

## :: Doktorandské štúdie

### :: Healthy housing

The subject matter of my thesis is "healthy housing". The aim of this paper is to clarify basic ideas and definitions of the term. The concept of HH will be further developed and specified in PhD thesis. Numerous books, articles and web sites dealing with this topic have been searched through. The topic of HH has become widely used not only by experts. It has been expanding in broader public ever more.

#### 1. Relationship between health and housing

##### 1.1 Human health

In 1948 WHO defined health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Housing is the conjunction of dwelling, home, immediate environment and community. Perception of a safe and intimate home is a major psychosocial benefit. It represents a protected refuge from the outside world, enables the development of a sense of identity and attachment (as an individual or as a part of a family), and provides space where a person can be him/herself.

During the 2nd HABITAT Conference in Istanbul (1996), UN Member States have defined **housing** in the following terms: "Adequate shelter means more than a roof over one's head. It also means adequate privacy; adequate space; physical accessibility; adequate security; security of tenure; structural stability and durability; adequate lighting, heating and ventilation; adequate basic infrastructure, such as water-supply, sanitation and waste-management facilities; suitable environmental quality and health-related factors; an adequate and accessible location with regard to work and basic facilities: all of which should be available at an affordable cost. Adequacy should be determined together with the people concerned, bearing in mind the prospect for gradual development. Adequacy often varies from country to country, since it depends on specific cultural, social, environmental and economic factors."(9)

##### 1.2 Healthy housing

Healthy home is not a specially designed house that is merely a vision, but it is also represented by a residential setting that is capable to fulfil the expectations of the residents. Healthy housing must be a comprehensive concept taking into consideration a variety of factors contributing to the quality of housing and housing environments. Such a concept of "healthy housing" covers the provision of functional and adequate physical, social and mental conditions for health, safety, hygiene, comfort and privacy.(9)

For the provision of these benefits, housing standards and good practical examples have been gained and accumulated over centuries of housing production, showing that the construction of a "healthy home" is mostly a question of applying existing knowledge and validated principles.

The relationship between housing and health is obviously a complex mix. For each individual domain, there is an array of effects that can be expressed as direct or indirect health effects, or as a limitation of the quality of life of the residents.

#### 2. Architecture and nature

Architecture should recognize that human civilization is an integral part of natural world and that nature must be preserved and perpetuated if the human community is to sustain itself indefinitely. Sustainable design and architecture involves site sensitive building design, the use of alternative energy sources, waste control, water recycling and control of building operations and maintenance. While providing comfort for occupants and clients, designers often can make decisions that are beneficial for environment as well, the appropriate choices of materials and products support responsible manufacturing processes and simultaneously provide a healthy indoor environment. Interior designers can have an impact on natural resources conservation and lowering outdoor pollution through energy efficiency, through water conservation and through promotion of recycling, use of recycled and recyclable materials and products. Ecology is the study of relationship of all living things, including people, to their biological and physical environments.

##### 2.1 Quality of indoor space

These days the air pollution levels inside is mainly worse than the air pollution levels outside. Indoor air pollution from dangerous (and often toxic) chemicals has been linked to the dramatic rises in childhood asthma and respiratory diseases, and chemical sensitivity in adults. Many of the most dangerous compounds (e.g. pesticides, urea formaldehyde, vinyl chloride, chromated copper arsenate) are commonly found in conventional building materials. The energy crisis lead to the construction of airtight homes that keep heating and cooling costs down, but also trap chemicals inside! Paints, carpets, insulation, caulking, adhesives, composite wood products, soil treatments, and fumes from natural gas appliances all contain toxic volatile organic compounds (VOCs). In addition, there are a number of natural VOCs and other toxins, like moulds and radon, found in most homes due to poor construction and design.(1)

#### 3. Considerations and basic principles of healthy housing

The reasons to build green are numerous. Most of us spent 80 % to 90% of our time indoor, so we need to be careful about what we surround ourselves with. Green buildings improved environmental aesthetics; interior comfort and they are much cheaper to heat, cool and light. Because they consume less energy, they produce less pollution. The overall goal of green building design is to design a wonderful building, bright and well lit, warm in winter, cool in summer, comfortable as it is healthy, energy- and resource- efficient, functional and long- lived – all that promotes the well-being of its occupants and the earth.

No one really knows what percentage of health problems are related to building ecology, there is little doubt that many work-related illnesses, headaches and eyestrain are directly related to poor lighting, inadequate fresh air, harsh acoustics and gloomy surroundings.

### 3.1 Criteria for healthy housing

A healthy home is one that incorporates healthy design elements, non-toxic building materials, and proper construction techniques. It "breathes", emits no toxic gasses, and is resistant to mold.

Criteria for a healthy home include the following attributes:

- :: Reduction of exposure to chemicals (such as formaldehyde in insulation and particle board; volatile organic compounds in adhesives, sealants and paints; and pesticides, fungicides and heavy metals used to treat wood) through use of non-toxic building materials and products.
- :: Utilization of passive airflow, daylight, and fresh air exchange through proper placement of windows and doors.
- :: Location of areas of high toxicity and combustible materials (such as the garage and utility room) away from bedrooms and primary living spaces. The benefits are homes that are safer, more comfortable, and require less maintenance.
- :: Good layout and solar orientation are as important as material choice in determining the liveability and workability of a place.
- :: It is important to look at inhabitants values, lifestyle, activities and sensitivities and work with what is given.

Before starting the design work we have to consider these principles:

- :: Allow enough time for conceptual thinking thorough planning.
- :: Sustainable design is more a philosophy of building than a building style. Most energy efficiency and other green technologies are essentially invisible as they can be blended into any architectural style.
- :: Green features do not have to dominate the design.
- :: Green building doesn't need to be expensive and complicated. Greenness isn't all or nothing, black or white. There's a spectrum: some buildings are better, some worse. A building that is partly green is far better than one that's not. Environmentally conscious interior design can be defined as professional practice that attempts to create indoor spaces that are environmentally sustainable and healthy for the occupants. There are both direct and indirect relations between interiors and environment: interiors generate pollution and require resources to construct and support their functioning. The aspect of green design that currently requires the most effort is the selection of green building materials.

### 3.2 Selection of materials

Choosing right environmentally friendly materials is not easy. The designers may find it difficult, if at all possible to verify the producer's claims of any product being environmentally friendly. Sometimes companies choose to advertise the environmental benefits, but omit information about the overall environmental

impact of product. That's why more and more professionals realize the necessity to educate the design community and to develop, sponsor and use independent sources of information about products.

### 3.3 Eco or green products and materials

The products that do not pollute indoor air and whose production processes and later functioning cause as little damage to the global environment as possible, we know as eco products or green products. Products and materials used in interiors are called green when they do not contribute to indoor air pollution, which means they do not compromise the health of occupants and at the same time their output processes, useful life and disposal cause as little damage to the global environment as possible. When deciding about products or materials we asked weather they are renewable, depleted or sustainable. The use of locally produced materials can significantly reduce the burden on environment by eliminating extensive transportation. (2)

The choice of natural materials over synthetics is influenced by the fact that most of them are derived from renewable sources, usually require less of manufacturing process and bring fewer toxicity problems. However, opinions about synthetic materials are based on prejudice rather than facts. Not all natural materials are better for the environment than man-made. (Specifying wool carpet opens plenty of questions about finishing and cleaning chemicals that will affect indoor air quality.) To properly judge which product is more appropriate designers have to consider the whole life cycle. All materials exact some environmental toll in their production. Natural fibres may come from pesticide - treated crops, which are more damaging to the environment than many manufacturing processes. Growing and processing of cotton may involve high costs of soil depletion, fertilizer and pesticide use, and pollution of water and air. Wood harvesting brings environmental problems in tropical forests and results in global changes in weather patterns. Each decision involves educated questions directed to the suppliers or producers and sometimes just choosing the lesser evil.

### 3.4 Air quality

Although the natural atmosphere has always carried bacteria, moulds, viruses, pollens, spores and dusts, nothing prepares us for the onslaught of toxic substances we now encounter daily. Recent studies have shown that indoor air can be two to four times as polluted as outdoor air. Unfortunately, the magnitude of problem is not matched by the volume of useful research findings. Though recommended maximum exposure levels exist for various pollutants, no one knows what levels, if any, of indoor pollutants are acceptable over the long term. Using ventilation is the primary line of defence. Filtration can increase the effectiveness of any ventilation system. Incoming air is filtered to remove pollen and other particles. Variety of

filters are available – activated carbon and other chemical filters remove many organic vapours and some inorganic ones – ozone, carbon monoxide, nitrogen dioxide; some carbon filters remove formaldehyde from the air. Electrostatic filters remove dust, pollen and smaller particles from the air. Filtration systems should always be designed to handle effectively the types and volume of pollutants that we wish to remove from indoor air.(1)

### 3.5 Lighting

Wrongly applied – too much or too little, lighting can have a negative effect on productivity, the mood and comfort of people, and the aesthetic impact of an interior. Depending on its character and function, lighting design for a space has to provide appropriate conditions for various activities performed. Building codes include energy budget requirements for lighting that are based on a particular type of space use. The designer's goal is to provide comfort, to satisfy aesthetic requirements and at the same time to limit the use of energy and lower the cost of maintenance. The well controlled natural light, supported by light –dispersing and light-reflecting materials, can provide good, healthy and inexpensive illumination. Deciding about the right interior lighting we have to analyse climate, site, fenestration, externally and internally reflected light and occupant's needs. The easiest way to allow more daylight into a space would be to use very large openings – clear glass windows or skylights. Direct sunshine can expose occupants to excessive contrast in brightness, resulting in poor visibility and discomfort. To prevent the negative effects, shading and control devices are used to reflect the sun but admit the daylight.

One of the most effective ways of controlling daylight is the use of reflected light. Reflecting daylight reduces light intensity, eliminates contrasts, increases visibility and improves quality of light in the interior. The harshness of direct light can be filtered before entering interior by outside trees, vines, curtains, reflective shelves and louvers. Horizontal louvers are the most effective on southern exposure windows; vertical louvers are suitable on west facing sites. One of the most effective interior light controls are Venetian blinds, which can be adjusted each time the conditions outside change or the inside needs vary. One of the innovations was developed in Europe. Slender blinds installed between two window panels, what eliminates the dirt – collection problem.(1)

Draperies can also control sunlight, depending on fabric and weave; they can provide a complete blackout. More flexibility can be achieved by using two separately tracked draperies over the same opening.

The entering light can be also controlled through selection of glazing material. Selectively transmitting materials permit the passage of some parts of radiant energy spectrum, while reflecting or absorbing others. Glazing materials treated with metallic oxide coatings or films, which reflect light rather than transmit or absorb it, reduce the view into interior from outside during the day.

People need to relate to natural surroundings both mentally and physically. In interiors completely deprived of natural light people often lose track of time, do not know outside weather conditions and feel disoriented. The general rule applied by designing artificial lighting is that activities of greater visual difficulty require higher illumination. A continuously fully lit interior is not only unpleasant, but also a waste of energy.

Defining light zones and providing a variety of ambient, accent and task lighting can easily satisfy a comfortable light level with appropriate power density. By providing a variety of independent task lights in interiors, the designer can achieve the most important goal: good illumination where it is needed and no waste of energy where it is unnecessary.

### Conclusion

This paper has tried to indicate some terms connecting the top theme. I have found and briefly studied several books and websites concerning with healthy housing and healthy interiors. They provide a wide variety of aspects that need to be further analysed. This, together with application of the gathered knowledge to our cultural and social environment will be the task of the thesis.

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