

## Annex 68, Subtask 4 Strategies for design and control of buildings

# Stakeholder interview guide A: Ventilation designers/Consultants

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### General information regarding the interview

Interviewer name, company/institution and contact details:				
Date of interview:		Time (hh:mm-hh:mm):		Recorded? <input type="checkbox"/> Via e-mail? <input type="checkbox"/>
Interviewees name <sup>(*)</sup> :		Age <sup>(*)</sup> :		Gender <sup>(*)</sup> :
Contact to interviewee <sup>(*)</sup> (e-mail, phone, postal address):				
Job title <sup>(**)</sup> :		Placement in organization <sup>(+)</sup> :		How long time has the interviewee been in the business? .....
Name of company/institution:				
Address of company/institution (including country):				

<sup>(\*)</sup> You need clear accept from the interviewee to write down this information.

<sup>(\*\*)</sup> For example: technical sale-coordinator, CEO, key account manager, senior specialist, etc.

<sup>(+)</sup> For example: customer support department, sales, dept. of building design, etc.

### State of the art

#### A1. What is your involvement/experience with different ventilation concepts in residential housing?

- *What is the number of new constructions?*
- *Has there been any energy efficient refurbishments in the past? If yes, when and what type of refurbishment measures have been applied?*
- *What is the typical construction/residential housing size (floor area, m<sup>2</sup>)?*
- *What type of ventilation system is installed in the housing?*
- *Elaborate on the types of the systems: Natural/hybrid/mechanical exhaust/balanced ventilation. Centralised/decentralised. With/without heat recovery, etc.*
- *What are the typical sound protection measures used? (siding block silencers, louver flaps, etc.)*
- *What are the typical frost protection measures implemented?*
- *How is the integration of additional "ventilation-influencing" appliances handled? (cooker hood, woodstove, etc.)*

- *What type of heat recovery system is typically installed? (cross flow heat exchanger, shell and tube heat exchanger, plate heat exchanger, recuperator, etc.)*
- *Which computational tools are used during the design process?*
- *How efficient is the system in delivering the outdoor air to each location in the room?*
- *Are there any solutions/recommendations from industry?*
- *What type of air tightness testing method is usually performed?*
- *What type of methods for duct and component sizing do you use?*
  - *velocity method*
  - *constant pressure loss method (or equal friction method)*
  - *static pressure recovery method*
- *What are the typically used preferences for duct routing and typically used duct materials?*
  - *preference (square, rectangular, duct routing)*
  - *material (galvanized steel, aluminum, polyurethane, fiberglass etc.)*
- *What type of user/instruction guide do you provide to the users?*

**A2. What are the indoor air quality requirements?**

- *Which IAQ classification schemes, guidelines or standards are applied?*
- *What is the typical procedure for determining supply/extract air rates? (typical values, used standards, tools, etc.)*
- *What are the national requirements of using natural/hybrid ventilation?*

**A3. What type of automatic control system to regulate the flow rate and flow balance is integrated with the ventilation system?**

- *How does the control look like? (centralized, in each apartment, thermostat,  $T_{supply} = f(T_{return})$ , CAV/VAV based on  $CO_2/T_i$ , window sensors, etc.)*
- *Do the control strategies include user control options and to what extent? (switch on and off the unit, to change ventilation intensity, to set operation mode, etc.)*

## **Barriers, problems and needs**

**A4. What are the main problems/barriers during the design process of ventilation system?**

**A5. What are the main problems during commissioning and operation (including maintenance)?**

**A6. What are the main needs you perceive as a ventilation designer/consultant to ensure high indoor air quality and high energy efficiency in residential buildings?**

- *Changes in the legislative regarding requirements or maintenance, etc.?*
- *Standardization, certification, EU legislative?*
- *Support from the government regarding energy effective ventilation?*

A7. A few reasons why people do not use their mechanical ventilation at homes are listed in the following table. How would you, according your experience, rank them with respect to their importance (1 = most important; 4 = least important)?

Reason for not using mechanical ventilation	Rank
Noise from the system	
Increased costs (energy/electricity)	
Operational difficulties	
Lack of awareness (people do not realize that they have a mechanical system)	
Other reasons (please add after your opinion) .....	

### Role of interviewee and his/her institution or company

A8. How many residential buildings (SFH, MFH, AB) does your company work with?

A9. What is your responsibility/job position?

A10. What portion of your building portfolio includes highly energy efficient housing (according to which certification criteria, e.g. energy label, Passive House, etc.)? How old are these buildings?

A11. To what extent is your party involved in the design process?

- *e.g. when and how was your party involved during the integrated design process*

# Annex 68, Subtask 4 Strategies for design and control of buildings

## Stakeholder questionnaire guide B: Facility management/Building administration

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### General information regarding the interview

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Date of interview:		Time (hh:mm-hh:mm):		Recorded? <input type="checkbox"/> Via e-mail? <input type="checkbox"/>
Interviewees name <sup>(*)</sup> :		Age <sup>(*)</sup> :		Gender <sup>(*)</sup> :
Contact to interviewee <sup>(*)</sup> (e-mail, phone, postal address):				
Job title <sup>(**)</sup> :		Placement in organization <sup>(+)</sup> :		How long time has the interviewee been in the business? .....
Name of company/institution:				
Address of company/institution (including country):				

<sup>(\*)</sup> You need clear accept from the interviewee to write down this information.

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<sup>(+)</sup> For example: customer support department, sales, dept. of building design, etc.

### State of the art

*Here the focus will be mostly on apartment blocks (AB), but if the company takes care about other type of dwellings, this should be taken into consideration.*

B1. How is the operation and maintenance usually managed?

- As semi-closed question e.g.:
  - Internally
  - Outsources
  - Left on occupants of the apartments

B2. What work was included during commissioning, and especially, is supply (and extract) air flow rate measured/adjusted?

- *What measurement technique is used for the flow rate measurement (e.g. pressure compensated)?*
- B3. Is there pre-defined operational strategy/maintenance plan for the ventilation systems in the buildings you are responsible for? If yes, who have developed the strategy/maintenance plan?
- B4. What is the most prevailing overall ventilation concept in the buildings you are responsible for?
- *Elaborate on the types of the systems: Natural/hybrid/mechanical exhaust/balanced ventilation. Centralised/decentralised. With/without heat recovery, etc.*

*If applicable:*

- *What level of controllability/adjustability do the occupants typically have?  
Is there a minimum ventilation rate independent on the occupant's adjustment?  
If applicable, can the heat recovery by-pass (for summer) be activated by occupant?  
Are there instructions for occupant control provided, how detailed are they?*
- *Is there a filtration of ambient air and/or indoor air (recirculation), and if yes, what filter class is applied? How often are the filters changed?*
- *How is the integration of "ventilation-influencing" appliances (cooker hood, woodstove, etc) typically handled and is it checked regularly?*
- *How much maintenance effort does the fire protection measures (e.g. fire flap) need?*

## **Barriers, problems and needs**

- B5. What are the typical complaints regarding ventilation you meet?
- B6. In the building you are responsible for, to what extend is mechanical ventilation (with heat recovery) accepted? Please give a grade from 1 to 10 (1 = Not accepted, 10 = Fully accepted).
- B7. What are the main problems you encounter during the operation and maintenance of the ventilation?
- B8. What are the main needs you perceive as a facility manager to ensure high indoor air quality and high energy efficiency in residential buildings?
- *Changes in the legislative regarding requirements or maintenance, etc.?*
  - *Standardization, certification, EU legislative?*
  - *Support from the government regarding energy effective ventilation?*
- B9. A few reasons why people do not use their mechanical ventilation at homes are listed in the following table. How would you, according your experience, rank them with respect to their importance (1 = most important; 4 = least important)?

Reason for not using mechanical ventilation	Rank
Noise from the system	
Increased costs (energy/electricity)	
Operational difficulties	
Lack of awareness (people do not realize that they have a mechanical system)	
Other reasons (please add after your opinion) .....	

**Role of interviewee and his/her institution or company**

B10. How many residential buildings (SFH, MFH, AB) does your company work with?

B11. What is your responsibility/ job position?

B12. What portion of your building portfolio includes highly energy efficient housing (according to which certification criteria, e.g. energy label, Passive House, etc.)? How old are these buildings?

B13. How much of your time is dedicated to work related with ventilation systems?

## Annex 68, Subtask 4 Strategies for design and control of buildings

# Stakeholder interview guide C: Public authorities

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### General information regarding the interview

Interviewer name, company/institution and contact details:				
Date of interview:		Time (hh:mm-hh:mm):		Recorded? <input type="checkbox"/> Via e-mail? <input type="checkbox"/>
Interviewees name <sup>(*)</sup> :		Age <sup>(*)</sup> :		Gender <sup>(*)</sup> :
Contact to interviewee <sup>(*)</sup> (e-mail, phone, postal address):				
Job title <sup>(**)</sup> :		Placement in the organization <sup>(+)</sup> :		How long time has the interviewee been in the business? .....
Name of company/institution:				
Address of company/institution (including country):				

<sup>(\*)</sup> You need clear accept from the interviewee to write down this information.

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### State of the art

- C1. In your country/region/building sector, are there source control measures in place, which limit the emissions from building products?
- C2. In your country/region/building sector, are there airtightness requirements, guidelines and/or recommendations?
- C3. Are there legally binding ventilation requirements for residential housing? If yes, which?

*Maybe as semi-closed question, e.g.:*

- *Based on Supply/Extract air flow or air exchange rate (e.g. l/s per person or 1/h for housing unit)*
- *Based on IAQ based metrics (e.g. CO<sub>2</sub> concentration)*
- *Other: \_\_\_\_\_*
- *None*

- C4. If applicable: Are the requirements formulated for a given/typical occupancy or as a minimum permanent ventilation rate? Is low humidity addressed within the requirements?
- C5. What can be considered state of the art in terms of residential ventilation (for the building sector you deal with)?
 

*Maybe as semi-closed question, e.g.:*

  - *Window ventilation (manually actuated)*
  - *Extract air ventilation:*
    - *with dedicated outdoor air elements*
    - *with heat recovery (HP)*
  - *Balanced ventilation system*
    - *with heat recovery (heat exchanger)*
  - *Other: \_\_\_\_\_*
- C6. Is there a clear rule/guideline how ventilation data is used for energy demand classification?
- C7. Are there any incentives (financial, regulatory, etc.) to promote certain ventilation concepts? If yes, which?
- C8. Are there any incentives, binding rules or recommendations for proper maintenance (filter change, cleaning, etc.)?

**Barriers, problems and needs**

- C9. In your view, what measures should be taken to ensure high indoor air quality and high energy efficiency in residential buildings?
- C10. In your country/region/building sector, to what extend is mechanical ventilation (with heat recovery) accepted? Please give a grade from 1 to 10 (1 = Not accepted, 10 = Fully accepted).
- C11. In your country/region/building sector, what are the barriers and problems for a widespread implementation of a mechanical ventilation system (with heat recovery)?
- C12. A few reasons why people do not use their mechanical ventilation at homes are listed in the following table. How would you, according your experience, rank them with respect to their importance (1 = most important; 4 = least important)?

Reason for not using mechanical ventilation	Rank
Noise from the system	
Increased costs (energy/electricity)	
Operational difficulties	
Lack of awareness (people do not realize that they have a mechanical system)	
Other reasons (please add after your opinion) .....	



## **Role of interviewee and his/her institution or company**

C13. What region/country is your institution responsibly for?

C14. What role / What responsibilities has your institution (and you) with regard to energy efficient construction and indoor air quality?

C15. Does your institution release or define any of the requirements of incentives or does your institution have any responsibilities in forming the current and/or future state of the art in terms of residential ventilation?

## Annex 68, Subtask 4 Strategies for design and control of buildings

# Stakeholder interview guide D: Housing developers

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### General information regarding the interview

Interviewer name, company/institution and contact details:				
Date of interview:		Time (hh:mm-hh:mm):		Recorded? <input type="checkbox"/> Via e-mail? <input type="checkbox"/>
Interviewees name <sup>(*)</sup> :		Age <sup>(*)</sup> :		Gender <sup>(*)</sup> :
Contact to interviewee <sup>(*)</sup> (e-mail, phone, postal address):				
Job title <sup>(**)</sup> :		Placement in organization <sup>(+)</sup> :		How long time has the interviewee been in the business? .....
Name of company/institution:				
Address of company/institution (including country):				

<sup>(\*)</sup> You need clear accept from the interviewee to write down this information.

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<sup>(+)</sup> For example: customer support department, sales, dept. of building design, etc.

### State of the art

*Differentiating between single family house (SFH), terraced/multifamily house (MFH) and apartment block (AB)*

- D1. Are source control measures applied in your projects?
- D2. What typical airtightness value (e.g. air exchange rate at 50 Pa) do you typically achieve in new residential buildings?
- D3. What is the most prevailing overall concept for residential ventilation in your projects?
  - o *Elaborate on the types of the systems: Natural/hybrid/mechanical exhaust/balanced ventilation. Centralised/decentralised. With/without heat recovery, etc.*
  - o *How does the control look like? Centralized, in each apartment, thermostat, T supply =f(Treturn), CAV/VAV based on CO2/Ti, window sensors, etc.*

If applicable:

- What level of controllability/adjustability do the occupants typically have?
- Is there a minimum ventilation rate independent on the occupant's adjustment?
- Can the heat recovery by-pass (for summer) be activated by occupant?
- Are there instructions for occupant control provided, how detailed are they?
- Is there a filtration of ambient air and/or indoor air (recirculation), and if yes, what filter class is applied?
- How is the integration of "ventilation-influencing" appliances (cooker hood, woodstove, etc) typically handled?
- How is the air distributed within the dwelling?
- Is the volume flow checked and adjusted for each terminal (i.e. room) during commissioning? If yes, how?
- Is operation and maintenance addressed during design phase? If yes, how?

## Barriers, problems and needs

D4. What are the main needs you perceive as a housing developer to ensure high indoor air quality and high energy efficiency in residential buildings?

- Changes in the legislative regarding requirements or maintenance etc.?
- Standardization, certification, EU legislative?
- Support from the government regarding energy effective ventilation?

D5. In your country/region/projects, to what extend is mechanical ventilation (with heat recovery) accepted? Please give a grade from 1 to 10 (1 = Not accepted, 10 = Fully accepted).

D6. In your residential housing projects, what are the main problems you encounter during the design and implementation of mechanical ventilation systems?

D7. If applicable, what are the main problems you encounter during the operational phase of mechanical ventilation systems?

D8. A few reasons why people do not use their mechanical ventilation at homes are listed in the following table. How would you, according your experience, rank them with respect to their importance (1 = most important; 4 = least important)?

Reason for not using mechanical ventilation	Rank
Noise from the system	
Increased costs (energy/electricity)	
Operational difficulties	
Lack of awareness (people do not realize that they have a mechanical system)	
Other reasons (please add after your opinion) .....	

## **Role of interviewee and his/her institution or company**

- D9. How many residential buildings (SFH, MFH, AB) does your company usually develop each year and what is your responsibility?
- D10. Since what year have you been building highly energy efficient housing (according to which certification criteria, e.g. energy label, Passive House...)?
- D11. Since what year have you been building highly energy efficient housing with mechanical ventilation?

## Annex 68, Subtask 4 Strategies for design and control of buildings

# Stakeholder interview guide E: Producers of ventilation systems

### General information regarding the interview

Interviewer name, company/institution and contact details:				
Date of interview:		Time (hh:mm-hh:mm):		Recorded? <input type="checkbox"/> Via e-mail? <input type="checkbox"/>
Interviewees name <sup>(*)</sup> :		Age <sup>(*)</sup> :		Gender <sup>(*)</sup> :
Contact to interviewee <sup>(*)</sup> (e-mail, phone, postal address):				
Job title <sup>(**)</sup> :		Placement in organization <sup>(+)</sup> :		How long time has the interviewee been in the business? .....
Name of company/institution:				
Address of company/institution (including country):				

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### State of the art

#### E1. What ventilation systems do you offer for single family houses and apartment buildings?

- o Which of the systems in your offer are “best sellers”? Why do you think is that?
- o Elaborate on the types of the systems: Natural/hybrid/mechanical exhaust/balanced ventilation. Centralised/decentralised. With/without heat recovery, etc.
- o How is heat recovery designed? How is heating/cooling of ventilation air done? What are typical supply temperatures?
- o How do the fire protection measures influence system design? Are there regulations which you as a producer need to be aware of?
- o How does the control look like? Centralized, in each apartment, thermostat,  $T_{supply} = f(T_{return})$ , CAV/VAV based on  $CO_2/T_i$ , window sensors, etc.
- o Is there a filtration of ambient air and/or indoor air (recirculation)? If yes, what filter class is applied and where in the system are the positioned?
- o How is the integration of “ventilation-influencing” appliances (cooker hood, woodstove, etc.) typically handled? Do you handle it in your solutions or do you leave it on the designer? Why?

- o *Are there binding rules or recommendations for “ventilation-influencing” appliances, especially woodstove (CO risk)?*
- E2. Do you have an overview about concepts used by your competitors on the market?
- o *Are those solutions different? In which features?*
  - o *What is your competitive advantage?*
- E3. Do you provide support for designers and end users?
- o *What kind of support do you provide? How do you reach the target audience?*
  - o *What are your experiences with the support? Does it bring you more customers?*

### Barriers, problems and needs

- E4. What are, in your opinion the largest barriers to installation of mechanical ventilation in modern dwellings?
- E5. In your view, what measures should be taken to ensure high indoor air quality and high energy efficiency in residential buildings?
- E6. What are the main needs you perceive as a producer of ventilation systems to ensure high indoor air quality and high energy efficiency in residential buildings?
- o *Changes in the legislative regarding requirements or maintenance etc.?*
  - o *Standardization, certification, EU legislative?*
  - o *Support from the government regarding energy effective ventilation?*
- E7. A few reasons why people do not use their mechanical ventilation at homes are listed in the following table. How would you, according your experience, rank them with respect to their importance (1 = most important; 4 = least important)?

Reason for not using mechanical ventilation	Rank
Noise from the system	
Increased costs (energy/electricity)	
Operational difficulties	
Lack of awareness (people do not realize that they have a mechanical system)	
Other reasons (please add after your opinion) .....	

### Role of interviewee and his/her institution or company

- E8. How many residential ventilation units do you sell every year? What is the ratio between export and domestic sale?
- E9. Do you, as a producer, participate directly in some demonstration projects? If yes, please give examples.

E10. Does your company have research and development department? If no, how is the R&D managed in your company?