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# Securing the quality of ventilation systems in residential buildings: Status and perspectives in Poland

Tomasz Trusewicz  
Polish Ventilation Association

Securing the quality of ventilation systems in residential buildings: status and perspectives in Poland - Tomasz Trusewicz, Polish Ventilation Association, Brussels, March 2013



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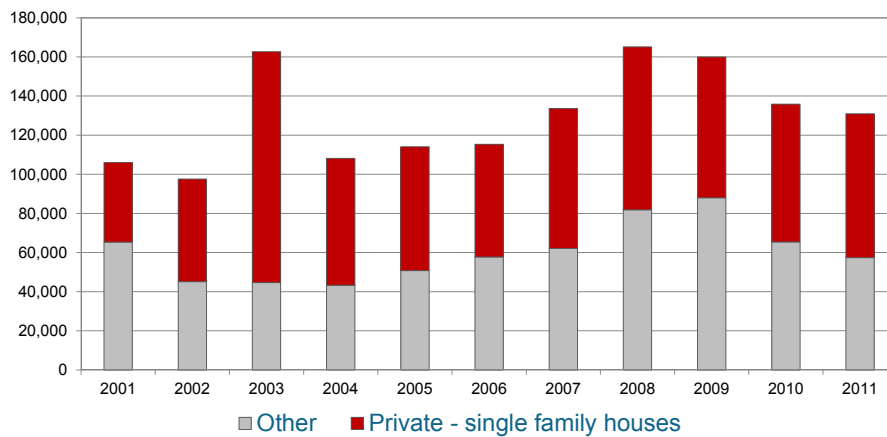
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2001 - 2013



## Number of apartments built in Poland



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## Number of apartments built in Poland

The number of new apartments remains still insufficient in comparison with social expectations.

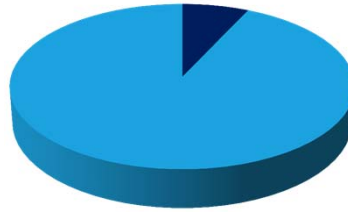
The size of apartments already in use is smaller than the average size in developed European countries.

Housing will continue to develop for at least the nearest ten or fifteen years.

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## Existing buildings – ventilation systems



- Mechanical ventilation
- Passive stack ventilation

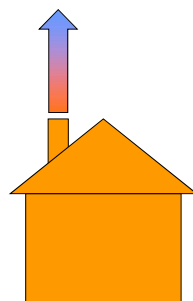
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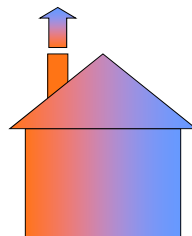
## Existing buildings – disfunctions of natural ventilation

- Variable, unpredictable air flow, depending on the external conditions

Season of the year

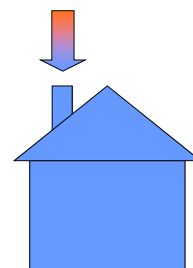


winter



$T_{\text{external}} = + 12^{\circ}\text{C}$

$T_{\text{internal}} = + 20^{\circ}\text{C}$



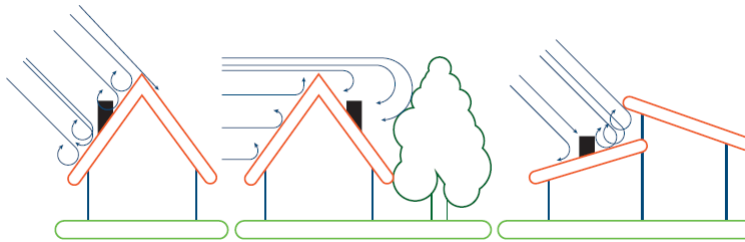
summer

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## Existing buildings – disfunctions of natural ventilation

- Variable, unpredictable air flow, depending on the external conditions  
wind, shape of the building etc



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## Existing buildings – disfunctions of natural ventilation

- Variable, unpredictable air flow, depending on the external conditions
- Excessive airtightness / insufficient supply of external air
- Humidity / mould and fungi / damage to the building structures



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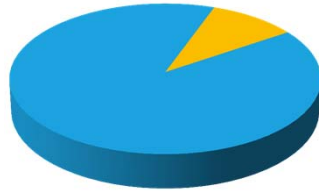


## New buildings – ventilation systems

2009-2012



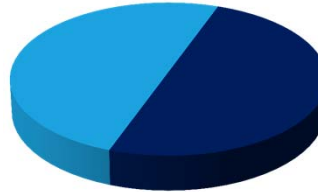
Single family houses



- Mechanical supply/exhaust ventilation with heat recovery
- Passive stack ventilation



Multi-family buildings



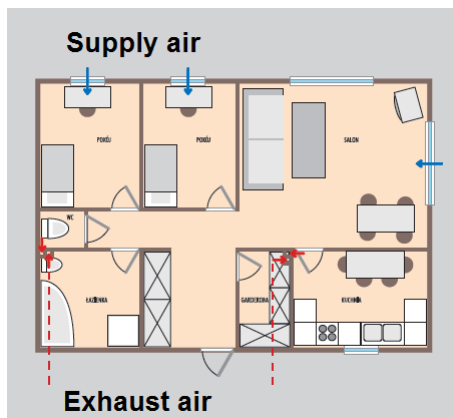
- Mechanical exhaust ventilation
- Passive stack ventilation

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## New buildings – ventilation systems

### natural exhaust ventilation



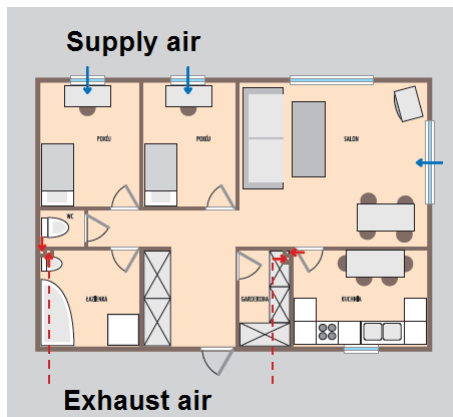
- natural supply of fresh air through leaks or air inlets
- natural exhaust of interior air through ducts
  - common or individual ducts (before 2000)
  - individual ducts (after 2000)
- buildings of up to 9 stories

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## New buildings – ventilation systems

### mechanical exhaust ventilation



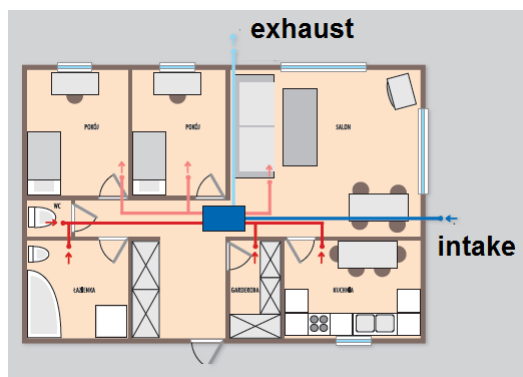
- natural supply of fresh air through leaks or air inlets
- mechanical exhaust of air
  - common ducts for rooms serving the same purpose
  - central fan at the roof
  - Individual fans in apartments

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## New buildings – ventilation systems

### mechanical supply/exhaust ventilation with heat recovery



- mechanical supply of fresh air
- mechanical exhaust of internal air
- kitchen hood included in system or not

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## New buildings – ventilation systems

All buildings erected in Poland have to be designed and built in accordance with the detailed building code.

The code requires that continuously working ventilation be ensured in each building.



## New buildings – ventilation systems

The regulations are a blend of goals to be reached on the one side and detailed technical guidelines on the other side.

The minimum volumetric flow rate of ventilation air for an apartment is determined as a sum of flow rates of air removed from the respective spaces



## New buildings – ventilation systems

### Flow rate of exhaust air

Type and intended use of space	[m <sup>3</sup> /h]
Kitchen, fitted with a gas cooker	70
Kitchen, fitted with an electric cooker	50
Bathroom	50
Separate toilet	30
Auxiliary room without a window	15

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## New buildings – ventilation systems

### Supply of fresh air

- Supply = exhaust
- Supply > 20m<sup>3</sup>/h/person
- Before 2009 - regulations not clear
- After 2009 - an obligation to install air inlets in windows or outer walls, both for natural and mechanical exhaust ventilation

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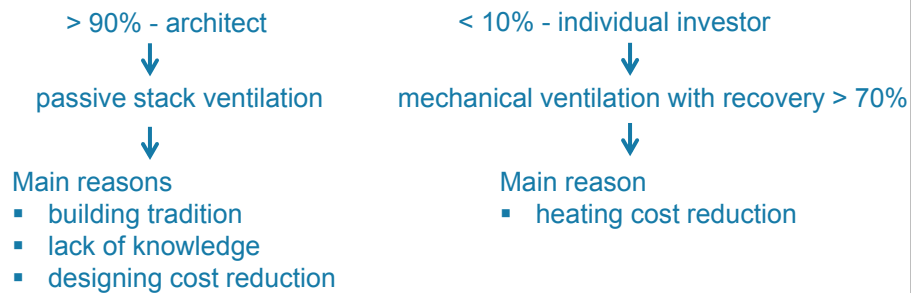




## New buildings – ventilation systems

### Decision makers

#### Single family houses



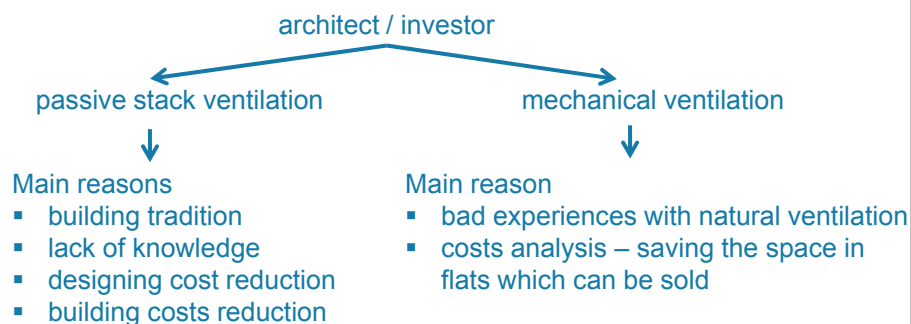
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## New buildings – ventilation systems

### Decision makers

#### Multi-family buildings



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## Designing a ventilation systems

- Architect – the main designer of the building
- Natural ventilation designed by architect
  - choosing appropriate locations of exhaust ducts
  - designing chimneys above the roof slope
  - ducts of 14x14cm cross section and height resulting from the building geometry
  - some ducts do not reach the capacity assumed as they are too short – 2 or 3 highest stories
  - the lower stories, having very high exhaust ducts, are often excessively ventilated

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## Designing a ventilation systems

- Mechanical ventilation is designed by specialized designers
- The designers should have special design licenses
- Designs of mechanical ventilation systems are in general correct

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## Installation of ventilation systems

- The contractors do their work using:
  - the technical knowledge and practical experience
  - diverse recommendations and guidelines given by various institutions, research institutes and ventilation technology suppliers

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## Installation of ventilation systems **quality**



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## Installation of ventilation systems



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## Guidelines for ventilation systems with heat recovery (recuperation system) for single family houses



- ❑ worked out by the Polish Ventilation Association
- ❑ based on legal regulations and practical experience
- ❑ a greater comfort for the future occupants
- ❑ two groups of users: contractors and investors

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	Standard values (minimum)		Recommended values
	Flow rate of supply air	Flow rate of exhaust air	Air change rate or air flow rate
	A		B
	<b>Use the value from column A or B, whichever is higher.</b>		
Type and intended use of space	[m <sup>3</sup> /h]	[m <sup>3</sup> /h]	[1/h]
Closed kitchen, fitted with a gas cooker	70	70	2
Open kitchen, fitted with a gas cooker	-	70	2
Open kitchen, fitted with an electric cooker	-	50	2
Bathroom	-	50	2-3
Lavatory (without a bathtub or shower cabin)	-	30	2-3
Vestibule and auxiliary rooms, such as cloakroom, pantry	-	15	1
Staircase / hall	-	-	50 m <sup>3</sup> /h minimum
Laundry / drying room / recreation rooms	-	-	2
Living quarters: room, living room, bedroom, study	20 m <sup>3</sup> /h/person	20 m <sup>3</sup> /h/person	1
Attic (when its intended use is unspecified)	-	-	1
Garage, boiler room, technical room, utility room	gravity ventilation or other type of ventilation in accordance with detailed regulations		

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**Thank you**

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