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## **Energy costs and lack of funds, increasing energy prices endanger the indoor environment and people's health.**

*Some guidance focused on the residential sector for cold and tempered climate regions in Europe and elsewhere.*

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Due to the recent extreme increases in energy prices, inhabitants have been forced to take energy savings measures because they can't any longer pay their energy bills, especially in older and poorly insulated homes.

This information note describes approximately what residents can do (and what they should not do) to maintain good indoor air quality.

### **First or all, they shall:**

- Avoid elevated humidity by minimizing moisture releasing activities
- Avoid use of combustion products indoors (use of unvented gas heaters should be absolutely prevented)
- Conserve heating energy by:
  - Reducing heating in unused rooms (but not having more than 5°C difference in temperature between rooms in a residence)
  - Adjusting ventilation to the needs. When infiltration through cracks has been limited by weather stripping, CO<sub>2</sub> and relative humidity sensors can be used to direct the best use of ventilation in the residence.

### **Observed reactions from inhabitants to high energy prices which can cause health risk**

Reducing ventilation without monitoring humidity and CO<sub>2</sub> levels by:

- Switching off or setting a too low position of their ventilation system
- Covering with tape (and other blocking materials) ventilation grilles preventing proper ventilation

Reducing heating:

- Turning down or even switching off their heating system, so that unheated rooms fall below 15°C. In older homes, condensation is more likely to form on thermal bridges in the facade.

Changing heating source:

- Installing wood burning stoves or unvented fuel burning heaters without sufficient outdoor air supply or when gaps are closed.

### **What they should do to reduce health risks and mould:**

- Keeping the temperature during night in unheated rooms at least above 15°C, and during the day above 18°C. This is because the moisture in the dwelling may not lead to condensation in cold bridges in the building envelope with possible mould growth. This mould growth has been connected with occupant adverse health problems.
- Avoiding long periods with relative humidity over 65%.
- Keep ventilating! To save energy, ventilate in accordance with the persons present in the rooms. if possible, use demand-controlled ventilation or use heat recovery. Without the use demand-controlled ventilation, it may require the occupants undertake an active behaviour by controlling the fan position, or change the position of the ventilation grilles. If possible, these choices should be made with the guidance of a CO<sub>2</sub> sensor or relative humidity sensor.

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- Changing heating source by installing wood burning stoves or unvented fuel burning heaters may result in the flue gases entering the room. Outdoor air supply has to be increased to avoid that flue gasses entering or staying in the heated rooms. With the use of an extracting cooker hood, a reversal of the air flow can take place. A reversed ventilation flow can pose a danger to health as it may result in elevated carbon monoxide levels that in turn may lead to the poisoning of the occupants.
  - Keep windows for airing open only for approximately five (5) minutes each time. But keep the interior doors in the rooms that are being aired closed. Temperature differences that are too large can cause condensation and mould in the adjacent rooms, and it may cool the entire house resulting in thermal discomfort.
  - If possible, remove unavoidable generation of airborne pollutants at the source. For instance, effective range hoods may minimize the cook's exposure to unhealthy fumes.
  - Try to minimize the moisture production by drying the laundry outside, and by having the occupants take shorter showers. This is particularly a risk in homes with a high occupancy per square meter since there is relatively more moisture production and possible mould growth in the building.
  - Keep uncontrolled air leakage through building cracks to a minimum, by using weather stripping. Uncontrolled air leakage through the building envelope may lead to an extra energy penalty. Ensure that there are alternative methods for ventilation in the building.

**What they should not do:**

- Switching off the fan, or setting the ventilation to a minimum position during the whole day.
- Switching the heating system to a position that, during a long period, can result in condensation on invisible areas in the construction.
- Keeping windows and doors closed throughout the entire day and not periodically airing out the rooms.
- Drying laundry inside that may cause moisture problems throughout the year.
- Using candle lights to heat or warm rooms.

**Guidance for Professionals**

- Invest in energy-efficient demand-driven ventilation systems and/or ventilation with heat recovery.
- Replace old ventilation systems with AC motors to DC motors.
- Install demand-driven bathroom ventilation using moisture sensors (setpoint < 65%) or connected to the light switch with a time overrun of 15-60 minutes.
- Install good cooking extraction (no recirculation). Extraction capacity should be at least 300 m<sup>3</sup>/h with a provision for adequate supply outdoor air.
- Prevent cold bridges by improving insulation and tightening of cracks.
- Provide a facility to dry laundry outside, or, if that is not possible, then dry laundry in rooms with humidity-controlled exhaust ventilation.
- Regularly check the humidity in the home, especially in bedrooms (the relative humidity should not exceed 65% for more than a few hours throughout the weather seasons).