

Housing the Environmentally Sensitive

As we learn about the impact of our actions on both individual human health and the global environment, we are learning new things that have an impact on the housing industry.

We are learning that some people are affected by extremely low levels of air pollution caused by moulds, dust, pollens or chemical vapours from building materials, heating systems, paints, carpets, furniture and cleaning and maintenance products. The levels of pollution which affect these people may have no noticeable effect on healthy individuals, and may even be undetectable by them. The medical profession itself has a difficulty in identifying some cases for what they are.

Builders should be aware of the issue, as they may encounter customers with complaints about their home. The tendency when one encounters such a situation is to put down such individuals, but there could well be a legitimate reason for the complaints.

The Health Problem

The problem shows up as general health disorders. The condition is commonly described as "environmental allergy", "environmental illness", "environmental hypersensitivity", or "20th century disease".

An environmentally sensitive person reacts to one or more substances in the environment at levels which do not appear to affect the rest of the population to the same extent. It causes sufferers discomfort or in some cases severe physical reactions.

There is much debate within the medical profession both as to the legitimacy of environmental sickness and to the diagnosis and treatment administered by clinical ecologists. Several branches of clinical ecology and research medicine deal regularly with the effects of environment on health. Physicians who practice "clinical ecology" believe that there are specific components in the environment that make people ill. These can be found in food, clothing, drugs, air and water as well as in the home, work, and play environment.

What causes environmental illness?

Any number of factors can trigger reactions. The key factors are considered to be:

- Biochemical individuality: each person has a unique make-up, a product of genetics and mother's health during pregnancy.
- Total body burden: all humans are subject to biological stress, including illness, psychological stress and exposure to toxic contaminants. When the total exposure exceeds an upper limit, the body may react in a variety of ways.
- Nutritional state: nutritional health is important in the activity of the immune system.

Any combination of these factors can add up to trigger illness in a person that is sensitive. The sick person can suffer a range of effects that, unfortunately, are not easy to diagnose. Sufferers go through a prolonged period of testing and doubting until their sickness is identified.

Many who experience extreme hypersensitivity develop the condition in mid-life, though some indicated that childhood allergies had persisted, or were early warnings of a problem. Some also associated their illness with environmental exposure at work or in a neighbourhood polluted by industry or traffic. Other vulnerable individuals are young children.

There are still some important questions that have not been answered.

How Many are Affected? Is the number of environmentally ill people increasing? Is this an advance warning of a public health problem of greater proportions?

Are the people affected by environmental illness useful guides for

the healthy population in terms of what can be done for prevention?

Are there useful lessons to be learned from these examples about building methods and materials which are more environmentally appropriate in terms of sustainable resource and energy use and reduced industrial pollution as well as other global concern?

Indoor Air pollutants

Indoor air pollutants that are responsible for most problems in houses are moulds, chemical pollutants, particulates, and radon.

Moulds

Fungus and mildew grows in damp places (bathrooms, basements, cold corners and closets that don't get much air circulation). Moulds release spores; mouldy smells are caused by fungi.

The smells are created complex mixes of volatile chemicals that make up the spores. Not all chemicals have been identified, nor is it clear how they actually affect people.

Chemical pollutants

There are two main groups: the inorganic gaseous pollutants and the volatile organic compounds (VOC's).

The inorganic pollutants include combustion gasses and household cleaners (e.g. chlorine (bleach), and ammonia). Smoking, unvented cooking, unvented heaters and leaking chimneys introduce combustion gases indoors. Strong exhaust fans can cause houses to operate under a negative pressure that can cause combustion appliance flue gases to spill indoors.

Volatile organic compounds comprise a wide range of chemical compounds which vary from simple to complex.

Sources are many and include building materials, furniture, carpets and synthetic floor coverings, wallpapers, plastics, household

products and bedding. Cooking, paint, new clothes and perfume odours are caused by volatile organic compounds.

The most widely studied of the VOC's has been formaldehyde. Sources of formaldehyde emissions include urea-formaldehyde (UFFI) insulation, particle board and pressed board products as well as home furnishings, carpeting and many other household products, including synthetic materials.

Formaldehyde is an irritant to the eyes and respiratory system. Some studies also indicate that it is a central nervous system depressant and produces numerous adverse effects.

Some VOC's are carcinogens, others affect the nervous system, or are mild intoxicants.

Particulates

House dust is made up of small particles and fibres which come from both outdoor and indoor sources. The largest of these tend to fall to the floor and collect into dust balls. Smaller particles remain airborne and easily enter the lungs.

Biological particles:

- Dust mites
- Mould spores
- Pollens and plant fragments
- Animal dander
- Bacteria and viruses

Sawdust from softwoods such as cedar and pine are allergenic to some people due to the volatile wood resins.

Non-biological particles:

- Asbestos
- Glass fibre from insulation
- Lead from automobile emissions
- Natural and Synthetic fibres
- Dust from soils
- Combustion particles from automobiles, smokers, industry, furnaces, stoves, and fireplaces.
- Other dusts, such as plaster from construction.

Synergy

Two or more air pollutants may have a combined effect that is greater than the sum of their individual effects.

What can be done for sensitive people?

Some people who have identified health problems that are related to common air pollutants have made alterations to their homes to reduce their exposure to these agents. Some have even built new homes to rigorous clean air standards. The range of renovations undertaken includes everything from removing one or more sources of air pollution such as a carpet from the home and adding an air cleaner, to building a specially designed home with special attention paid to details suitable to their health needs.

In the winter of 1989-90 a cross-Canada survey (sponsored by CMHC) was undertaken to find out the kinds of problems people have and the kind of actions that have been taken by people with environmental health problems to reduce their exposure to indoor air pollution.

The request for participants clearly specified that the researchers wished to hear from those who not only suffered from unusual sensitivities to environmental agents, but who had also made significant changes to their homes to reduce their exposure.

Over 200 responses were received in a twelve week period of the survey from which 92 were selected for a more detailed analysis.

The study presents a partial picture of the nature and extent of "clean air" housing in Canada, what resources people have found useful in producing these houses or renovations, and the building materials and methods, heating and ventilation systems found in ten of the houses which were investigated in detail.

The work is not a definitive, statistical or academic study of the

nature or scope of the environmental health problem in Canada. However, it provides a valuable resource for those who are planning, building, renovating or moving due to special environmental health concerns.



Figure 1 An extreme example of remedial action taken: a special fume hood to remove emissions given off by computer, VCR and TV.

It will also help those who are interested in indoor air quality with regard to the healthy population and in building materials and systems which are more "environmentally friendly" in global terms.



Figure 2 Even books can give off emissions. Exhaust grilles over book case.

What are the solutions?

There are no universal solutions. The study looked at 48 renovations, 27 new constructions and 17 moved households for a total of 92 dwellings. Because emphasis was placed on reaching those who had built new houses, the actual proportion of

renovations is probably much larger represented here.

The majority of the renovations had been done in the past ten years; most of the new construction in the past 5 years or was still in progress.

Generally special measures to achieve clean indoor air are a key component. This means use of benign materials (usually natural products) or inert items like ceramics or metals. Ventilation is an important element.

The common perception that houses must be leaky to have good air quality is a myth. In most buildings, air which leaks through walls, floor, and ceilings carries with it various gases from insulation, glues, asphalt treated products and dusts contained in the cavities of the building structure.

Draft sealing methods used in energy efficient homes not only improve comfort, save energy and help prevent concealed moisture damage to the structure, but they also prevent the flushing in of pollutants from the cavities into the living space.

Energy efficient homes with ducted ventilation systems and heat recovery ventilators can be designed so that they can draw intake air from the safest point outside the home away from the streets, garages and other polluting sources. They can also provide filtration of outside air not possible with natural ventilation. Other energy efficient features such as passive solar heat retention reduce the reliance on central heat sources and consequently reduce the potential for indoor pollution from such sources.

Draft free or airtight construction ensures lower energy costs and improved longevity for buildings. Draft free construction alone does not guarantee better indoor air quality, but a well designed ventilation system in an energy efficient home can insure that fresh air is delivered to the occupied space, so long as the ducting remains clean and that exhaust is extracted from the most appropriate points. Airtight walls, ceilings and floors are highly appropriated features of the "clean air" home.

What were the health conditions of the people surveyed? The majority cited both chemical sensitivities and

sensitivities to moulds, dusts, and chemical agents.

Respondents who had built new homes typically reported more severe initial sensitivities than those who renovated and, in general, the newly-constructed homes approached air quality more rigorously. The preference for all-electric or isolated combustion heating, and the preference for hardwood and ceramic floor finishes without carpets are also evident in those who built new houses.

Central ventilation systems with air filtration, custom cabinets without particle board and furnishings with

chemically untreated and natural fabrics and fillings are more common in new construction than in renovations.

Floor coverings and heating systems were the first items modified in renovations. The preferred floor coverings were hardwood and ceramic tile, with small area rugs. The preferred heating systems were hot water, electric radiant heat or low temperature electric baseboard heaters. In some cases a recirculating forced air unit was used, with a low temperature fan coil heat exchanger operated by hot water or a heat pump,

CLEAN AIR HOUSING CHECKLIST

Features common in clean-air housing that were observed in the study include:

- Heating system uses an electric source rather than petroleum fuel; a low temperature heating system is preferable.
- Flooring such as ceramic tiles or hardwood; tiles are laid with cement mortars rather than adhesives; concrete without admixtures, water reduction oils, and curing agents is used for foundation.
- Building materials with no formaldehyde or minimum emission of volatile organic compounds; woods used are not treated with wood preservatives.
- Wall and ceiling surfaces that do not require paints (such as plaster), or if painted, non-toxic paints are used.
- Draft free building techniques are used to reduce the infiltration of contaminants from the outdoors or from materials in the building envelope.
- Good outdoor ambient air quality and location away from heavy traffic, industrial pollution, or power lines is emphasized.
- Ventilation system to bring in fresh air and exhaust stale air from local sources of pollution within the house is used.
- Air purification system to remove airborne contaminants such as dust, mould spores, pollens, and chemical pollutants.
- Central vacuum system which exhausts to the outside, or suitable means of removing the dust from the home.
- Furniture, furnishings, household products selected for minimum emission of volatile chemical contaminants.
- Sufficient amount of natural lighting.

This is not a definitive list of steps to take, but it gives a general indication of the type of action to take. Much depends on the needs of the individual.

which also provides air filtration.

The second priority, in most cases, was the use of low emission building and finishing materials and furnishings. The most common materials avoided were particle board, interior plywood, carpets, soft plastics and plastic foams. Several respondents avoided conventional paints, varnishes and glues and a few avoided gypsum wallboard. Many substituted solid wood, cotton and wool fabrics, and special low emission paints for more conventional materials. A few built largely with masonry, concrete and plaster to avoid woods, manufactured woods and gypsum wallboard.

Though some used heat recovery ventilators ducted to all rooms, the most common ventilation systems relied on conventional local exhaust fans in bathrooms and kitchens with building leakage and open windows providing the makeup air. Some also added exhaust fans directly to laundry rooms, storage rooms and closets to remove moisture and odours from those spaces.

Many try using portable air cleaners (with charcoal adsorption) to improve air quality in unmodified homes but some report disappointing results with portable air cleaners.

Most avoid using commercial cleaners, bleaches, waxes, polishes, etc. and substituted borax, baking soda, washing soda, vinegar and mild soap flakes for cleaning purposes.

*This item summarizes:
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Rousseau, Virginia Salares, Bruce
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available from CMHC, 682 Montreal
Rd, Ottawa Ont. K1A 0P7
(Tel 613-748-2367)*

SUPPLIERS OF SPECIALTY PRODUCTS

This is a partial list of suppliers of products that may be suitable for low-tox housing

AIR PURIFICATION

Tibbits Ltd.
Cobourg, Ont.

Aircare/Enviroscience,
Vancouver B.C. (604) 734-4211

Sunnyhill Research Centre
Goodwood, Ont. (416) 649-1356

FABRICS & BEDDING

Island Shepherd International Inc.
Hillsborough, PEI (800) 565-0264 (in Canada)

PAINTS

Teekah, Inc.
Toronto, Ont. (416) 229-4199

Natural Structures & Supplies Inc.
Apoahqui, NB (506) 433-3455

Smiths Pharmacy
Toronto, Ont. (416) 488-2600

FLOOR COVERINGS

Erv Parent Ltd.
New Westminster, BC (604) 525-4124

Phoenix Wall & Floor Products
Rexdale, Ont. (416) 745-4200

Circul-Aire
Montreal PQ (514) 336-3330

A RANGE OF PRODUCTS (filters, sealers, fabrics, etc)

Smiths Pharmacy
Toronto, Ont. (416) 488-2600

Springfield Plumbing
Kelowna, BC (604) 861-8080

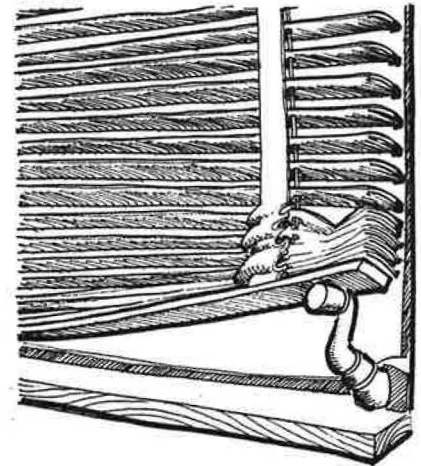
Pur et Simple
Ayer's Cliff, PQ (819) 838-4203

Allergy Relief Distributors
Richmond, BC (604) 270-0015

Allergy Resource Products Ltd.
Edmonton, AB (403) 434-3181

We'd like to see. . . .

We'd like to see window manufacturers take a bit of time to see how the end users of their product - the homeowner, deals with their products.



The beef I have is with the hardware design, especially the crank that is found on many windows. Venetian blinds are used frequently. As we've tried to illustrate, the two usually come in conflict.

The result is that homeowners remove the crank so that there is no obstruction to the blinds. This means that to open the window, the crank must be located (it never gets lost, does it?). If the window must be used in an emergency, it can't be.

There are other hardware designs where the operating mechanisms fold out of the way. Why aren't they used more frequently? Perhaps it's time to give some thought to the end user.

Builders should also think about this, and ask for alternate hardware when ordering windows. Homeowners are your customers too!

Make sure the window people get the message!♦