

Natural Healthy Buildings



This course addresses the vital interconnectedness among the built environment, human health, and planetary ecology. It seeks to lay a solid foundation that prepares you to Go Beyond Green™, to meet the urgent call for sustainable dwellings and common spaces that are designed and built to lead one from life into living, from nature into natural, with Nature herself as the Gold Standard: the one and ultimate guide.



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The compilation of information for this Natural Healthy Buildings (NHB) course began in February 1995. It combines data from Germany and other areas of Europe, from the United States and Canada, as well as from other countries of the world.

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IBE 101 Natural Healthy Buildings – Overview of Building Biology

This Natural Healthy Buildings (NHB) is self-study, with support from an IBE assigned mentor, and introduces the Principles of Building Biology®. Students will learn what kinds of hazards a house or office may contain, how to detect them, what to do about them, and best of all how not to cause them. This course benefits home dwellers, as well as architects, interior designers and other building professionals. Topics include:

- Environmental situation
- Building Biology and building culture
- Biologically-sound building materials
- Construction and building methods
- Heating and thermal insulation
- Water and water pollutants
- Air and air pollutants
- Electro-climate issues

Resources:

- *Prescriptions for a Healthy House*, 3rd edition (2008), Paula Baker Laporte, et al.
- Natural Healthy Home thumb-drive
- Radon and water test kits
- Gauss meter

Time requirement: 2 to 3 months

Prerequisites recommended: None

It is not possible within a 2-to-3 month timeframe to cover all of the material required for building a natural, healthy home. This course is only intended to raise awareness of Building Biology® research and techniques. Completion of this course alone is not intended to imply that the attendee is qualified or certified for consultancy, building, architectural design, teaching, or any other practice associated with Building Biology principles.

This course is part of the requirements for certain IBE professional certification tracks. For more information please contact the International Institute for Building-Biology® & Ecology (IBE).

Natural Healthy Buildings (NHB)

International Institute for Building-Biology® & Ecology

Welcome to the study of Building Biology!

As Executive Director, I am very pleased to welcome you as a student of the International Institute for Building-Biology® & Ecology. By starting this self-study course, you have demonstrated your desire to take some of the responsibility for improving the conditions in which we live on this planet, and we salute you for joining the ranks of Building Biologists.

The experience of IBE 101 students, past and present, has proven that it is very helpful to develop a “road map” to follow as you study the materials. This road map is the Study Progress Sheet (SPS). I urge you to take the time now to plan out your timetable for study and transfer this information to the SPS, which is a separate document you will find on the Natural Healthy Buildings thumb-drive. This preparation will structure your undertaking and break the task into manageable segments. Refer to the SPS as you progress, and you should have no difficulty in finishing the course within the period you have set for yourself.

We at the Institute are here to assist you as you work your way through this course, so please let us know whenever you have a question or would like some assistance. And we look forward to your joining us in spreading the word about the crucial interrelationship between the built environment and human health and wellness. The efforts of one can become the efforts of many, and there is no better way to bring about positive, meaningful change in our world.

Finally, please know that links this course provides to third party information might not reflect or support the Building Biology viewpoint, and can change without our knowledge. However, we believe you will find it of interest to see how other people, groups, institutions, etc. argue the same subject. We think you will enjoy this course.

Now get started, and have fun!

Best wishes for exciting learning,

Michael Conn



Executive Director, IBE

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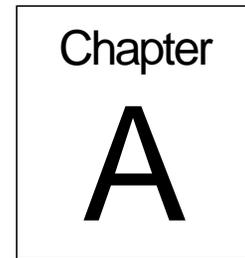
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A. Introduction

The words Bau-Biologie® and Building Biology® are German and English terms, respectively, that have exactly the same definition: How buildings impact life. The word Building Biology, first coined by Dr. Hubert Palm, in Germany, refers in either language to creating and sustaining buildings that encourage and support human health.

Upon completion of the NHB course, you will have gained the following information:

- The basic principles of Building Biology, ecology, and what makes homes healthy, less than healthy, or unhealthy;
- Increased awareness of the built environment;
- The myriad possible health hazards and potential solutions;
- The environmental impact of individual actions and interventions;
- How to undertake a layperson's inspection of his or her home and detect some of the problems that may exist;
- How to determine what steps to take for improvement and whether professional help is needed or not;
- How to implement some of the necessary solutions;
- How to effectually communicate with professionals who might be hired to perform services.

Who should study Building Biology?

We believe everybody should study this course because this interdisciplinary approach identifies potential problems in the living environment and gives solutions to improve the quality of life. We all have the right and the opportunity to live in healthy houses and work in healthy offices, and this information should be disseminated as widely as possible. Schools and colleges should offer this course as part of the environmental studies curriculum. Alternative medical practitioners, physicians, and physicians assistants should understand how building materials impact people's health. Architects, interior designers, and other building professionals should know how to create healthy homes and incorporate this knowledge into their work. Corporate executives who have this knowledge can prevent sick building syndrome and increase their employees' productivity. And individuals who want to pursue careers as an environmental consultant or inspector need to acquire this knowledge.

Chapter
B

B. Program Information

B.1 Purpose and Goal of NHB

Asbestos, formaldehyde, pesticides, quality of drinking water, indoor air quality, radon, ozone, electromagnetic fields, Sick Building Syndrome....

Most people have heard these environmental “buzz words” on TV, on the radio, in the newspapers. People are becoming convinced that there is a problem, but they are confused about the extent of the problem, about how the problem applies to them in their own homes and workplaces, and about what they can or should be doing to protect the health of their families. This confusion exists because we hear conflicting voices in the media, not only from representatives of government, industry, and medical fields, but also from advertisers who promote various 'nontoxic', low toxic or otherwise environmentally safe products.

Who is one to believe? How is one to gain the information needed to make informed environmental decisions for the sake of one's self and one's family?

The nonprofit International Institute for Building Biology addresses these questions with unbiased information - both for the layperson and the professional. Various correspondence and on-line courses, training programs for beginning and advanced students, and resource lists have been developed to provide up-to-date, practical information for building healthier environments at home and in the workplace.

The International Institute for Building-Biology & Ecology, and the Institut für Baubiologie und Oekologie (Neubeum, Germany), have been in practice in Germany since 1976 and in the United States since 1987. Together they function as a clearinghouse for holistic environmental information throughout the world. Thousands of buildings have been inspected and data collected on remediation techniques and health concerns.

Many professionals in health and building fields, as well as concerned individuals, such as you, have accessed this wealth of information. And in response to the growing need for consumer information, the Institute developed this "nuts-and-bolts" Natural Healthy Buildings course to provide people with information on what they can do to improve their living environments, reduce day-to-day toxic exposures, enhance the well-being of their families, and put their energies into prevention rather than treatment.

Upon completion of this Natural, Healthy Buildings course, you will be better able to:

- understand environmental issues in layperson's terms;
- know what current options are in this developing field;
- make informed decisions on healthful products;
- learn the basics of selecting/building a healthy house.

(Note: while the material in this course is relevant for house selection, the course is not intended as a manual for building or selecting a home. More detailed information on this subject will be found in advanced IBE courses and seminars.)

Upon making changes in your surroundings, you will have increased your confidence that you are promoting health, not illness, where you dwell and work. As Sherry Rogers says in *Tired or Toxic*, “we each have an imaginary cup which is gradually being filled up from toxic exposures. Depending on toxic load, one day some

exposure could put us over the edge.” It makes more sense to work now on emptying those cups instead of waiting for them to overflow. The goal of this course is to provide health-minded folks with the basic knowledge and direction they need to improve their own environments and to avoid building-related illness.

Whether or not you are experiencing any symptoms of environmental illness, by implementing healthful changes, you will have the satisfaction that you are doing what you can to live optimally. You will better know what the important issues are, and you will better be able to prioritize what needs to be done. This course is geared for healthy persons who want to improve their surroundings, as well as for persons experiencing symptoms possibly related to environmental stress.

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. (World Health Organization)

For persons having symptoms such as asthmatic or respiratory distress, sleep difficulties, headaches, bed-wetting or nighttime urgency, allergic reactions, fatigue, irritability, and nervousness, often such symptoms are lessened or even completely relieved when changes are made in the home. Sometimes, however, even though there may be an environmental component, the physical problem is multi-dimensional, and other aspects need to be considered as well. For example, migraines could be caused by environmental exposure plus may have a hormonal aspect. Or, multiple chemical sensitivities (MCS) could stem from chronic candida infection and/or heavy metal poisoning. It is important to find a health-care professional who is experienced with environmental illness.

Whether these symptoms exist or not, moving in the direction of a healthier home and environment makes sense for everyone. An increasing number of books address one or more of these subjects, but to our knowledge IBE 101 is the only self-study course of its kind, addressing from an holistic viewpoint the health hazards posed by the built environment.

B.2 Why a self-study course?

Why work with a self-study course? Why not read a book? A self-study course differs from a book in a number of ways:

1. Books are, for the most part, designed for uninterrupted reading and usually require little if any practical involvement. This is not to detract from the value of books. Indeed, an important and timely book is included with the NHB.

The NHB, on the other hand, provides each student with the framework for acting on new information. With information, for example, on how the house functions and how the building materials affect the well-being of its occupants and the health of the environment, wise choices can be made for any remediation or remodeling that might be initiated.

2. Though usually designed to be read, books are often put back on the shelf after only a few pages have been read.

By undertaking a self-study course, a participant networks into a living resource. Not only is there telephone or email contact with a mentor, if needed, but also the student has access to the various resources of the Institute. Further, to assist the student in progressing through the course, the Institute has designed the Study Progress Sheet (SPS). The SPS can be an invaluable aid for maintaining momentum when used in conjunction with course work. It is located on a separate document on the IBE thumb-drive.

Further advantages of self-study courses include:

- Self-study courses, in general, are increasingly being used as an adjunct to the existing educational system. These courses address the need for further education in a wide variety of fields when individuals lack the time to attend class, are unable to attend class, or when a particular course is unavailable locally.
- Self-study courses have made it possible for students to take additional subjects or pursue postgraduate study, often improving advancement prospects and broadening capabilities.

- A self-study course offers self-programmed, individualized study. The student sets the pace of study according to interests, needs, ability, and time availability. No one need be excluded from any course. A self-study course offers an opportunity for people of all ages and professions.

- As a rule, learning at a distance, as compared to learning in a classroom, offers freedom from performance-stress and time-stress.
- Studying at home provides opportunities for whole families to participate in the educational process. Building Biology especially lends itself to getting children involved.
- Study undertaken out of self-motivation has its rewards of discipline and accomplishment, both transferable to other areas of life.

B.3 Course Materials

The material is presented in seven modules, which are divided into numerous chapters.

In order to optimize the learning process, this program incorporates accessories such as a technical dictionary, graphics, and lists of other relevant websites, as well as references for books and articles related to the subject.

The seven major modules covered in the NHB are:

- A. Building Biology
- B. The Biological Home
- C. Air
- D. Water
- E. Matter
- F. Energy
- G. Remedies for House and Environment

Each module is divided into a number of chapters each addressing a different topic:

Building Biology presents the philosophy of the science, its history and its future development.

The **Biological Home** module explains the concept of a natural home, and its importance for both the health of the structure and the occupants described from a Building Biology and Ecology perspective. This module encourages you to start evaluating homes from a health perspective, as the “third skin,” and to discern whether the home protects or harms the occupants.

The **Air** module provides a basic understanding of indoor air. It describes common pollutants, their sources, health effects, testing methods and remediation strategies.

The **Water** module provides a basic description of water. It covers common pollutants, their sources, health effects, testing methods and remediation strategies.

The **Matter** module provides a basic description of building materials, as well as common choices, health effects, environmental effects, treatments, and alternatives.

The **Energy** module provides a basic description of electromagnetic energy, as well as common pollutants, their sources, health effects, testing methods and remediation strategies.

The **Remedies for House and Environment** module describes how to identify problems, and why Building Biology Guidelines are unique. In addition, some straightforward mitigation techniques are provided.

Finally, the Appendix contains supplemental information:

- Stress from Current and Radiation, a collection of case studies and other important information about electromagnetic radiation, by Wolfgang Maes.
- Other relevant information.

Also part of the NHB is:

- The thumb-drive with the Natural Healthy Buildings course material.
- *Prescriptions for a Healthy House* by Paula Baker Laporte, Erica Elliott, M.D., and John Banta – a wealth of information about building a healthy house.
- A gauss meter which measures alternating current (AC) magnetic fields coming from wires and electrical devices. A gauss meter should be part of every household.
- Radon and water test kits.

How to Use the Study Progress Sheet (SPS)

The SPS is an essential aspect of this course. It is your guide through the materials as well as a means for communicating your progress back to the Institute. By using the SPS to plan your work - and then working your plan - you will see the mileposts pass by until you reach your destination, the end of the course. (This is located as an easily printable file on the thumb-drive.)

The SPS will assist you to:

- maintain the special sequence built into the material;
- guide you in organizing and assimilating the course material through questions, practical exercises, and measurements;
- pace yourself until you finish the course.

At the conclusion of the Course, return the completed SPS to the Institute along with the assignments. It will be our pleasure to forward a Certificate of Environmentally Aware upon satisfactory completion of the SPS and course work.

B.4 Validity of the Data: Applying the Precautionary Principle

Someone once said that statistics are numbers looking for an argument. We in Building Biology would be among the first to call for more research, yet we also understand the limitations of research. There are fiscal limitations, problems with defining the scope of the research, problems with how to set up experiments where multiple causes of a problem are involved, and problems with determining how hundreds of thousands of industrial chemicals interact with each other, and on and on. Additionally, innumerable building materials, decorative items, and household maintenance products are on the market without proper evaluation as to their biological and ecological effects.

If we waited for all the research to be accomplished before we opened our mouths, we would be long gone - and probably the human race would be, too. Instead, let us take what we know and act on it. We know, for instance, that electricity has certain biological effects. That is enough information to act on. We do not have to determine if electricity causes X, Y, or Z; if we can minimize our exposure to electricity in various ways, we thereby minimize the biological effects. Look at it another way. Suppose “enough” research was accomplished, what would that mean to you or me? If a “safe” limit of electromagnetic fields were found for the average person, are you the average person? Am I? Maybe our bodies respond to levels far lower than the average. Every individual is unique and responds differently to different stimuli. So, instead of getting frustrated by insufficient research, let us act on what we do know. Rather than looking for “safe” levels of toxins, let us aim for “zero” levels. Of course, realistically, we cannot always achieve “zero”, but the good news is we can often bring the levels of toxic exposure way down in our environments. Building Biology believes that any improvement is worthwhile. You have the power to improve your environment by increasing your knowledge and taking action on what you learn. Although not every sick home can be effectively remedied the vast majority of homes can be improved.

There is not always consensus on the best approach to remediation. Issues can be complex and often budget, location or existing infrastructure will require that tough choices must be weighed. Sometimes holistic materials are not yet available and the least toxic of existing products has to be chosen. In some cases, even

though the end product might be acceptable, a life cycle analysis will reveal harm to others in a material's extraction, production, transportation or application.

Building Biology is ultimately a study in the laws of nature. Nature is the gold standard for a healthy human environment and the ultimate model of a sustainable system. The laws of nature are immutable. To the extent that we study and honor these laws we will learn to create environments that nurture. We hope that this self-study course will be an important step to you in your journey to a more holistic life for yourself and for all within your sphere of influence..

B.5 Acknowledgements

This course in its current 2015 edition has been edited and updated by Paula Baker-Laporte with expert support from Martine Davis (indoor air quality), Lawrence Gust (electromagnetic radiation and Jeanne McLaughlin (course structure). And we are deeply indebted to our founder Helmut Ziehe, who first envisioned and wrote this course in 2003, with the invaluable support of volunteer experts M. Spark Burmaster, Will Spates, Anne Stewart, and George Swanson.

We would like to further acknowledge the following building biologists whose vision and pioneering efforts influenced Helmut in his undertaking, and whose spirit lives on in this document: Professor Dr. Anton Schneider, Reinhard Kanuka-Fuchs, and Wolfgang Maes.

We are also indebted to Greenpeace for providing the materials included in this course on Chlorine and PVC; and to *Environmental Building News* for their article on carpets and the problems attendant to these materials. We appreciate their cooperation. The materials they contributed significantly enhance the value of this course. We are grateful as well to the Swedish association, F.E.B., which is comprised of people who have been harmed by electricity and video display terminals. This group collects and publishes invaluable data on the influence of electromagnetic radiation.

B.6 Timetable

The estimated time of completion for the course pack Natural Healthy Buildings (NHB) is approximately two months of full-time study.

Of course, the overall time of completion will increase the more a student uses the links to other websites that are provided in the text. While some of the links might prove very beneficial to the understanding of the subject, most of them are only necessary for acquiring advanced knowledge.

While the time for completion varies as per the individual, there is a set two year limit for completion. It is advisable to create a schedule and stick to it. For part-time students, three months should be a comfortable time frame.

B.7 NHB Testing & Certification

The student's knowledge of the subject is tested by answering questions provided with each module in the Study Progress Sheet. Upon completion of all the modules, submit your answers and Study Progress Sheet to admissions@buildingbiology.net or IBE, P.O. Box 8520, Santa Fe, New Mexico 87504.

Be sure to keep track of your learning by using the Study Progress Sheet.

Once a student has successfully completed all tests of the NHB course pack, a Certificate of Completion will be issued.

B.8 Study Notes

The Study Progress Sheet (SPS) provides you with a navigational tool and assignments to progress through the study material. It is not necessary to progress through the material as it is laid out. However, it is important

to keep track of what you have completed and what you still need to complete. The SPS helps you do this. Follow the instructions in the Study Progress Sheet and answer the questions and do the drills as required. (Note this is provided as a separate printable file on the thumb-drive.)

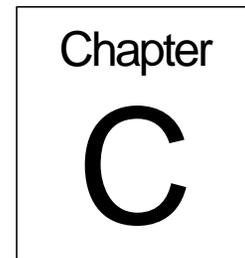
When studying this material, utilize the Glossary, Links to other Websites, Additional Articles, and Graphics. It is very important that you comprehend words you do not understand by using our glossary or any other dictionary. If you disregard this procedure, you might very well experience study problems.

B.9 Study Progress Sheet

Use this progress sheet (separate file and a copy on thumb-drive for tracking) to keep track of your learning in the NHB course. Print out this sheet, mark the dates of completion and submit with your answers. Once you have completed all modules, be sure to update this progress sheet first, and send it along with your answers to

Your answers will be reviewed by IBE and you will be notified about your status and certificate award. For questions, contact IBE at (866) 960-0333 or admissions@buildingbiology.net.

NHB – Natural Healthy Building Course
PHH – Prescriptions for a Healthy House book



C. Building Biology® & Ecology

C.1 What is Building Biology?

From before recorded history human beings have constructed shelters. The intent of these shelters was to provide a measure of comfort to the inhabitants while protecting them from the sometimes-harsh regional environment. These structures were assembled from whatever materials were close at hand and easy to obtain. Today we think of home as a financial investment but resale values based on size, number of luxury commodities, convenience and accommodation of our automobiles has very little to do with the real purpose of home which is to provide us with a health nurturing shelter from the extremes of nature while doing no harm to the natural environment.

Imagine yourself in a forest on a fine day: a gentle breeze caressing your skin, the symphony of bird calls and babbling brook delighting your ears. The surrounding vegetation, as the sunlight dances on it, is a visual feast of color and pattern. You are breathing the fragrant air, while the sun bathes you in light and warmth. The forest floor is soft yet firm under foot. You feel alive...connected. Nature gifts us with a sense of wholeness that you don't have to leave behind just because you have walked through your front door! Building Biology studies the qualities of the natural environment and teaches us how to recreate this nurturing environment indoors.

Building Biology® is an international movement of individuals who are concerned about the environmental factors of the built environment that affect human health. It is the holistic study of the man-made environment, human health and ecology. This group is involved in delivering current information regarding environmentally friendly building systems and materials. Building Biology is not a narrowly specialized subject, but is a living subject that brings together fields of study that are otherwise only taught in isolation. Building Biology was founded in Germany by a group of professionals from a variety of disciplines concerned about the inability of post-war housing to support health and ecology. Our Founder, Helmut Ziehe, brought Building Biology to the English speaking world with the mission of raising awareness and training experts in the field of healthy building through education.

Building Biology is the science of the holistic relationship between life, the living environment and the built environment.

C.1.1 Building Biology® & Ecology

As the Institute for Building Biology and Ecology we study two fields that are intrinsically interconnected:

Building Biology from the original German Bau-Biologie can be translated as "building for life": It is the study of the impact of the built environment on human health, and the application of this knowledge on the built environment Building Ecology specifically refers to the holistic interaction of humans with the environment so that the nature's regenerative balance is sustained. The underlying principle is one of "balance." All materials that come from the natural environment make up the "living structure" of our planet and will return to the natural environment without harm or waste in the endlessly renewable cycles of nature. Problems occur for people and the environment when synthetic materials and man-made pollutants are introduced, creating harmful toxics and producing a waste stream that does not biodegrade.

C.1.2 Background Information

While the phrase “Building Biology and Ecology” is relatively new, the science is not. There have been many pioneers – in the United States, Canada, Germany, and throughout the world – who have studied and written about various aspects of building technology and effects on human health. We would like to acknowledge a few of these forerunners, human ecologist Theron G. Randolph, M.D., Wilhem Reich, architect Richard

Crowther, and writer Ken Kern (author of *The Owner-Built Home*), were driving forces in the United States. Hubert Palm, M.D., wood technologist Anton Schneider, Ph.D., and electrobiologist Alfred Hornig helped to establish the Building Biology movement in Germany. The work of Nikola Tesla, electrical engineer/inventor, was also of significance to the movement.

C.2 Goal of Building Biology

We live in an era where “green building” has become popular, as many realize the seriousness of a looming man-made environmental crisis. Building Biology is unique on its emphasis on human health with the perspective that “there is almost always a direct correlation between the biological compatibility of any building material and its ecological performance.” In other words, that which is truly healthy for us will also be healthy for the environment. The multi-disciplinary approach of Building Biology gives a wider perspective which embraces aspects of health and ecology that are not encompassed by the North American green building movement. These include the study of the time-tested natural building precedents of Europe, health studies by the medical community and the effects on human and animal health of the man-made and naturally occurring electro-climate, and much more.

The IBE mission brings together design methods and technology to provide the information needed to create healthy homes and workplaces. This knowledge will raise awareness, provide tools for solutions, and promote effective ecological practices for our future generations.

The IBE goals are to:

1. Pool multi-disciplinary efforts to gain a broad perspective and understanding of the issues.
2. Organize the information into a systematic and useful format.
3. Present the information and knowledge to various professionals and to the general public, with the end goal of disseminating the knowledge needed to live healthy lives on a healthy planet.

C.2.1 Building Biology in Practice

At first glance, Building-Biology® may appear to consist of a number of isolated building strategies such as,

- measurement and diagnosis of the existing indoor environment
- use of non-toxic building materials,
- application of proper electrical wiring, and so on.

While Building Biology® does include these strategies they must be seen as a part of an integrated and holistic approach to health and the environment. Being holistic in nature Building Biology often combines hitherto isolated fields of study producing new and useful insights. Its scope extends into many inter-related fields, such as ecology, biology, medicine, the construction industries, education, economics, energy conservation, etc. It is an evolving science which synthesizes new information in all of these fields in order to create the healthiest and most ecologically sound environments possible.

Regarding the creation of our homes and communities, Anton Schneider a founding father of Building Biology pointed out that there is imbalance that exists in our current methods and materials for building. Up until the modern building era heralded by WWII, the vast knowledge base represented by historical materials and methods of construction were the result of centuries of evolution and perfection. Now we are faced with a rapid advancement of new technologies which become the construction industry standard before they have stood any test of time and often fail to perform as anticipated. New building technology driven primarily by economics often now determines how a home or community is built whereas historically, individuals built their own homes from local, healthy and non-polluting natural materials using methods that were passed on from generation to generation. Today, the theory and practice of building is detached from the end users and a growing number of people are becoming sick from the built environment.

Properly used, technology should be in the service of life, culture and planetary ecology. Building development that disregards the basic needs of human life harms the human body and the environment. Yet today we have:

- Building codes that do not support health and sometimes even, *require* the use of harmful materials. (an example of this would be the requirements for fire-retardants that end up as harmful respirable particles in our indoor air)
- An industry-led drive toward increasing the acceptable threshold levels of harmful materials;
- Lack of adequate governmental health standards; and, where such standards exist, failure to effectively enforce them;
- Absence of independent monitoring organizations.

Toxicity of various materials has been known for a long time, and change for the better happens slowly while new untested materials are introduced rapidly. Since we are all on “Spaceship Earth”, it seems logical for government and industry to work together reversing the flow of toxins into our environment. Despite the well-meaning and sporadic efforts of concerned people in both government and industry, by and large, little has been accomplished. Individuals still spend the majority of their time in buildings that are promoting sickness, not health.

Certain welcome advances are being made. For example California’s CARB II now has some of the most stringent standards for formaldehyde emissions in the world.¹ However, without a holistic approach there is much confusion and at the same time as advances are being made in one area we are seeing setbacks from a Building Biology perspective in others. For example while LEED and Cal-Green scorecards reward the use of low VOC products they reward the use of potentially harmful substances such as fly ash or synthetic gypsum because these industrial waste products are taken out of the waste stream and introduced into our living environments!

Among those who set standards and policies few are aware of healthier options and know what to do, most are unaware, and some are aware but are not acting on their knowledge. As a result we have innumerable products being developed which are hazardous to human health. For example, drywall was once produced solely from naturally occurring gypsum. Now the majority of gypsum used in our buildings is an industrial waste product called FGC gypsum that comes from Flue-Gas Desulphurization. Although the waste product has the same chemical composition, it can be radioactive. Unlike Building Biology, the current Green Building requirements do not take radio-activity into consideration, because it is not a holistic health-based approach to building. The result: There will be an increased level of radioactivity in the home and workplace. There is no final radiation and toxicity check on this product or most other products.

C.3 The 25 Building Biology Principles

The twenty-five principles of Building Biology were originally developed by Anton Schneider, Ph.D., founder of the *Institut für Baubiologie und Ökologie* and have recently been updated by the American Institute. These principles, divided into four major categories can be used while planning the construction of a healthy and ecologically friendly home, or while remodeling an existing one. These principles are addressing the homeowner and the building professional in order to make sure that the dwelling is life enhancing to its inhabitants, not detrimental to the builders, and with as little disruption to the environment as possible.

Site and Community Design

1. Verify that the site is free of naturally occurring health hazards.
2. Place dwellings so occupants are undisturbed by sources of man-made air, soil, water, noise and electro-pollution.
3. Place dwellings in well-planned communities that provide ample access to fresh air, sunshine and nature.
4. Plan homes and developments considering the needs of community, families and individuals of all ages.

Occupant Health and Well-Being

5. Use natural and unadulterated building materials.

6. Allow natural self-regulation of indoor air humidity using hygroscopic (humidity buffering) building materials.
7. Assure low total moisture content and rapid desiccation of wet construction processes in new buildings.
8. Design for a climatically appropriate balance between thermal insulation and thermal storage capacity.
9. Plan for climatically appropriate surface and air temperature.

10. Provide for ample ventilation.
11. Use appropriate thermal radiation strategies for heating buildings including passive solar wherever viable.
12. Provide an abundance of well-balanced natural light and illumination while using color in accordance with nature.
13. Provide adequate acoustical protection from harmful noise and vibration.
14. Utilize non-toxic building materials that have neutral or pleasant natural scents.
15. Use appropriate water and moisture exclusion techniques to prevent interior growth of fungi, bacteria, dust and allergens.
16. Assure best possible potable water quality by applying purification technologies if required.
17. Utilize physiological and ergonomic knowledge in interior and furniture design.
18. Consider proportion, harmonic measure, order and shape in design.

Natural and Man-Made Electro-Magnetic Radiation Safety

19. Minimize indoor interference with vital cosmic and terrestrial radiation.
20. Minimize man-made power system and radio frequency radiation exposure generated from within the building and from outside sources.
21. Avoid use of building materials that have elevated radioactivity levels.

Environmental Protection, Social Responsibility and Energy Efficiency

22. Construction materials production and building processes shall provide for health and social well-being in every phase of the building's life-cycle.
23. Avoid the use of building materials that deplete irreplaceable natural resources or are being harvested in an unsustainable manner.
24. Minimize energy consumption throughout the life of the building utilizing climate-based and energy efficient design, energy and water saving technologies and renewable energy.
25. Consider the embodied energy and environmental life cycle costs when choosing all materials used in construction.

C.4 Challenge

In recent history humans have created environmental conditions that have decreased well-being and we have come to realize that our production and consumption patterns are also responsible for massive environmental degradation.

Most people have heard about the dangers of petrochemicals, pesticides, preservatives, etc. Yet not only do these substances continue to be used, laws are passed that protect the polluters. In some cases laws are even passed that force people to apply toxic chemicals such as pesticides to their homes if they want mortgages.

Although it is now generally accepted fact that there is a serious environmental problem why have we not made more progress in turning the situation around? The reasons are complex and multi-faceted.

- Most people do not realize the urgency. Those who do often feel powerless to make a difference given the enormity of the issues. Those who both realize the urgency and have the power to institute positive change often fail to act because of immediate financial repercussions.
- The information about toxics is confusing and controversial. Research data exists which contains erroneous or manipulated information. Most people do not have the background chemistry that is necessary in order to properly evaluate available information and the harmful effects of many chemicals remain unknown. There is very incomplete data on the health effects of most of the more than 84,000 man-made chemicals in existence. There are no studies on the combined effects of chemicals interacting with one-another in the environment together and yet this is the most common condition of our exposure.ⁱⁱ

- Current law in North America requires that a substance be proven to be harmful in order to be taken off the market. However from the experience of Building Biologists in working, for several decades with those who have been made ill by substances thought to be safe, this process is backwards.

Manufacturers should be made to prove that their product is safe prior to being allowed to sell their product.

- Change is resisted. We have grown used to the comforts and conveniences of our modern lifestyles and don't want to make the necessary sacrifices now to benefit future generations.
- The day-to-day complexities of life for many are often overwhelming and daily survival takes precedence over the larger environmental picture.
- The effects of man-made pollution – are often obscure. Many health conditions have a long incubation period and are the result of several factors, not just exposure to one toxic substance. Thus, the source of the problem can be very difficult to trace.
- Western medicine treats symptoms and not underlying causes and so the feedback loop between environmental cause and health effect is little understood by the medical profession and in turn by those whom they treat. Pharmaceuticals offer superficial relief but little is done to educate the patient to undertake the lifestyle and environmental changes that would result in a restoration of real health.
- These changes might include:
 - Eating food that is beneficial to the body
 - Exercising regularly
 - Living in dwellings that are made of unadulterated materials and systems
 - Reducing exposure to wireless technologies
 - Working in quarters that are not polluted
 - Wearing clothing made of natural fibers
 - Sleeping and working in electro-magnetically undisturbed areas

Building Biology recognizes that people can live healthier and more productive lives by making changes to our immediate environment and that if the majority of people learned this information and made these changes, together we would have a positive effect on the larger environmental picture.

While many people are aware of the health effects of a sedentary life-style or an unhealthy diet there is far less public awareness of the role our built environment plays in our health and well-being. In studying IBE 101 you are taking an important step in educating yourself about changes you can make to your living environment.

C.5 Institute's Educational Program

In 1987 the International Institute of Building Biology and Ecology, Inc. (IBE) was founded in Clearwater, Florida. Its purpose is to offer information on how to eliminate unhealthy living conditions in homes and offices, disseminating information through the Building Biology Correspondence Courses, on-line courses and seminars. This basic Natural Healthy Buildings course is an adaptation of the German edition created by Anton Schneider Ph.D. Thousands of individuals have already completed it to date, and this recently-revised version offers the promise of reaching even more. This coursework is a pre-requisite to the more advanced certificate courses offered by IBE

IBE also offers more advanced programs to train certified Environmental Consultants in order to address the needs of those wanting their homes and offices evaluated for levels of electromagnetic radiation and, indoor air quality. In 2016 the Institute will also introduce a new certification track for professional architects, builders, planners and designers with an emphasis on applying this knowledge in the construction of new homes, workplaces and communities and the healthy renovation of existing structures. To-date graduates with professional certification in Building Biology® include architects, electricians, builders, naturopathic physicians, home inspectors, engineers, and many other environmentally concerned individuals.

In addition to this certificate course, the Institute provides other seminars, consultation services, a speaker's bureau, books, videotapes, testing and measuring equipment and a newsletter.

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IBE 101 – Natural Healthy Buildings

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