Introduction – IEA EBC Annex 68

- Highly energy efficient residential buildings are airtight, and their need for ventilation should be optimized
- Inappropriate ventilation leads to risk of high levels of pollutants indoors
- Annex 68 shall focus on design and operation of buildings towards highest energy efficiency while ensuring good & healthy indoor conditions
- Annex 68 should consider latest scientific data regarding indoor air pollution as well as available modelling tools
- Annex 68 shall provide guidance regarding design and operation with a specific target of new and refurbished residential buildings
Subtasks

- ST1 - Defining the metrics
- ST2 - Pollutant loads in residential buildings
- ST3 - Modeling
  - ST4 - Strategies for design and operation
- ST5 - Field measurements and case studies

Subtask 4 - Objectives

- Gather results and approaches of the other subtasks of the Annex 68 and annex participants
- Address optimal and practically applicable design and control strategies for high IAQ in residential buildings
- Present results in context with existing knowledge
Focus of the subtask is on energy efficient and comfortable mechanical ventilation in tight, low energy residences

Structure:

- **Activity 4.1**
  - State of the art - written knowledge & stakeholder survey (the reality)

- **Activity 4.2**
  - Design strategies - case studies/research focused on design

- **Activity 4.3**
  - Operational strategies - case studies/research focused on operation

- **Activity 4.4**
  - The Annex 68 guide for practitioners: Current challenges, innovative solutions and case studies on indoor air quality design and control in residences

Identifying possible solutions – case studies, methodologies, research results

Current practice, barriers and challenges

Presenting results
Objective:
To identify improvement opportunities for the design and operation of mechanical ventilation in residential buildings

“Transition from requirements to practice”

VENTILATION REQUIREMENTS → AVAILABLE GUIDANCE → CURRENT PRACTICE

- National building codes & Standards
- Guidelines, internet-based knowledge bases, computational tools, etc.
- Stakeholder survey

Methods

<table>
<thead>
<tr>
<th>Review of ventilation requirements</th>
<th>Stakeholder survey</th>
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<tr>
<td>• Recommended ventilation systems</td>
<td>Overview about today’s practice in design, operation and commissioning of ventilation systems in residential buildings in different countries</td>
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<tr>
<td>• Background and nominal ventilation rates</td>
<td>Stakeholder groups:</td>
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<td>• Supply and extract airflow</td>
<td>A – Ventilation designers and Consultants</td>
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<tr>
<td>• Requirements for heat recovery efficiency</td>
<td>B – Facility management and Building administration</td>
</tr>
<tr>
<td>• Requirements for specific power input (SPI)</td>
<td>C – Public authorities</td>
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<tr>
<td>• Requirements for demand-controlled ventilation (DCV)</td>
<td>D – Housing developers</td>
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<td>E – Producers of ventilation systems</td>
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Survey results – Conducted interviews

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Total: 44 interviews

Identified Barriers & Problems

Design (decision making, concept design, detail design)

Spatial requirements & duct routing

- High capital cost
- Positioning exterior in-/outlets
- Positioning units to minimise noise
- Lack of flexibility for flow rates to account for real occupancy
- Maintenance
- Complexity of MVHR
- Prejudice
- Challenging frost protection
- Coordination between designer, architects and customer
Identified Barriers & Problems

Construction (installation & commissioning)

- Poor quality in system installation & commissioning
- Non-compliance with requirements & design intent
- Lack of qualified & experienced installers
- Designers not involved in commissioning
- Systems not balanced
- Big centralised systems too complicated
- No adjustment in flowrates

Identified Barriers & Problems

Post-handover (operation & maintenance)

- Noise
- No proper support for tenants
- Operational failures (cold draughts, odours, dry air)
- Lack of occupants knowledge & awareness
- Lack of flexibility for flow rates to account for real occupancy
- Re-programming of the systems
Suggestions for improvements by survey participants

**Legislative pushes:**
- More flexibility in legislation including a more holistic approach allowing for trade-offs
- Coordinated approach to energy and IAQ
- Strengthen requirements to installation, commissioning and maintenance

**Technical pushes:**
- Training and accreditation of installers
- Simple design and user control flexibility / Zonal control and more sensors
- Identification of risk factors and failure modes of a design strategy
- Specify appropriate mitigation measures throughout the building procurement process

**Market pulls:**
- Quality labels for ventilation systems
- Low emission building products
- Market interventions to balance energy efficiency and cost of installation
- Level playing field in the market
- Stricter regulatory requirements

**Financial incentives pulls:**
- Government subsidy or grants for systems
- Insurance incentives for system maintenance

**Outreach programmes:**
- Clear government guidance on IAQ
- Feedback to designers on actual performance of systems
- Enhanced training for practitioners
- Outreach campaign on benefits of mechanical ventilation systems
Activity 4.4 – Presenting results

A guide through innovative solutions, current challenges, and selected case studies on indoor air quality, ventilation design and control in residences

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Ways to design residential ventilation in the future/How to overcome nowadays challenges?
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4/OPERATION
Towards better performance, user satisfaction and easier maintenance
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Kevin Smith

5/CONCLUSIONS and OUTLOOK
Jakub Kolarik, Gabriel Rojas

Annex 68 guide - overview

- 40 contributors
- 22 case studies
- Available in spring 2020
Annex 68 guide - overview

Each case study is presented using a fixed structure comprising of:

- **Objectives, description and methods** – briefly presents background, aim and main methodology used in the case.
- **Main results and findings** – this section documents how the objectives were fulfilled.
- **Conclusions and lessons learned** – represents a direct connection between the case study and practice.
- **Further reading** – a simplified reference section. Presents one, most important source for further reading providing additional information regarding the case study.

Annex 68 guide – an appetizer

Following presentations in this session represent examples of individual “chapters” in the guide

Thank you for your attention

http://www.iea-ebc-annex68.org/