VENTILATION

assembled by: Gyula Dési

15th of September 2017

VENTILATION

1. Vocabulary:

- **Air:** colourless, odourless gas mixture (N_2,O_2,CO_2,H_2+gázok)→**always humid**

- **Characteristic values of air:**

  absolute pressure = 1.013×10^5Pa

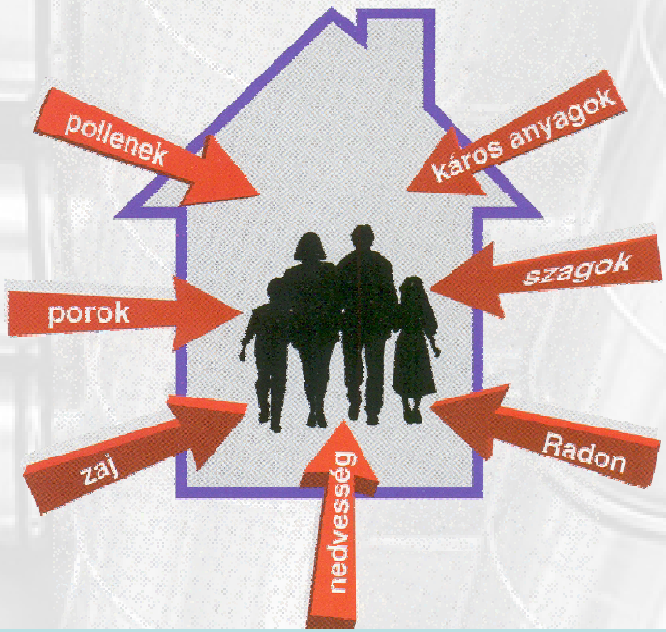
  degree of relative humidity

  φ = …%

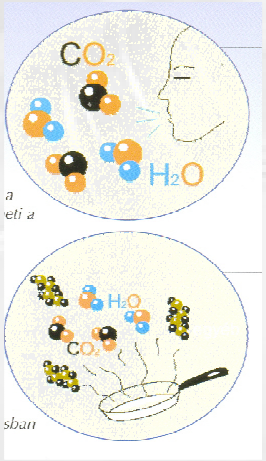
  saturated air: can not absorb more humidity / water

  φ = 100%

  CO_2 content



Effects on a room: pollen, dust, Radon, humidity, smells, evaporating harmful materials from furniture, …etc.



Breathing:

CO_2 + H_2O

Cooking, drying, plants:
H_2O + (odour)

Why do we have to speak about ventilation?:

a) It needs a lot of space: engine room …

1.

2.

Why do we have to speak about ventilation?:

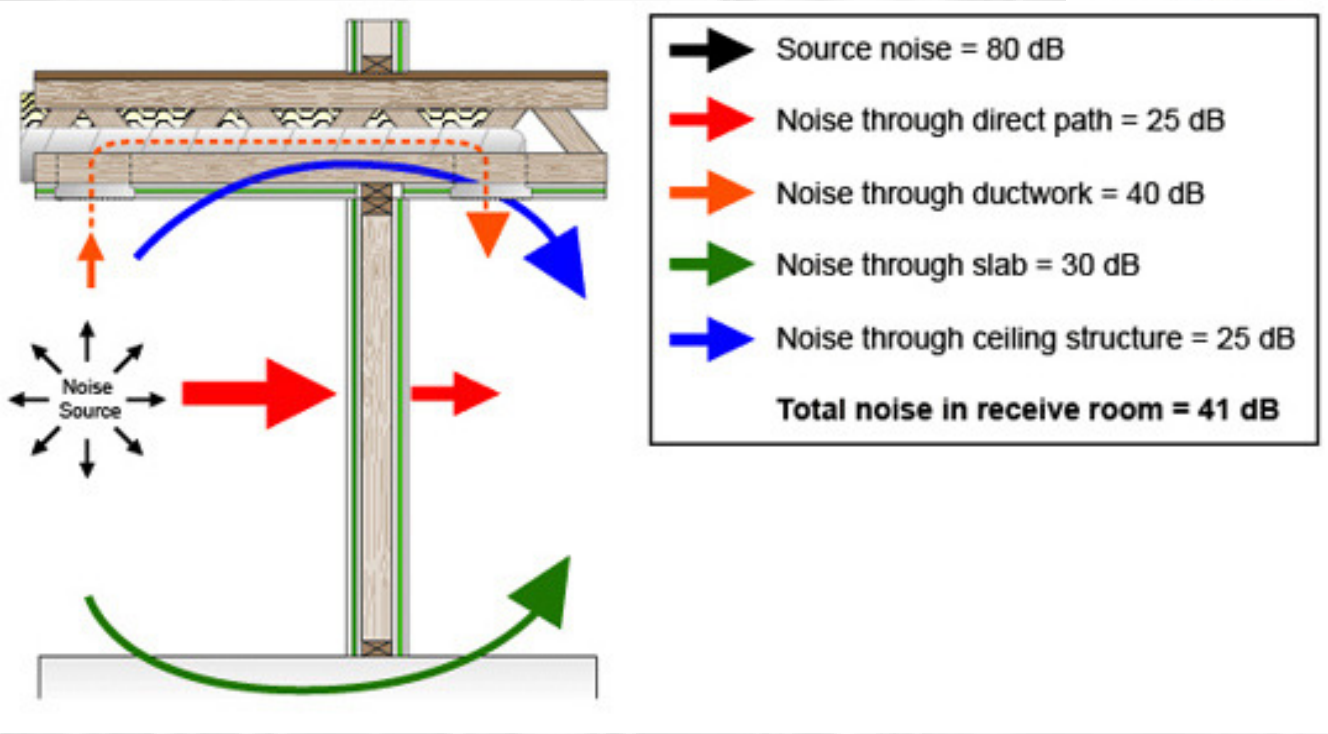
a) **… and clear height for air ducts.**

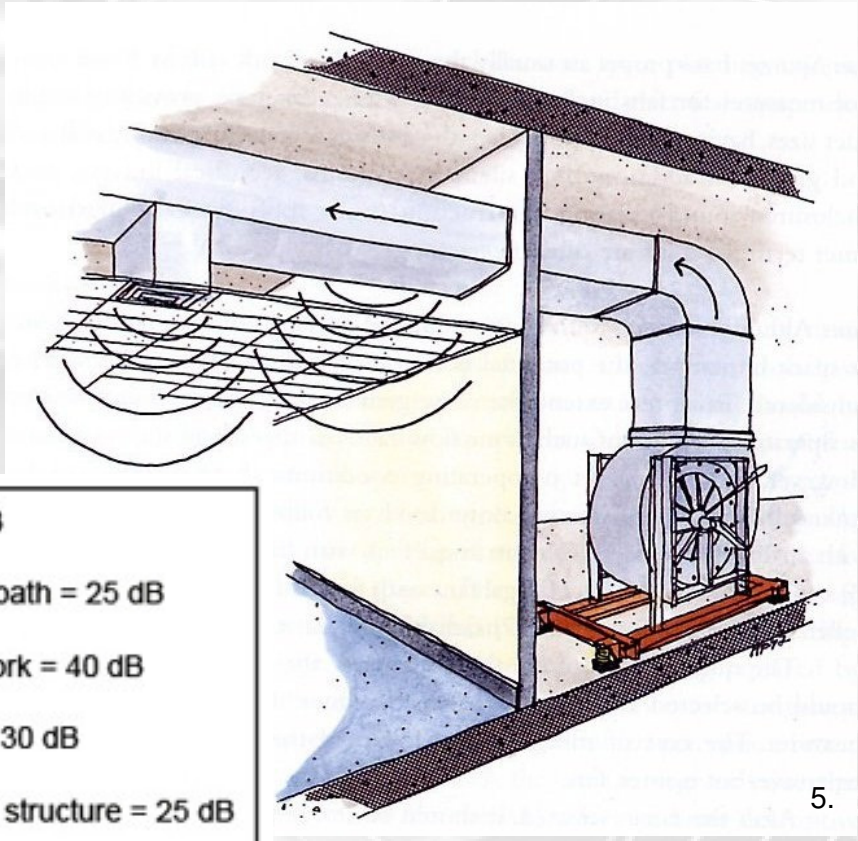
3.

Why do we have to speak about ventilation?:

b) mostly noisy (it may disturb the neighbouring functions)

4





5.

Why do we have to speak about ventilation?:

b) mostly noisy (it may disturb the neighbouring functions)

Noise reduction in the ventilation room – noise absorbing cover

vibration insulation at the support of the ventilation plant

Why do we have to speak about ventilation?:

b) mostly noisy (it may disturb the neighbouring functions)

noise absorbing vent pipe

vibration insulation in vent duct

Why do we have to speak about ventilation?:

c) above the ground / on the building it is visible, we have to plan it.

6.

Kitchen_NewYork_www.masterfireprevention.com

Why do we have to ventilate?

1)

- **Human body and clothes**

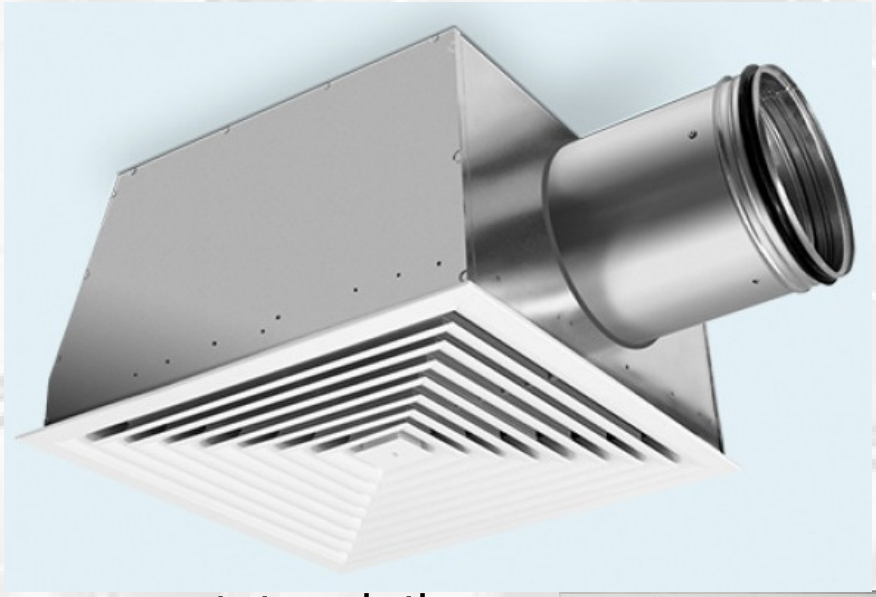
  →less O_2, more CO_2

  → increasing relative humidity

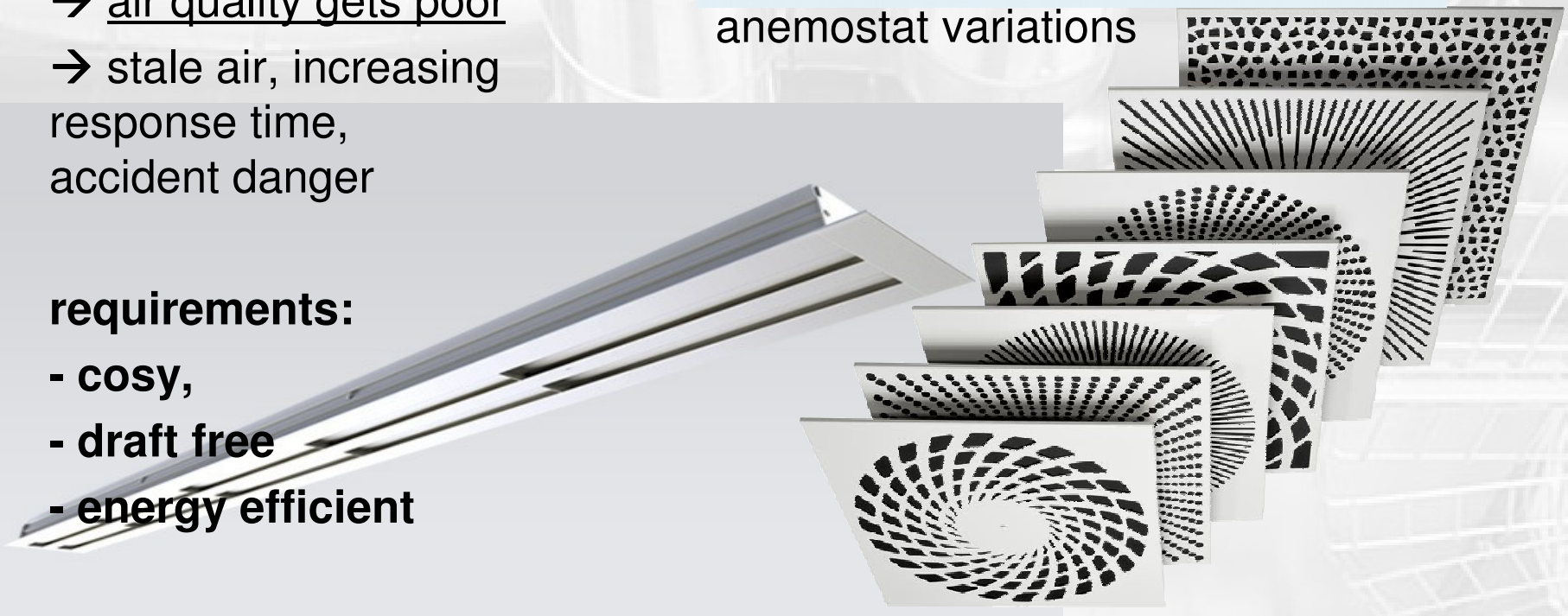
  → more dust

  → <u>air quality gets poor</u>

  → stale air, increasing response time, accident danger



anemostat variations



- **requirements:**

  - cosy,

  - draft free

  - energy efficient

Why do we have to ventilate?

2)

- **Human activity – smells, smoke, vapour / steam**

  → kitchen (restaurant)

  → smoking

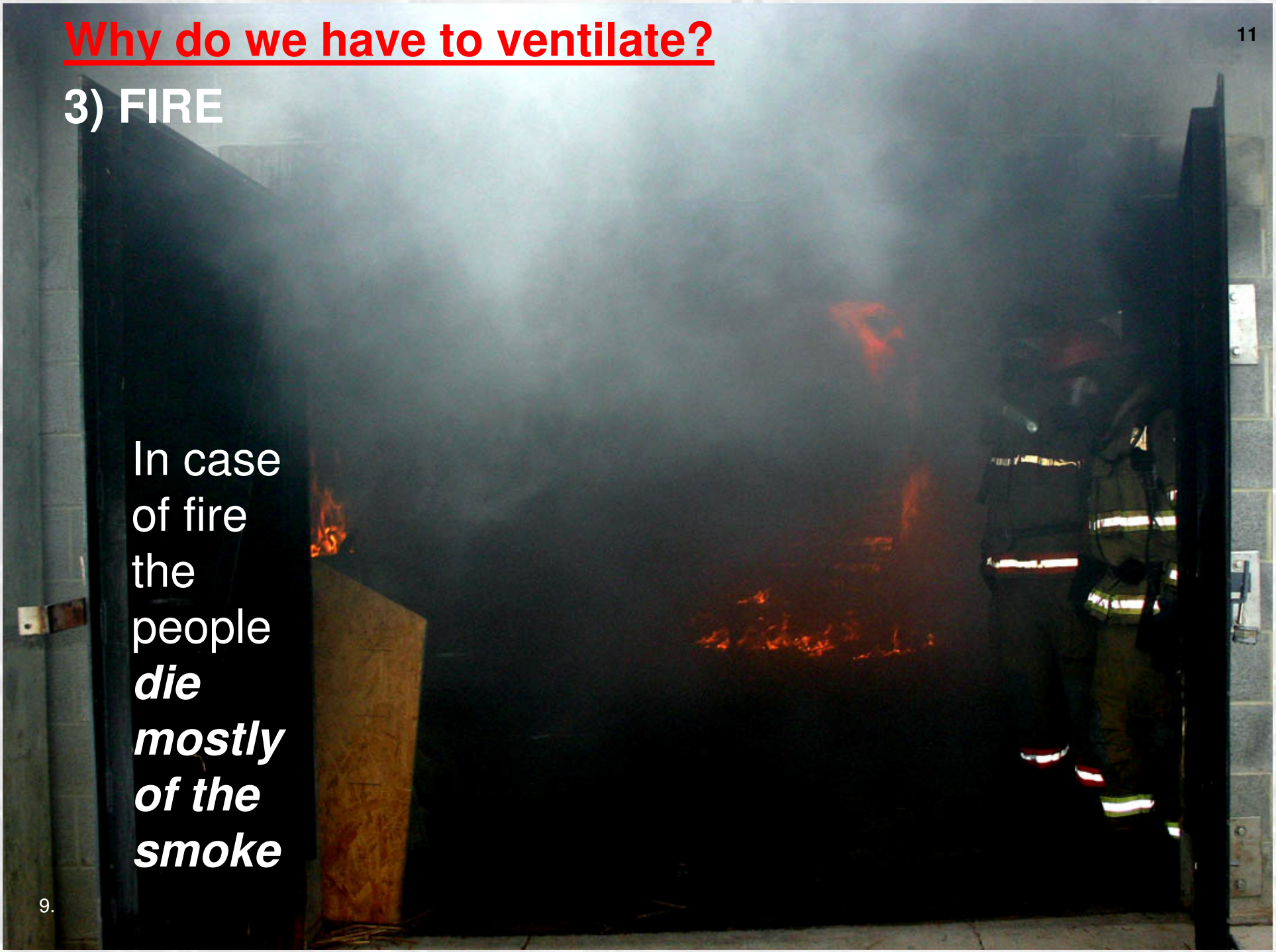
8.

7.

Much higher amount of air has to be changed

Why do we have to ventilate?

3) FIRE



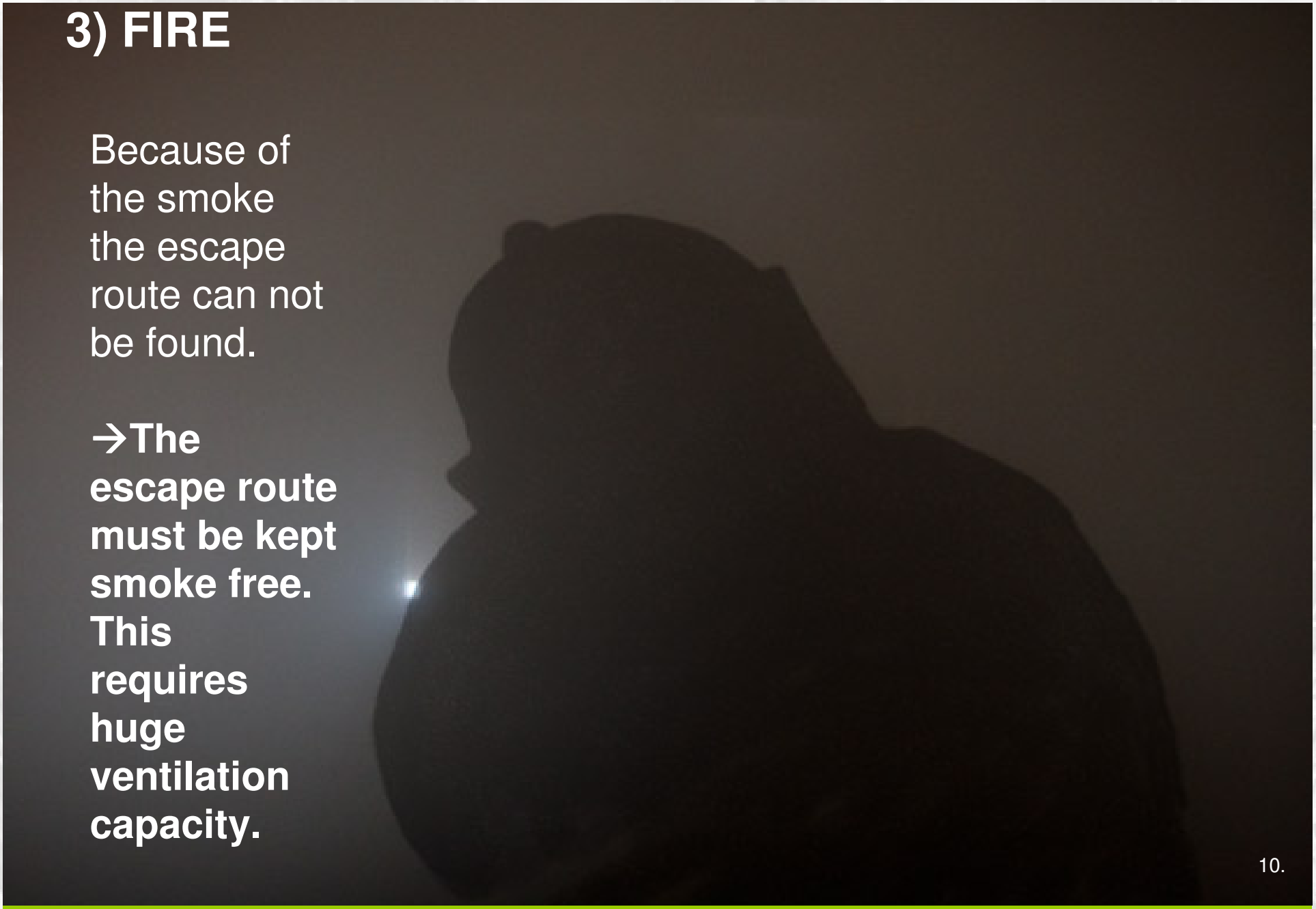
In case of fire the people ***die mostly of the smoke***

Why do we have to ventilate?

3) FIRE

Because of the smoke the escape route can not be found.

→The escape route must be kept smoke free. This requires huge ventilation capacity.



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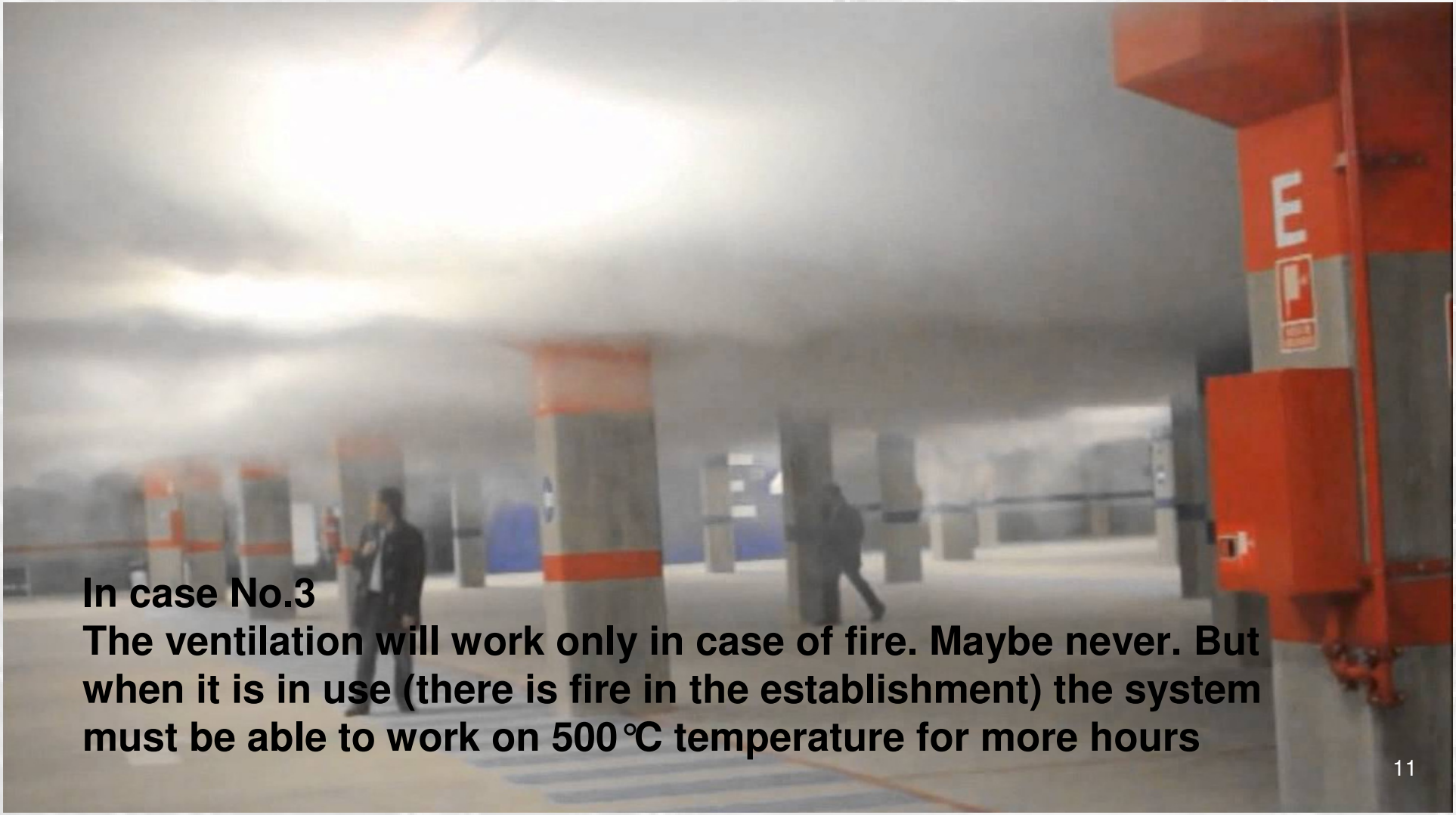
In case No.1 and No.2

- (when the establishment operates) the ventilation will work continuously. Can be controlled by measuring the air quality.



In case No.3

The ventilation will work only in case of fire. Maybe never. But when it is in use (there is fire in the establishment) the system must be able to work on 500℃ temperature for more hours

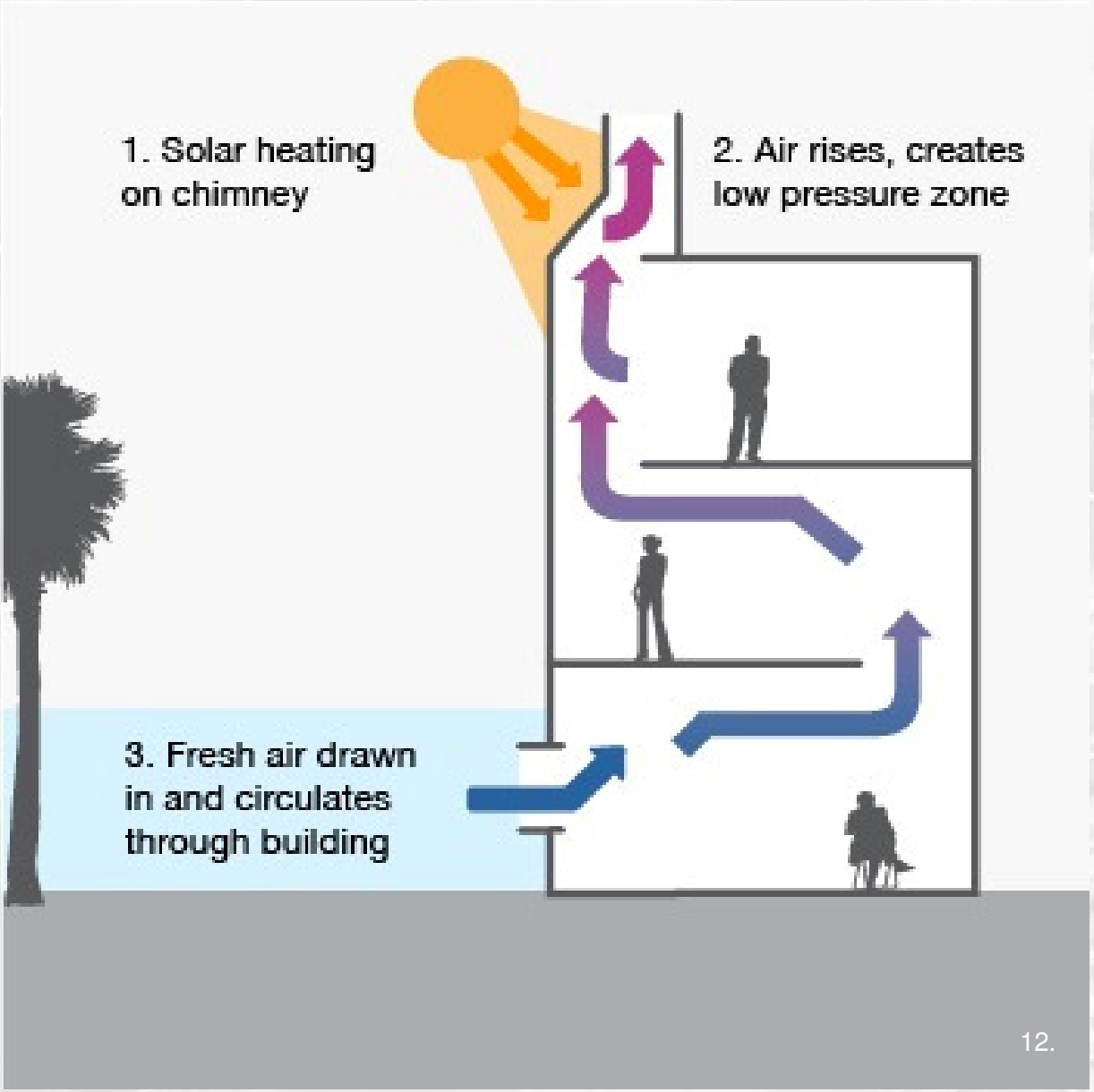
How?

Theoretically it would be possible to ventilate the area by natural way, but:

- What, if there is no sunshine during the day?

- What is during the night?

- What, if the temperature inside and the temperature outside are very different?

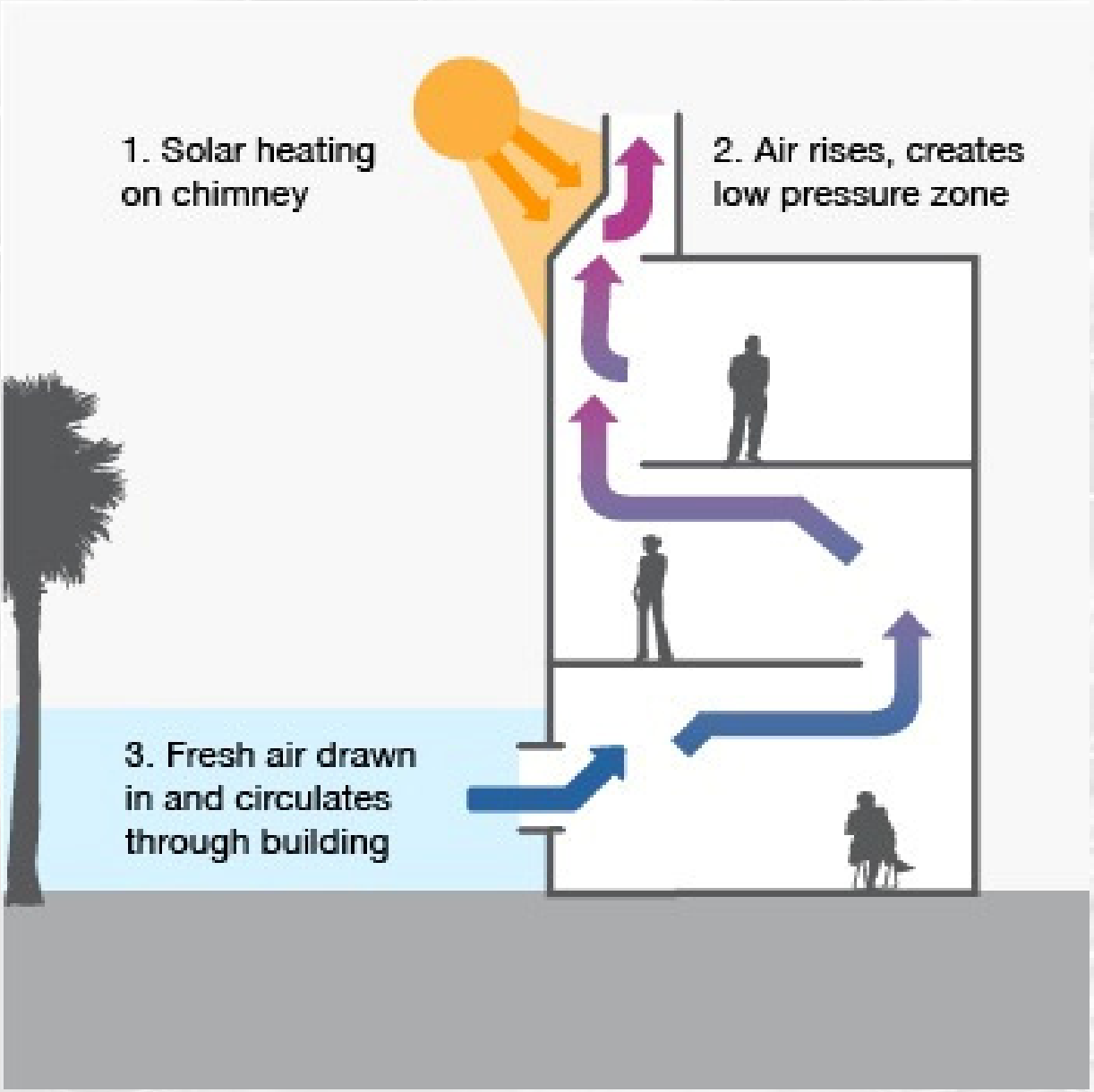


12.

How?

During the cold period of the year this system works. (You heat inside anyway, so there will be the necessary temperature-difference for the airstream.)

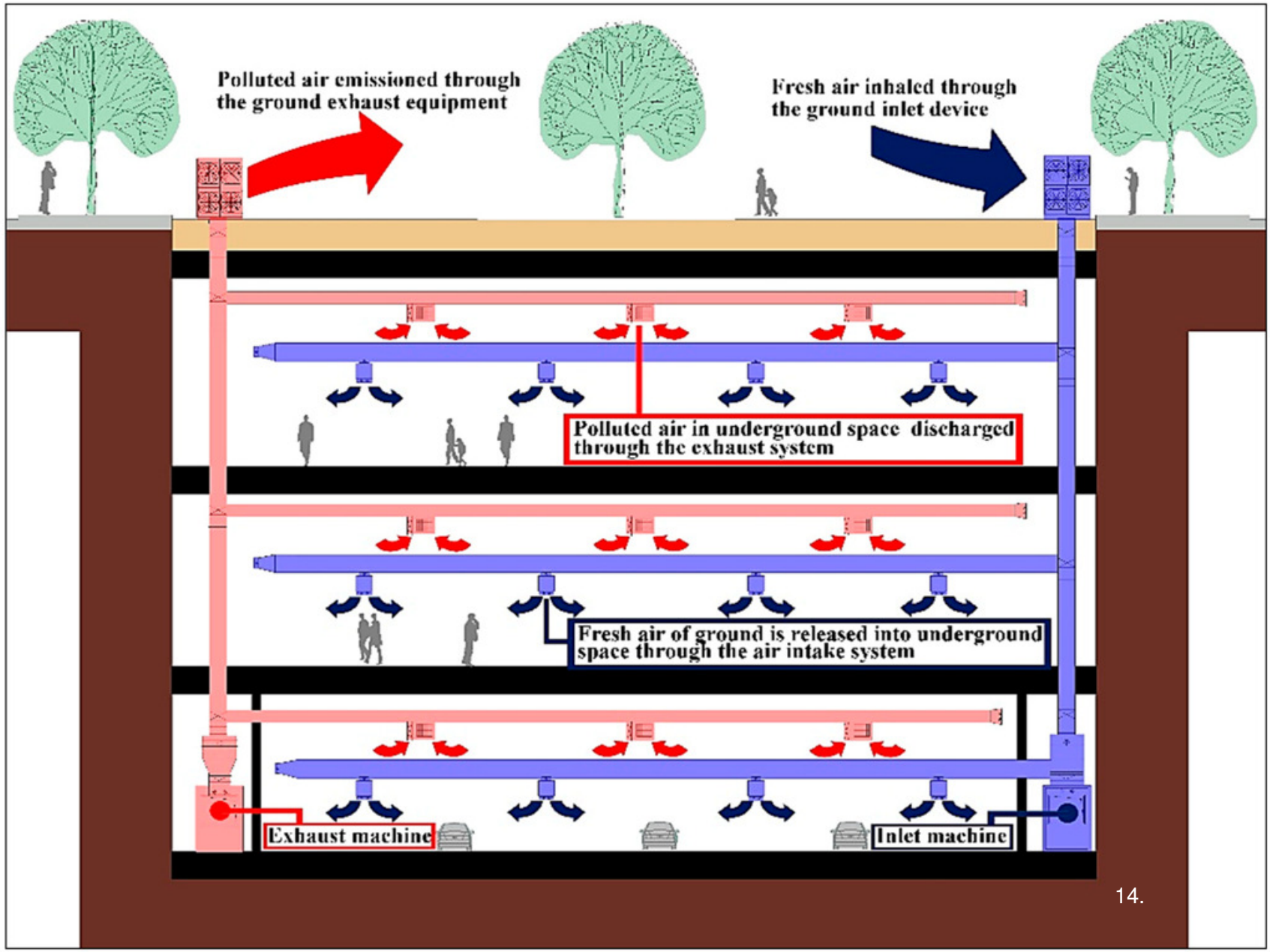
! You let in cold air, you have to heat it up, at the same time you waste the energy with the blown out (warm) air.



How?

So we may need artificial ventilation.

VENTILATION – in the past



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Today the inlet machine and the exhaust machine **is at the same place** in one unit.

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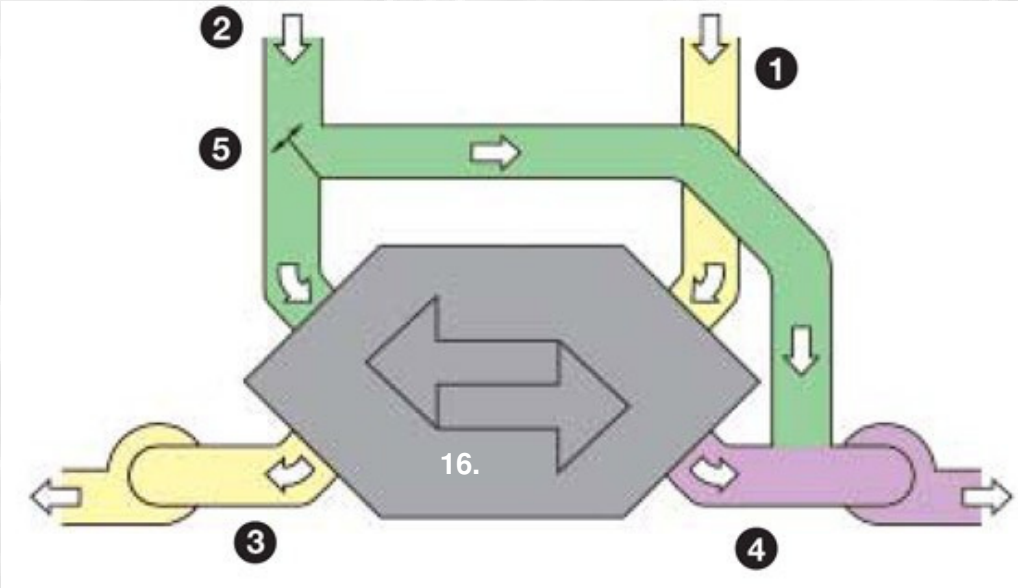
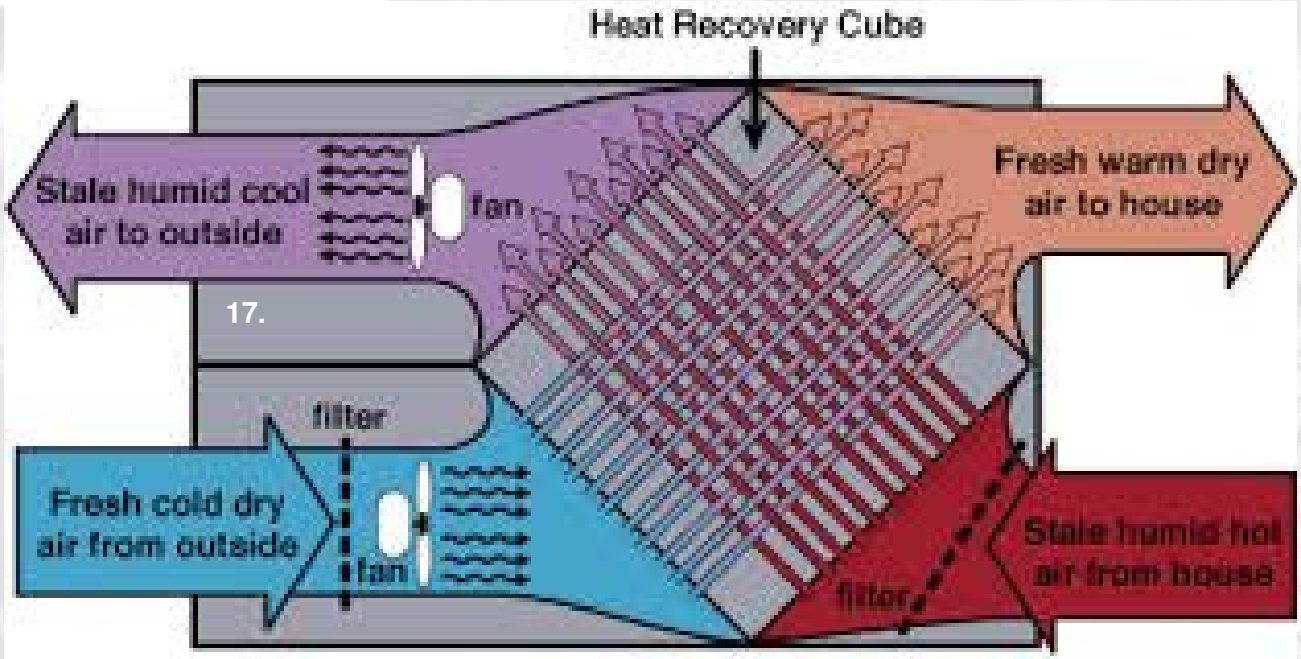


Green: incoming fresh air
Yellow: stale air

working method of the heat exchanger



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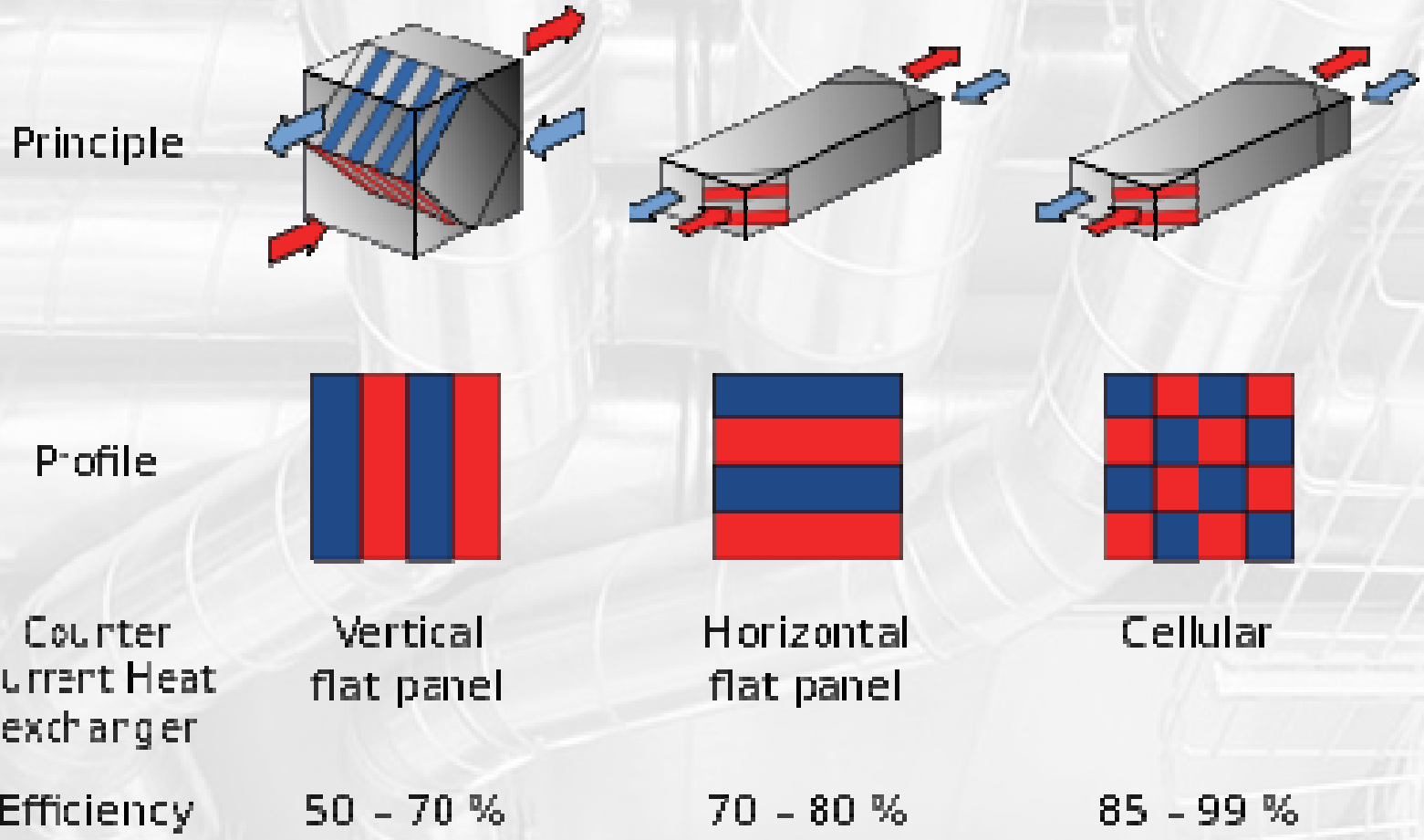
We can spare most of the heat energy of the exhaust air



Preheating – pre-cooling

You will plan to excavate a huge pit. You can use than the heat stored in the soil to preheat or pre-cool the incoming air. This can help a lot to decrease further the energy consumption.

Before coming into the building the air can be filtered, cleaned.

VENTILATION

19.

How to drive the fresh or stale air? By pipes?

VENTILATION

VENTILATION

How to drive the fresh or stale air? By pipes?

- Pipe goes everywhere, where ventilation is needed

- the air speed and temperature can be planned and controlled

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How to drive the fresh or stale air? By pipes or

- the system can be hidden, covered by suspended ceiling.

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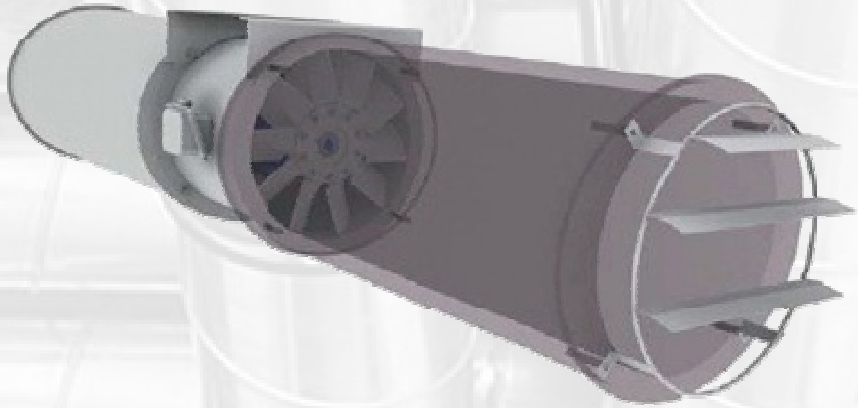
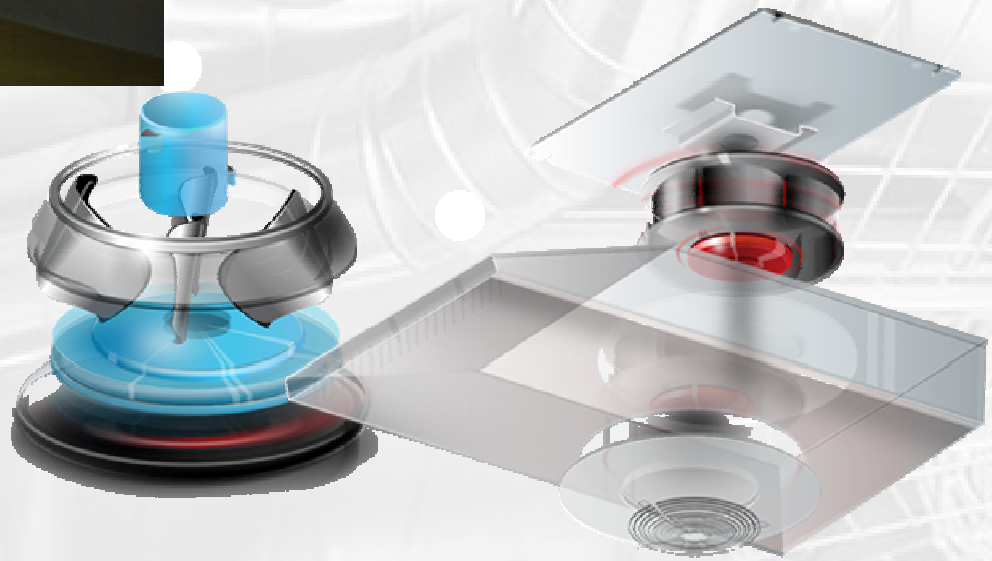
How to drive the fresh or stale air? Sometimes without pipes



VENTILATION

How to drive the fresh or stale air? Sometimes without pipes



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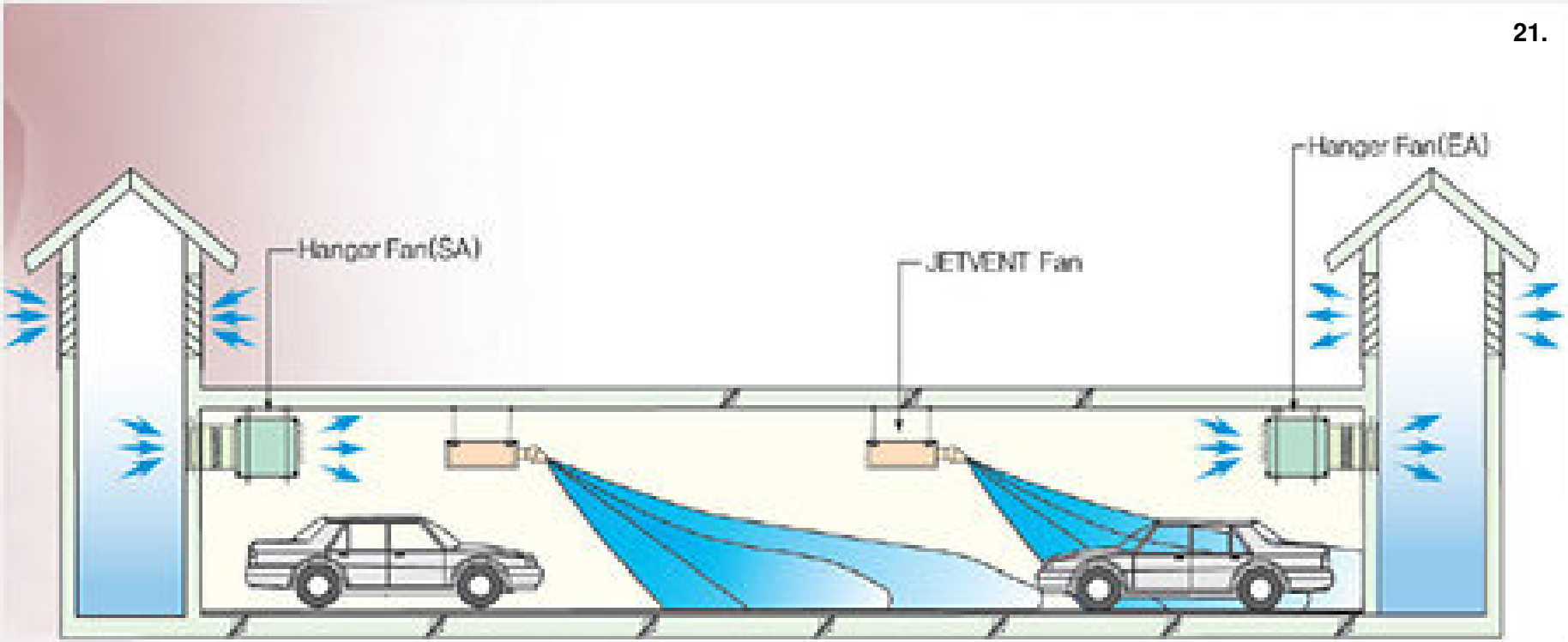
You drive the pipe or plan the air stream.

21.



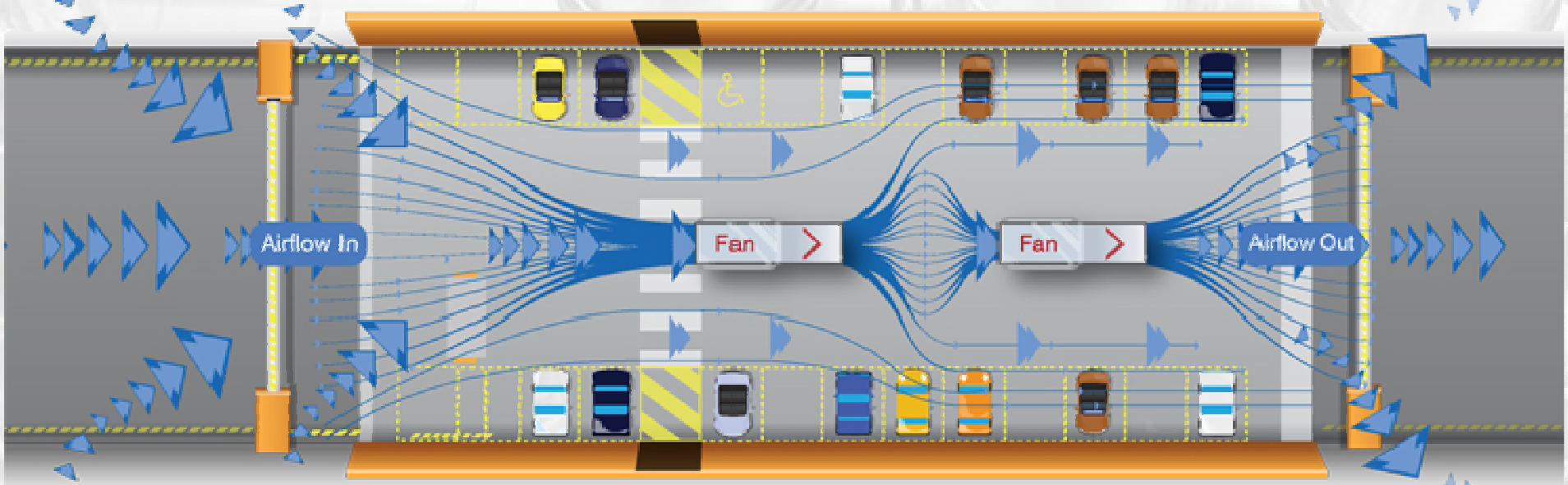
〈Fig 1〉 System Flow

The air quality can be examined to control the ventilation system, control the air amount and air speed.

VENTILATION

You drive the pipe or plan the air stream.

22.

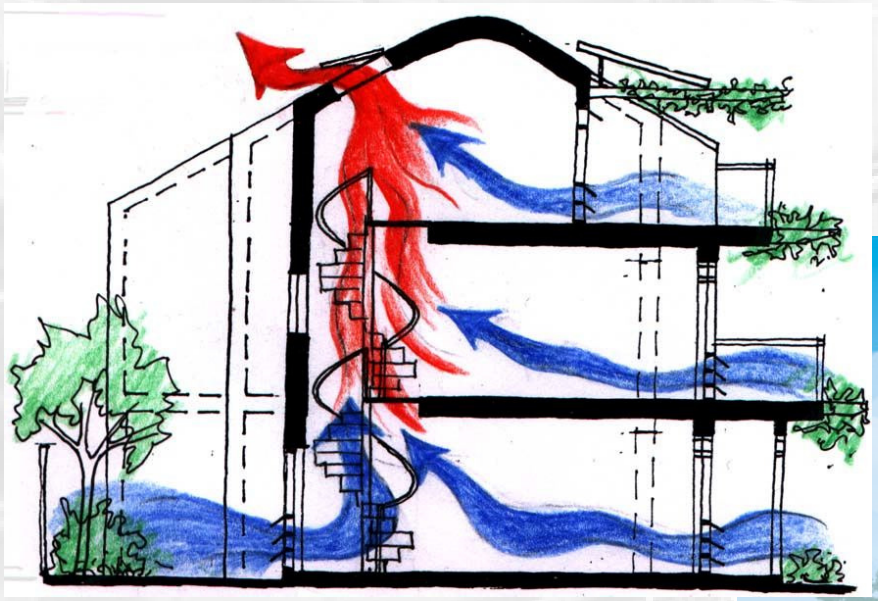


The jetvent system is used mostly in large underground area. It coses sometimes – uncomfortable - draft. In public walkway it can be acceptable. Where the people sit down for some reason we do not use.

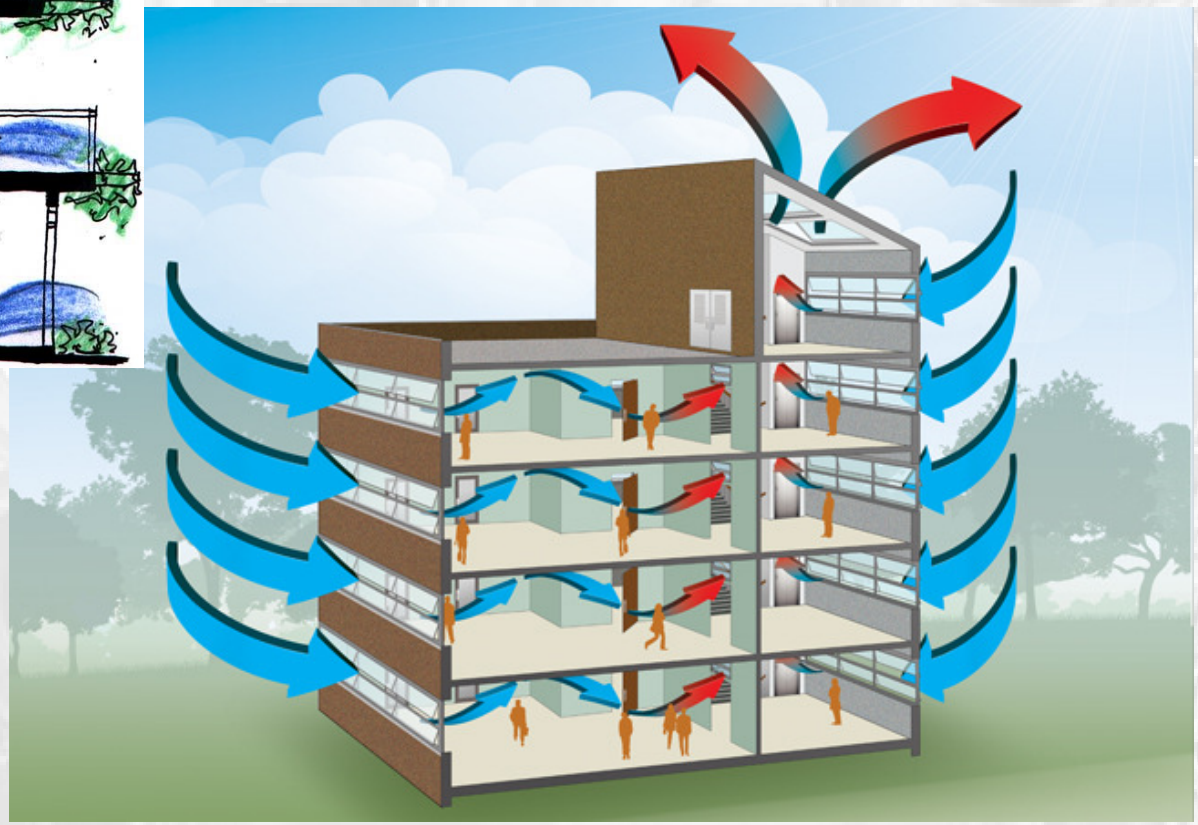
VENTILATION

You plan the air stream.

Enedi AIR VENTI_4.jpg.



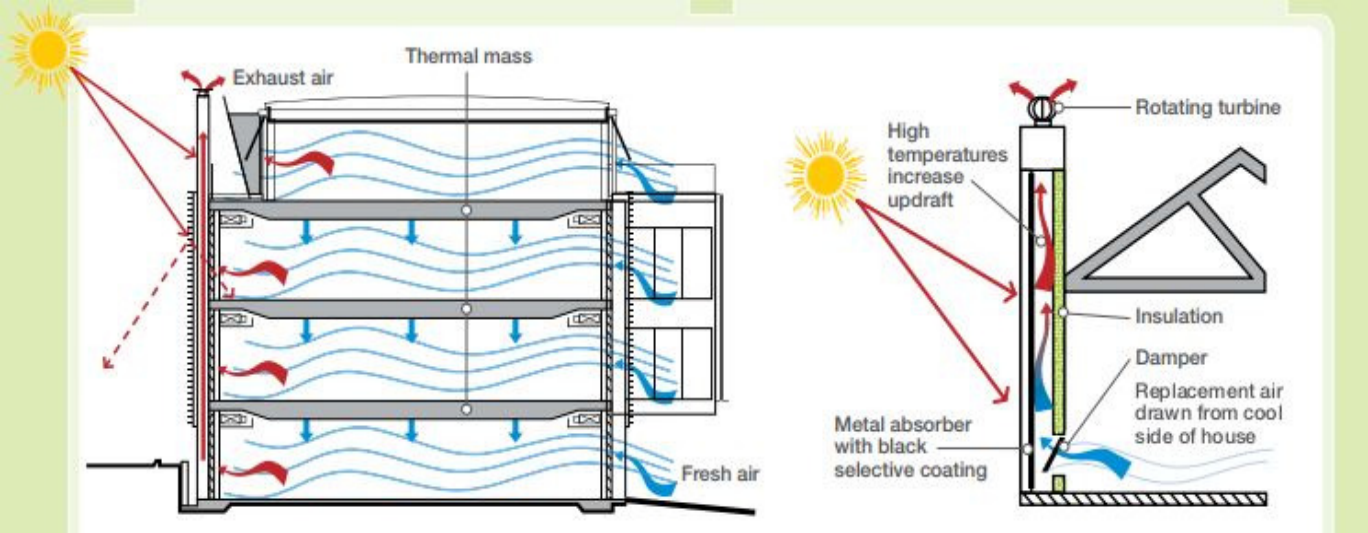
SIVA Builders - natural-ventilation



„Easy” to arrange the natural ventilation when there is no high temperature-difference between the interior and exterior.

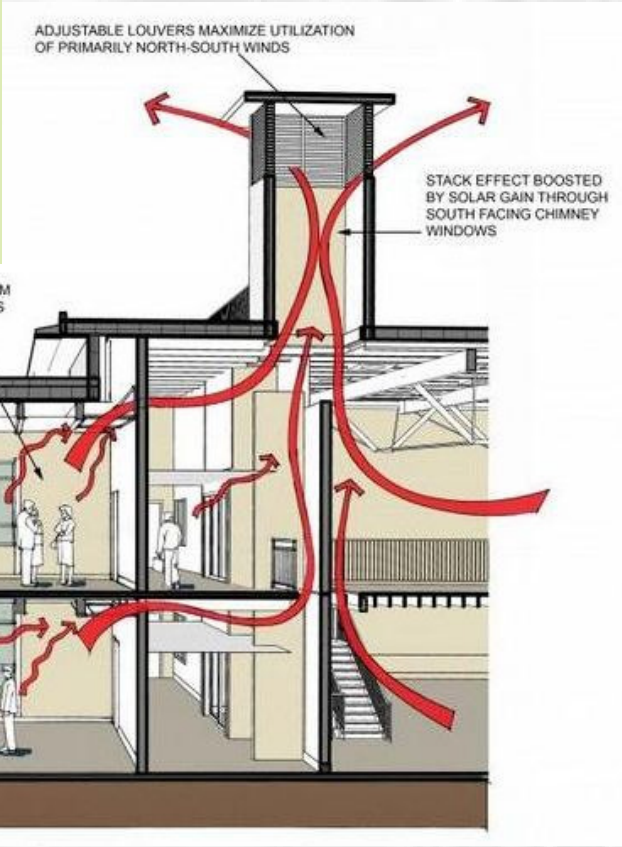
VENTILATION

You plan the air stream.



Marcy Wheeler natural ventilation

okanagan-college-centre_www-okanagan-bc-ca

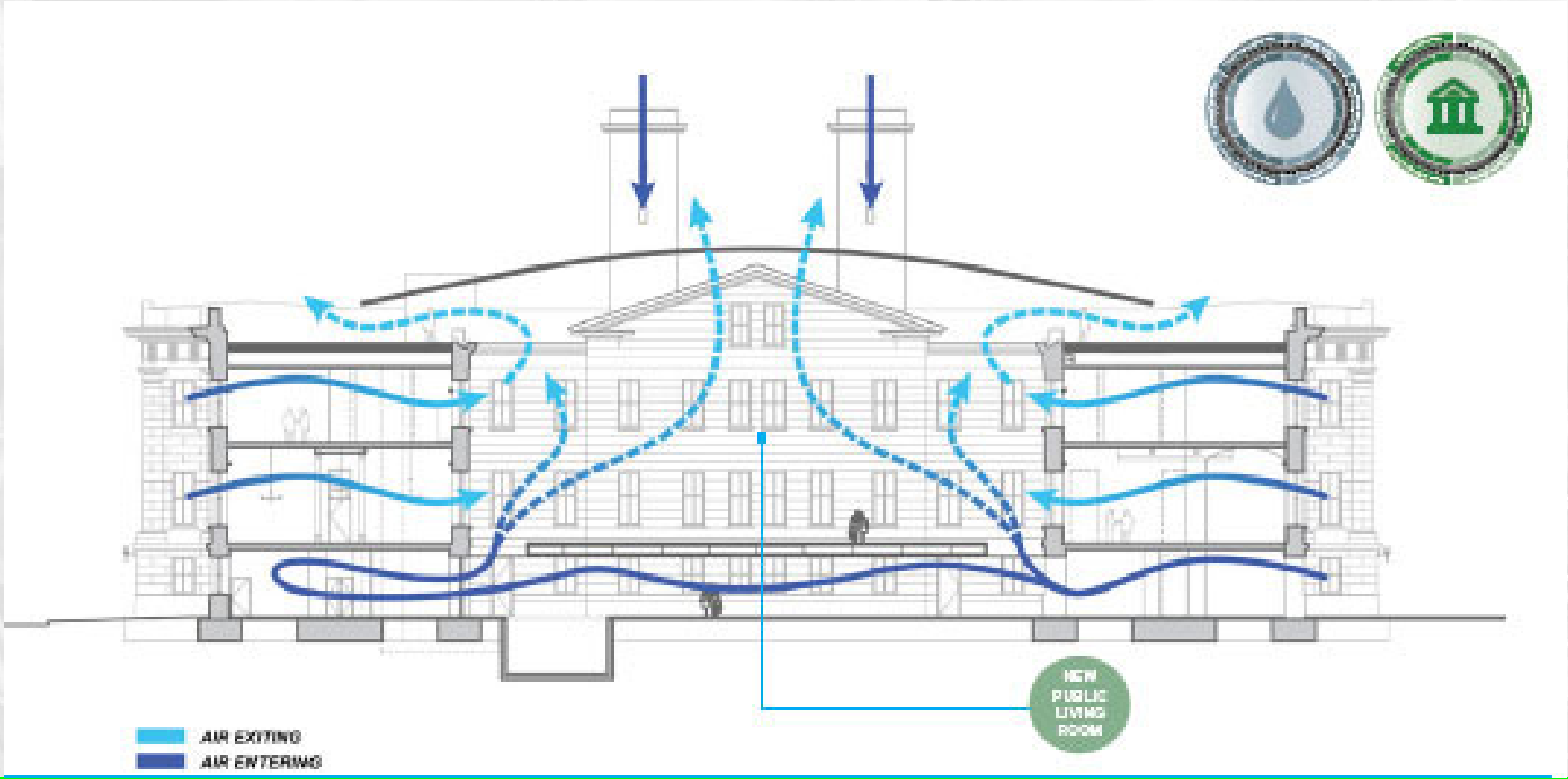


„Easy” to arrange the natural ventilation when there is no high temperature-difference between the interior and exterior.

VENTILATION

You plan the air stream. But how?

US MINT Building San Francisco, California Passive ventilation

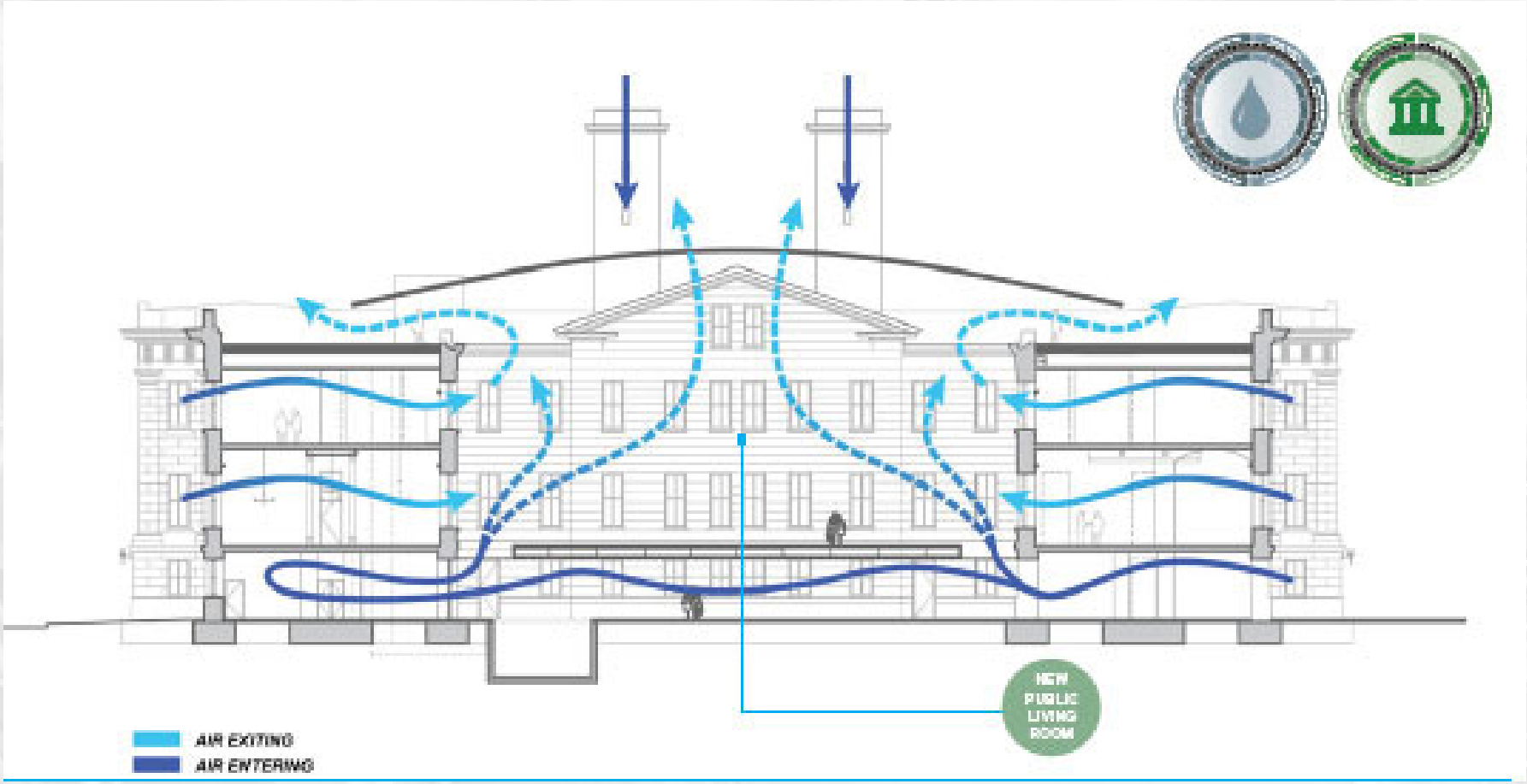


In case of very hot or very cold weather we have to get back the heat energy of the stale air before blowing-out.

VENTILATION

You plan the air stream. But how?

US MINT Building San Francisco, California Passive ventilation



How to combine together the heat exchanger and natural ventilation?
How to provide enough strong airstream without artificial ventilation (fan)?

VENTILATION

Smoke free area / stair

The way to keep smoke free the escape route by natural ventilation:

- at the ceiling we let out the hot smoke
- at the bottom (!) we let in clean fresh air

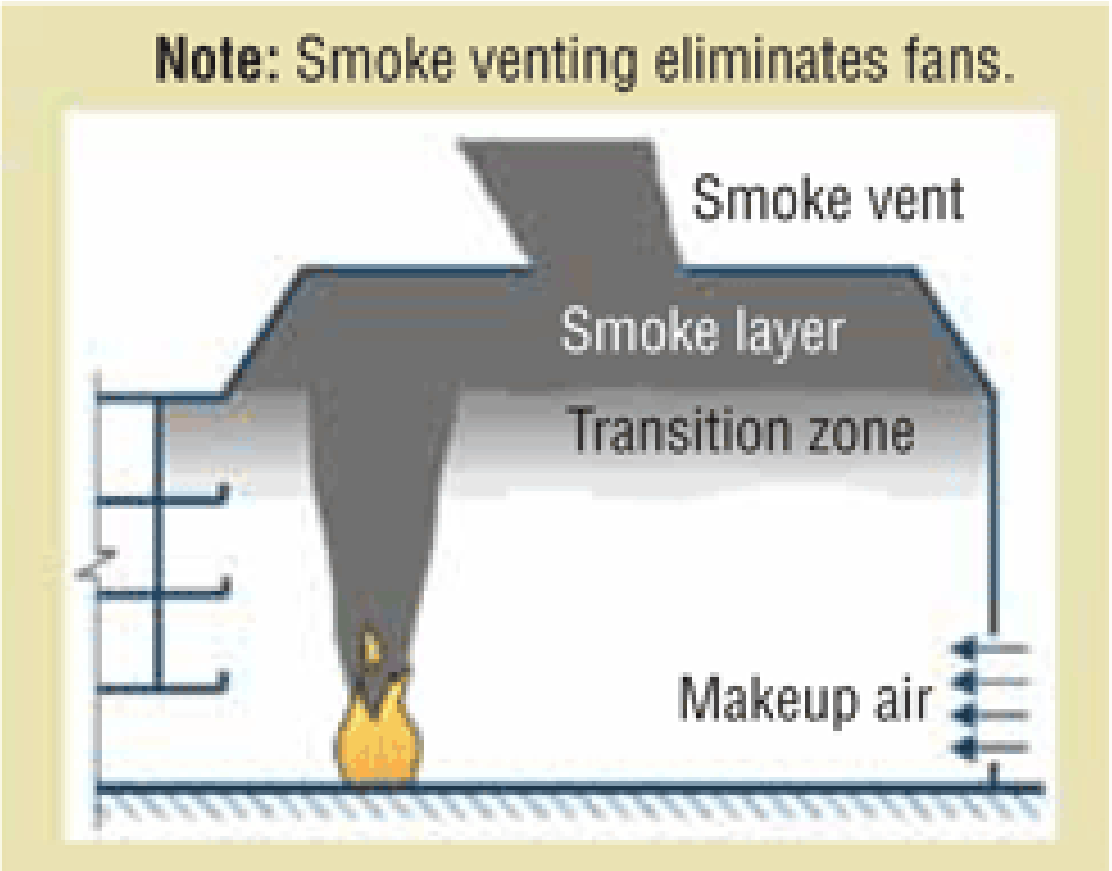


FIGURE 1. Natural smoke venting.

24.

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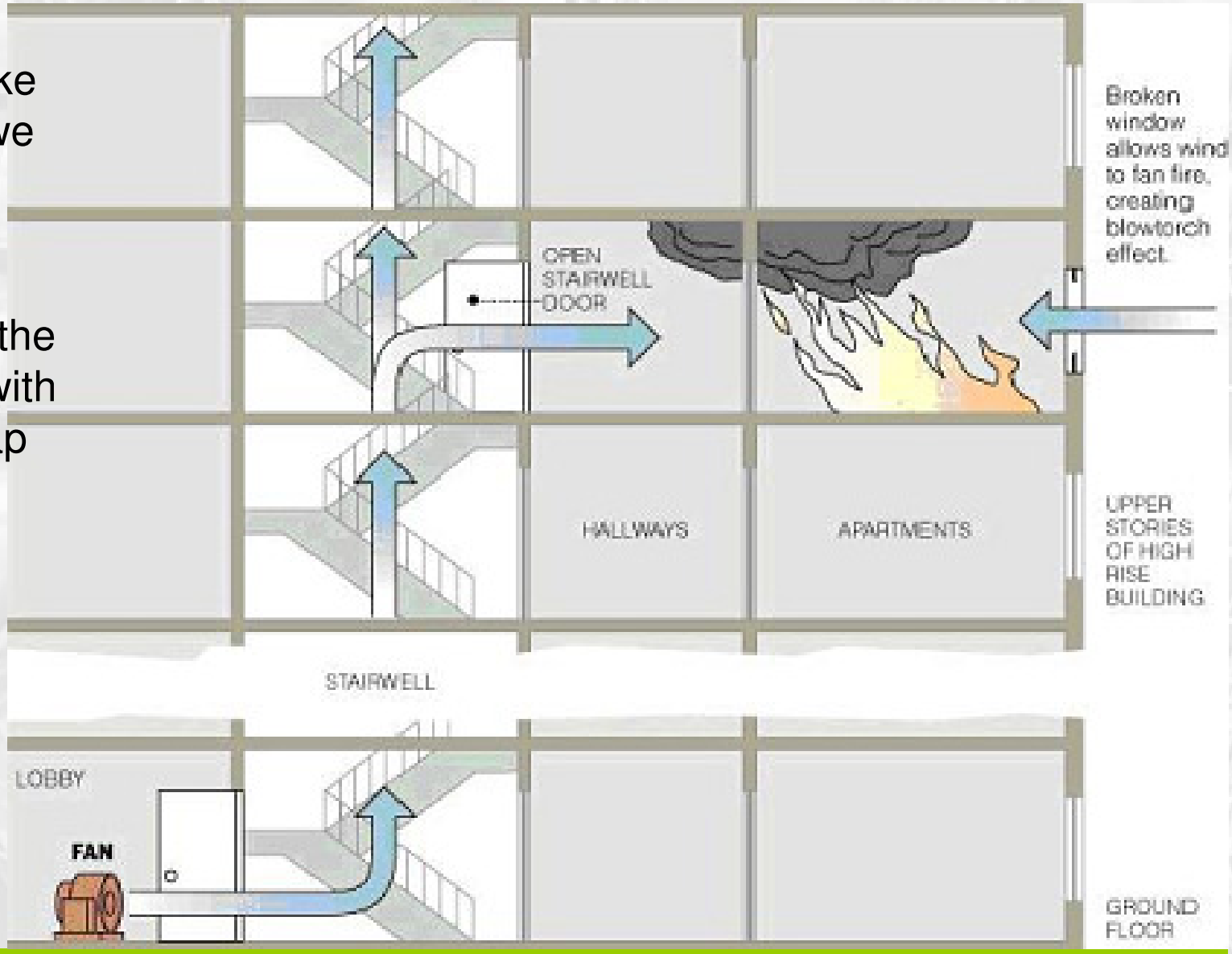
Smoke free area / stair

25.

To have a smoke free staircase we need artificial ventilation to provide overpressure in the staircase room with unremitting (gap free) electric supply.



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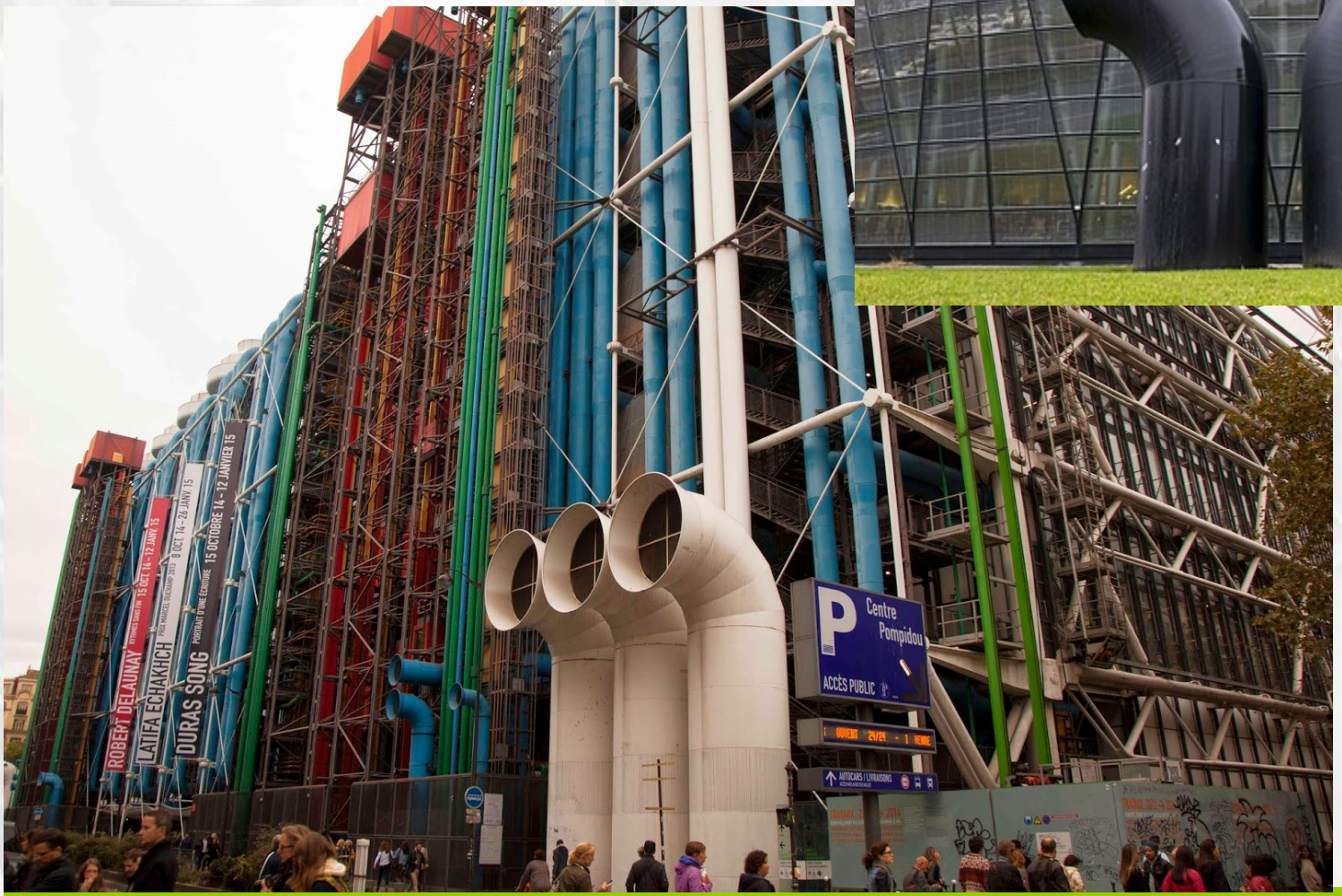
Your task is to design the air ducts (or room for them).

Your other task is to design the visible elements of the systems were mentioned.

26

VENTILATION

35.



36.

Samples

VENTILATION

wind cowls in the BedZED development for passive ventilation

old-living-house-roof-with-ventilation-pipes-EWEDFA

Bad and good samples

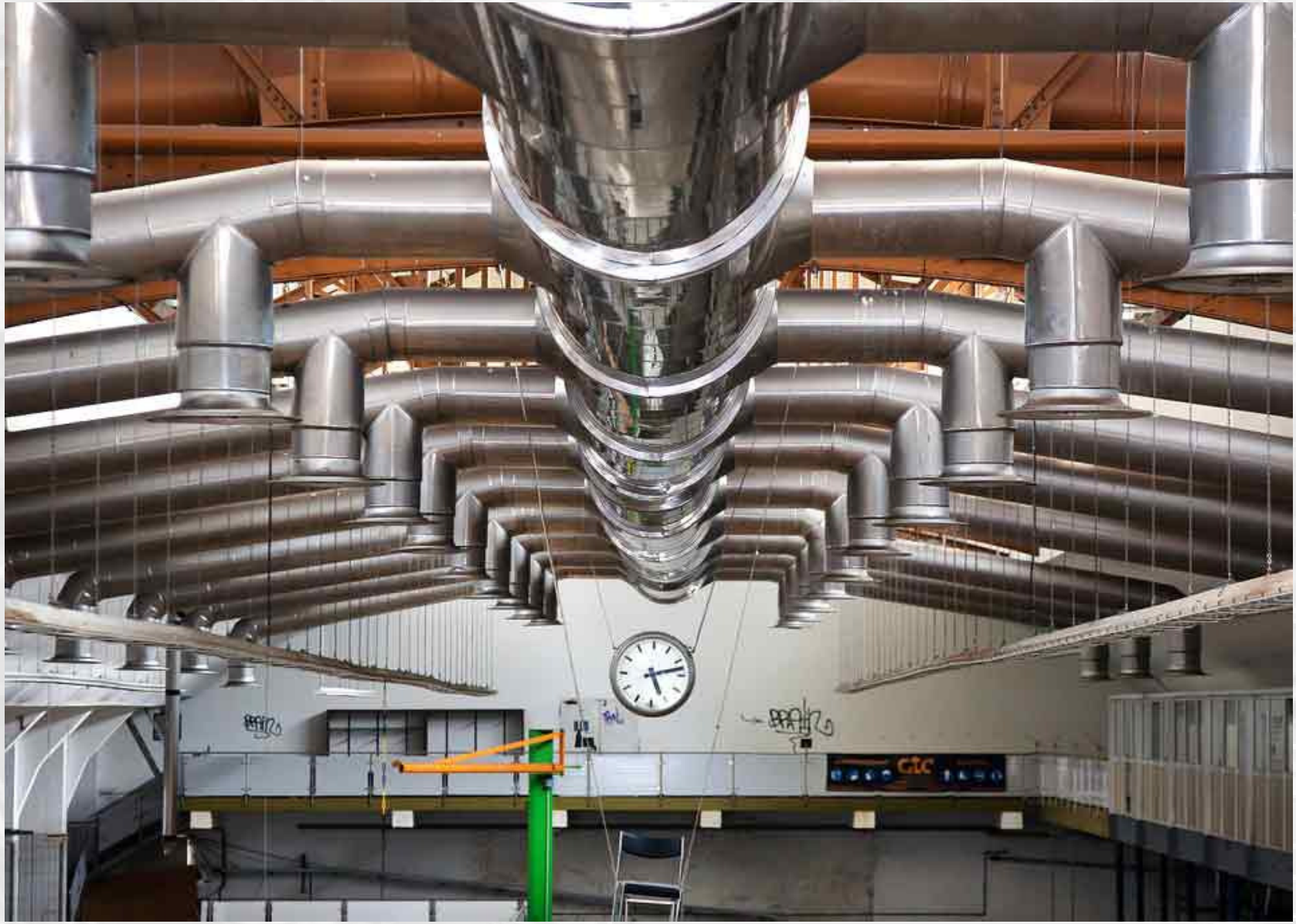
VENTILATION

Bad and good samples

VENTILATION

Good samples

VENTILATION



Good samples

So use your imagination!

38.

Thank you for your attention!

Sources of pictures:

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