

Fresh-r introduction Small Planet Supply

1. Fresh-r introduction team



Hans Arentsen

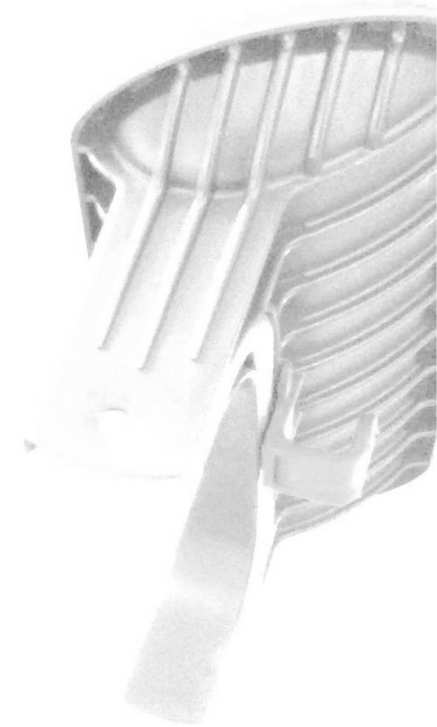
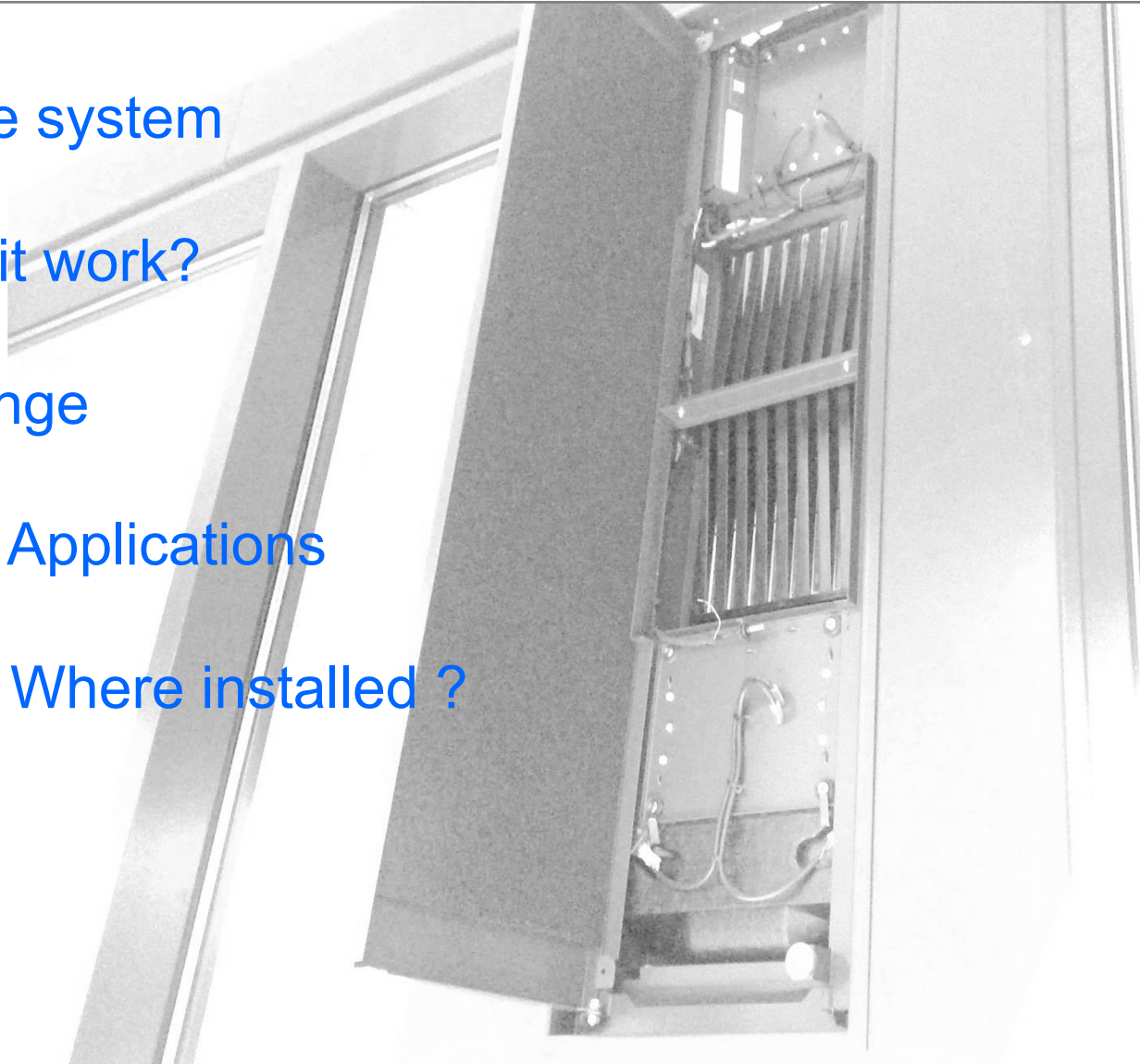


Jeroen Cremer



Philip Bredt

1. Fresh-r, the system
2. How does it work?
3. Product range
4. Examples: Applications
5. Examples: Where installed ?
6. Questions



1. Fresh-r system

1) What is the aim?

- Healthy, intelligent smart indoor air care
- Energy efficient

2) What is the concept?

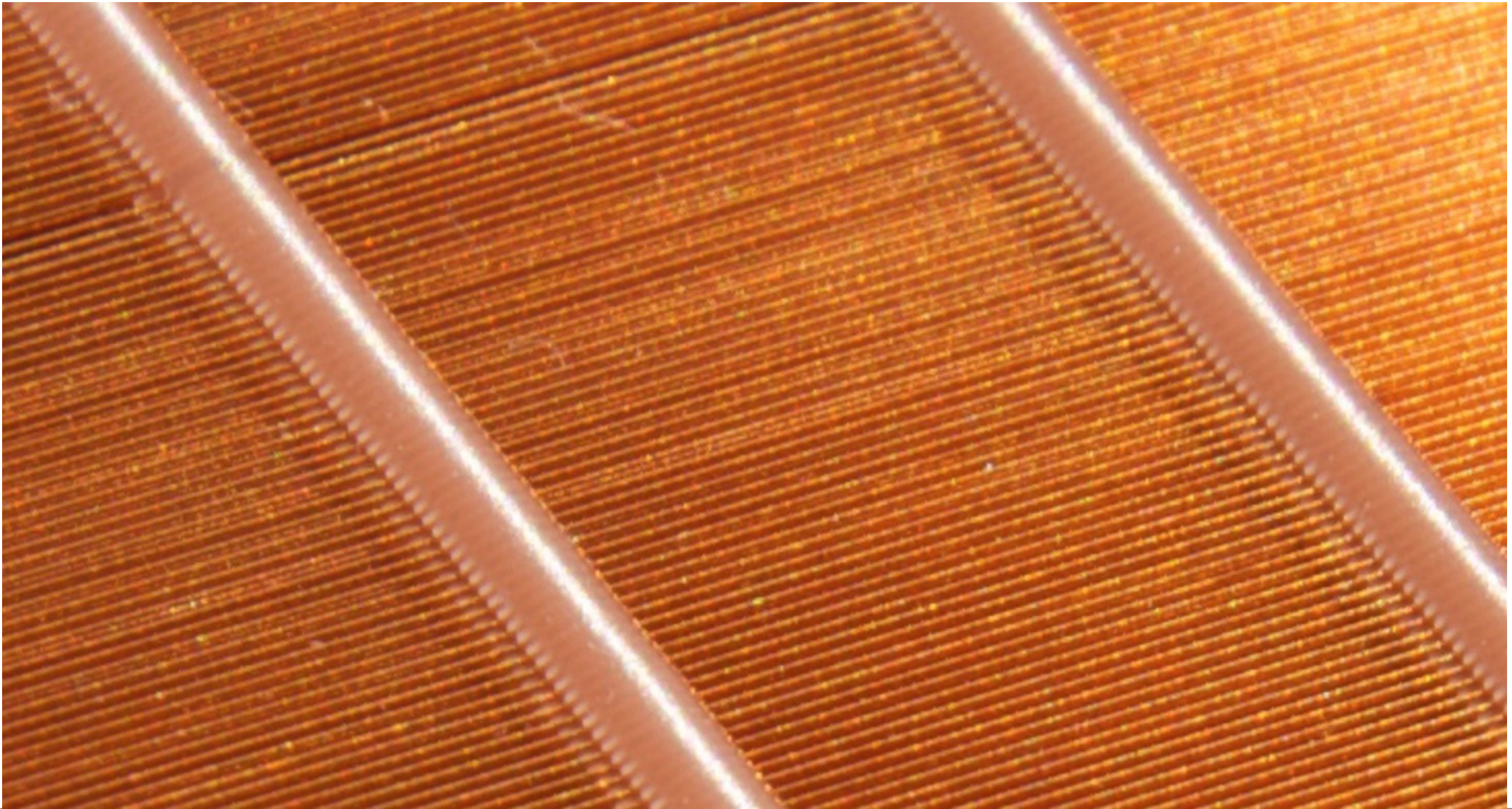
- Decentral ventilation system
- Revolutionary cooper wire heat exchanger
- Dynamic control – ventilate when needed
- On-line monitoring

3) How? Measure and react

- CO2
- Temperature
- Humidity
- Small particles (fine dust, pollen)

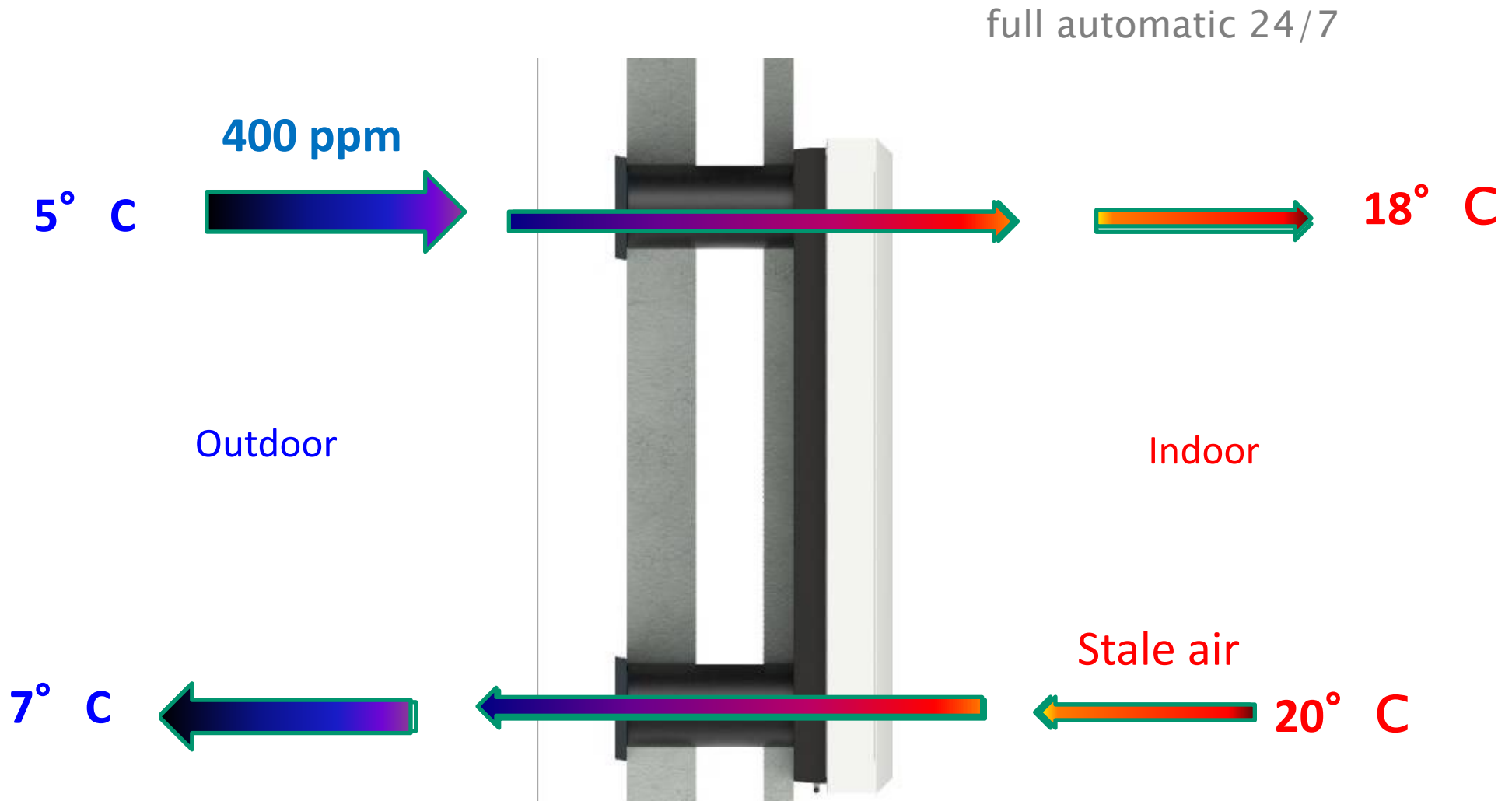


2. The heat exchanger, how does it work?



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2.

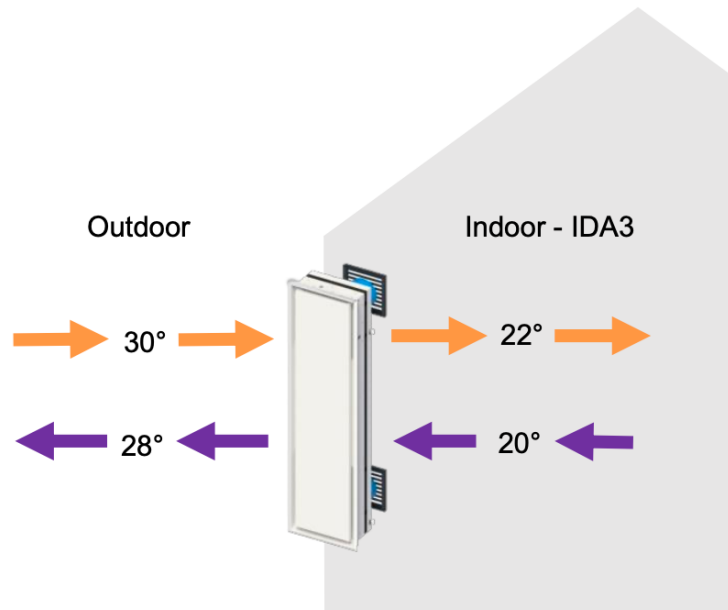


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Seasons

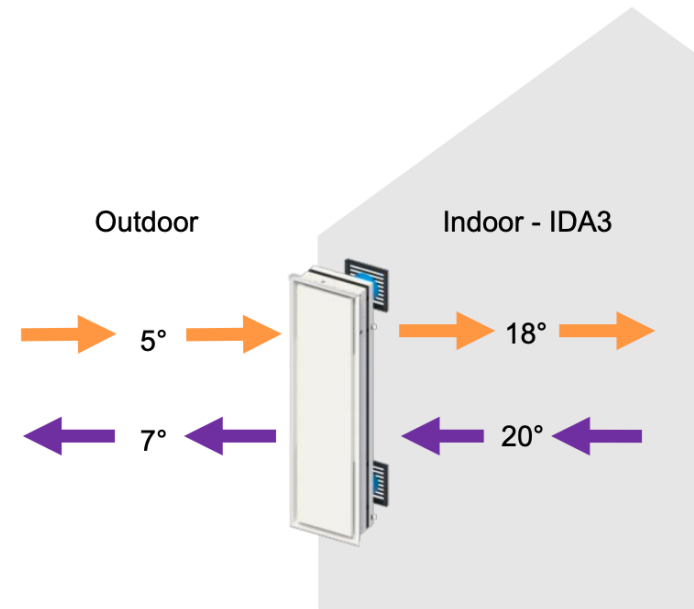
Summer season

Fresh-r automatically ventilates indoor to provide IDA3 indoor air quality.
At the same time Fresh-r is recovering energy.
Energy from outdoor air at 30°C will be transferred to the indoor air of 20°C.



Heating season

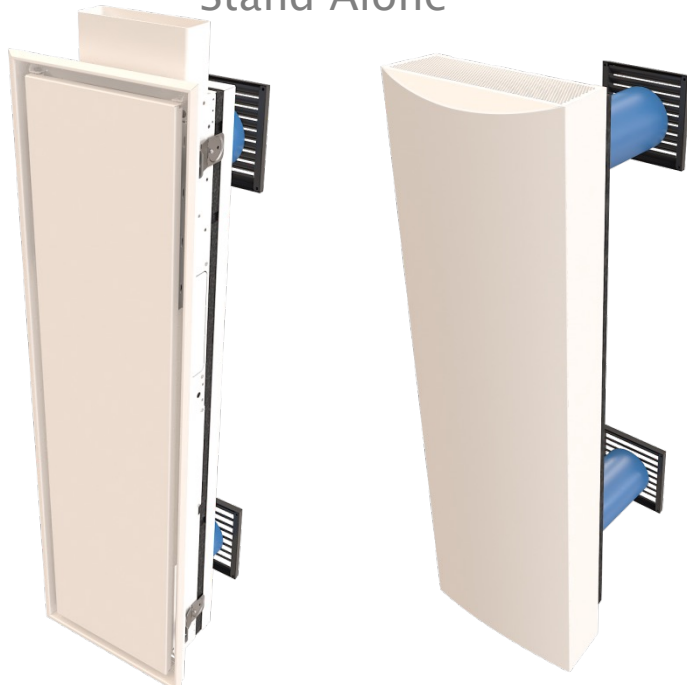
Fresh-r automatically ventilates indoor to provide IDA3 indoor air quality.
At the same time Fresh-r is recovering energy.
Energy from indoor air at 20°C will be transferred to the outdoor air of 5°C.



3. Fresh-r Product Range

1) Fresh-r ITW / OTW

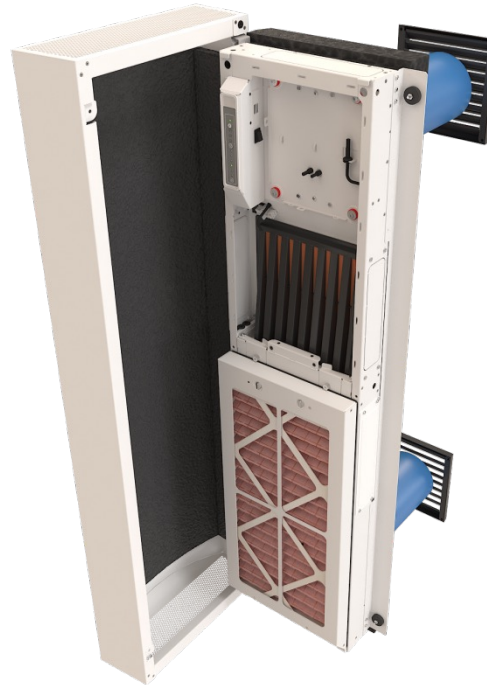
In-The-Wall or
On-The-Wall
Stand Alone



5 people (Regular House) OR
4 people (Airtight Passive House)

2) Fresh-r Everywhere

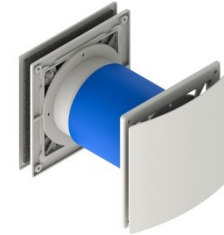
Cascade
Extract Connection



5 people (Regular House) OR
4 people (Airtight Passive House)
PLUS 2 Wetrooms

3) Fresh-Forward

Cascade
Multiroom



2 people (Bedroom), ultra silent,
CO₂ and RH% controlled

4. Fresh-r, Examples of applications



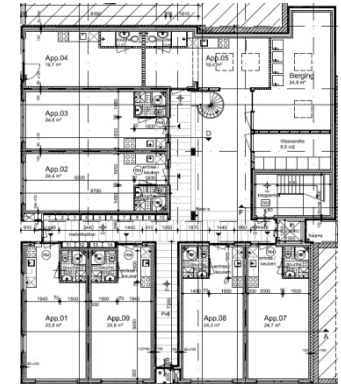
A. OPEN SPACE, Stand alone

- a. Fresh-r, central location on outside wall
- b. additional: wet rooms with separate ventilation



B. OPEN SPACE, Wetroom Cascade

- a. Fresh-r Everywhere, central location on outside wall
- b. wet rooms extracted via short duct



C. MULTIPLE ROOMS, Rooms Cascade

- a. Fresh-r, central location on outside wall
- b. wet rooms with separate ventilation
- c. additional rooms ventilates by use of Fresh-r Forward



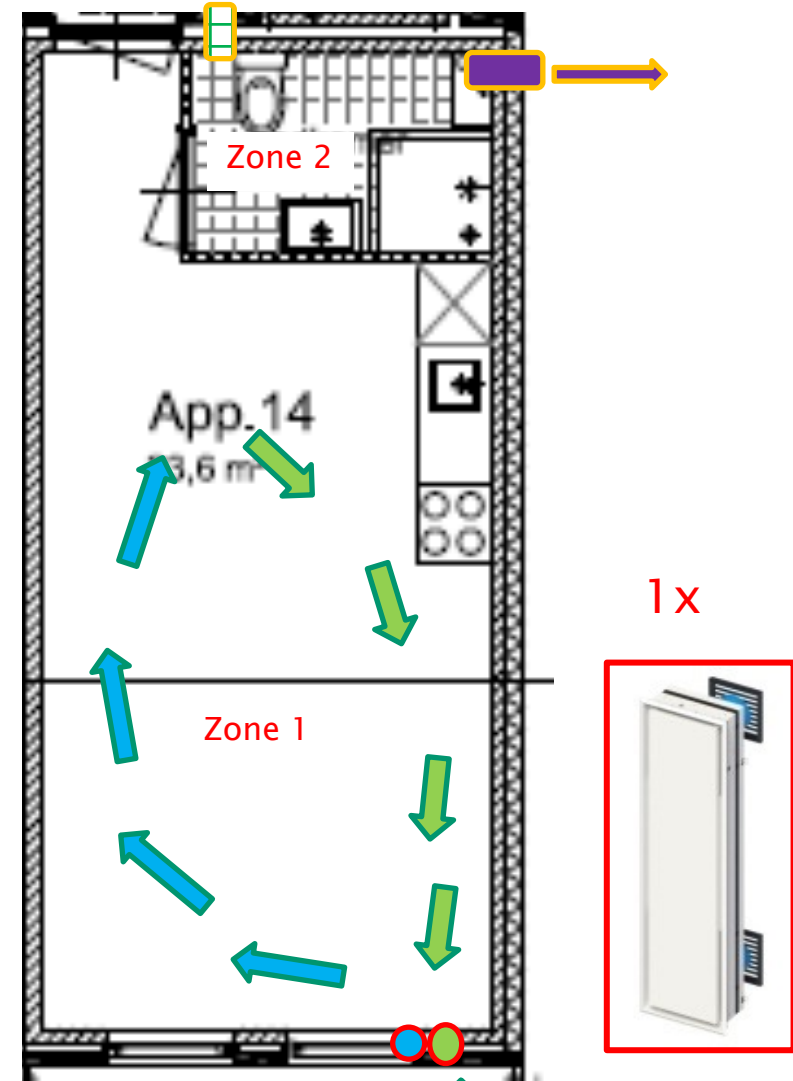
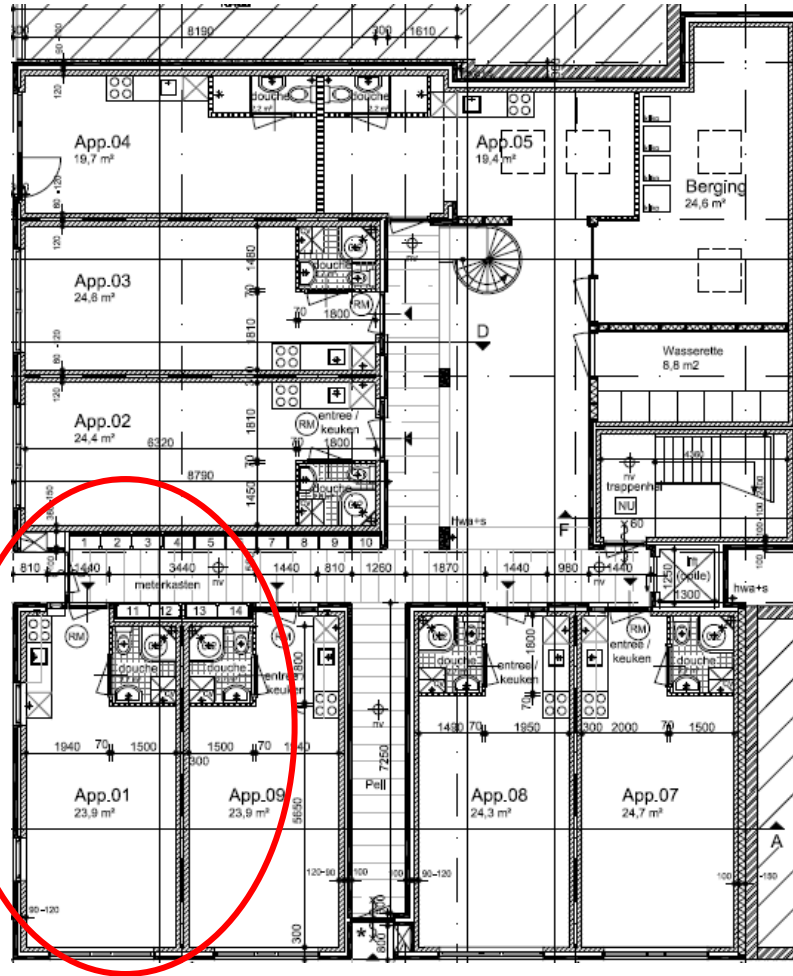
D. MULTIPLE ROOMS, Rooms and Wetroom Cascade

- a. Fresh-r Everywhere, central location on outside wall
- b. wet rooms extracted via short duct
- c. additional rooms ventilated by use of Fresh-r forward



E. Combination of A + B + D

4. Fresh-r, Examples, A. OPEN SPACE, Stand Alone

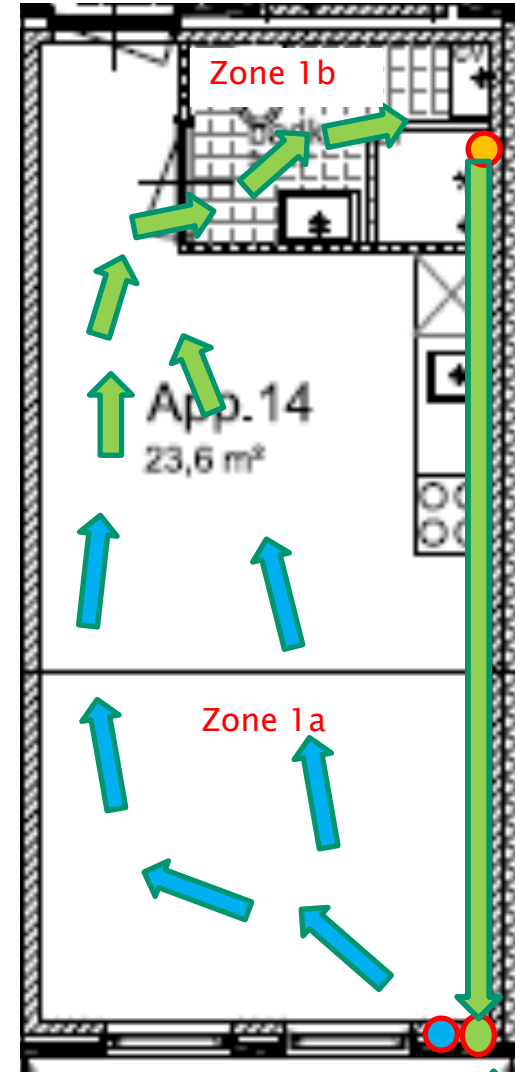
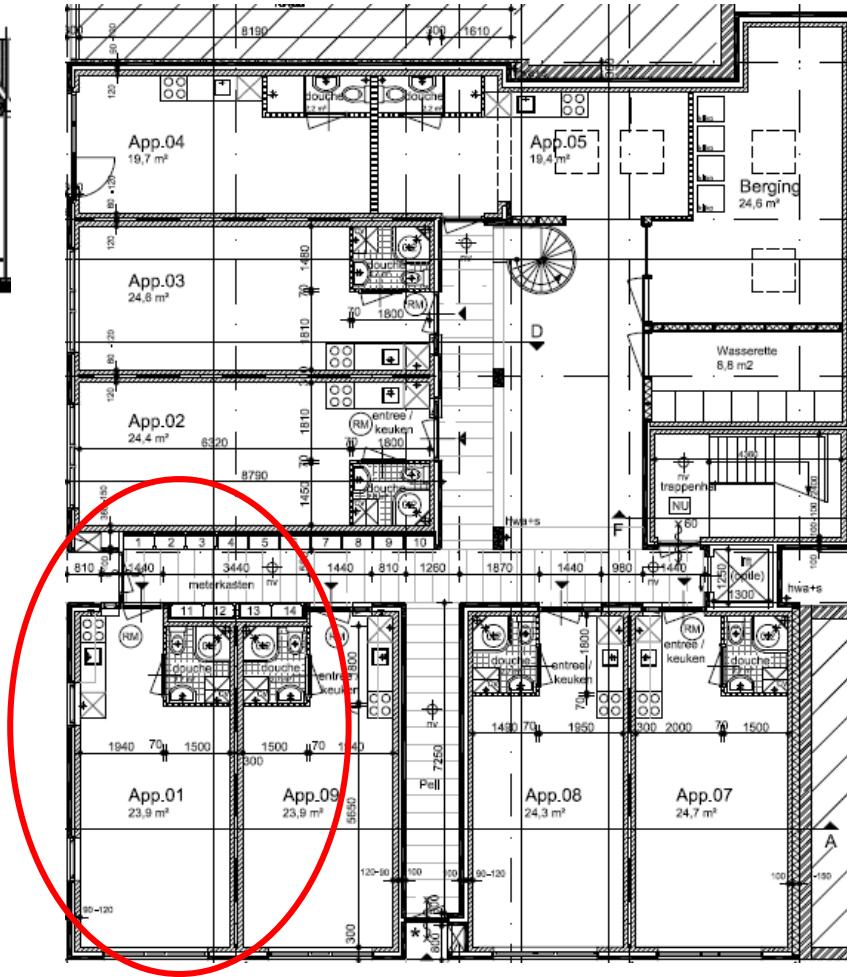


Zone 1: Open Living/Kitchen : Fresh ITW/OTW in wall
Zone 2: Bathroom : Separate Intermittent Fan

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4. Examples: B. OPEN SPACE, Wetroom Cascade

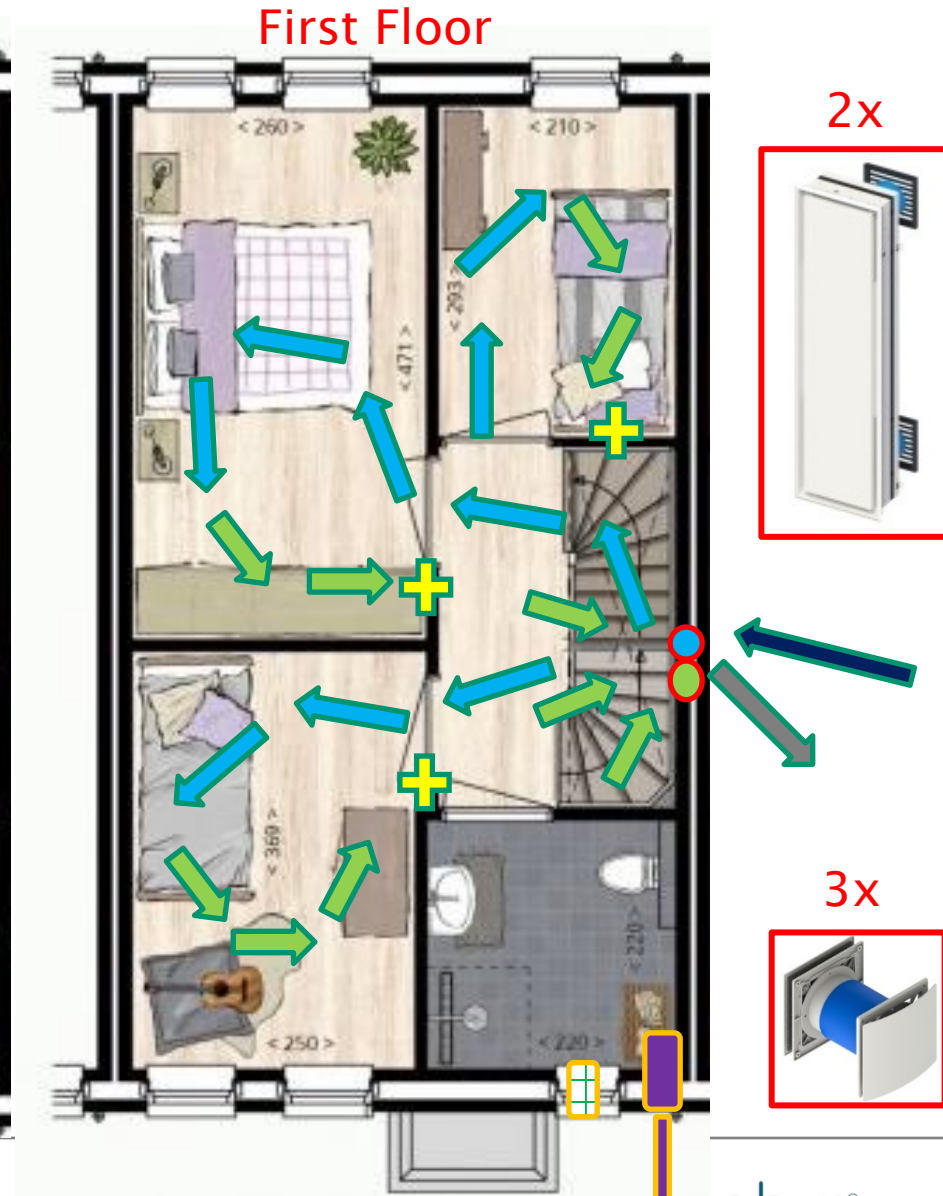
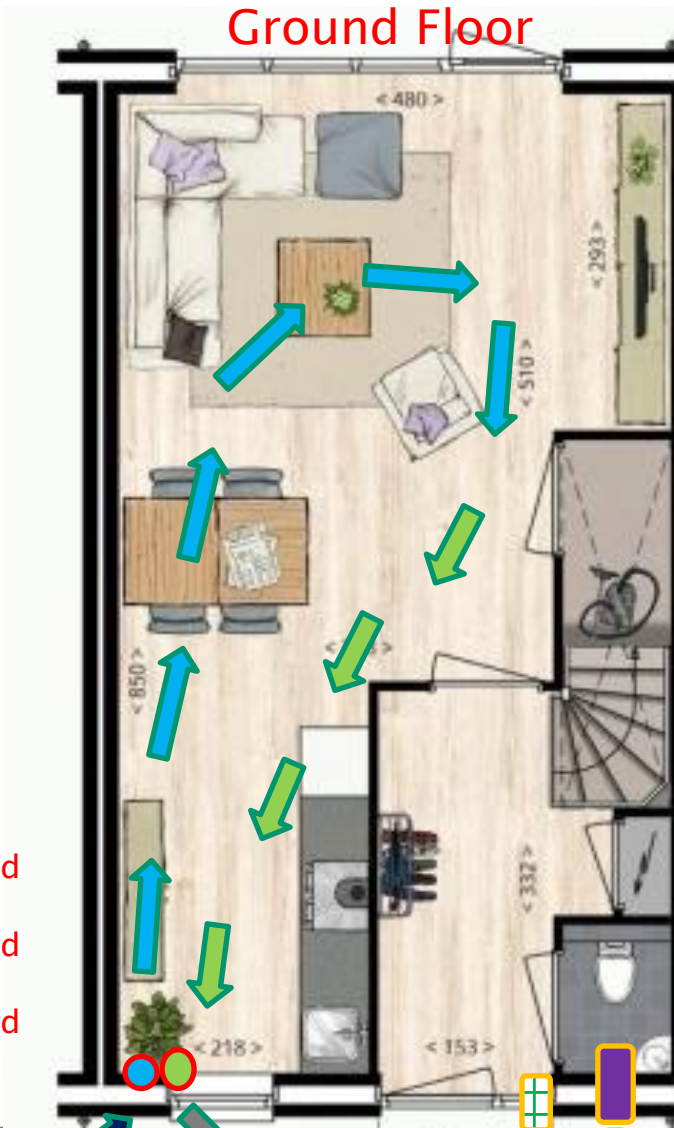


Zone 1a: Open Living/Kitchen : Fresh Everywhere in wall
Zone 1b: Bathroom : Cascade Extract duct

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4. Examples: C. MULTIPLE ROOMS, Rooms Cascade



GROUND FLOOR:

Zone 1 : Living/Kitchen :

Fresh ITW/OTW in wall

Zone 2: WC :

Separate Intermittent Fan

FIRST FLOOR:

Zone 3a : Landing :

Fresh-r ITW/OTW

Zone 3b: Bedroom 1 :

Cascade by Fresh-Forward

Zone 3c: Bedroom 2 :

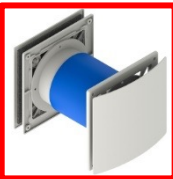
Cascade by Fresh-Forward

Zone 3d: Bedroom 3 :

Cascade by Fresh-Forward

Zone 4: Bathroom :

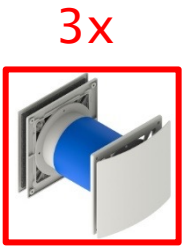
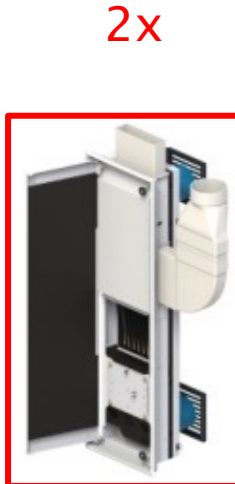
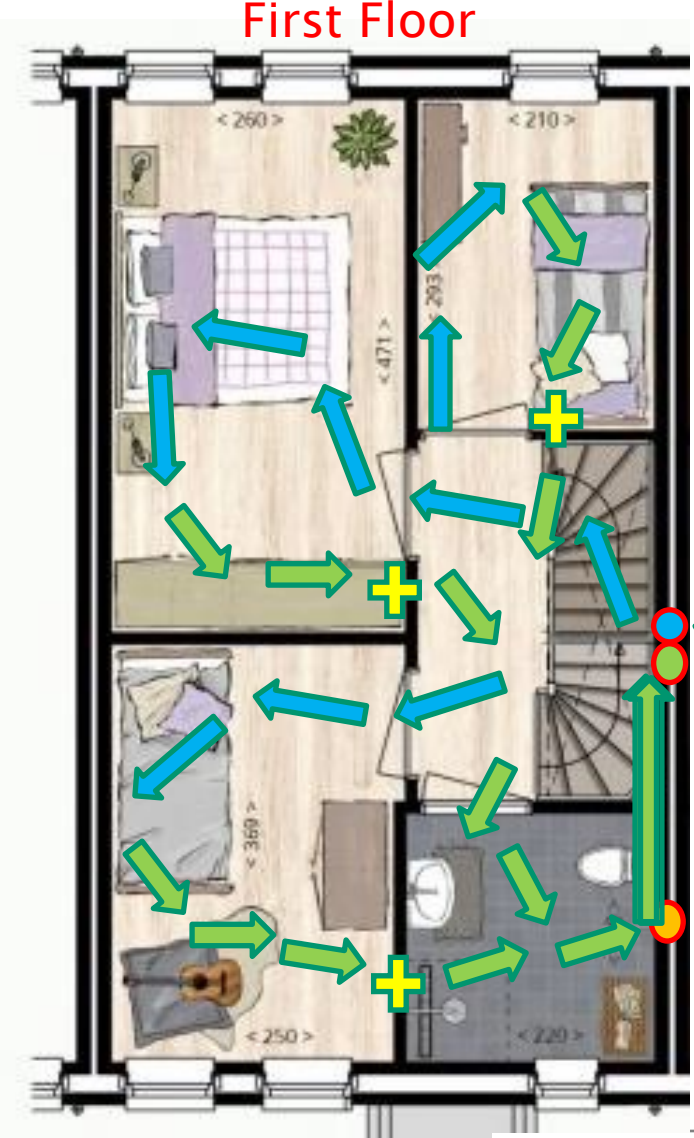
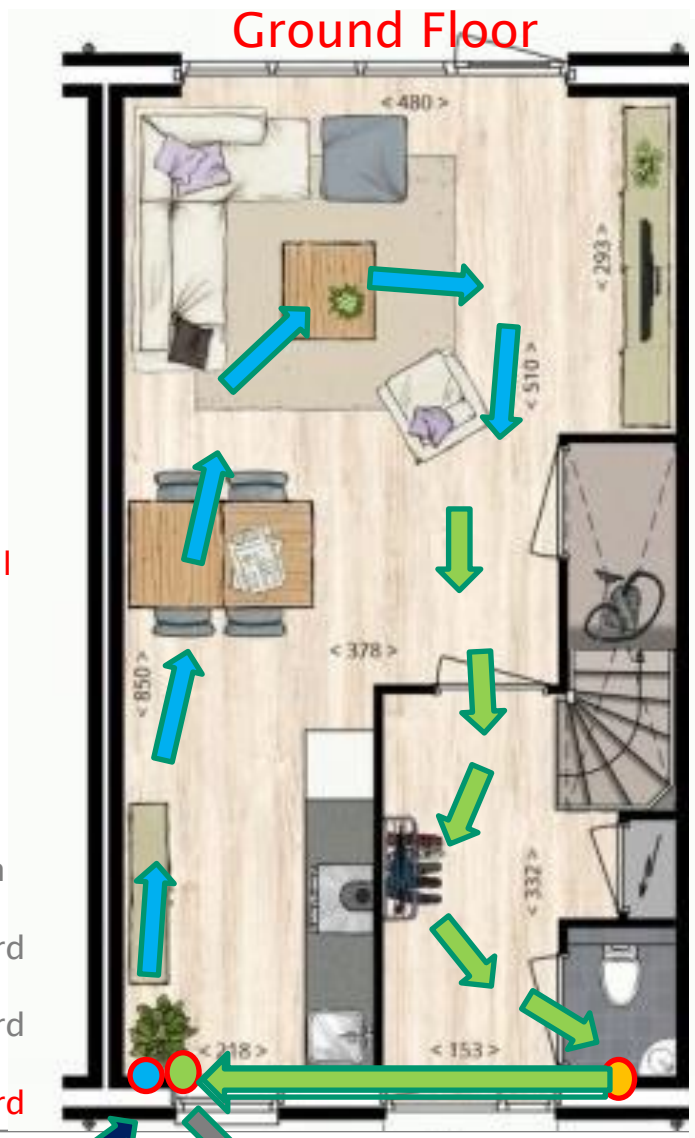
Separate Intermittent Fan



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4. Examples: D. MULTIPLE ROOMS, Rooms- and Wetroom Cascade



GROUND FLOOR:

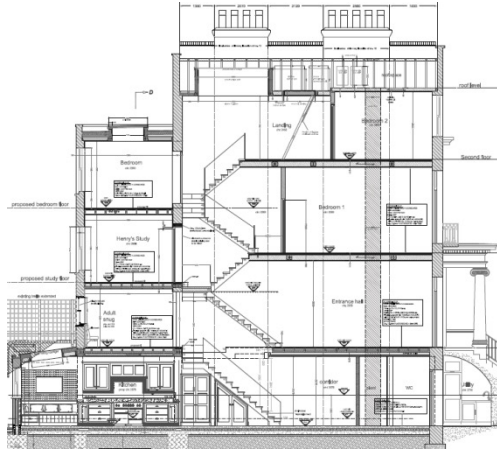
- Zone 1a :** Living/Kitchen :
Fresh Everywhere in wall
- Zone 1b:** WC :
Cascade Extract duct

FIRST FLOOR:

- Zone 3a :** Landing :
Fresh-Everywhere ITW
- Zone 3b:** Bathroom :
Separate Intermittent Fan
- Zone 3c:** Bedroom 1 :
Cascade by Fresh-Forward
- Zone 3d:** Bedroom 2 :
Cascade by Fresh-Forward
- Zone 3e:** Bedroom 3 :
Cascade by Fresh-Forward

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4. Examples: E, Combination



Zone 1: Kitchen/dining

Fresh-r ITW/OTW

Zone 2a: Bedroom 1:

Fresh Everywhere in Bedroom 1

Zone 2b: Play room:

Cascade

Zone 2c: Office area:

Cascade

Zone 2d: Ensuite bathroom

Extract duct Cascade

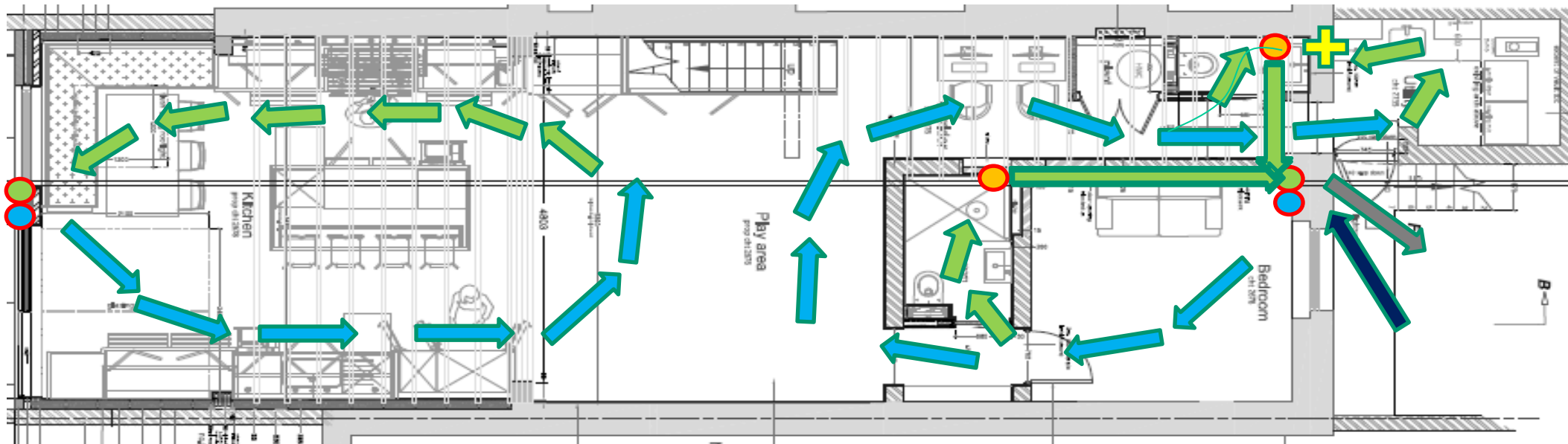
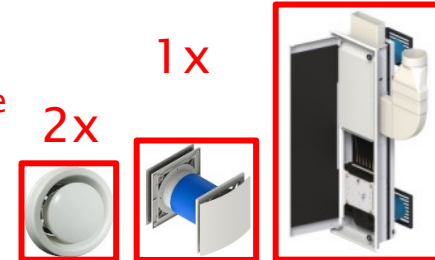
Zone 2e: WC:

Extract duct Cascade

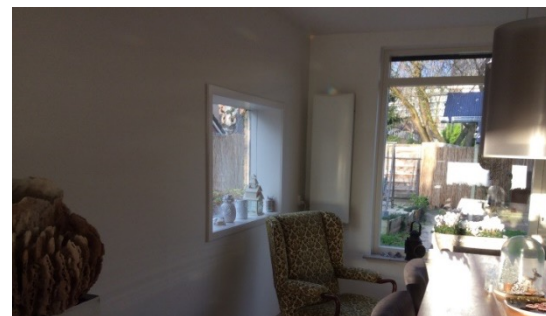
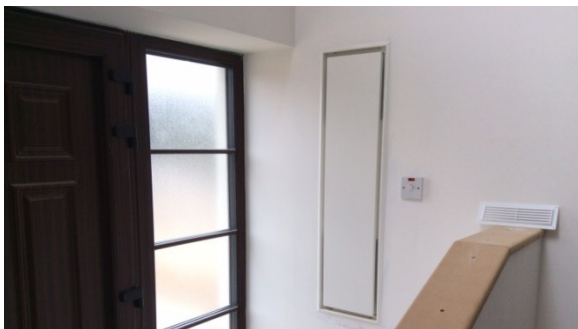
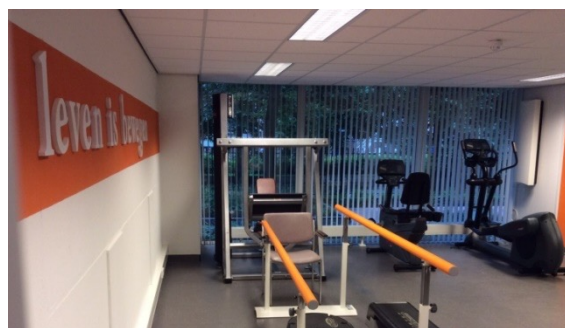
Zone 2f: Utility room:

Fresh-Forward Cascade

1x



	Date	#	@	Key	Benefits	
5. Fresh-r.eu						cases



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Potential	Date	#	@	Key	Benefits
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New build



Renovation



Offices



PHI



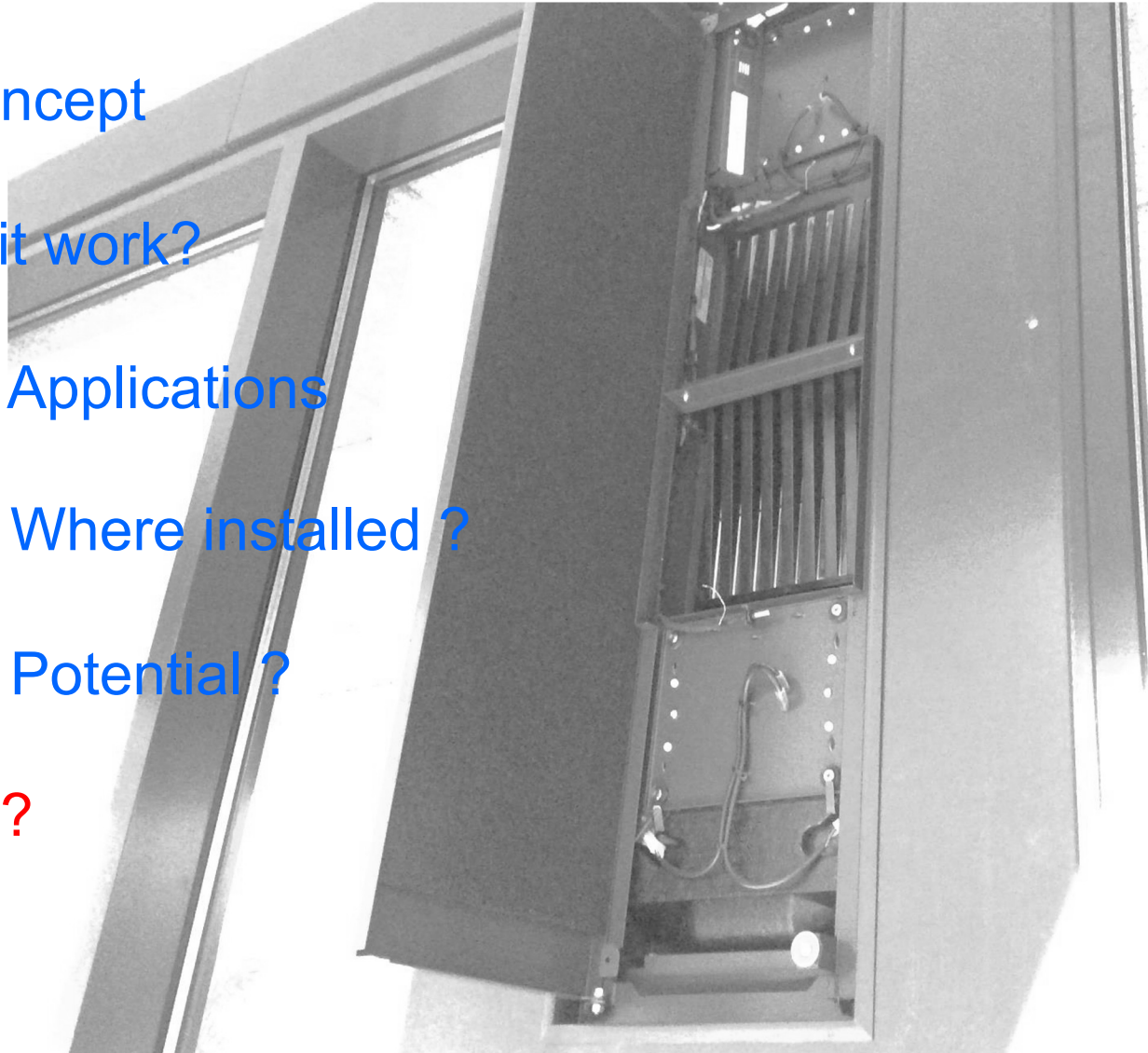
Familyhouse



Combi Window Frame

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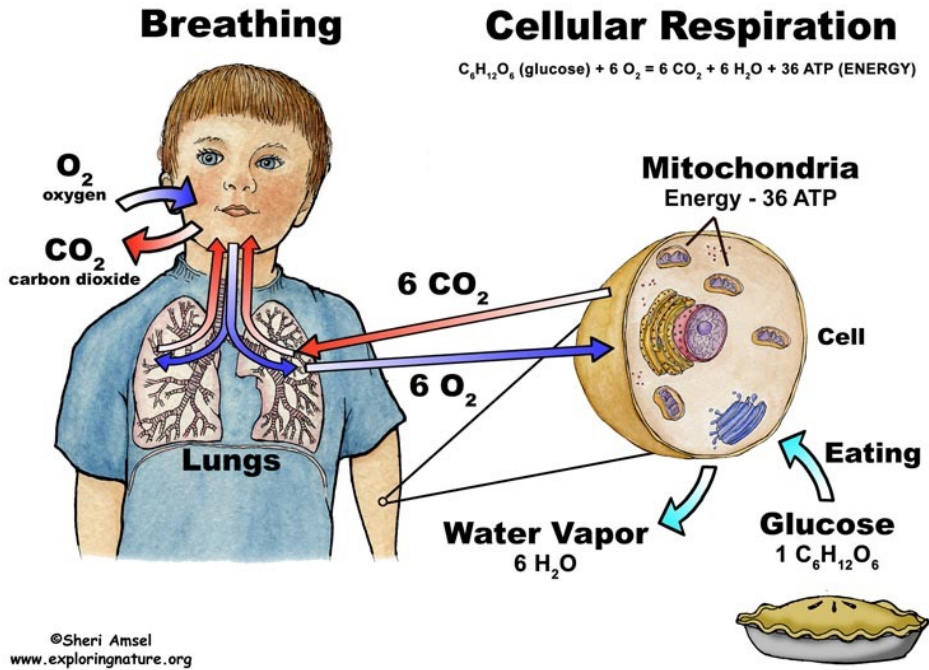
1. Fresh-r, concept
2. How does it work?
3. Examples: Applications
4. Examples: Where installed ?
5. Examples: Potential ?
6. Questions ?



2. Fresh-r, How does it work ? Indoor Air Quality

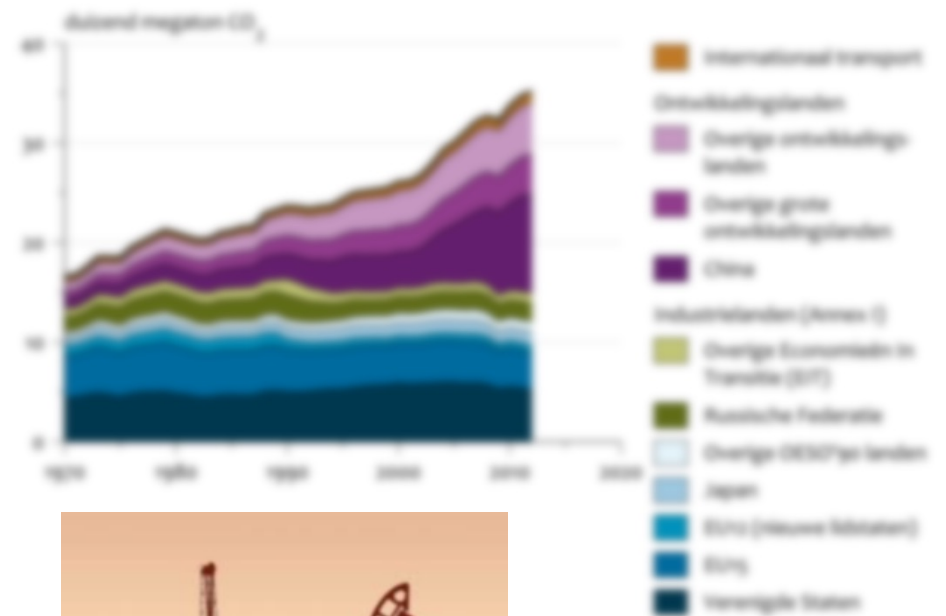
2.1 human-CO2 = short cycle

vs. fossile-CO2 = eternal cycle



per person	per minute	per hour	per day	energy	
CO2 rest	0,22	1	13,2	1	60,12 W
water rest	0,14	g	8,4	g	0,20 1 5,297 W
CO2 light exc	0,58	g	34,8	1	158,5 W
water light exc	0,39	g	23,4	g	0,56 1 14,76 W

Wardle article beschreibt den global fossilen Kreislauf an einem Produkt pro Jahr



From: OSHA & OTC (OSHA, 2013) BP, 2013; USA, 2013; USA, 2013; USA, 2013; USA, 2013; USA, 2013

www.fresh-r.com

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2. Fresh-r, How does it work ? Indoor Air Quality

2.2 IDA3 = In-Door Air Quality level (EU)

Human CO2 ppm

CO2 Sensor in Fresh-r, measure continuously
As soon as CO2 increase, then speedup flow

Moisture

Sensor for RH % indoor humidity
Prevent condensation and mould (toxic)

Ultra fine dust

F7 filter for PM2.5 particles (option)

per person	per minute		per hour		per day		energy	
CO2 rest	0,22	1	13,2	1			60,12	W
water rest	0,14	g	8,4	g	0,20	1	5,297	W
CO2 light exc	0,58	g	34,8	1			158,5	W
water light exc	0,39	g	23,4	g	0,56	1	14,76	W

http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19950005398_1995105398.pdf

Approx. 400 ppm
(Outdoor CO2)



Above 1 400 ppm
(Indoor CO2)



Heat Exchanger with copper HEX
8 Kilometer, multi layer fine wire
Transfer heat airflow Indoor / Outdoor
Sub-zero & Summer-mode

See also: [Technical Datasheet](#)

2. Fresh-r, How does it work ? Indoor Air Quality

2.3 Cognitive Performance

IMPORTANCE OF AIR QUALITY

2012 study in *Environmental Health Perspectives*

CO₂ ↑ >> ↓ cognitive performance



600ppm - 1,000ppm - 2,500ppm

All icons from the Noun Project: Gregor Cresnar, Cole Perkins

Usha Satish, Mark J. Mendell, Krishnamurthy Shekhar, Toshifumi Hotchi, Douglas Sullivan, Siegfried Streufert, and William J. Fisk, "Is CO₂ an Indoor Pollutant? Direct Effects of Low-to-Moderate CO₂ Concentrations on Human Decision-Making Performance," *Environmental Health Perspectives* 120 (December 2012), accessed November 30, 2015. doi: 10.1289/ehp.1104789

Outdoor CO₂ is approx. 400 ppm
Indoor CO₂ target below 1400 ppm

<u>basic activity</u>	<u>applied activity</u>	<u>focused activity</u>
<u>task orientation</u>	<u>crisis response</u>	<u>information seeking</u>
<u>information usage</u>	<u>breadth of approach</u>	<u>strategy</u>

For 7 of 9 scales, mean raw scores consistently decreased with increasing CO₂ concentrations.

Scores were ...

11-23% lower @1,000ppm
44-94% lower @2,500ppm

} each participant had a different level of reaction to changes in CO₂ level.