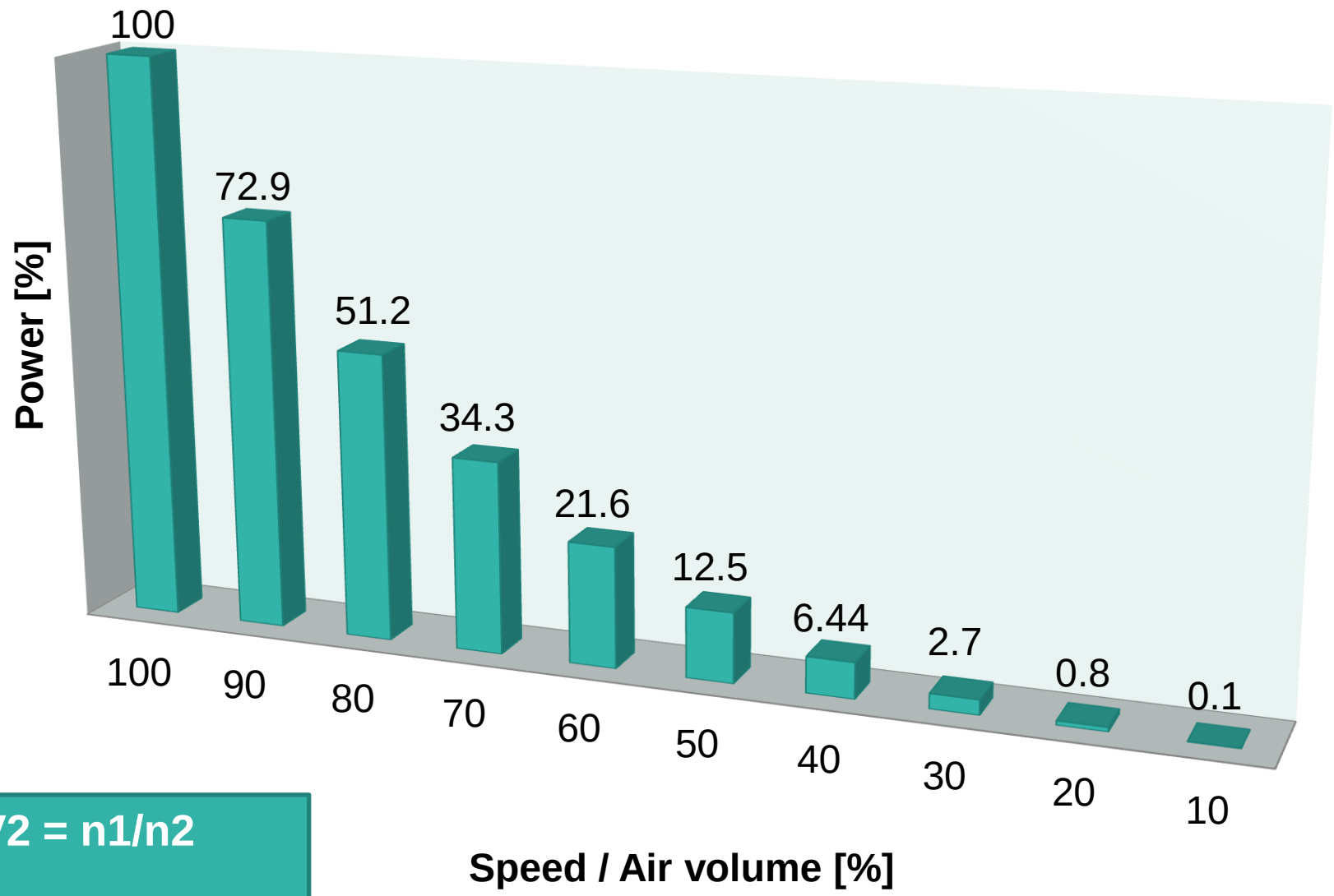
The Pressure (p) changes proportional with the second power to the fan speed

$p1/p2 = (n1/n2)^2$

The Power (Pw) changes proportional with the third power to the fan speed

$Pw1/Pw2 = (n1/n2)^3$

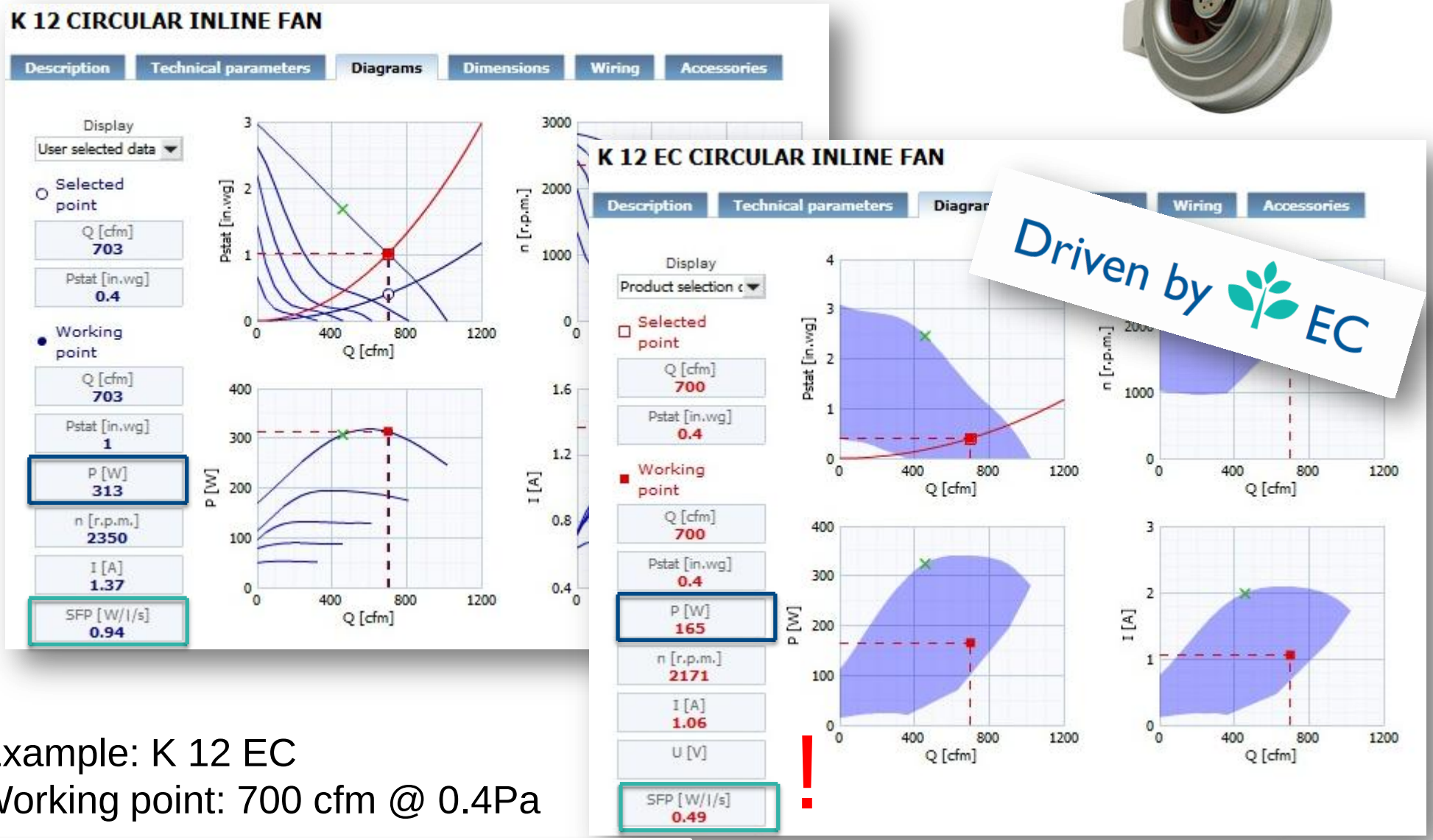
Power – Speed / Air Volume



$V1/V2 = n1/n2$

$Pw1/Pw2 = (n1/n2)^3$

Set to the optimal load with EC-fan

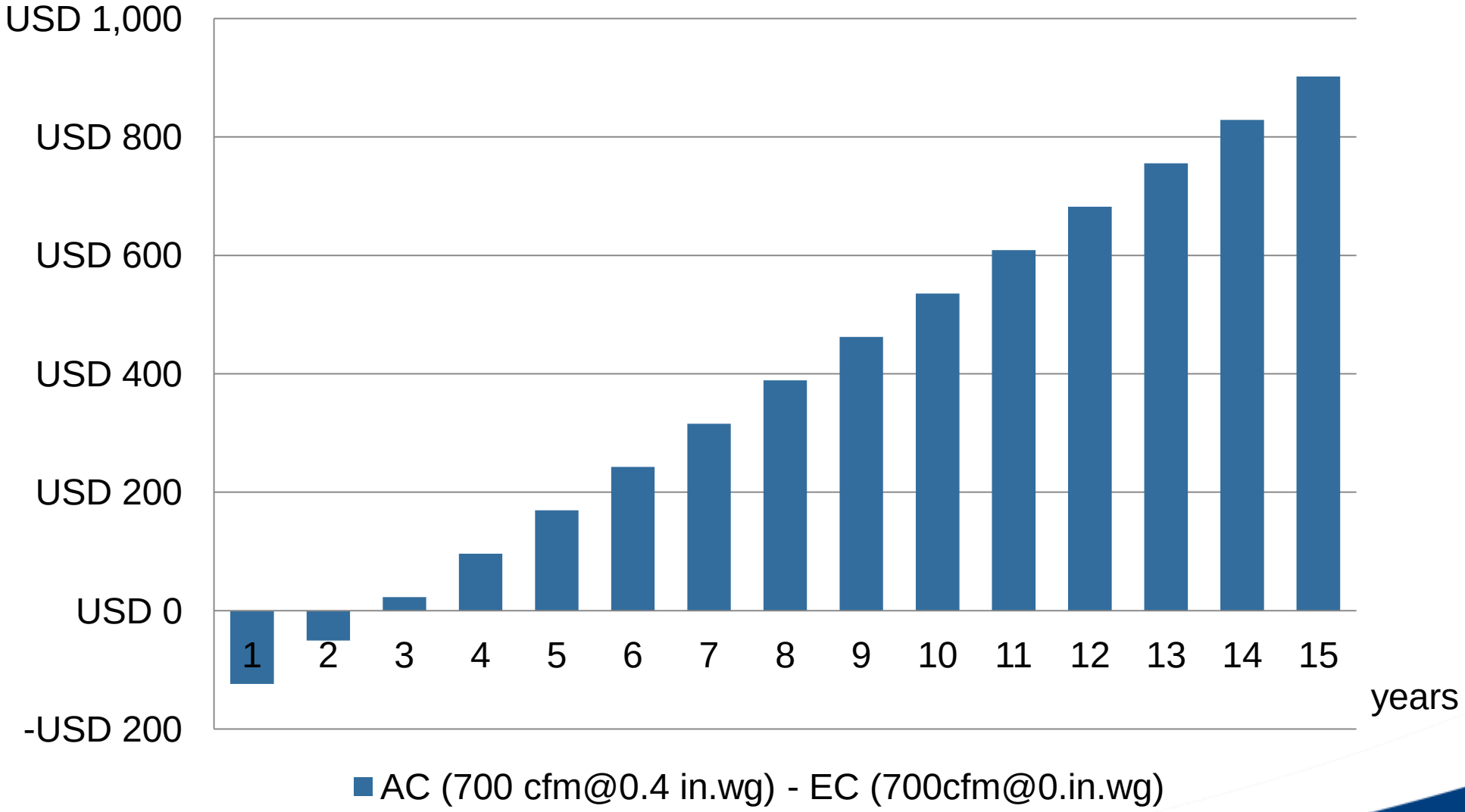


Example: K 12 EC
Working point: 700 cfm @ 0.4Pa

Power consumption: -47%

Payback a year

Fan	K 12, K 12 EC
Running time	10h/day, 5 days/week, 52 weeks
Energy costs	11 cents/kWh
Duty point	700 cfm @ 0.4 in.wg



Energy saving with:

Demand Control

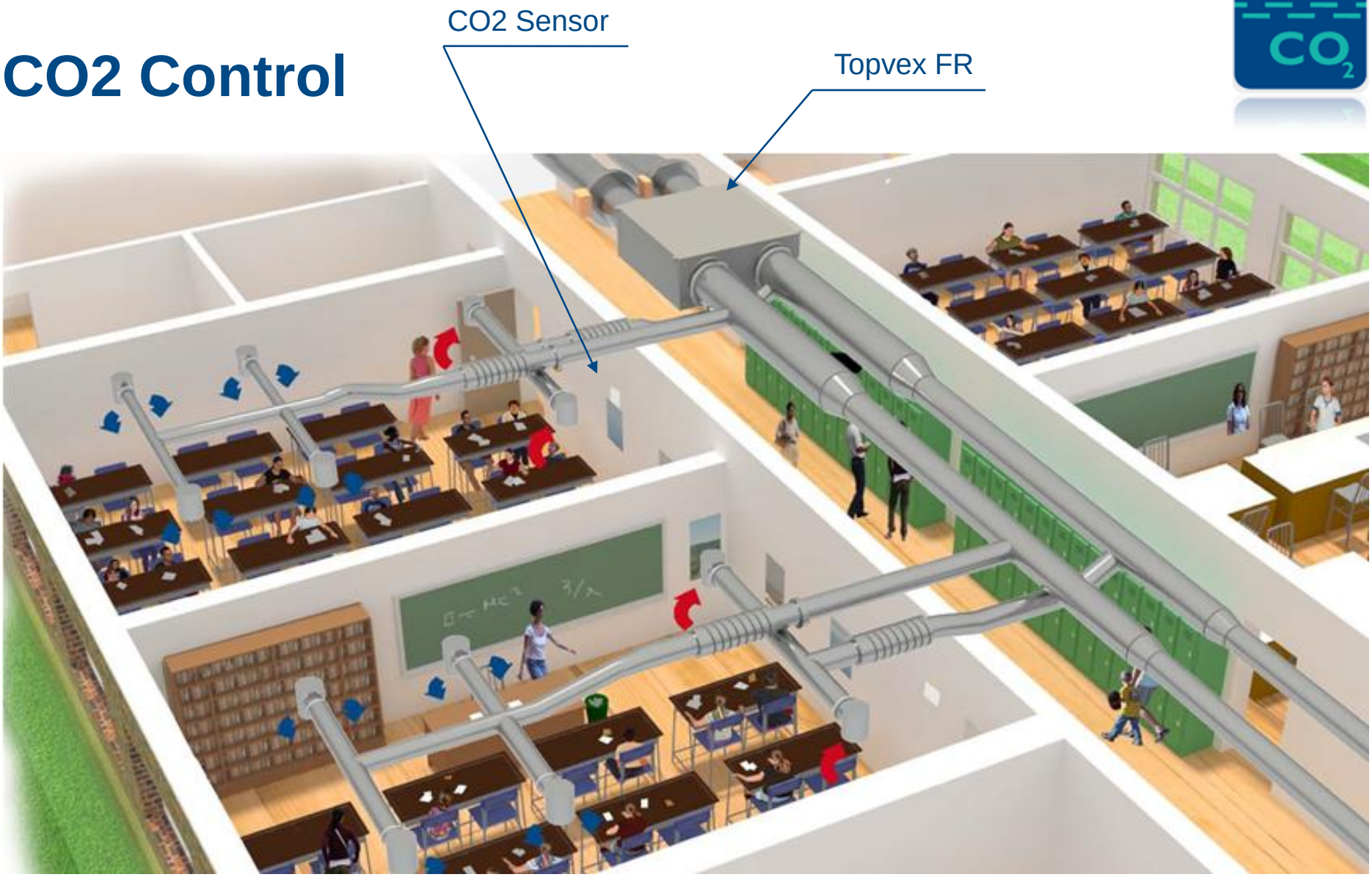
Demand control

The current indoor air is detected by sensors and the air volume is regulated to the actual situation or requirement

Energy saving

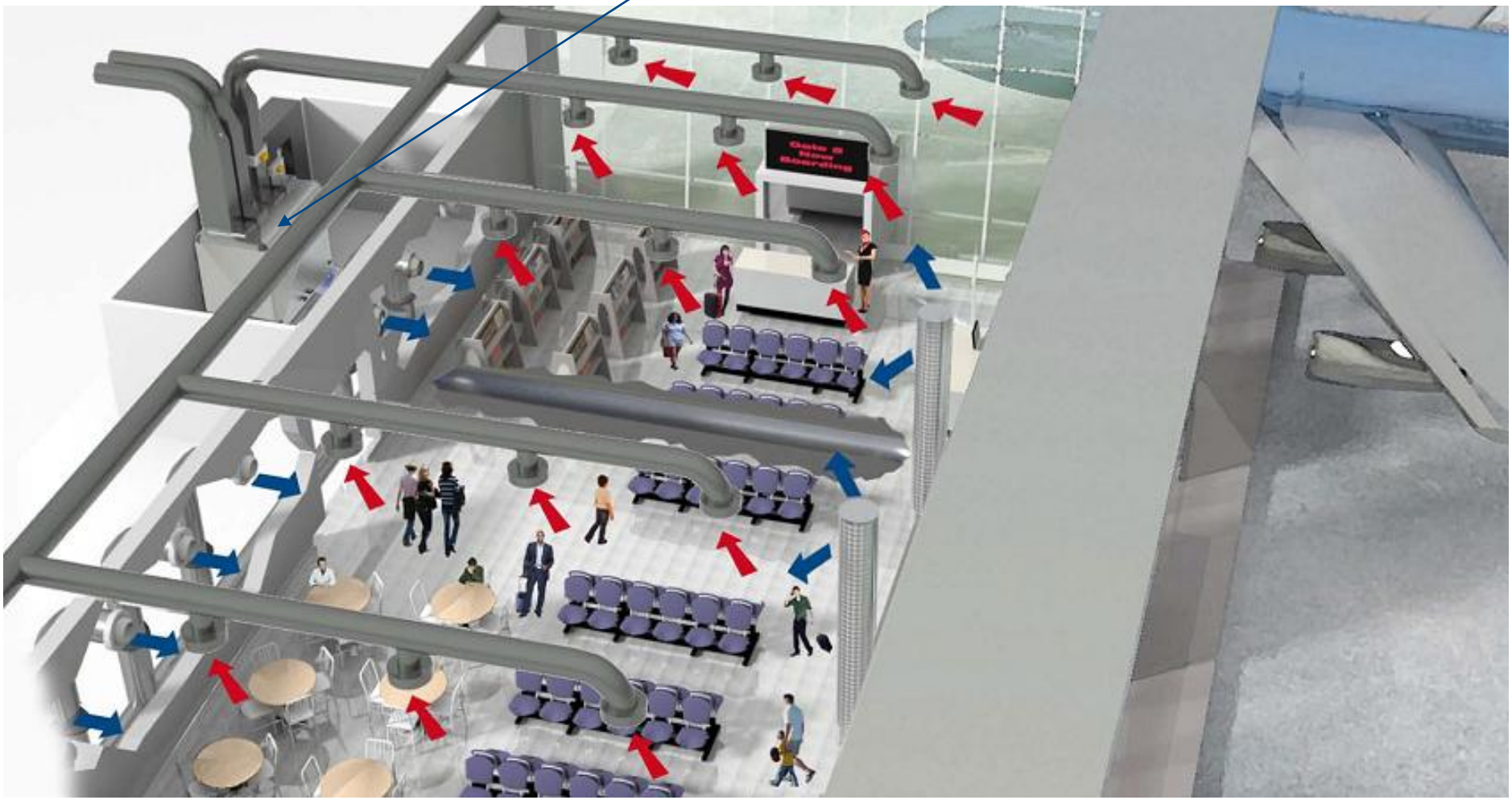
in the power consumption of ventilation products

CO2 Control

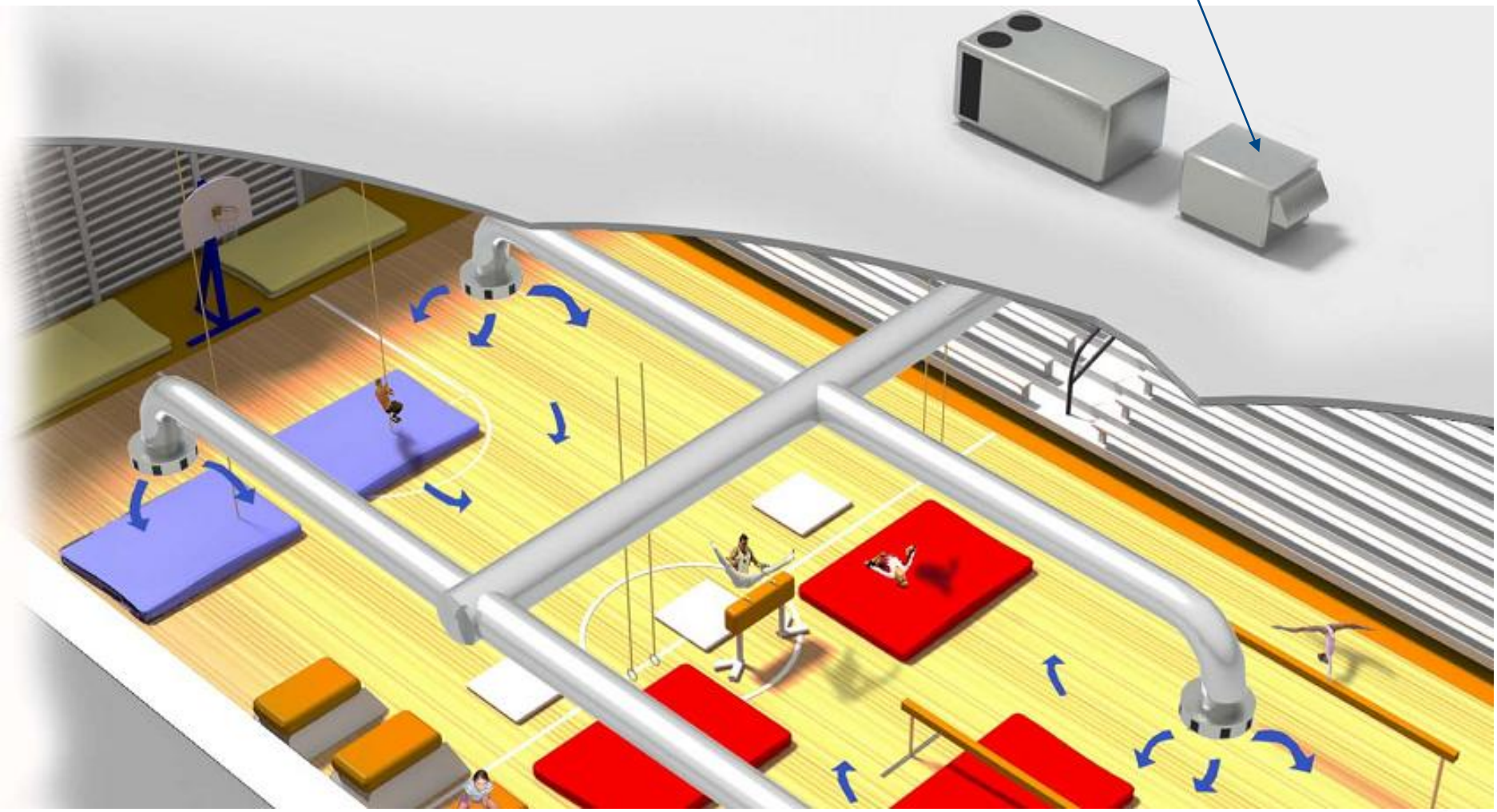


Day/night conditions

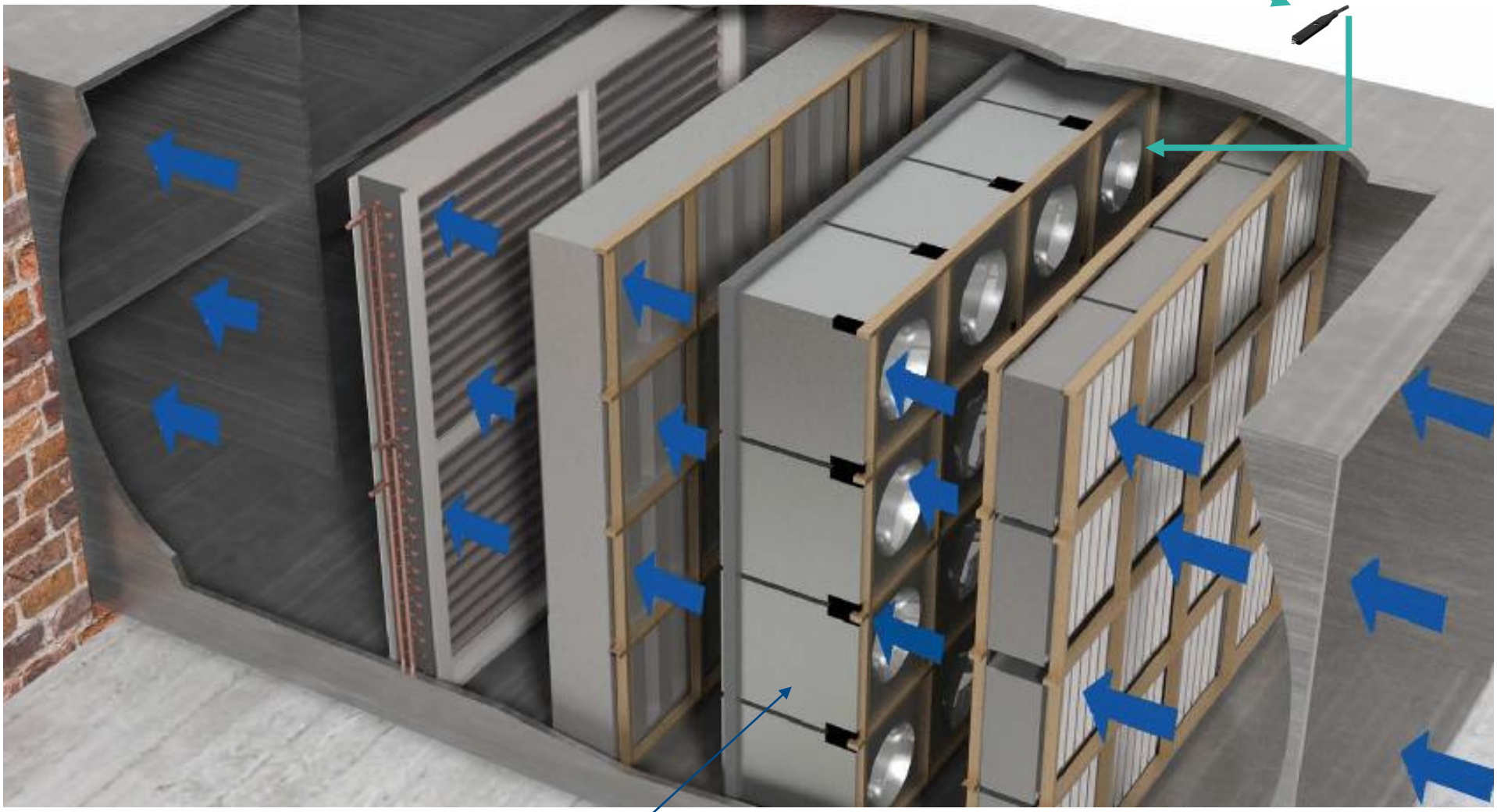
Topvex TR with pre-cofigurated timer



Count down timer



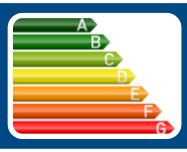
Temperature



MUB Fanwall

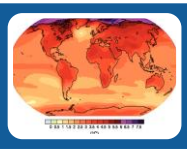
Motion indicator

Summary



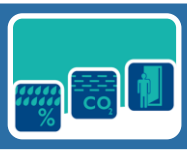
EC-motors use less energy, low SFP

Less energy means lower CO_2 emissions



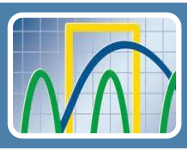
Less CO_2 emissions means lower global warming

Less Energy means lower energy costs



Energy saving with demand control

Less heating-cooling energy



Easy control by integrated controllers

Thank you for your attention!