

Building multi-unit housing for people disabled by environmental illness

by Andrew Eriksen

Building multi-unit housing for people with multiple chemical sensitivity (MCS) or electro hypersensitivity (EHS) has several challenges that are not found in individual homes.

This article is part of a series about multi-unit MCS/EHS housing, and deals with the design and construction phases.

Location

The location of a multi-unit complex is usually a compromise. Most of the existing projects are in urban areas, though a rural setting is generally better for health.

There is MCS housing on the beaches of Florida, the high deserts of Arizona and urban areas of Dallas and the San Francisco Bay.

Consider the neighborhood as it is, and what it may develop into years later. Avoid problem neighbors, such as laundromats (including private ones), gas stations, loading docks, certain restaurants, golf courses, polluting industries, major roads, power lines, etc.

In rural areas, the problem neighbors include farm fields, pig farms, mining operations, wind farms, slaughter houses, feed lots, etc.

The project should not be located within a mile (1.6 km) of high tension power lines, or transmission towers. In the country, the distance to wireless transmission towers should be greater. The towers are more powerful there, as they need to cover a larger area than in a city. The ambient radiation levels are also higher in a city, so individual towers will drown in the overall level at a shorter distance.

Facilities for people with EHS should be located outside populated areas, if at all possible.

Separation is essential

Many entities advocate that disabled people should be integrated into the rest of society, rather than live separately. This does not work here.

The environmentally ill must live separately from the rest of society to accommodate their basic needs.

Mixing the two populations has been done in some projects, but the result was often that the environmentally ill were unable to use the outdoor areas and had to keep their windows closed. The neighbors' activities, such as clothes drying, use of fragrances, bug sprays, etc. put substantial restrictions on the environmentally ill.

Direct access to the outside

The entry door from each apartment should open directly to the outside, not to an interior corridor, shared vestibule or elevator. Such shared spaces can often become contaminated by other people's personal care products and activities. It also makes it less bothersome to the tenant if a fragranced visitor knocks on the door. In most of the projects in the United States, outdoor walkways provide access to each apartment, which works well.

Outdoor spaces

Porches and other outdoor spaces are an important feature to provide. Some renters may only be able to tolerate the ink fumes from a book when reading it outside, or only be able to receive visitors in open air, for instance.

It is also good for renters to have a place they can air out new purchases before taking them inside. Most goods have residual chemical odors from the store they came from, as well as the materials they were made from.

A private porch or balcony could also be used to temporarily sleep on if maintenance work or other contamination took place inside the apartment.

A separate room for less-tolerable items

There should be a room to store somewhat-tolerable items, such as perhaps books, clothes and whatever tends to accumulate. Individually those items may be tolerable, but a stack of them may not be.

It could also be a place the tenant may place a computer and printer, without contaminating the rest of the apartment.

Such a room should have operable windows and an airtight door into the rest of the apartment.

Parking

People with environmental illness tend to drive older vehicles, as their interiors will be more tolerable or the vehicles may have less bothersome electronics. Older vehicles may leak oil and pollute more than newer models.

Then there are delivery vehicles, which usually sit with their engines idling.

Parking needs to be thought out as a part of the overall design. It is best located on the downwind side of the building and away from windows, porches, etc. It is naturally a compromise, as too great a distance and it will be a burden, and the residents will try to defeat the system.

This author's experience is that a minimum distance of 20 ft (7 m) works well with one or two vehicles in the downwind direction. People seem to accept that fine.

In one project, the designated spaces were about 60 ft (20 m) away, so the residents kept parking in the fire lane.

In another project, catering to people with severe MCS, the parking is over a hundred yards (100 m) away, with a loading zone about 60 ft (20 m) away. Some residents use carts to ferry their groceries.

These experiences are in the United States, where "convenient parking" is a part of the culture; it is probably less of an issue in other countries.

Parking should never be in an attached garage, or a basement under the building, as the fumes will migrate into the living space.

Storage place

Long-term renters would need a separate place to store items too toxic to be inside the apartment. This can also be used for new items purchased from a store, which need to be offgassed — sometimes for months.

This storage place is best located away from the apartment, so the fumes do not enter. An airtight door may not be sufficient here.

In one facility, each unit has a storage room in a separate utility building. Another option is to use a garden shed for each apartment.

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The storage room must have a secure door, but good ventilation must be provided at all times regardless of the weather.

At Ecology House in California, the facility has an offgassing room shared among the residents, but it is not big enough for long-term storage.

A commercial storage place is rarely usable, as they tend to spray pesticides regularly to avoid bugs.

Laundry

The renters are unable to share laundry facilities with the general population. They will either need a totally separate laundromat, or a washer/dryer in each apartment.

A shared laundry is the most common approach. This has the advantage that the fumes from the hot motors and washing process are kept outside the apartment. Some people have problems with the chlorine fumes from the city water, or only tolerate their clothes once they are dry. Some people are also bothered by the drone (noise) of the machines. Some places use shared machines, while others have dedicated machines for each unit. Some have both shared and private machines in their laundry.

Sharing laundry machines can cause conflicts, as the tenants may use laundry products that leave a residue to contaminate the clothes of the next user. It is essential to have a list of acceptable laundry products. Some people need to wash new clothes up to a hundred times before they can wear them. This puts a great strain on the equipment and is a cost that may not be reasonable to share with the other renters. Consider using some sort of pay-per-use system. This will also encourage less resource-intensive methods, such as using a clothesline or soaking the clothes.

An outdoor clothesline should be provided for the renters. It saves money and some people do better with air-dried clothes, rather than clothes dried at high heat.

Kitchen design

People with MCS usually also have food allergies and intolerances to a lot of processed foods. They therefore generally cook all meals from scratch. The kitchen must be large enough for this purpose.

They also tend to use regular plates to eat off, not paper plates or other throw-away items. That means the sink and sink areas need to be suitable for daily dish

washing. A dishwashing machine will be bothersome to many people and is best omitted.

Some of the safer paints available are not as durable as regular paints. It is important to protect painted areas against splashes in the kitchen, both around the stove and over the counters. A two-foot (60 cm) backsplash is adequate. It can be made with wall tiles.

The stove and the refrigerator should not be placed up against a wall to a bedroom, as the noise, vibration and radiation can be a problem during sleep or rest.

Heating and cooling systems

The most common heating system is electric baseboard heaters that are permanently mounted on the walls. Low-EMF models are available.

One place has radiant in-floor heating, which is the best. Second best are hot water baseboard heaters.

Avoid forced air systems with air ducts. Those have many problems with condensation and mold growth, blowing dust, leaky ducts, etc. They should be avoided, unless they can be done with very short easy-to-clean ducts.

The individual room air conditioners are usually used, though expect them to take quite some time to become tolerable, due to hot engine parts and insulation inside.

The best air conditioning system appears to be the mini-split systems, which are less noisy, have lower EMF levels, and do not use any air ducts. These systems can usually also be used for heating.

Passive heating and cooling features

It is often simple to reduce the need for heating and cooling, if considered early in the design phase. This can be done at little or no extra cost, and generally saves money.

As many people with environmental illness have problems tolerating heating and cooling systems, it is a good idea to consider features that reduce their run-time.

There are many books available about this subject, which provide much more detail, but some of the typical features include:

- align the building east-west

- increase window space on south façade (but not too much)
- decrease window space on north side (for reduced heat loss)
- decrease window space on west side (block the afternoon sun)
- overhanging roof on south side (shade during the summer)
- use heavier building materials, such as tile and concrete floors (thermal mass)
- insulated foundation
- super-insulated walls and attic

Mold prevention

People with environmental illness are usually much more sensitive to mold than the general population. The problem is both the spores and the gases that the mold sends out.

Molds can be present in troubling quantities, even if they cannot be sensed or smelled. Mold can be a problem in all climates, even in the desert.

Over time, mold can make a safe house unsafe, which has happened many times. It is best to design the building from the start to prevent mold, as molds are very difficult to eradicate. Replacing moldy building products, such as wood and drywall, may make the apartment uninhabitable for the clientele.

Mold likes moisture, darkness and something porous and edible to grow on. Wood and drywall are common breeding grounds, when combined with moisture.

Redwood and other mold-inhibiting types of wood are often used as the bottom plate in stick-built walls. Be aware that redwood itself is very aromatic and must be enclosed.

The window sills and frames may see condensation during winters, so windows are best surrounded by tile work and not left in contact with drywall.

Exterior walls should use moisture barriers to prevent condensation inside the wall. The moisture barrier must be placed correctly according to the local climate.

Drywall is best avoided entirely in the bathrooms, unless sealed with a vapor barrier. The special mold-retarding drywalls are not acceptable, as they contain fungicide chemicals. Cement boards are better. Tiles are best.

Ventilation and natural light help inhibit mold and should be available, especially in the bathroom. An operable window and a fan are best, though the fan must be

controlled by a separate switch and not tied to the light switch. Low-noise fans are helpful, as some people are hypersensitive to noise.

Choice of materials

The many options for materials is a large subject which will not be covered here. The author recommends looking at articles about specific homes and specific procedures for this information.

Bear in mind that in many cases, there is no product that is tolerable by everyone. This is especially important with materials that are in direct contact with the indoor air. Problems are common with paints, caulks, sealers, grouts and drywall. Especially the paint.

Consider using different products in different apartments. That way, the tenants can choose the apartment that works best for them.

Perhaps seal the walls with tiles, aluminum foil, Tu-Tuff and a painted-on sealer in various apartments.

Building for minimal maintenance

Maintenance projects, both inside and outside, are problematic. It is best to use durable materials that need little upkeep, especially those that need no paint.

In two MCS apartment buildings in Dallas (both are now torn down), the outside was covered with wooden boards which periodically needed to be painted. This caused many problems with the tenants. In one case, the manager tore down the boards, transported them some distance away, where they were painted before being put up again.

It is best to use durable materials for siding, roofing, trims, railings, posts and stairs. Steel, concrete and plastic (outside only) are good, while wood and tar shingles are not.

If paint has to be used outside, it may be best to use a regular commercial paint during the initial construction, as they tend to be more durable.

Interior paint

In some jurisdictions, the law requires rental units to be painted before each tenant moves in. This is not possible to do in MCS housing as any paint will take at least several months to offgas. Some sort of variance or exemption will be needed in these jurisdictions.

The choice of paint is a difficult one. There is no paint available that is “safe” for everyone. Some of the paints marketed for people with MCS have an odor that lasts for many years and is intolerable to some people. Perhaps consider using a variety of interior paints in different units to allow for the different sensitivities people may have.

Some of the special paints are less durable. The clay paints can be rubbed off the walls, for instance. To protect the painted areas, consider installing larger backsplashes over the stove and kitchen countertops. A two-foot (60 cm) wall backsplash made of wall tiles should work well.

Landscaping

Any landscaping should be kept simple and use native plants that will not require a lot of fertilizer and other chemicals. The use of pesticides and herbicides is totally unacceptable.

Lawns can be fine, but mowing them is a problem both with the fumes from the equipment and the terps from the freshly cut grass. In one facility with a large lawn, most of the tenants go away the day the lawn is mowed.

Electrical meters

Each unit should have its own electrical meter. If electricity is part of the rent, it will be abused, sometimes grossly so. It is not fair that the other renters must bear the cost of the few abusers, and the cost can be substantial. The price of electricity is likely to be higher in the future and it is more costly to retrofit meters after a building has been built.

The electrical meters should be located away from the building(s), not mounted on the wall. The meters themselves send out electromagnetic radiation, and in the future they will likely be replaced with so-called “smart meters” which communicate with the electrical utility by wireless or by transmitting high-frequency signals on the wires. Both are problematic to some people with environmental illness.

If the meter must be wall mounted, at least put it away from frequently occupied areas such as the bedroom.

Low-EMF features

A growing segment of the environmentally ill are sensitive to electromagnetic radiation from electrical appliances, cell phones, wireless networks, etc.

Accommodating the needs of these people is complicated and may not be entirely possible.

It may be realistic to designate some of the apartments as low-EMF units and concentrate the efforts there.

Features of a low-EMF apartment may include:

- located at the end of the building, i.e. with an extra exterior wall
- located away from the power feed to the building
- located away from high-power facilities, such as laundry, central heating and cooling
- in multi-story buildings, low-EMF apartments could be located on top of each other, to buffer each other.
- locate electric panel, refrigerator, stove, water heater, air conditioner, etc. on one side of the apartment, away from the bedroom
- be aware that walls and ceilings do not stop the radiation
- the wiring should be routed to minimize radiation in areas the tenant spends much time, especially the bedroom
- no wiring should pass through the bedroom to other rooms
- use twisted wires. Some brands of 3-conductor (12/3) wiring happen to be factory-twisted. The extra conductor is left unused. This must also be done in walls/ceilings shared by adjacent apartments. Even better is metal-clad wiring.
- install operable bathroom window, so no exhaust fan is necessary
- no fluorescent light fixtures
- stove does not use inductive heat, has simple mechanical controls and no built-in clock
- wiring done with no unbalanced circuits (check for wiring errors)
- a wall switch to control the outlet for the refrigerator

- any bathroom fan must be on a dedicated wall switch
- an alternate location for the refrigerator in a remote part of the apartment, or elsewhere
- detached housing is best, to minimize problems from the neighbors' use of wireless gadgets, etc.
- electrical meter located away from the apartment
- multiple outlets for telephone and data, to discourage use of wireless gadgets

Wiring for telephone and data

Multiple outlets should be provided for telephone and data, so there is no need to use cordless phones and wireless networking.

Even if one tenant is not bothered by these wireless devices, the neighbors may be. Wireless devices have been shown by many scientific studies to be biologically active, though the extent of possible harm has not been determined yet. Many people with environmental illness are directly affected by this type of radiation, however.

A tenant may want to put a printer in a separate room from the computer, to avoid the fumes. Make sure this is possible with an appropriate outlet.

Initial offgassing

A newly built or modified apartment will need to be offgassed for some months, sometimes a year. It is very rare that this is unnecessary.

Offgassing is done by having ample ventilation 24-hours a day. An open window in each side of the building to provide cross ventilation, possibly aided by a fan, is an effective method. Large air volumes are essential, a single open window, or a couple of slightly-open windows will not do it.

Offgassing is much less effective in cold weather, as heat is needed to vaporize the pollutants.

When designing the project, consider installing a window on each side that is protected by overhangs or porch roofs, so they can be left open in rainy weather.

Awning-type windows can also be used. It is not practical to have a staff person constantly opening and closing windows, depending on the weather.

Conclusion

A multi-unit housing project for people disabled by environmental illness poses a number of unique issues.

A successful project is not easily attained, especially if there is no prior experience available. It is highly recommended that someone with actual experience is consulted throughout the project, which could save a lot of trouble.

About the author

The author is an engineer who has lived in two multi-unit MCS housing facilities in Texas. He served as assistant manager of one facility for about 1½ years. He now lives in rural Arizona in a safe house of his own design.