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## DeAL - Facade Integrated Ventilation Systems Evaluation Results from 12 Buildings in Operation

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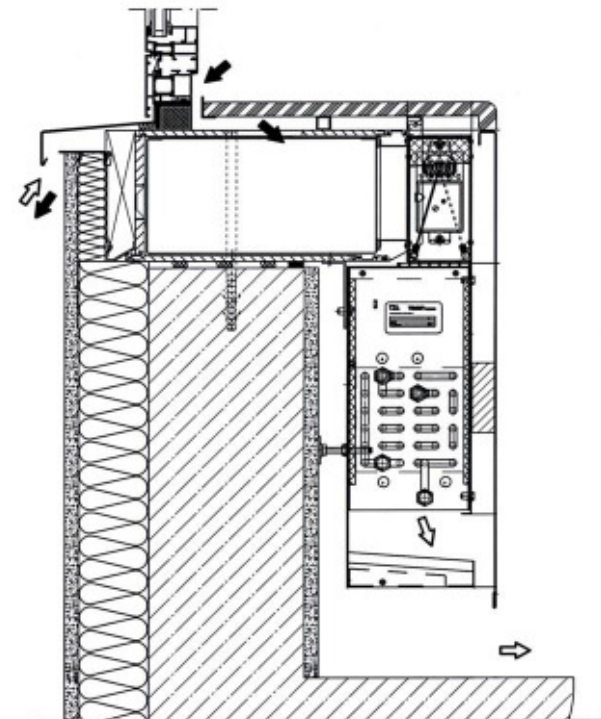
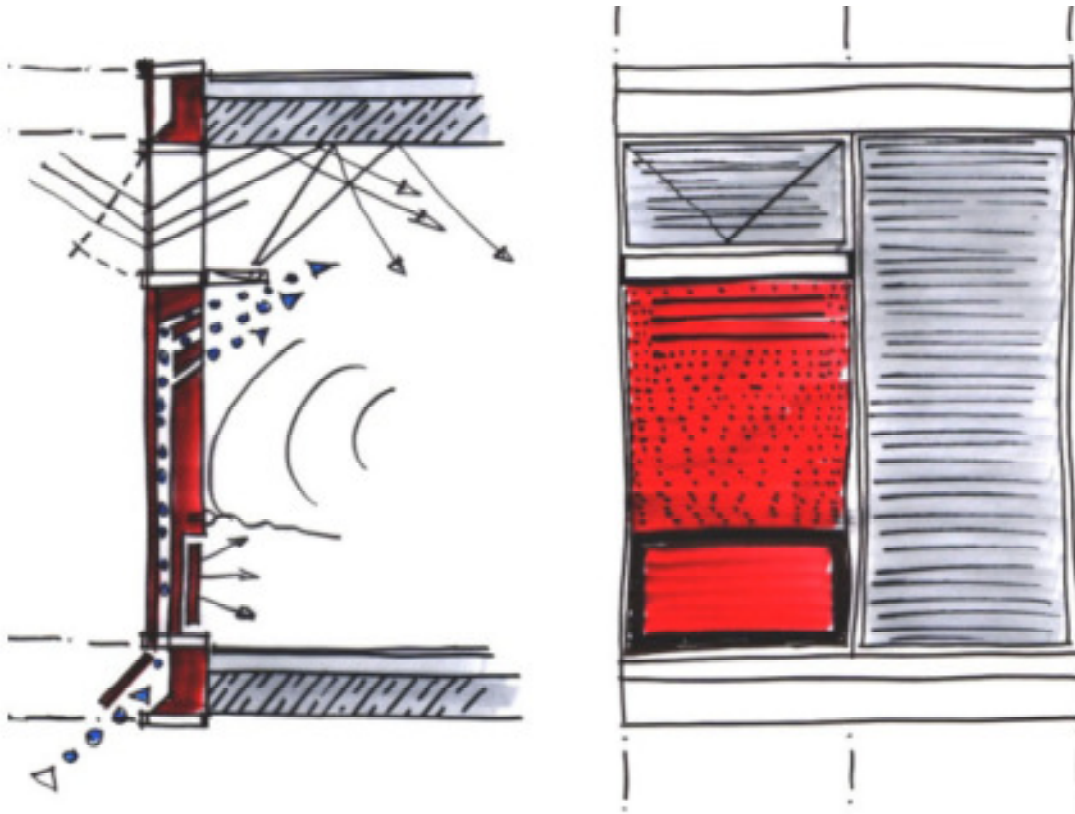


## What are Facade Integrated Ventilation Systems?



## Facade Integrated Ventilation Systems are ...

... ventilation units with acoustic insulation integrated into the outer shell of a building which transport by the shortest route supply air into the room and / or extract air from the room ...



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The art of handling air

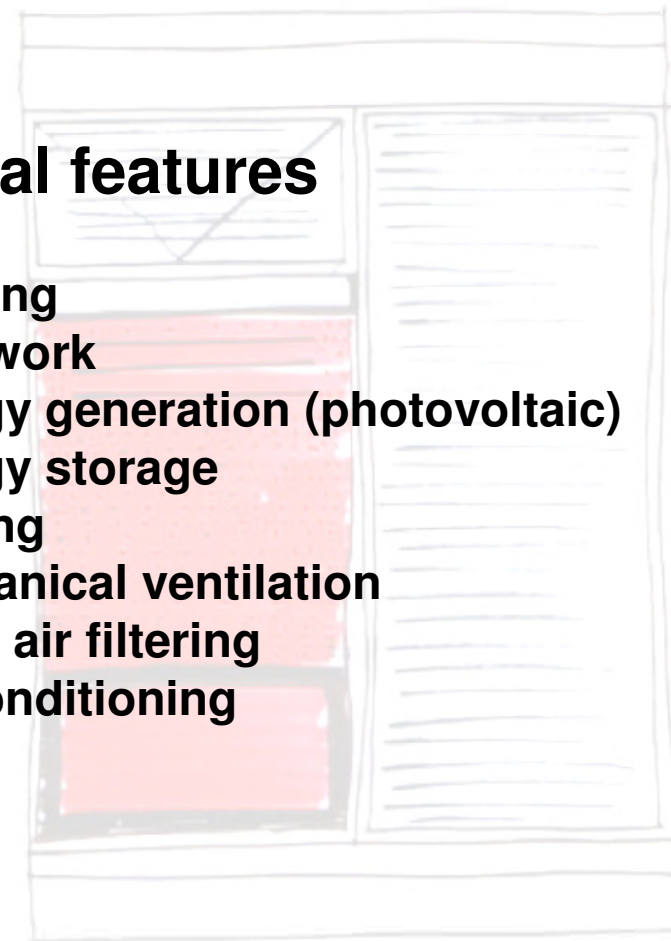
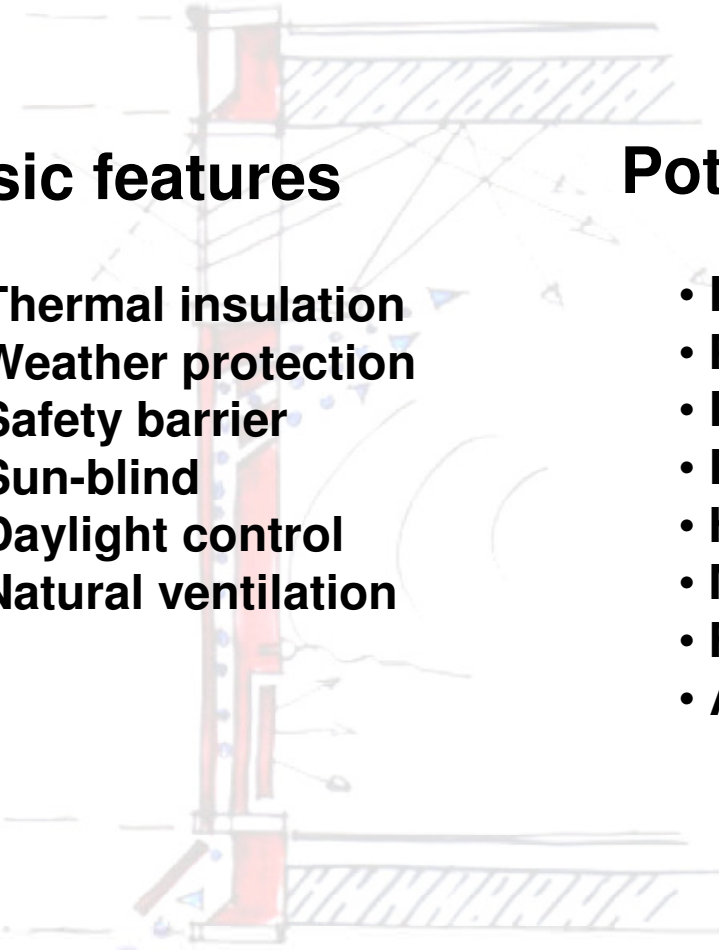
## More and more features in the building envelope - A continuous trend

### Basic features

- Thermal insulation
- Weather protection
- Safety barrier
- Sun-blind
- Daylight control
- Natural ventilation

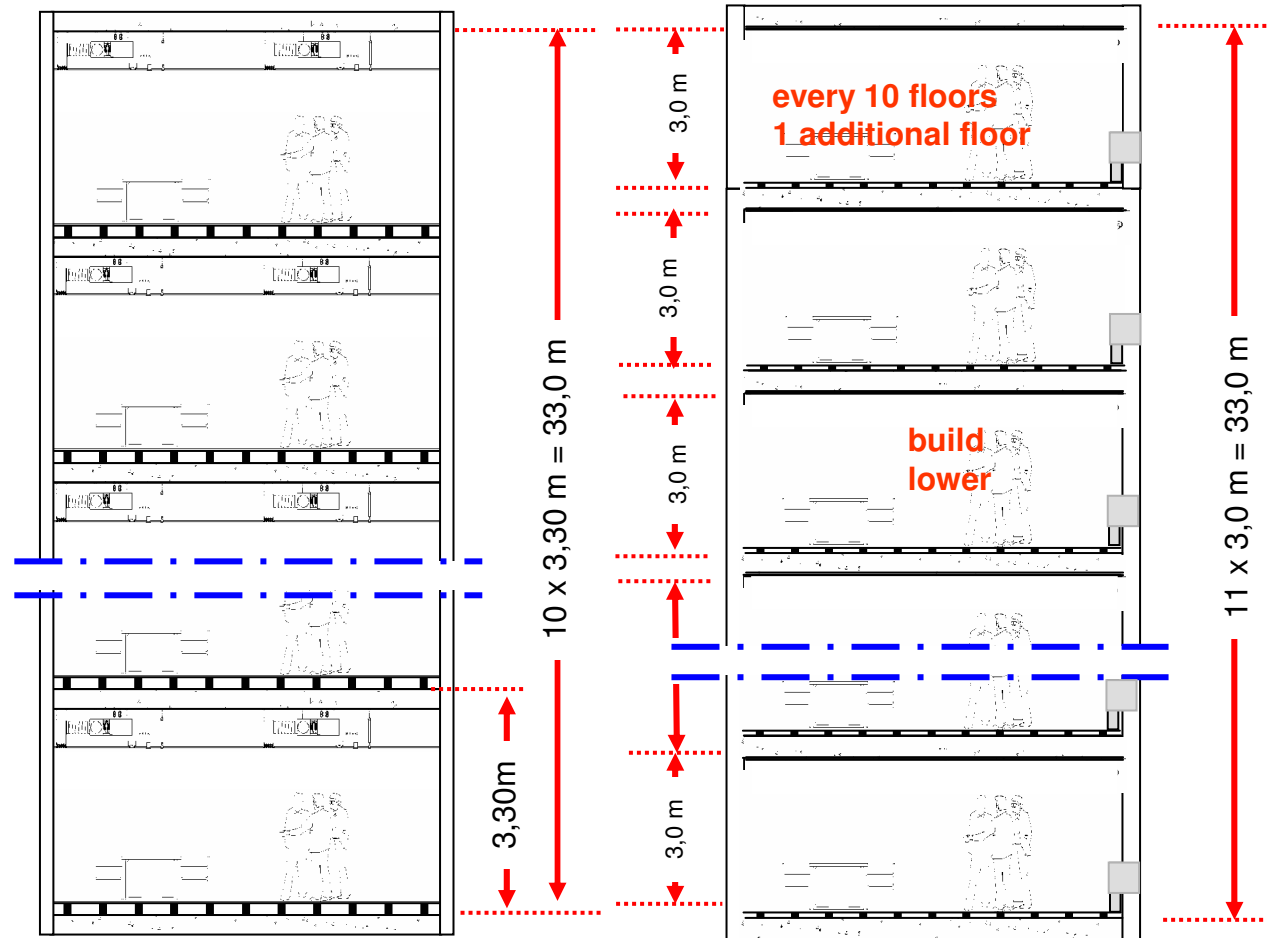
### Potential features

- Lighting
- Pipe work
- Energy generation (photovoltaic)
- Energy storage
- Heating
- Mechanical ventilation
- Fresh air filtering
- Air conditioning

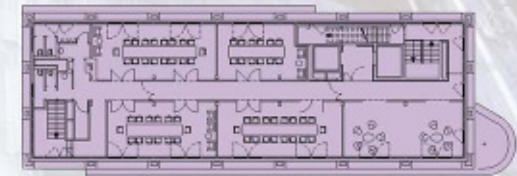
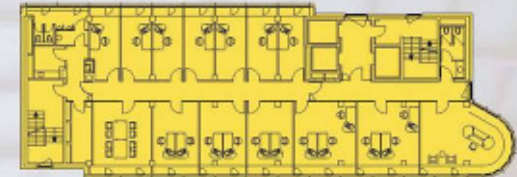
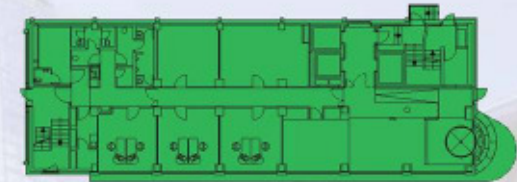
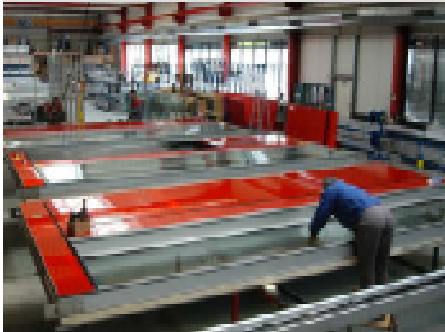


## More and more features in the building envelope - The key benefits

- Reduction of structural height
- Natural thermal cooling and concrete core activation
- Often the only possible way for refurbishments



## More and more features in the building envelope - The key benefits



- **Off-site prefabrication**
- **Plug & play installation**

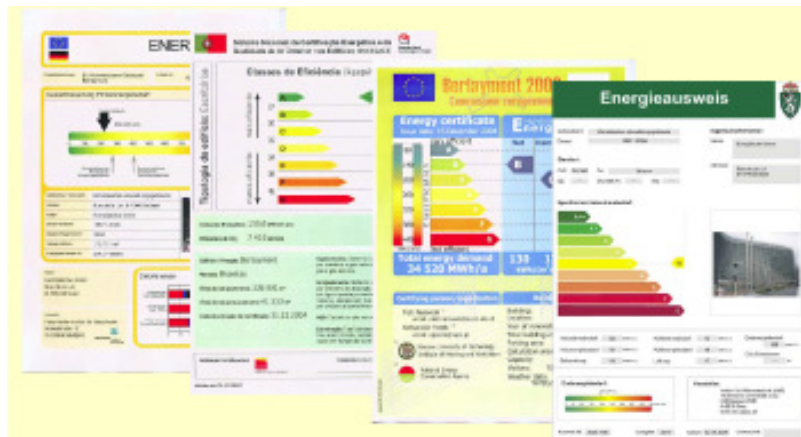
- **Maximum flexibility in utilization and layout**
- **High space efficiency**

# Energy efficiency

## Energy efficiency



↓  
**ENEV**



## Indoor climate / comfort

**EN ISO 7730**

**EN13779**

**EN15251**

## Energy efficiency



(Green building  
rating system)

## DGNB

(Certificate of the Deutsche  
Gesellschaft für Nachhaltiges Bauen)

## Benefits of Green Building

### Environmental benefits:

- Enhance and protect ecosystems and biodiversity
- Improve air and water quality
- Reduce solid waste
- Conserve natural resources

### Economic benefits:

- Reduce operating costs
- Enhance asset value and profits
- Improve employee productivity and satisfaction
- Optimize life-cycle economic performance

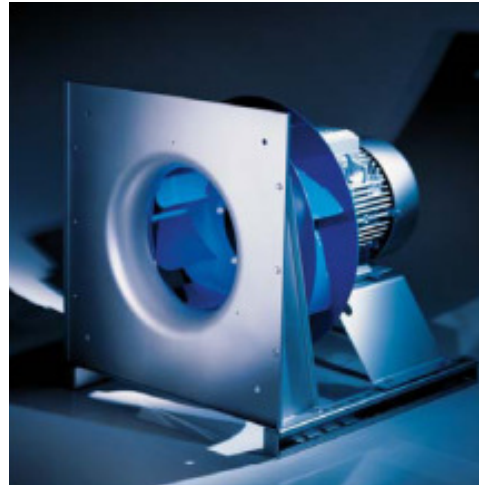
### Health and community benefits:

- Improve air, thermal and acoustic environments
- Enhance occupant comfort and health
- Minimize strain on local infrastructure
- Contribute to overall quality of life



## More and more features in the building envelope - The key benefits

- Low operational costs by means of load dissipation with water and minimized air distribution energy
- High savings potential due to cut-off during non service periods



standard specific fan power  
(SFP) 1500 – 3000 W/(m<sup>3</sup>/s)



specific fan power (SFP)  
previous: 600...1400W/(m<sup>3</sup>/s)  
now: 250...600 W/(m<sup>3</sup>/s)

Limit value according to EN 13779:  
SFP4 = 1250...2000 W/(m<sup>3</sup>/s)

- High degree of acceptance by the user owing to individual adjustment and windows that can be opened



## Maintenance

# Cheaper than expected!

### Just...

- Change the filter
- Clean the condensate tray if necessary
- Control the functions

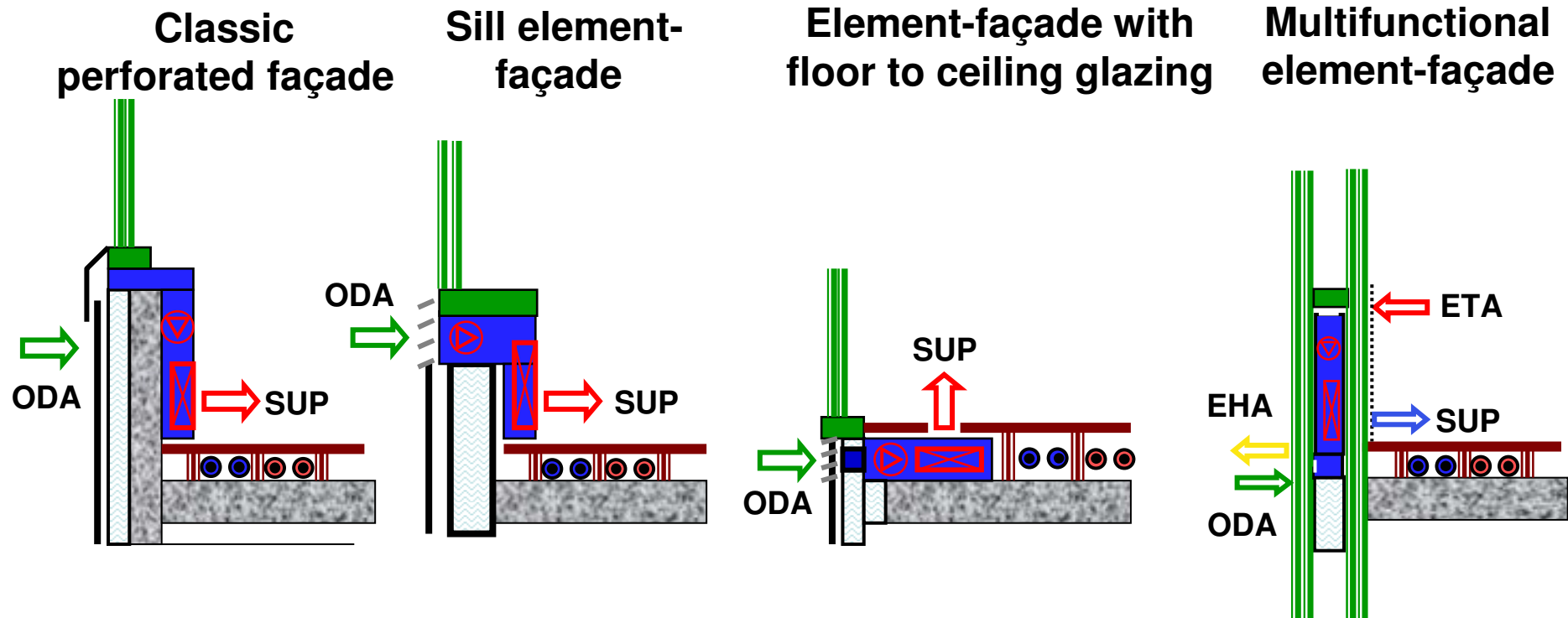
### Save on...

- Cleaning the whole ductwork
- Control all the fire dampers
- Shutting down the whole ventilation system for hours



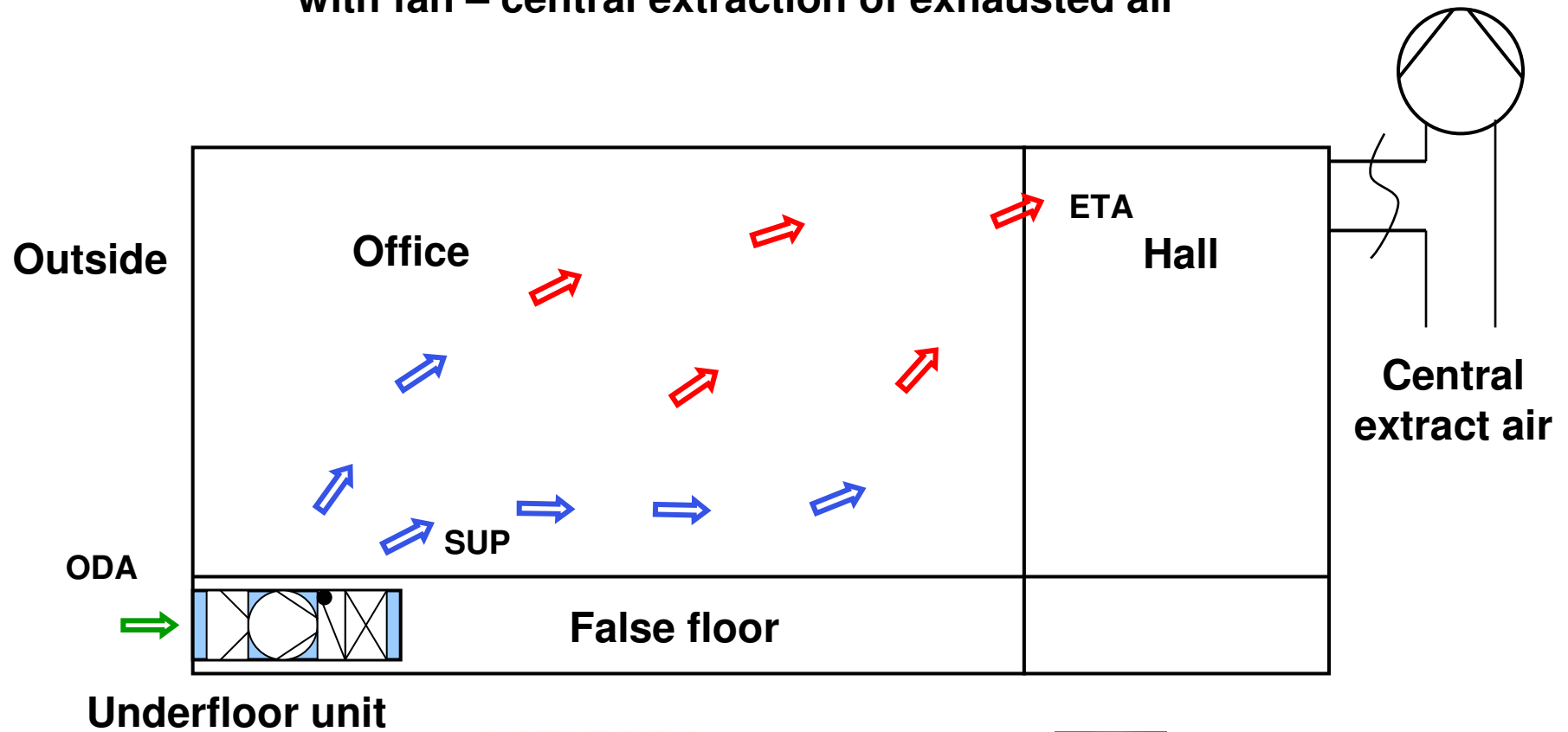
**Maintenance cost are on the same level!**  
(compared to a central ventilation system)

Designs



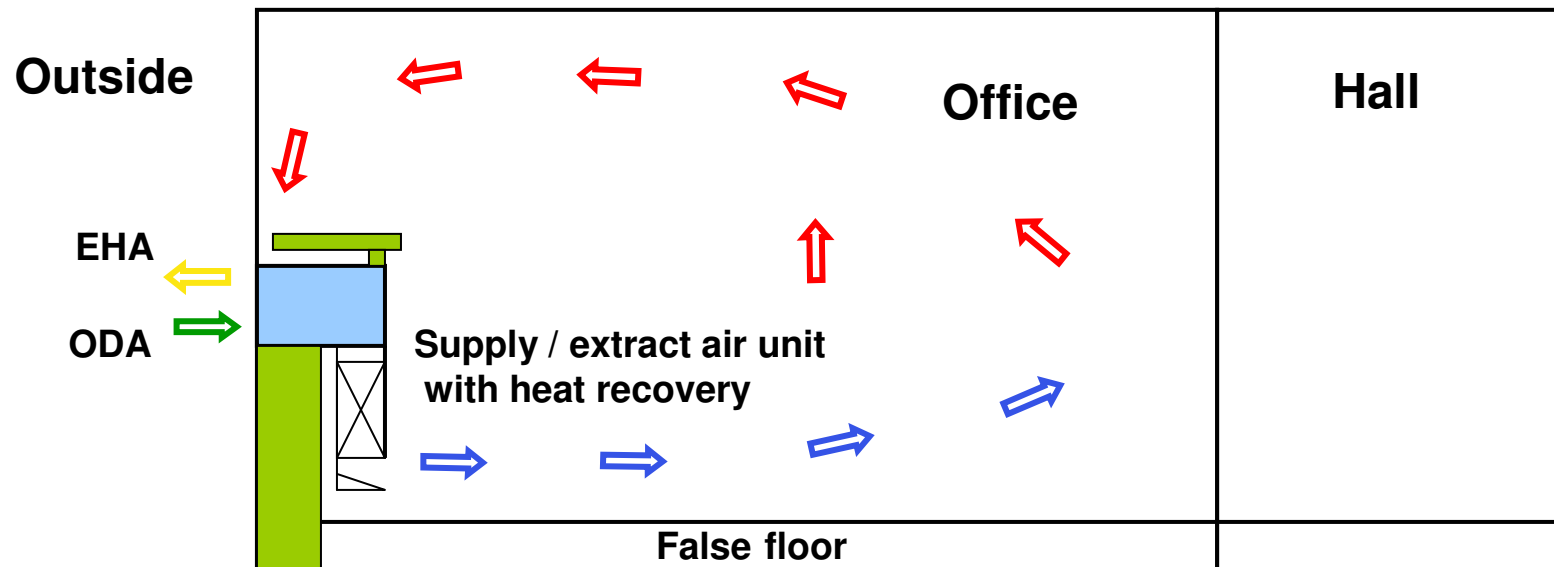
Concept 1

**Decentralized air supply through underfloor/sill units with fan – central extraction of exhausted air**



Concept 2

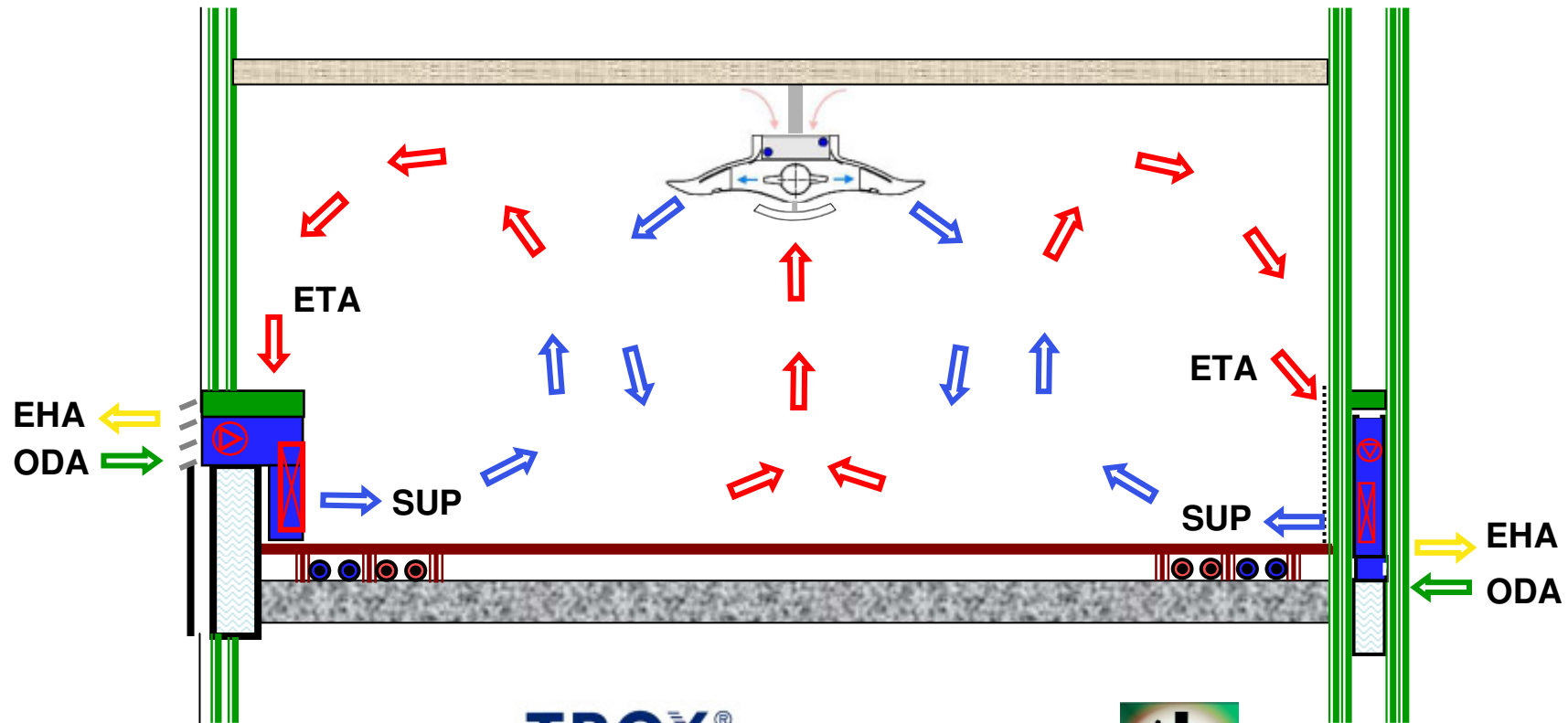
**Decentralized air supply and transport of extract air with underfloor / sill units with two fans**



Concept 3

Open Space Offices

Perimeter zone with decentralized ventilation units of different configurations  
 Core with air-water-systems – e. g. ComBeam

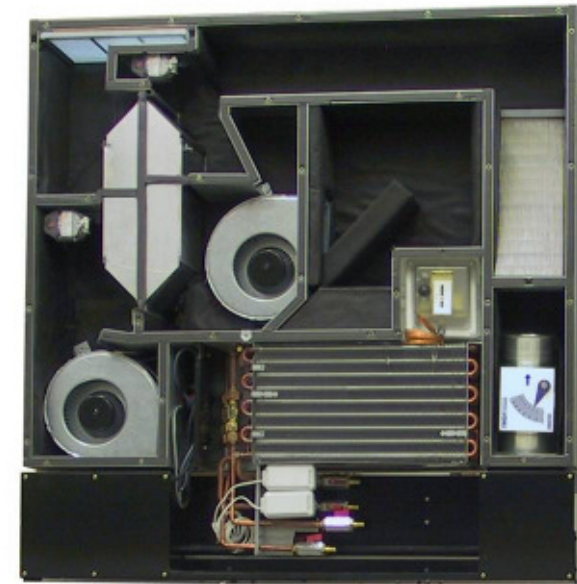
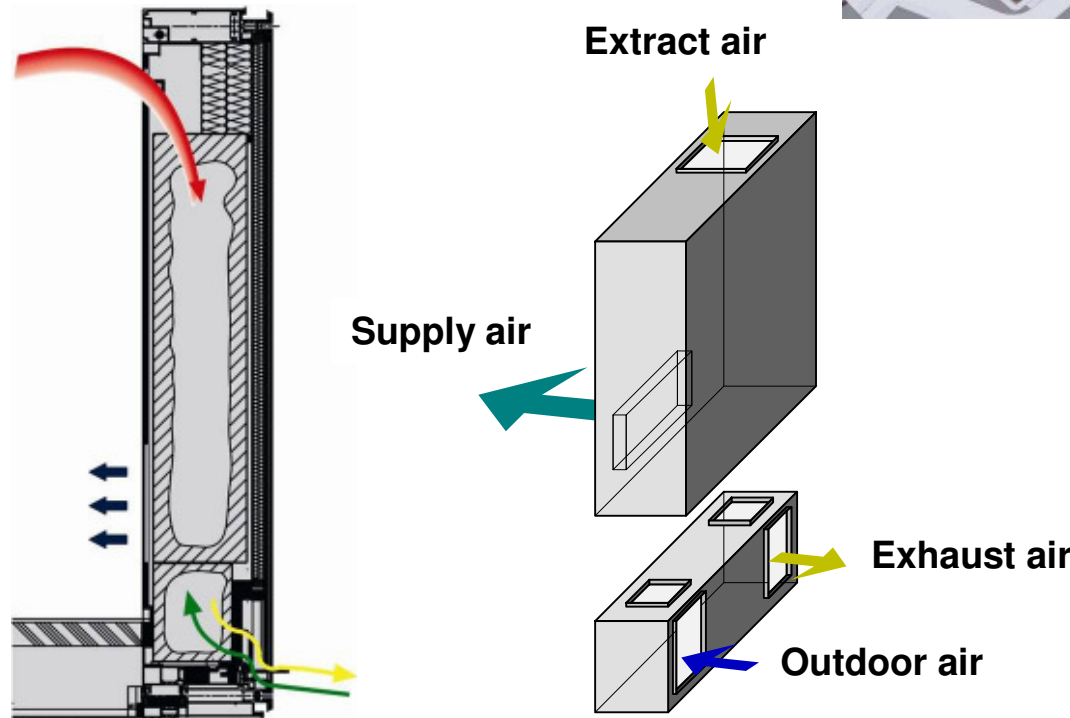
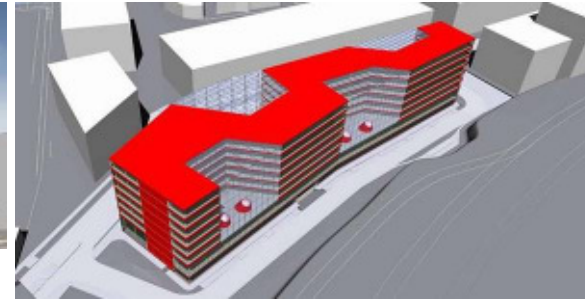


## Limits of application

### **Decentralized ventilation technology is not recommended for:**

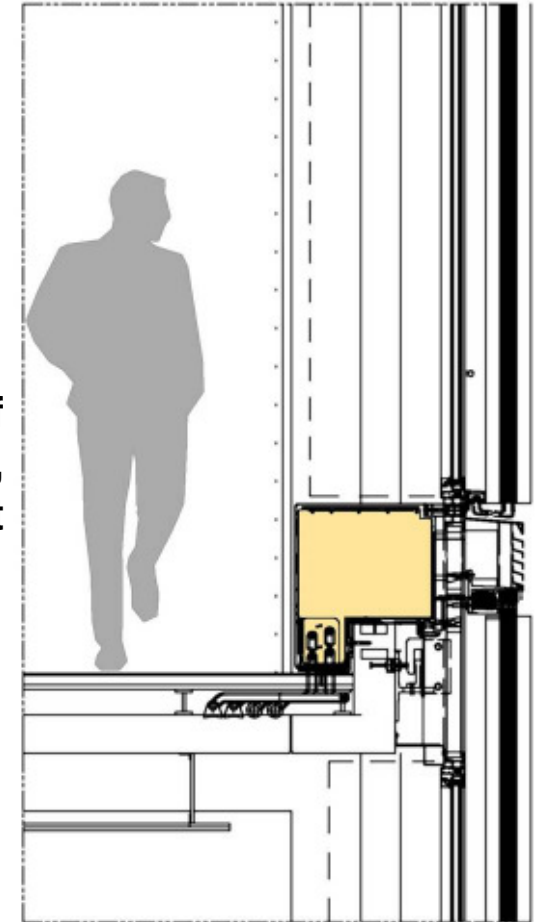
- **Rooms with a required constant relative air humidity**
- **Clean rooms**
- **Rooms with high people frequency and low facade space**
- **Inside rooms and rooms with room depths > 6 m**

# Capricorn in Düsseldorf - An excellent example for a façade integrated design

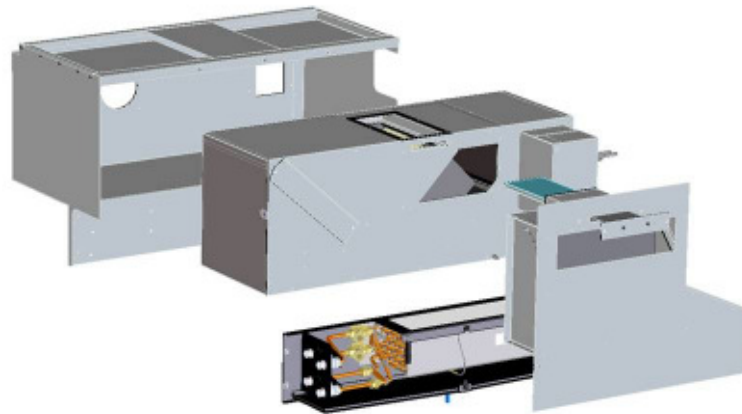
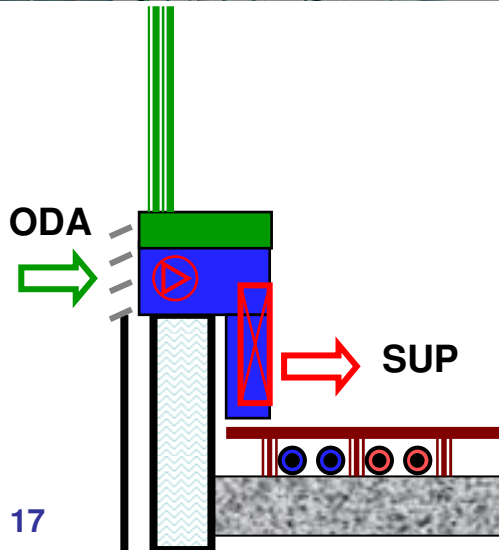




# Laimer Würfel in Munich - A brilliant example for modular design



**Modular design consisting of  
module casing, function box,  
thermal switch and coil unit**



**TROX® TECHNIK**  
The art of handling air



# Lighttower in Frankfurt - A brilliant example for a refurbishment

