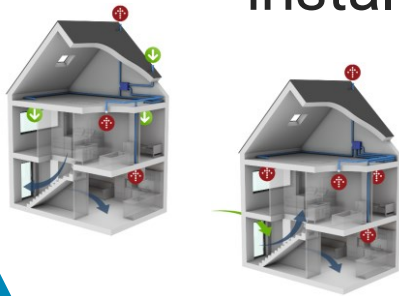


# Innovative ventilation systems easier to install for retrofitting dwellings



AIVC Webinar – 20/06/2024

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Buildwise - Belgium

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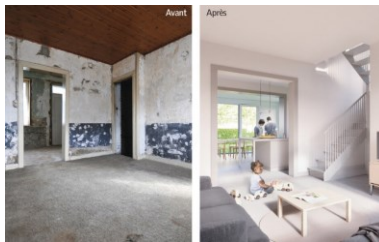
## The playground of the research: a social housing district in Brussels



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# The houses have a long history and are being progressively renovated

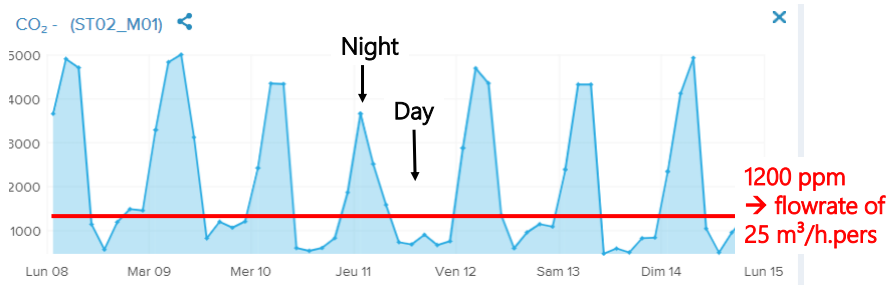


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# IAQ in existing houses is very poor

## Example of CO<sub>2</sub> monitoring in a bedroom

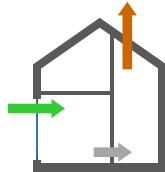


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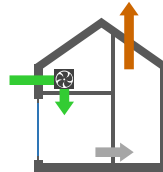
4

# Classical ventilation systems are difficult to install in existing dwellings

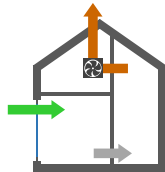
A: natural stack ventilation



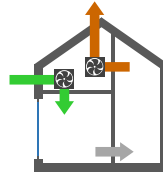
B: fan assisted supply ventilation



C: fan assisted exhaust ventilation



D: fan assisted balanced ventilation



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# The main challenges of installing ventilation

Needed space for

- Ductwork
- Ventilation unit



Invasive works

- Natural supply requires windows modifications
- Extensive finishing works inside are necessary

Simplified or incomplete systems: are they efficient ?



Cost !

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## Innovative ventilation systems easier to install

“D cascade”

→ D (balanced system) in (double) cascade mode

“C hallways”

→ C (exhaust system) with supply in hallways

## D (balanced system) in (double) cascade mode



“D cascade”

## “D cascade”: how does it work?

Mechanical supply

- In bedrooms

Air transfer

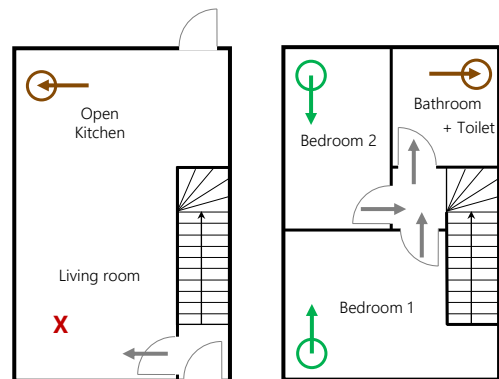
- To hallways
- To living room
- To service rooms

Mechanical extractions

- In service rooms

**No direct supply in the living room!**

(Reduced total flowrate)

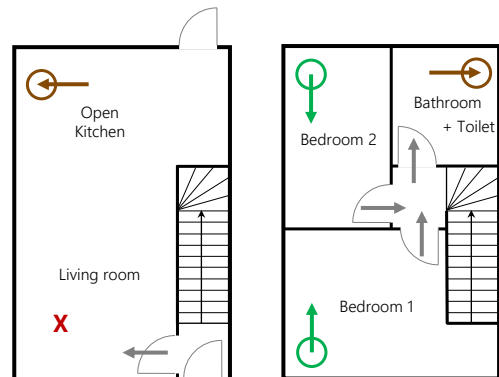


2 story house

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## “D cascade”: same components as classic D



2 story house

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## Control options of the “D cascade”

The total flowrate is already reduced!

*Option 1: central control – CO<sub>2</sub> living room*

- *Minimum flowrate = total flowrate for bedrooms*
- *CO<sub>2</sub> living room → increases the total flowrate when needed*

*Option 2: same as option 1 + time control for the bedrooms*

## Main advantages of the “D cascade”

Easier to install

- No ductwork toward the living room

Reduced costs

- Smaller ventilation unit (reduced flowrate)
- Less ductwork

Efficient system

- IAQ as good as classic D system
- Heat recovery possible
- Reduced flowrate: demand control less necessary
- No influence of the airtightness of the building envelope

Applicable in many dwelling configurations

## C (exhaust system) with supply in hallways



“C hallways”

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## “C hallways”: how does it work?

Natural supply

- In the hallways

Air transfer

- To bedrooms
- To living room
- To service rooms

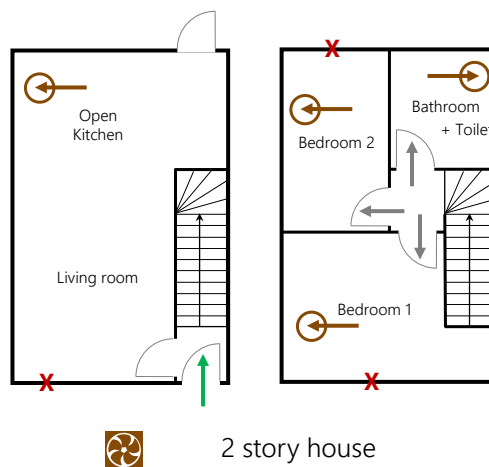
Mechanical extractions

- In service rooms

- **In bedrooms**

**No direct supply in the bedrooms!**

(Higher total design flowrate, but with DCV)

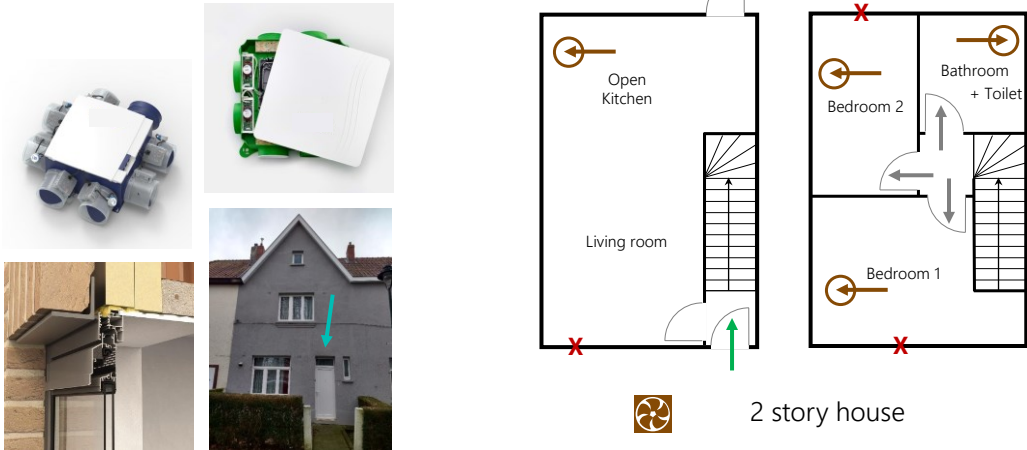


2 story house

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## “C hallways”: same components as classic C



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## Control options of the “C hallways”

Higher total design flowrate!

- Demand Control Ventilation (DCV) is necessary
- Higher impact and potential for control

### Local Control

- Bedrooms  $\text{CO}_2$
- Bathroom Relative humidity (RH)
- Toilets Presence detection or equivalent
- Kitchen  $\text{CO}_2$  (+RH)

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## Main advantages of the “C hallways”

Easier to install

- No natural supply needed in bedrooms

Much more efficient system

- IAQ as good as classic D (balanced) system
- No influence of the airtightness of the building envelope
- Effective demand control ventilation
- Improved comfort: less draught and noise from outside

Applicable in many dwelling configurations

## Additional innovative system for apartments

“C cascade”

→ C (exhaust system) in (double) cascade mode

## C (exhaust) in (double) cascade mode

Natural supply

- In bedrooms

Air transfer

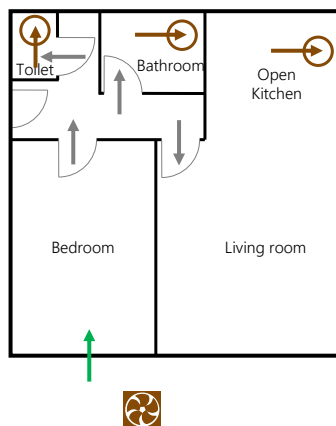
- To hallways
- To living room

- To service rooms

Mechanical extractions

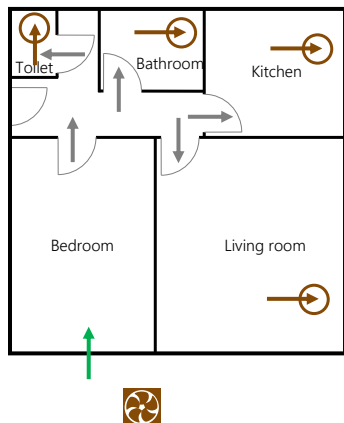
- In service rooms
- In living room (if open kitchen)

**No direct supply in the living room!**

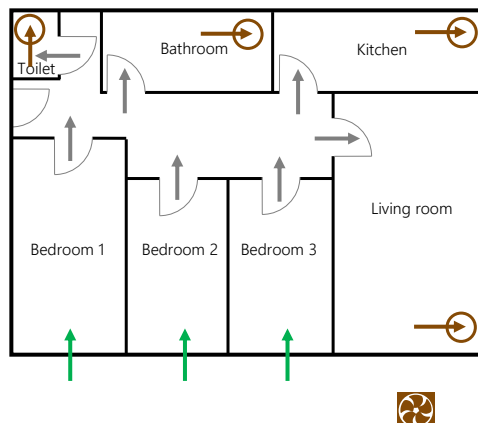


## “C cascade”: for open kitchen

1 bedroom apartment



3 bedrooms apartment



## Main advantages of the “C cascade”

Easier to install in apartments

- Or central exhaust system using existing duct
- Or smaller individual ventilation unit with C system

Efficient system

- Reduced flowrate
- Demand control is easy

**But pay attention: very good airtightness of the building is required**

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## Thanks

You for your attention

The partners of Prio-Climat project

- Foyer Anderlechtois
- Free University of Brussels
- VELUX



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