

# **CREATING HEALTHY MULTI-UNIT HOUSING**

## **A Resource Guide**

**Produced by the Centre for Equality Rights in  
Accommodation**

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## INTRODUCTION

This Resource Guide was created as part of *HomeSafe: Creating Healthy and Green Housing*, an initiative of the Centre for Equality Rights in Accommodation (CERA). It is designed for residential landlords, co-operative and condominium boards of directors, property managers, superintendents and others working in the multi-unit housing sector to complement CERA's *Guidelines for Creating Healthy Multi-Unit Housing*. In the following pages you will find a wide variety of information and resources on how to improve the indoor air quality in residential buildings and make them environmentally safer for residents.

### HOW “GREEN” MAY DIFFER FROM ENVIRONMENTALLY SAFE

The building industry is filled with “green” guidelines and certifications which typically focus on reducing the environmental burden associated with products. While this is an excellent step in the movement towards energy efficiency and environmental stewardship, it may not be enough to create healthy living spaces for many residents.

Creating healthy housing requires reducing the chemical burden.

Products that are recycled, or “less toxic,” can still have negative health impacts, particularly for children, pregnant women and people with chronic respiratory problems or environmental sensitivities.

### WORKING WITH RESIDENTS WHO HAVE ENVIRONMENTAL SENSITIVITIES

Environmental Sensitivity – often called Multiple Chemical Sensitivity – is a recognized medical condition that has been diagnosed in over 600,000 Canadians. Creating safe and healthy living spaces is critical for these individuals.

For people with environmental sensitivities, exposure to scented products, fumes from cleaning or maintenance materials, smoke and other air contaminants can trigger a variety of serious physical reactions, including:

- ⇒ neurological symptoms such as trouble concentrating and remembering, seizures, anxiety and depression
- ⇒ respiratory problems such as wheezing and shortness of breath
- ⇒ skin rashes such as eczema and hives
- ⇒ gastrointestinal symptoms such as nausea, bloating and abdominal pain
- ⇒ muscle or joint pains.

While some people will have mild reactions, others can become completely disabled. Research has revealed that people with allergies to dusts, moulds, pollens and animal dander are more likely to have environmental sensitivities and vice versa.

The source of residents' sensitivities may not be a simple, single item, but multiple items within the apartment and building. It can be a daunting task to find these sources or "triggers", and fix, repair or alter them. However, keep in mind that the goal is to create a space that can help a person move from potentially being disabled to being healthy. And consider the fact that the health of people with environmental sensitivities, just like everyone else, is being affected by chemicals and other contaminants in the indoor environment that we live and work in. By making changes in apartments, common areas, and other parts of your building, you are in fact making the spaces healthier for everyone in your building. That can only be a good thing.

When working with residents who have environmental sensitivities, it is important to realize that substances in their apartment, the building and on tradespersons and staff can trigger reactions and impact their health. People with this problem, recognized as a disability by the Ontario and Canadian human rights commissions, therefore look at defending their safe spaces as a serious matter.

To ensure smooth and successful renovation or maintenance work, make it a priority to give residents with environmental sensitivities as much warning as possible. This will allow them to plan for alternative ways to move through the building, if work is being done in a public space, or to consider other places to stay to avoid reactions.

## **BUILDING SCIENCE BASICS: AIR MOVEMENT**

Buildings are tremendously complex. There are many elements that have an impact on their operation and daily function:

- ⇒ **Stack/chimney effect:** This refers to the forces causing air to rise within a building (like a chimney) and involves a change in air pressure from the lower to the upper areas of the building. For example, the air pressure in the basement is usually under negative pressure, which pulls in air from outside through cracks and leakage points, while the upper part of the building is typically under a positive pressure causing air to leak out of the building at this point.
- ⇒ **Wind pressure:** This effect changes seasonally, daily, hourly and even by the minute, changing the pressure load on the building. It creates positive pressures on the windward side of the building and negative pressure on the leeward side of the building.
- ⇒ **Mechanical systems:** These include forced air systems, fresh air intakes, exhaust fans in garages, dryer vents, kitchen and bathroom fans, and the operation of elevators. All of these systems alter the building air pressure. The intensity of that variation is dependent upon the number of appliances running, whether they are drawing in or exhausting out, where the mechanical systems are located within the building and whether they are balanced.
- ⇒ **Residents:** Residents affect the building systems when they open internal and external doors and windows, generate heat and moisture, and generally stir up the air.

It is easy to see how complex building operation can be - and this is simply looking at the movement of air within them. Having a firm grasp of these issues can make it easier to find ways to improve the air quality within buildings.

## **BUILDING SCIENCE AND INDOOR AIR QUALITY: GENERAL STRATEGIES**

There are some simple steps that can be taken to improve air quality within apartment units:

- ⇒ **Seal off all openings into apartments:** This will include sealing around baseboards, plumbing entrances through walls and floors, electrical outlets and switches, openings around fans, and any other place that compromises the “envelope” of the apartment. Making this space as airtight as possible will allow better control of the air quality within the apartment, which will ultimately create a healthier space. It also allows the building representative to determine whether the apartment or the building as a whole is causing the air quality problems. (Please note that the Building Code requires an air space below the suite entry door, with positive pressure in the corridor, to prevent the spread of fire).
- ⇒ **Minimize the pressure differential:** As discussed above, the Building Code requires a negative pressure in apartment units. However, where the unit has its own separate forced air system it may be more appropriate to have an HVAC professional try to minimize the pressure differential while still keeping the safety of the building and its occupants through meeting the Building Code requirements.
- ⇒ **Improve filtration where there is a common forced air system:** Filtration systems can be applied to the building as a whole, or at the point of entry into apartments. Stand alone room air filtration units may be another option. This topic will be discussed in more detail in the chapter on pollution control.

For further information, see **Canada Mortgage and Housing Corporation’s Air Leakage Control Manual for Existing Multi-Unit Residential Buildings** or *Solving Odour Transfer Problems in Your Apartment*. Both are available free on CMHC’s website: [www.cmhc-schl.gc.ca](http://www.cmhc-schl.gc.ca).

## **FIRST STEPS WHEN RENOVATING AN APARTMENT**

There are some basic approaches that can be used when renovating an apartment to start the process of creating a healthy space for residents:

- ⇒ **Apply a zero-VOC<sup>1</sup> (Volatile Organic Compound) paint to the walls:** Since some zero-VOC paints still contain chemicals, it is important to have residents

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<sup>1</sup> Volatile Organic Compounds are chemicals which are released as gases (“off-gas”) from a large variety of substances, both solid and liquid. Many of these compounds are toxic and have been found to have short and long-term health consequences. In the building industry VOCs are typically associated with paints, stains, furniture, cleaning supplies, pesticides, glues, and other petroleum-based products.

with environmental sensitivities or related conditions test the paint to make sure it is appropriate. Some residents may have sensitivities to latex paints, which would require an alternate solution. Natural clay-based paints are a better option.

**NOTE:** Many paint tints contain VOCs, so ensure that they are zero-VOC as well.

- ⇒ **Install tile flooring throughout the apartment:** This is a better option than installing carpets or vinyl flooring (made with poly vinyl chloride) which off-gas VOCs. Tile floors can also create a beautiful space and are tremendously durable.
- ⇒ **Seal all cabinetry in the apartment with a zero-VOC paint or sealer:** Much of the cabinetry in apartments is particle board, which is glued together using formaldehyde binders, a major source of indoor air quality problems. By sealing these exposed and unfinished surfaces - such as the backs of cabinets, the lower surfaces of counters, and such - you will reduce the release of toxic VOCs dramatically. Apply at least 2 or 3 coats, including all of the edges.
- ⇒ **Carry out a thorough inspection of the apartment for water leaks:** Inspect for leaks both with respect to plumbing and building failures. Fix and repair all noted items. Inspect the caulking of windows, doors, tubs, shower stalls, etc., and repair as required. When water gets into building materials, molds can grow and break down those materials as food. Proper water management is, therefore, very important.

These are starting points. By following these steps when renovating units (either as a scheduled repair or in response to the needs of residents) and by air sealing as noted earlier, most major sources of poor indoor air quality will be removed. All of these areas are explained in more detail in the chapters below.



# GENERAL REQUIREMENTS

## OPERATIONS AND MAINTENANCE

### Cleaning Products:

Cleaning products have a huge impact on the air quality within a building. Cleaning chemicals, which are typically petroleum-based, are highly volatile, meaning they are unstable and disperse through the air quickly. Many of them are known carcinogens, reproductive disruptors, neurological agents (impacting brain functions), endocrine disruptors (the endocrine system regulates hormone production), and hormone mimickers (petroleum-based estrogen mimickers are common ingredients in many cleaners and plastics).

Indoor air quality can be dramatically improved by integrating healthier, more natural and less toxic cleaning products into the overall maintenance of the building. This will also reduce the exposure of cleaning and maintenance staff to harmful chemicals. Natural-based (i.e. primary ingredients are non-chemical products), non-toxic cleaning products that are effective in commercial residential buildings are readily available and finding one to suit the needs of your building should no longer be a difficult task. Many supply companies offer effective natural-based solutions in store to make the transition easier. If the cleaning is sub-contracted, it is important to have a contract that outlines the use of natural-based, zero VOC or scent-free cleaning products.

Also consider discussing the cleaning schedule with residents who are pregnant, have young children or have a medical condition such as allergies, environmental sensitivities, asthma, or chronic bronchitis/obstructive pulmonary disease. If these residents are concerned about, or affected by, the products being used, a plan of use may allow them to move within the building safely. This is of course secondary to the more important task of switching to less toxic cleaning products.

### SUGGESTED PRODUCTS:

*Please note that not everyone may be able to tolerate these products.*

⇒ **ECOgent General Purpose Cleaner and Carpet Cleaner**

[www.ecogent.ca](http://www.ecogent.ca)

Purchase through Chemspec: 1-800-268-6093

⇒ **Nature Clean All Purpose Cleaner, Floor Cleaner and Tub and Tile Cream Cleanser**

[www.naturecleanliving.com](http://www.naturecleanliving.com)

Available at retailers across Ontario, including Canadian Tire, Loblaws, Metro, and Sobeys.

⇒ **MASS Environmental Biodegradable Commercial Cleaning Products**

www.massenv.com  
705-652-1757  
P.O. Box 400  
Lakefield, ON K0L 2H0

⇒ **AFM SafeChoice Products**

www.afmsafecoat.com

Available through:

EcoInhabit: Earth Inspired Living  
www.ecoinhabit.com  
888-538-0777

Sustain  
www.sustainmuskoka.ca  
705-787-0326

⇒ **Eco Mist “Pro Solutions” Products**

www.ecomistsolutions.com

Available at Home Depot stores.

⇒ **Microfibre Mops**

Microfibre mops can effectively dust, clean and polish either dry or with water – and without the use of chemical cleaning products. Most have detachable mop heads that can be soaked in warm water and used to clean a variety of surfaces, including floors, sinks, tubs and windows. For heavier jobs, microfibre mops can be used in conjunction with the less-toxic cleaners listed above.

Microfibre mops and cloths are widely available at hardware stores across Ontario, including Canadian Tire, Rona, Home Hardware and Home Depot.

## **Maintenance Products:**

Other products within buildings include the finishes of surfaces, such as floor coverings, paints and greases, and lubricants for elevators. Finishes typically fall under the same staff delivery methods as the cleaning products, and more environmentally healthy solutions can be sourced through the same suppliers. Repainting and refinishing public common spaces is typically infrequent, so it should not be difficult to build in natural-based, low/no-VOC materials to the plan.

Finishes are discussed in greater detail later in the guide.

## **Staff and Tradespersons:**

Ensure that building staff, interior designers, architects, design professionals or tradespeople using the chosen products understand the *reasons* for using them. They should not replace the product specified without first contacting the building owner/manager or general contractor. This should typically be written into any

performance contract. Some maintenance products, such as elevator components, will not have readily available natural-based, or low/no-VOC solutions. However, if the questions are not posed to tradespersons and suppliers, then solutions will never be found.

By looking at all consumables used in the building as potential sources for indoor air pollution, decision trees can be created to better source, supply and replace these products with environmentally healthier building products. This must be part of the thinking process for the trades coming into the building as well. A checklist can be found on the following page to assist in achieving these goals.

Residents with environmental sensitivities and related conditions may react to staff and tradespeople if they are “scented” with personal care products, personal cleaning products, smoke, laundry products and more. As much as possible, staff and tradespeople conducting maintenance and/or repairs need to come to the job scent free.

*It should be made clear to contractors that access to the workspace will depend upon compliance with a scent-free policy.*

**TIP:** Have a pair of coveralls on site, washed in a non-toxic, scent-free product. Tyvek coveralls work for most people as well.

The following checklist will help create a plan of action for work being carried out within or near the apartment of a tenant with environmental sensitivities or who is otherwise sensitive to chemicals. This checklist is not complete, but it is a starting point. It will allow building staff and the resident to have a productive conversation and to engage the tradesperson in a manner that ensures that the work is conducted in as safe a manner as possible.

## TASK SHEET FOR WORK WITH ENVIRONMENTALLY SENSITIVE RESIDENTS

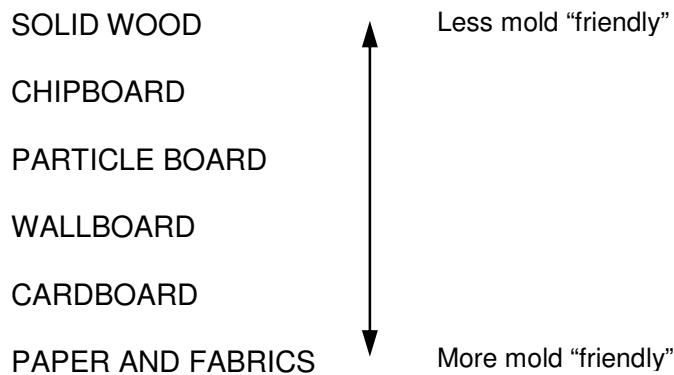
Date:	
Company name:	
Company representative:	
Work location in building:	
Nature of work:	
Name of resident:	
Contact number for resident:	
Resident has sensitivities to the following products:	
List of chemical-based products planned to be used during work: (If necessary attach MSDS to Checklist)	
Are above products approved by resident/building representative?	Y or N
List recommended substitutions for products:	
Tradesperson must be scent free to perform work. (This includes but may not be limited to: laundry products, personal care products, dryer sheets used on clothes, personal cleaning products, etc.)	Signature
Tradesperson must not switch approved products without consent of above listed persons.	Signature
Tradesperson must make an effort to find alternatives to chemical based products that will cause reactions from tenant, and still meet expected durability requirements.	Signature
Can a resident-safe/approved pair of coveralls be provided for workers to wear?	Y or N
Can the resident remain in their unit during the work?	Y or N
Is containment required to carry out the work?	Y or N
Can the contained area be negatively pressurized?	Y or N
What cleaning products would be used for spills and accidents? (If necessary attach MSDS to Checklist)	
Based on above checklist define the scope of work to be carried out:	
	Signature
Approval of work scope by resident:	
Approval of work scope by building representative:	
Approval of work scope by contractor:	
Approval of work scope by all tradespersons doing work:	

## EXISTING CONDITIONS

### MOLD

Mold is a biological organism that, like us, needs food, water and a warm place to live. Water leaks, water penetrations and floods, and the presence of a food source such as cellulose building materials, can lead to mold growth.

Building materials are a food source for molds and the softer the materials, the easier they are for mold to eat.



Some people are very sensitive to mold, while others are not. It is a biological interaction between two creatures, the mold and the resident, and as such, the exposure history of the person, the strength of their immune system and other issues play a part in determining their reaction. People with environmental sensitivities and related conditions will often have more severe reactions to mold due to their pre-existing health issues.

While it is difficult to remove the food sources for mold, we can control the water in buildings through ongoing maintenance and inspections. Of course, there will always be unexpected water events that are beyond control. Dealing with these water events quickly and thoroughly will prevent the onset of mold growth.

**NOTE:** If work is carried out within the first 24 hours, the ability of mold to take hold is effectively removed. After 48 hours it is likely that mold will have started to grow.

If the work is beyond the scope of the building staff, then contacting a professional remediation company is recommended.

**DO NOT USE BLEACH** when cleaning mold, as bleach will encourage mold to release spores or mycotoxins (their allergenic "weapons"). Bleach is also highly toxic. Use unscented dish soap, or other cleaning products such as Tri-sodium phosphate (TSP),

or any of the cleaners mentioned below. Some people have also had good results using hydrogen peroxide.

**SOME SUGGESTED PRODUCTS:**

- ⇒ **Tri-Sodium Phosphate**  
Very effective mold cleaner typically found in hardware stores in a powder form.
- ⇒ **Concrobium**  
Mold cleaner found in most hardware stores (contains a “proprietary mixture of food-grade inorganic salts and purified water”).
- ⇒ **Benefact**  
Very effective mold cleaner. Main active ingredient is thyme oil.  
Found in some commercial cleaning supply stores.
- ⇒ **AFM SafeChoice X-158**  
Non toxic and low odour sealant for surfaces where mold/mildew might appear.  
[www.afmsafecoat.com](http://www.afmsafecoat.com)

Available through:

Ecolnhabit: Earth Inspired Living  
[www.ecolnhabit.com](http://www.ecolnhabit.com)  
888-538-0777

Sustain  
[www.sustainmuskoka.ca](http://www.sustainmuskoka.ca)  
705-787-0326

A variety of mold remediation guidelines can be found on the website for the **Canada Mortgage and Housing Corporation** ([www.cmhc-schl.gc.ca](http://www.cmhc-schl.gc.ca)).

The following chart should help you create a safe approach to determining the scope and scale of a mold situation and who should be involved in addressing the problem.

Note: this chart is simply a means to effectively and quickly gather information on the situation to make informed decisions. It is not a replacement for a detailed onsite inspection or sound professional advice.

## WATER DAMAGE AND MOLD REMEDIATION WORKSHEET

Date and location of water event:	
Brief description of water event:	
Date of inspection:	
Name of inspector:	
Name of resident:	
Does resident have environmental sensitivities?	Y or N (If yes, then refer to Task Sheet for Work with Environmentally Sensitive Residents)
Contact info for resident:	
Source of water:	
Detailed description of water event including timelines:	
Actions taken prior to inspection:	
Can the water damage be dried within 24 hours from event time?	Y or N (If yes, then staff may be able to resolve the issue)
Size of water damage (area, sq. ft, sq. m, height, etc.):	
What is damaged? (floors, cabinetry, furniture, contents, other areas outside this apartment, etc)	
Is there visible mold?	Y or N
Size of visible mold area: Area less than 1 square metre? (10 square feet) Area 1 square metre or more?	Y or N (If yes, then staff may be able to resolve the issue) Y or N (If yes, it is recommended that a professional mold remediation expert be consulted)
Recommended people and actions:	
Date item closed:	

## LEAD

Lead is present in most paint in buildings older than 1978, especially on outdoor paint or indoor “high traffic” surfaces like banisters, window and door trim, and kitchen and bathroom cupboards. Lead can also be found in old water service lines or in the solder joints of copper pipes installed before 1988.

In Canada, regulation of lead in paint has been very slow, with Canadian regulations matching U.S. rules only since 2005. However, paint manufacturers in North America have generally followed U.S. legislation that dramatically phased down lead levels in paint as of 1978. As a result, any paint older than 1978 is a concern. Paint from before the 1960s can contain exceptionally high levels of lead – up to 40 or 50% pure lead.

Lead paint exposure typically comes from sanding old paint, or when old paint in windows and other areas is peeling due to moisture, temperature, or physical wear.

*Any painted surface in a building that is older than 1978 should be tested for lead content prior to any sanding or renovations that might stir up paint dust.*

### Lead screening:

Simple lead screening kits are available at most paint stores, with use instructions inside the kit. A lead screen typically involves cutting at an angle through all the layers of paint down to the bare surface, so that the swab can make contact with all of the layers of paint.

### Pipes:

Some older buildings may also have lead pipes still in use and these should be removed and replaced as soon as discovered. Until the late 1980s, 50% lead solder was used on household plumbing.

There are currently no specific Canadian guidelines on how to safely remediate lead paint in residential situations. However, the websites for the **Canada Mortgage and Housing Corporation** ([www.cmhc-schl.gc.ca](http://www.cmhc-schl.gc.ca)), **Health Canada** ([www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)) and the **US Environmental Protection Agency** ([www.epa.gov](http://www.epa.gov)) contain a wealth of useful information.



## LEAD EXPOSURE DECISION TREE

Is the building older than 1978?	Y or N (If yes, then consider testing for lead paint and continue with the checklist)
Has the building been tested for lead paint?	Y or N (If no, then consider creating a risk analysis inspection of the building)
Are there operable windows that rub against painted surfaces?	Y or N (If yes, this can create lead dust and blow it through the living space)
Are there water damaged areas, blistering paint or surfaces that are wearing, chipping, or peeling?	Y or N (If yes, then test these areas for lead paint)
Does the resident have environmental sensitivities, or are pregnant women or small children present?	Y or N (If yes, then they may be more at risk for negative health impacts from lead dust)
Date of inspection:	
Name of inspector:	
Actions required:	
Actions carried out by:	
Date issue resolved:	

## ASBESTOS

Similar to lead paint, the use of asbestos in building related materials ended by late 1970s and early 1980s.

### Sources of asbestos in buildings:

- ⇒ Vermiculite insulation (which when mined from Libby, Montana, contained asbestos)
- ⇒ Drywall and plaster compound
- ⇒ Asbestos wrapped pipes (typically found in older buildings with radiant heat).
- ⇒ Vinyl floor tiles (typically those that are 9 inches square, though other sizes may have some asbestos content)

In buildings older than 1980, test wall materials, flooring and vermiculite insulation before carrying out any work involving the deconstruction of walls.

In Ontario, asbestos inspection, control and abatement are regulated by the **Ministry of Labour**. The Ministry of Labour has a free downloadable guide, which can be found at: <http://www.labour.gov.on.ca/english/hs/pubs/asbestos/>.

## DUST

For many people, but particularly those with environmental sensitivities, asthma, allergies and related conditions, dust can be a major health concern. Dust can contain a wide range of allergens, including pollens and animal dander, and many bio-aerosols (molds, bacteria and viruses) and chemical toxins.

During any renovation or repair work, control of dust will be an important step in ensuring residents can remain safe and healthy during the process.

Here are some suggestions:

- ⇒ **Isolate:** Isolate the work being done from the rest of the area. This can typically be done with clear plastic rolls taped to the floor, ceiling and walls and held in place with temporary framing or stretch poles.

**NOTE:** If there are residents with environmental sensitivities, you may need to find a type of tape the residents can tolerate. This could be Tuck tape, or more likely, aluminum tape.

- ⇒ **Exhaust:** Exhaust the air from the space to the outside so that a negative pressure is created inside the containment area. This ensures that dust generated inside the space is removed from the building, and that air from outside the containment is drawn into the work area - and not the other way around. This negative pressure can be created with a HEPA air scrubber or with a large vacuum exhausting out a sealed window opening. The window can be opened and then sealed with plastic or rigid insulation with a hole placed in the barrier to install the exhaust duct/hose.

Simply opening a window is never enough to create negative air pressure and control containment. Depending on the direction of the window, dusty air may blow into the living space and create a larger problem for residents.

- ⇒ **Z-Flap Door:** Entry and exit into a work area should be through a Z-flap door. This will help reduce the spread of dust and other contaminants. This is simply done by installing three pieces of construction 8-millimeter polyethylene clear plastic sheeting at the location where you wish the door. The first is taped across the top and one side. The middle piece is only taped across the top and the third piece is taped across the top and the opposite side as the first. This creates a sort of barrier to reduce contaminant spread.
- ⇒ **Tunnel:** Another option is to install a tunnel to the door. This works well when there are multiple doors present, but is not always feasible in an apartment setting.
- ⇒ **Decontamination Chamber:** If you have residents with severe sensitivities who cannot be relocated during the work, it may be necessary to set up a decontamination chamber. This is a small chamber which has a doorway leading

into it and a second doorway from it into the work area. A decontamination chamber allows workers to change out of clothing, change boots and double-bag debris coming out of the work area.

**NOTE:** If containment and control of dust is not possible due to the layout of the work space, it may be necessary to relocate some residents, such as those with environmental sensitivities, while the work is being carried out.

## **INDOOR VEGETATION**

Indoor vegetation can be an attractive addition to foyers, hallways and other common areas in residential buildings. However, for residents with environmental sensitivities and allergies, flowering plants, bushes and trees – and seasonal decorations that incorporate any of these – can be a health concern. These residents can react to the pollens and scents associated with this vegetation.

Where indoor vegetation is making a resident ill, housing providers may have to explore alternatives.

### **SUGGESTED RESOURCES:**

There are a number of books available that provide strategies for creating allergy-free gardens, including *Allergy Free Gardening* by Thomas Ogren (Ten Speed Press) and *Creating a Low Allergen Garden* by Lucy Huntington (McArthur & Company).

## CONCRETE

Concrete can be one of the healthier solutions for many residents, as it cannot grow mold. Also, it typically does not have any chemicals added to it, unless it was poured/formed during adverse temperatures and admixtures were included. Admixtures are chemical additives which change the properties of concrete so that it can still cure in temperatures outside its normal curing range.

**NOTE:** Chemicals in concrete admixtures are a concern for people with environmental sensitivities. When used, residents with sensitivities should be informed.

## MOISTURE MOVEMENT

The main concern with concrete is its ability to absorb water and, through capillary effect, move it long distances. This can put moisture in areas that are not designed for it or do not have moisture protection built into them. The presence of efflorescence, which is a mineral salt deposited on surface of concrete when water is present, is a sign of this moisture movement. When this is discovered, further investigation will be necessary.

## **MASONRY**

Similar to concrete, masonry products can be a relatively safe building material.

### **NEW MASONRY**

New masonry is an excellent building material as it also helps regulate indoor humidity levels by absorbing moisture from the air and releasing it when the levels in the air are lower than the masonry.

**NOTE:** Ensure no chemical additives are used in the mortar of any masonry build up as per the description of admixtures in concrete.

### **OLD MASONRY**

Masonry can absorb contaminants where residents have been heavy smokers, or have been using perfumes, scented chemical-based cleaning products or other volatile petroleum-based substances. These chemicals and contaminants may “bleed” out at a later time, possibly long after those residents have left.

You can seal old masonry with a non-toxic sealer to trap any chemicals inside it. This action must be taken with caution as it will no longer allow the masonry to move water vapour, and may lead to premature failure of the masonry product. It could also push water to undesirable locations. Only seal as a last resort.

## **METALS**

Metals do not grow mold and can be a very healthy building material.

### **ELECTROMAGNETIC FIELD (EMF) SENSITIVITY**

Some residents may be extremely sensitive to the electromagnetic fields (EMF) that are generated by electricity present on or moving through wires. Metals, such as studs or metal roofing, may act as antennae and amplify the EMF in the area. They will also amplify High Frequency Field exposures from wireless and other microwave level devices. Inappropriate shielding of electrical exposures can amplify the fields, and have negative health implications for these residents.

If you have residents with EMF sensitivities, contact a professional who has training in EMF mitigation.

## WOOD, PLASTICS AND COMPOSITES

### WOOD

Wood can be a safe building material for tenants with some exceptions:

- ⇒ **Avoid finishes:** Wood should typically be unfinished, as many finishes, such as urethanes, contain chemical drying agents that are toxic and, for some residents, can cause severe reactions. In some cases, natural-based oils or natural finishes can be used. If there are residents with environmental sensitivities or related conditions, wood finishes should always be tested with the resident before using.
- ⇒ **Avoid “aromatic” woods:** Some woods such as cedars, pines, and spruce have aromatics and terpenes in them, which can cause reactions in some people. Better woods include aspen, birch, beech and maple.
- ⇒ **Control the spread of wood dust:** Cutting of wood should be undertaken outside of the apartment or building, or using the containment procedures described earlier. This will prevent the spread of wood dust.

### PLASTICS

Plastic is a petroleum-based product and, as such, releases toxic VOCs into the air. Consider other material choices where possible.

- ⇒ **Better plastics:** Harder, non-flexible plastics instead of the flexible materials.

### COMPOSITE MATERIALS

Composite materials, such as laminate floors, particleboard, chipboard, and other wood composites typically have high levels of formaldehyde, and indoor environmental toxin. Ways to reduce the dangers associated with composite materials include:

- ⇒ **Formaldehyde-Free Materials:** Look for materials that are labeled formaldehyde-free when purchasing shelving, cabinetry, and other wood products (Note: all wood contains some naturally occurring formaldehyde).
- ⇒ **Exterior Grade Composites:** If formaldehyde-free products are not available, use exterior grade materials which contain phenol formaldehyde. This type of formaldehyde is less volatile than urea formaldehyde (which is typically used in interior products), and therefore off-gasses less. There is also less formaldehyde in exterior grade materials.
- ⇒ **Zero-VOC Finishes and Glues:** When using engineered flooring, such as bamboo, ensure that it uses zero-VOC finishes and glues. Bamboo can be a

better choice for residents with environmental sensitivities and related conditions because it does not contain terpenes.

- ⇒ **Composite Decking:** Composite plastic decking may be less problematic for some residents than natural wood, such as cedar, which contains aromatics and terpenes.
- ⇒ **Avoid Pressure Treated Wood** (such as Alkaline Copper Quaternary (ACQ) or Copper Azole (CA) preserved wood).

Before installing, test potential composite products with any residents with sensitivities. Also, ensure residents' windows are closed prior to cutting, and that the windows and all exterior surfaces around the apartments are thoroughly cleaned after the work is complete.

#### **SUGGESTED PRODUCT:**

- ⇒ **AFM Safecoat Sealers**  
Helps stop off-gassing of composite wood products.

Available through:

EcoInhabit: Earth Inspired Living  
[www.ecoinhabit.com](http://www.ecoinhabit.com)  
888-538-0777

Sustain  
[www.sustainmuskoka.ca](http://www.sustainmuskoka.ca)  
705-787-0326

Eco Building Resource  
[www.eco-building.ca](http://www.eco-building.ca)  
905-841-3535



# THERMAL AND MOISTURE CONTROL

## MOISTURE CONTROL

Control of moisture is critical to a building's operations and long-term viability. As discussed earlier, mold growth can have particularly negative impacts on the indoor air quality of a building. Proper upkeep of the exterior of the building, including flat roof inspections and maintenance/inspection of wall systems, windows, doors, etc., are tremendously important to ensure a healthy building.

## THERMAL CONTROL

Thermal insulation comes in a variety of styles and formats. Use formaldehyde-free insulation. There are some batt insulations and loose fill insulations that are formaldehyde-free.

### SUGGESTED PRODUCTS:

- ⇒ **Blown cellulose** in loose or wet formats can be installed in open cavities.

Available through:

Therm-O-Comfort Co. Ltd.  
[www.thermocomfort.ca](http://www.thermocomfort.ca)  
1-877-684-3766

- ⇒ **Roxul rigid insulation** has very low levels of formaldehyde after manufacture.  
[www.roxul.com](http://www.roxul.com)  
1-800-265-6878

- ⇒ **Ultra Touch natural cotton fiber insulation** is recycled denim blue jeans turned into batt insulation.

Available through:

Sustain  
[www.sustainmuskoka.ca](http://www.sustainmuskoka.ca)  
705-787-0326

Eco Building Resource  
[www.eco-building.ca](http://www.eco-building.ca)  
905-841-3535

Once installed and sealed, insulation is generally not an issue. However, insulation materials can become a problem if there is airflow through the wall or ceiling cavities. Once again, proper air sealing of a building is important.

# OPENINGS

## MATERIALS FOR OPENINGS

Avoid materials such as vinyl and plastic that off-gas VOCs. Stable, better quality materials will be more durable and longer lasting, and ultimately a better return on your investment.

### SUGGESTED PRODUCTS:

- ⇒ **Commercial grade metal framed windows and doors**
- ⇒ **Residential grade aluminum clad wood windows and doors**

Available through:

Sunset Construction and Millwork, Bechin  
705-484-5515

- ⇒ **Fibreglass framed windows and doors**

Available through:

Thermotech Windows Ltd., Ottawa  
[www.thermotechwindows.com](http://www.thermotechwindows.com)  
613-225-1101

- ⇒ **Metal screening** is a better option than screens made of plastic/petroleum-based products, which release VOCs when heated by the sun.

## AIR TRANSFER

Air sealing around doors and windows is critical in controlling odour in any indoor space. This has been explained in detail elsewhere in this guide.

- ⇒ **Low formaldehyde spray foam:** Consider using low-formaldehyde spray foam when installing doors or windows.
- ⇒ **Zero-VOC caulking:** Acetic acid and other chemicals in typical caulking are very toxic, so choose a zero-VOC caulking for sealing-up details around windows. If you have residents with environmental sensitivities or related conditions, choosing an appropriate caulking is critical to the success of window/door installations and maintenance.

- ⇒ **Vinyl weather stripping:** Though it is not ideal, vinyl weather stripping around doors and windows is typically a healthier option than petroleum-based rubber seals and gaskets.

**SUGGESTED PRODUCTS:**

- ⇒ **AFM Safecoat Caulking Compound**  
[www.afmsafecoat.com](http://www.afmsafecoat.com)

Available through:

EcoInhabit: Earth Inspired Living  
[www.ecoinhabit.com](http://www.ecoinhabit.com)  
888-538-0777

Sustain  
[www.sustainmuskoka.ca](http://www.sustainmuskoka.ca)  
705-787-0326

Eco Building Resource  
[www.eco-building.ca](http://www.eco-building.ca)  
905-841-3535

- ⇒ **Adbond by Dutab**  
[www.dutab.com](http://www.dutab.com)

Available through:

Eco Building Resource  
[www.eco-building.ca](http://www.eco-building.ca)  
905-841-3535

- ⇒ Some **aquarium caulks** may work as they are typically low-VOC and low in other potential toxicants.

## FINISHES

Finishes are a major part of maintenance, repair and renovation associated with apartment buildings. By following a few basic principles, landlords and building managers will be able to greatly improve the air quality within their properties.

### PAINTS

- ⇒ **Use low/zero-VOC products:** Use low or zero-VOC paints, stains, wood covering, floor covering, and sealers. These products are now readily available across Ontario.
- ⇒ **Beware of tints:** Tints can add VOCs to paint. When buying low or zero-VOC paints, make sure that the tint is also zero-VOC. Test bottles are available at many paint supply stores.

**NOTE:** low or zero-VOC products may have a scent which could make residents with environmental sensitivities or related conditions ill. This should also be investigated prior to using the product.

- ⇒ **Seal old paint:** When painting a unit, it may be necessary to apply a sealer over the existing paint before the final paint job. As discussed earlier in this guide, smoke and chemical cleaning products can get absorbed by the paint and leach out over time. Sealing the old paint will prevent this. Use zero-VOC sealers as many sealers are chemical-based and can be very toxic.
- ⇒ **Be careful when using mold preventative paints:** These paints contain a biocide which is a biological poison.
- ⇒ **Consult the MSDS:** If in doubt, consult the Material Safety Data Sheets of products and contact the manufacturer.
- ⇒ **Test products:** If residents have sensitivities, you will need to test products with them before using. This may involve a “sniff” test or some other method that the resident feels is appropriate.

#### SUGGESTED PRODUCTS:

- ⇒ **Benjamin Moore Natura Interior Paints**  
[www.benjaminmoore.ca](http://www.benjaminmoore.ca)

Available throughout Ontario.

⇒ **AFM Safecoat Paints**

Available through:

EcoInhabit: Earth Inspired Living  
[www.ecoinhabit.com](http://www.ecoinhabit.com)  
888-538-0777

Sustain  
[www.sustainmuskoka.ca](http://www.sustainmuskoka.ca)  
705-787-0326

⇒ **Z-Coat Zero VOC Paint**

[www.generalpaint.com](http://www.generalpaint.com)

Available through:

Eco Building Resource  
[www.eco-building.ca](http://www.eco-building.ca)  
905-841-3535

⇒ **Farrow and Ball Paint**

Clay-based paint.  
[www.farrow-ball.com](http://www.farrow-ball.com)

Available at various paint stores across Southern and Eastern Ontario.

⇒ **American Clay Plasters**

[www.americanclay.com](http://www.americanclay.com)

Available through:

Sustain  
[www.sustainmuskoka.ca](http://www.sustainmuskoka.ca)  
705-787-0326

The Healthiest Home Store  
[www.thehealthiesthome.com](http://www.thehealthiesthome.com)  
613-715-9014  
1-877-ECO-4211

⇒ **Totem Coatings**

Lime and clay plaster, soy and lime paint.  
<http://www.totemcoatings.com>  
905-488-0535

⇒ **Homestead House Paint Company Ltd.**

[www.homesteadhouse.ca](http://www.homesteadhouse.ca)

Order from the manufacturer.

## WALLS

There are biocides in premixed drywall plaster which may cause reactions in some residents. Consider powder form plaster or, ideally, biocide-free compounds. These products are available across Ontario.

### Suggested Product:

⇒ **Murco M-100**

Hypo-allergenic all purpose taping, topping and texture compound.

Available through:

Eco Building Resource  
www.eco-building.ca  
905-841-3535

## FLOORING

Floor finishes follow the same guidelines. As with paints and stains, safer options are readily available in Ontario.

As discussed earlier, carpets can be particularly unhealthy with toxic chemicals present in fibres, dyes, backing glues, and various treatments. These chemicals can off-gas for years. Carpets also collect pollutants and allergens, such as pesticides, pet dander, pollens and dust. Wherever possible, carpeting should be avoided.

**NOTE:** If you have residents with sensitivities, make sure to test a sample of the flooring with the resident prior to installation.

### Other suggestions:

- ⇒ Avoid vinyl flooring which is made from polyvinyl chloride and off-gasses VOCs
- ⇒ A better choice is linoleum made from linseed oil. Note: this product has a natural odour that may be a problem for some residents with environmental sensitivities.
- ⇒ If carpets are necessary, cotton or other natural fibred carpets, without pesticides, are a very durable, long-lasting choice.
- ⇒ The “safest” choice is solid surface flooring such as ceramic tile.

## **SUGGESTED PRODUCTS:**

### ⇒ **Eco Timber Floors**

Free of formaldehydes and harsh solvents.  
[www.ecotimber.co](http://www.ecotimber.co)

Dealers across Ontario.

### ⇒ **Forbo Flooring Systems**

Marmoleum flooring (made of cork flour, wood flour, linseed oil, natural resins and mineral pigments).  
[www.forboflooringna.com](http://www.forboflooringna.com)

Dealers across Ontario.

### ⇒ **AFM Flooring Products**

Carpet seal and adhesive.

Available through:

EcoInhabit: Earth Inspired Living  
[www.ecoinhabit.com](http://www.ecoinhabit.com)  
888-538-0777

Sustain  
[www.sustainmuskoka.ca](http://www.sustainmuskoka.ca)  
705-787-0326

### ⇒ **Finitech Flooring Products**

[www.finitec-inc.com](http://www.finitec-inc.com)  
1-888-838-4449

Available through:

Eco Building Resource  
[www.eco-building.ca](http://www.eco-building.ca)  
905-841-3535

## **SPECIALTIES**

### **LAUNDRY FACILITIES**

For residents with environmental sensitivities and related conditions, common laundry facilities in an apartment building will be a major challenge. Laundry products that have an odour, including but not limited to scented products, can be very harmful for these people. Typically, washing machines and dryers containing residues of these products will be unusable.

Solutions will vary depending on the situation, provincial/municipal requirements, the layout of the building and numerous other variables.

#### **Some options to consider:**

- ⇒ Have a separate laundry room for residents with sensitivities that is locked and cannot be used and contaminated by others.
- ⇒ Set up laundry equipment in these residents' apartments (This would be a similar approach as installing wheelchair accessible cabinetry and handrails for a tenant).
- ⇒ Set up one laundry machine by the door to the laundry room, or under an exhaust hood, for the exclusive use of these residents.
- ⇒ Reduce the rent for residents that cannot use the common laundry facilities due to chemical contamination.



## EQUIPMENT

### KITCHEN APPLIANCES

Kitchen and other appliances can have negative health effects for residents with environmental sensitivities. The following steps will reduce the likelihood that appliances will make these residents ill:

- ⇒ **Avoid gas appliances:** Residents with environmental sensitivities will typically not be able to tolerate gas appliances in their apartments. If gas appliances are the only option, then an extremely thorough leak detection inspection should be carried out, along with regular scheduled maintenance to ensure back drafting, leaks or other environmental concerns are not occurring. For gas stoves, it is critical that an exterior exhausting vent hood be installed.
- ⇒ **Electric appliances are a better option.**
- ⇒ **Clean new appliances:** Thoroughly clean new appliances with unscented dish detergent and water to remove the oil film that is applied to prevent corrosion during transit. Residents with environmental sensitivities may react to this film.
- ⇒ **Seal plastic/rubber components:** Where possible, flexible, plastic or rubber components of appliances should be covered with aluminum tape.
- ⇒ **Process new appliances:** “Baking off” a stove, whereby the appliance is set up somewhere other than the apartment and is simply turned on and left to burn off chemicals, followed by a thorough cleaning, can make the stove safer for residents with environmental sensitivities.
- ⇒ **Consider using older appliances:** Slightly older appliances are often a better solution as they have had time to off-gas. Of course, when using older appliances, energy efficiency must be considered.

## CONVEYING SYSTEMS

### ELEVATOR MAINTENANCE

The use, operation and maintenance of elevators are strictly regulated. As such, there is limited opportunity to make these processes environmentally safer.

It is appropriate, however, to have discussions with your elevator maintenance company about options for low-VOC, low odour products when maintaining the elevator. Many companies are coming out with products that are less toxic to occupants and the workers themselves. If encouraged by building owners and managers, maintenance companies will seek out these products.

#### **Cleaning Products:**

With the focus on elevator maintenance products, it is easy to forget that the products used to clean up after the work is completed can be equally toxic. As discussed earlier, low or zero-VOC, unscented cleaning products should be used.

#### **Scheduling:**

Where possible, plan and schedule elevator maintenance and provide advance notice for all tenants. This will allow residents with sensitivities to consider using the stairwells or adjust the timing of their elevator usage.

## PLUMBING

As discussed earlier, lead plumbing is a concern for all tenants. It is worthwhile to carry out a complete inspection to check for lead pipes (in older buildings) or lead solder in copper pipes (in newer buildings). This can be done by testing water levels for lead and through a physical inspection of the pipes.

Some residents, such as those with environmental sensitivities, may react to plastic pipes. Where this is the case, a first step would be to seal, isolate and wrap the plumbing. If the resident continues to have problems, it may be necessary to switch to copper pipes.

## HEATING, VENTILATING AND AIR CONDITIONING

Due to the wide range of HVAC delivery systems, set-ups and apartments, it is difficult to create a broad comment on the subject. However the following suggestions may be helpful in improving the indoor environment in your building.

### GENERAL

Electric HVAC appliances are preferable to gas and oil appliances due to the presence of petroleum products. This is especially true when the HVAC unit is inside a resident's apartment.

### DUCTS

Consider cleaning the ductwork every few years, and ensure that there are no cleaning products, biocides or other chemicals, sprays or scents added to the ductwork. The oil film present on all ductwork can cause reactions in people with environmental sensitivities. Removal of ducts and thorough cleaning is typically the solution. As removal will rarely be feasible in apartment buildings, cleaning ducts in place may be the only option.

### HEATING

- ⇒ For residents with environmental sensitivities, hydronic radiant heat is the best heating option.
- ⇒ Radiators should be cleaned periodically to remove the dust from between the fins.
- ⇒ Seal any wiring holes behind electrical baseboards with spray foam (where the resident has environmental sensitivities or related conditions, make sure that the foam is appropriate).
- ⇒ Some residents may be sensitive to the electricity and electro magnetic fields generated by electric radiators.

### AIR FLOW

The ability to control the amount of fresh air coming into an apartment can be tremendously important for residents, and particularly for those with extreme sensitivities to air quality. This allows residents to take fresh outside air into their living space when that is the best source of clean air. When the outdoor air is polluted, it allows them to

isolate their apartment from outdoor contaminants. Again, depending on the system, this may or may not be feasible. Heat or Energy Recovery Ventilators (HRV's or ERV's) may aid in this and may be something that could be added to the apartment as a standalone system, where possible.

As discussed earlier, another approach to improving air quality within apartments may be to reduce the negative pressure in the apartment to the bare minimum, while still meeting the Ontario's Building Code requirements. This will make it less likely that toxins from common areas outside of the apartment will be drawn in. This can be done through the specific apartment's HVAC and/or the HRV/ERV, or even through an intake fan into the apartment working in harmony with the kitchen and bathroom exhaust fans.

**Air filtration** will be discussed in a later section.

# ELECTRICAL

## ELECTROMAGNETIC FIELDS

Electrical hypersensitivity is common among individuals with environmental sensitivities. Electricity present on or moving through wires generates **electromagnetic fields (EMF's)**. These fields are measurable and impact our bodies. Residents with sensitivities may require some special consideration:

- ⇒ **Turn off breakers in the apartment:** This will remove the source of the EMF in the apartment. This of course only works for breakers within the apartment, and does not reduce exposure to EMF's from other apartments. However, it can be enough to help the resident. If the circuit panel is in the apartment, create a map of the panel so that the resident can work with the appropriate breakers, and not have to struggle to determine what is and is not impacting them.
- ⇒ **Use demand switches:** In cases where the breakers are not in the apartment, or close by, the use of demand switches may be appropriate. Demand switches work through a sub-panel which is attached to the main electrical panel. The desired circuits are fed into the sub-panel and the resident can use a remote control to turn the power off to those circuits (e.g. when sleeping). The sub-panel will re-energize all of the circuits on the panel if a light switch or something else is turned on, making it a simple process to use and operate.

**NOTE:** For more complex electrical sensitivity concerns it is best to consult with a trained EMF expert.

# POLLUTION CONTROL

## AIR FILTRATION

Due to the fact that most apartments have a central heating system, the ability to improve filtration is typically limited. The capacity of a building's HVAC unit to filter contaminants is determined by the age of the unit, the size of the filter slot and the ability of the unit to effectively move air after an improved filter is installed. This last issue is referred to as 'back pressure' and is the resistance the filter adds to the flow of air. There is a limit to the resistance that HVAC equipment can overcome and this may prevent higher levels of filtration.

It is easier to improve air quality through filtration in apartments with unit furnaces.

### Furnace Filters:

Furnace filters are rated out of 20 – MERV (Minimum Efficiency Reporting Value) by ASHRAE (The American Society of Heating, Refrigeration and Air Conditioning Engineers):

- ⇒ **Standard fiberglass filter:** Rating: ~ 1 out of 20. These filters are not effective.
- ⇒ **Washable furnace filters:** Rating: ~ 3-4 out of 20.
- ⇒ **Electronic furnace filters:** Rating: ~ 4-8 out of 20 (BUT, according to CMHC, the efficiency of electronic filters drop by 60% after two weeks). The electrically charged dust that does get through will also stay in the air and not settle as furniture electrically repels it.
- ⇒ **Paper pleated one-inch filters (such as the 3M Filtrete Filters):** Rating: ~ 12 out of 20. These filters pull out a large amount of allergens from the air and are good value at \$25 each.
- ⇒ **HEPA (High Efficiency Particulate Arrestor) filter:** Rating: ~ 17 out of 20. This is the best available filtering system. HEPA filters often come with pre-filters for larger particles and carbon filters to remove chemicals and odours as well. Typically these filters cost at least \$1000, and require a competent HVAC tradesperson to install.

For many apartments, using a portable filtration system is the best option. There are many portable HEPA filters systems on the market that do an excellent job.

### Carbon/Charcoal Filters:

The filters described above will not remove chemicals in the air – they simply remove particulate. The removal of chemicals in the air is typically accomplished through the use

of a carbon or charcoal filter. These often come as a pre-filter on HEPA systems. Carbon filtration can often be more important than the particulate filter, especially where there are residents with environmental sensitivities. There are various carbon filters, using various types of carbon. If there are residents with environmental sensitivities, it will be important to test the carbon filter with the residents before using.

**NOTE:** Ensure filters are changed on a regular schedule.

**SUGGESTED PRODUCTS:**

⇒ **Amaircare**

Portable and installed HEPA air filtration systems.  
[www.amaircare.com](http://www.amaircare.com)

⇒ **Allerair Air Purifiers**

Manufactures portable systems specifically designed for people with environmental sensitivities.  
[www.allerair.com](http://www.allerair.com)

⇒ **IQAir**

Manufactures portable, installed and HVAC HEPA cleaners, including room air purifiers specifically designed for people with environmental sensitivities.  
[www.iqair.com](http://www.iqair.com)



## RESOURCES

### GOVERNMENT

#### Canada Mortgage and Housing Corporation

[www.schl.gc.ca](http://www.schl.gc.ca)

##### CMHC Publications

These publications can be ordered by contacting CMHC at 1-800-668-2642. Many are also available online for free.

- ⇒ *Healthy Housing Practical Tips* (pub. #60916) (available online)
- ⇒ *Healthy Housing Fact Sheets* (available online)
- ⇒ *Healthy Housing Renovation Planner* (#60957) (\$34.95)
- ⇒ *Building Materials for the Environmentally Hypersensitive* (#61089) (\$29.95) (currently being revised)
- ⇒ *About Your Apartment: Solving Odour Transfer Problems in Your Apartment* (#63419) (available online)
- ⇒ *About Your House: Fighting Mold - The Homeowner's Guide* (#60516) (available online)
- ⇒ *Clean Up Procedures for Mold in Houses* (#61091) (\$14.95)
- ⇒ *Healthy High-Rise: A Guide to Innovation in the Design and Construction of High-Rise Residential Buildings* (#62876) (available online)
- ⇒ *Air Leakage Control Manual for Existing Multi-Unit Residential Buildings* (#65847) (available online)

#### Health Canada

[www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)

#### US Environmental Protection Agency

[www.epa.gov](http://www.epa.gov)

### GREEN BUILDING MATERIAL SUPPLY COMPANIES

#### Healthiest Home

135 Holland Ave  
Ottawa ON K1Y 0Y2  
613-715-9014  
1-877-326-4211  
[www.thehealthiesthome.com](http://www.thehealthiesthome.com)

#### Eco Building Resource

136 Wellington St. E  
Aurora ON L4G 1J1  
905-841-3535  
1-877-741-3535  
[www.eco-building.ca](http://www.eco-building.ca)

**Ecolnhabit**

121 Old Highway #26  
Meaford, ON N4L 1W7  
1-888-538-0777  
www.ecoinhabit.com

**Sustain**

8 Crescent Road  
Huntsville, ON P1H 0B3  
705-787-0326  
www.sustainmuskoka.ca

**Envirodesic**

enquire@envirodesic.com  
www.envirodesic.com

**GREEN BUILDING CONSULTANTS****Stephen Collette** BBEC, LEED AP, BSSO

Your Healthy House  
705-652-5159  
www.yourhealthyhouse.ca

**Paul Battle**

The House Doc  
613-297-2996  
www.thehousedoc.ca

**Anne Stewart** B.A.Sc., C.P.H.I.(C), B.B.E.C.

Environmental Health Consulting  
416-836-5509  
www.annestewart.net

**Robert Stellar** BBEL, BBEC, EE

Breathing Easy  
519-599-1111  
www.breathing-easy.net

**Robert Metzinger**

Safe Living Technologies (EMF mitigation)  
519-240-8735  
www.safelivingtechnologies.ca

**Bruce Small and Howard Rubin**

Small & Rubin Ltd./Envirodesic  
416-520-3127 (Howard Rubin)  
905-702-8615 (Bruce Small)  
www.envirodesic.com

## **ENVIRONMENTAL DESIGN PROFESSIONALS**

### **Linda Nolan**

Linda Nolan Interiors  
613-290-3969  
[www.lindanolaninteriors.com](http://www.lindanolaninteriors.com)

### **David McAuley**

J. David McAuley Architect Inc.  
519-823-2441  
[www.jdm-arch.com](http://www.jdm-arch.com)

## **GREEN COMMUNITIES CANADA**

Green Communities Canada is a network of community-based non-profit organizations that provide environmental programs and services. Their members are excellent resources for sourcing local tradespersons, materials and consultants.

[www.greencommunitiescanada.org](http://www.greencommunitiescanada.org)

### **Members:**

#### **Environment Network** (Simcoe County)

705-446-055  
1-866 377-0551  
[www.environmentnetwork.org](http://www.environmentnetwork.org)

#### **Elora Environment Centre** (Halton, Peel, Bruce, Grey, Huron, Dufferin, Wellington, S-W Ontario)

519-846-8464  
1-866-865 7337  
[www.ecee.on.ca](http://www.ecee.on.ca)

#### **Green Venture** (Hamilton, Niagara, Brant, Norfolk)

905-540-8787  
1-866-540 8866  
[www.greenventure.ca](http://www.greenventure.ca)

#### **Hearthmakers Energy Cooperative** (Kingston, Frontenac, Quinte, Lennox Addington, Grenville)

613-547-8122  
1-866-547-8122  
[www.hearthmakers.org](http://www.hearthmakers.org)

#### **Peterborough Green-Up** (Peterborough, Kawartha Lakes, Northumberland)

705-745-3238  
1-888-745 3238  
[www.greenup.on.ca](http://www.greenup.on.ca)

**Rideau Environmental Action League (REAL)** (Smiths Falls, Lanark, Leeds)  
613-283-9500  
[www.REALaction.ca](http://www.REALaction.ca)

**EcoSuperior** (Thunder Bay)  
807-624-2140  
[www.ecosuperior.org](http://www.ecosuperior.org)

**Waterloo Region Green Solutions** (Waterloo Region)  
519-744-9799  
[www.reepwaterlooregion.ca](http://www.reepwaterlooregion.ca)

**Windfall Ecology Centre** (Toronto, York, Durham)  
905-727-0491  
1-866-280-4431  
[www.windfallcentre.ca](http://www.windfallcentre.ca)

**Baerg's Home Performance Solutions** (Temsikaming, Cochrane)  
705-563-2202  
[baergsolutions@parolink.net](mailto:baergsolutions@parolink.net)

**Grassroots North** (Muskoka, Parry Sound, Nipissing)  
705-636-1388  
[inspector@xplornet.com](mailto:inspector@xplornet.com)

**Green Communities Home Energy Solutions** (Central Office)  
1-888-661-0000  
[www.SaveHomeEnergy.ca](http://www.SaveHomeEnergy.ca)

## **OTHER ORGANIZATIONS AND NETWORKS**

**Environmental Health Association of Ontario**  
[www.ehaontario.ca](http://www.ehaontario.ca)

**Canadian Environmental Law Association**  
[www.cela.ca](http://www.cela.ca)

**Centre for Equality Rights in Accommodation**  
[www.equalityrights.org/cera](http://www.equalityrights.org/cera)

**Canadian Partnership for Children's Health and the Environment**  
[www.healthyenvironmentforkids.ca](http://www.healthyenvironmentforkids.ca)

**Canadian Association of Physicians for the Environment**  
[www.cape.ca](http://www.cape.ca)

**Women's College Hospital Environmental Health Clinic**  
[www.womenscolleghospital.ca/programs/program76.html](http://www.womenscolleghospital.ca/programs/program76.html)

## **BOOKS**

**Prescriptions for a Healthy House** by Paula Baker-Laporte, Erica Elliott and John Banta (New Society Publishers).

This book is arguably the single most important book on the subject of creating healthier spaces. We strongly recommend it as your second step after reviewing this guide.





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