Building Biology and Ecology Institute of New Zealand's

PRINCIPLES FOR A SUSTAINABLE, HEALTHY AND HARMONIOUS BUILT ENVIRONMENT

Sustainable Building Principles

1. Design buildings with efficient planning and multi-use spaces for a smaller physical footprint.

A smaller house makes for a simpler lifestyle and is easier to clean and heat. With good design you can minimise circulation, and by using fewer, multi-use spaces you keep a feeling of spaciousness.



Bigger buildings use up more raw materials for building and furnishing.

2. Choose to redevelop existing buildings for their resources and heritage, and to avoid locking up useful land or building on land not suited for habitation.

It is better use of resources to improve our existing built environment than to fill up our open landscape with yet more buildings. Building on moderate land means steep land can be permanently vegetated and flat land used for food production.

Deforestation on steep land can cause flooding.

3. Design the building, site and surrounding landscape to maximise food production using Permaculture principles, and allow natural habitat and wildlife to flourish.

Growing food on your property makes for greater resilience in times of adversity. Permaculture principles exemplify sustainable living and land use. Setting aside areas for permanent natural habitat helps with local water and air quality, and the survival of species.

Transporting food or buying it from shops uses fossil fuels, as does lawn mowing.

4. Choose building materials that are naturally durable or biodegradable, re-usable or recyclable, and from renewable, abundant or non-depletable sources.

Renewable resources such as timber or non-depletable resources such as earth means the potential for building with these materials remains constant. Much energy and labour goes into producing materials and making buildings, so it makes sense to use materials that are durable or can be used again.

Materials from limited sources need to be reused or recycled otherwise demand will outstrip supply and more invasive extraction will be required.

5. Choose building materials that do not contribute to environmental problems in their production, transportation, installation, demolition or disposal.

Building materials need to be considered in all stages of their existence from their initial formation and use, until to their reuse or eventual decay.

For some materials high energy costs for production or transportation may have a more detrimental effect on the environment than their relatively benign useful life, others may be problematic when the building is demolished, creating toxic or non-biodegradable landfill.

6. Design to minimise construction waste, avoid unnecessary packaging of building materials and promote reuse or recycling of waste materials.

Dimensioning a building to suit the unit sizes of building materials can save labour and offcut waste. Materials such as bricks can be transported without excessive packaging, leftovers can be returned without wastage and they can be used again. Dismantling a building means what cannot be reused can be recycled.

Waste that cannot be reused ends up in landfill, scarring and often polluting the environment.

7. Incorporate efficient energy use and renewable and on-site energy sources in the building design to achieve zero net imported energy use.

Zero net imported energy use involves on or near site generation of power and heat using renewable resources such as solar or wind. Independent power can give you a greater degree of autonomy and resilience in emergencies, without sacrificing comfort.

Energy created by the burning of fossil fuels is polluting, and nuclear power is hazardous.

8. Plan developments to reduce reliance on mechanised transport, and use renewable sources of fuel for longer haul transportation.

Neighbourhoods with a mixture of homes, shops, entertainment and offices facilitates walking and cycling. Car sharing schemes can supply transport when the need for a car arises. For longer haul journeys and freight transport there needs to be an efficient network using renewable sources of energy.

Burning of fossil fuels contributes to global warming and oil extraction accidents are devastating.

9. Incorporate efficient water use and on-site stormwater and wastewater disposal in the building design to achieve zero net imported water use.



Zero net imported water use involves the harvesting of water on or near the site, and the disposal of wastewater back into the same natural ecosystem in quantities suited to its natural capacity. Purification of water and treatment of wastewater needs to mimic natural processes.

Reticulated water supply and wastewater is expensive and disruptive. Many systems are antiquated and overstretched, causing pollution.

10. Restore and enhance water quality before returning it to the natural ecosystem.

Water self-cleanses and cools through an in-winding movement as it moves around rocks in a stream or the loops of a river. We need to preserve that vitality in our water supply and restore it in our wastewater treatment. Using non-toxic cleaners and body care products minimises pollution.

Denying water's inherent braking properties by forcing it to run in straight channels can cause flooding. Domestic and industrial pollution can affect wildlife right up the food chain.

Healthy Building Principles

1. Design buildings to be free from technical electromagnetic interference, keep a natural ionisation balance, be open to natural magnetic fields and beneficial cosmic and terrestrial radiation and avoid harmful terrestrial radiation.



People have evolved within the earth's natural electroclimate, and their own electrical impulses are in tune with it.

Many modern building materials block or distort cosmic and terrestrial radiation; create excess positive ions and static charges with synthetic surfaces; and appliances and wiring are the major source of technical electro-magnetic interference. EM fields are much stronger than natural ones and are in forms that the body cannot adapt to, causing health problems. Earth fields can be harmful or beneficial, but beneficial ones can be distorted by fault-lines and underground streams, and appear on the earth's surface in concentrated and harmful amounts. Sleeping over one of these stress zones for many years, or within high electrical or magnetic fields can result in disease.

2. Choose building materials that are non-toxic, non-radioactive, and do not off-gas harmful chemicals.

Inert materials, whether natural or synthetic, do not pollute the indoor climate.

Slate and granite can be radioactive, resinous timbers and natural fibres can trigger allergic reactions. However, synthetic materials off-gas a cocktail of chemicals and are more likely to be a problem.

3. Choose building materials that allow water vapour and air diffusion to regulate the humidity of the indoor environment, and to filter and neutralise air pollutants.

Building materials that can breathe help keep the indoor climate free from bad odours, chemical build-up, damp and mould.

Indoor pollutants can be irritating or cause health problems for the people exposed to them. Mould can affect the building structure as well as health.

4. Ensure the indoor environment does not promote, accumulate or circulate harmful vapours, particles, radioactivity, bacteria, viruses and fungi.

A warm, dry building with good natural ventilation and natural materials and furnishings makes for a healthy indoor environment.

Pollutants can be present due to toxic materials, inadequate ventilation, excess moisture or ventilation systems that breed and spread microbes. Dust mites abound in high dust areas.

5. Heat and ventilate the building using natural and manually adjustable means.

Natural radiant heating and fresh air ventilation is healthier, less cost to the user and less harmful to the environment. With good design it can still be achieved in climates of extreme temperatures or in highly polluted environments.

Heated air can create drowsiness, and mechanical ventilation can transfer airborne diseases.

6. Ensure the indoor air temperature varies during the day and from room to room, but is still within the optimum range for the health of the occupants.

Temperature differences between rooms stimulate the body as it moves around a building. Fluctuations in room temperature that reflect (to a lesser degree) the diurnal and seasonal temperature keep people in tune with nature. The optimum range for comfortable and healthy indoor temperatures is 18° – 24° Celsius, with bedroom areas requiring lower temperatures than living areas. A wider range of 16° – 26° Celsius can be tolerated by some people. Aim for not more than 2° Celsius differential between floor and ceiling temperatures.

Discomfort and health issues arise if colder or hotter temperatures are experienced for long periods. Constant warm temperatures can produce drowsiness.

7. Insulate against or isolate from unwanted noise and vibration.

While pleasant sounds are welcomed and can be soothing or stimulating, unwanted noise is not.

Noise and noise-induced vibrations within buildings or penetrating into them from outside can cause stress to the occupants, both physically and psychologically.

8. Light a building with daylight or natural light spectrum artificial light during the day, and warmer tinted lighting for evenings.



Natural daylight or full spectrum artificial light stimulates daytime physiological functions, and is essential for people spending all day indoors. Lights at the warmer end of the spectrum stimulate nightime physiological functions.

Lack of full spectrum light during the day can cause depression. Too much blue light in the evening suppresses the production of melatonin and causes sleeplessness.

9. Provide an outlook to nature from all rooms, and allow easy access to the natural environment.

An outlook to nature stimulates one's body physiologically and psychologically, and access to fresh air, sunshine, water and greenery is necessary for rejuvenation.

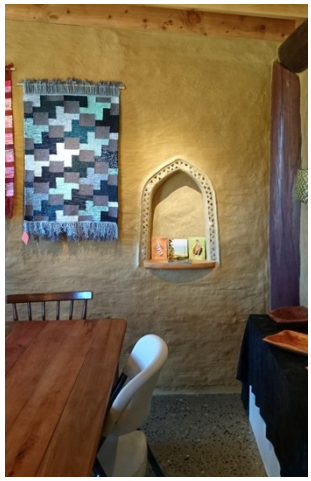
Toxic or electro-polluted indoor environments, with no connection to nature, are doubly stressful.

10. Design for ergonomics and safety.

Ergonomics and safety consider a person's comfort when using a piece of furniture or equipment, or moving around. Dimensions need to conform to the average human body.

Poor ergonomic design can cause accidents, or discomfort from long-term use and repetitive actions. Buildings need to ensure against falling, slipping, tripping, fire, burns, electrocution, cuts, being run over and drowning.

Harmonious Living Principles



1. Use colour to promote the psychological well being of the occupants.

Different colours stimulate people in different ways, so a positive influence of colour in the living environment is important for wellbeing. Natural colours increase the sense of harmony with the natural environment.

Inappropriate colours can make people feel angry, depressed or rejected.

2. Design using natural patterns and laws of harmony and proportion, and to a human scale.

All natural forms respond to natural forces, and the same patterns and proportions appear again and again. Using natural proportions in built forms increases a person's innate sense of the rightfulness of a place. Building to a human scale ensures that people feel comfortable in the spaces they inhabit.

Awkward proportions jar on the senses, and buildings larger than human scale can be intimidating.

3. Create a building that embraces the relevant ancestral, cultural or spiritual origins or the philosophical standpoint of its occupants.

In traditional cultures, spiritual philosophies govern how their buildings are planned and detailed, as well as many other aspects of life. They are based on the wisdom of centuries about how to live in harmony with the earth. Buildings that reflect the heritage, culture, beliefs or philosophies of individuals or the community help people create a connection with the place they live.

Buildings that are disconnected from the rhythms of the earth or cultural tradition create a sense of isolation and emptiness.

4. Create a building with soulful elements that express the occupants' creativeness.

The more creativity people can put into places where they live, work or otherwise spend a lot of time in, the more connection they feel with the place and the more respect they will have for it. A building that reflects the soul of the occupants will feel more like home and visitors will also enjoy the character of the place.

Sterile environments, or ones that cannot be changed by the occupants never feel like a home.

5. Design buildings to foster healthy family and community relationships.

Buildings and communities need to respect the different relationships people have, providing boundaries and spaces for privacy as well as communality to promote healthy interaction.

Ignoring people's personal boundaries can create tension and quarreling.

6. Design buildings to complement or reflect the local character of the community.



Regional differences based on local building materials and climate, as well as the general philosophy of the people that live there, create a greater sense of harmony and community. This is best achieved by a true understanding of the spirit of the place.

Slavish copying of building styles irrespective of their origin produces incongrity in a neighbourhood, and the buildings may not perform well in a different climate.

7. Plan housing developments to be away from but with easy access to major traffic routes, and encourage foot and cycle traffic within the neighbourhood.

A blend of living, work and retail in a neighbourhood means people can carry out much of their daily life locally and travel on foot or bicycle.

Major traffic routes are noisy, polluted and hazardous and are not appropriate in living zones, but easy access to them is needed at times.

8. Plan housing developments to be away from centres of industry, and encourage a mix of home, small shops and business within the neighbourhood.

Light industry and businesses add life to a housing neighbourhood and means people can walk or cycle to get to shops or workplaces.

Housing only suburbs can be isolating for those remaining at home during the day, and require a car to get to other facilities. Heavy industry businesses are not suited to living zones and should be located together well away from them.

9. Choose to be socially responsible and just, whether creating individual homes, housing developments or commercial/industrial developments.

Developments should consider the people that live there, providing places that are healthy to live and work in, and satisfying to the soul. They need to be responsible during the construction phase, providing ethical wages and prices for materials and without compromising open space, design and materials for profit.

Poor pay and treatment means poor quality design and workmanship, and the occupants suffer the consequences.

10. Create small-scale neighbourhoods with their own identity and resilience, either stand-alone or distinct units within a larger urban area.

Small, self-sufficient communities have less need for commuting, importing goods, or large-scale infrastructure, and have increased resilience in the face of diminishing energy supplies or natural disasters. The development of a community identity strengthens the loyalty of residents to where they live, and provides a distinctive attraction for visitors.

Disconnected neighbourhoods foster souless lives, and have nothing to fall back on in an emergency.