



## **Building Biology and Ecology Institute of New Zealand's PRINCIPLES FOR A SUSTAINABLE, HEALTHY AND HARMONIOUS BUILT ENVIRONMENT**

### **Sustainable Building Principles**

- 1. Choose building materials that are durable and from renewable, recyclable or non-depletable resources.**

Renewable resources such as timber or non-depletable resources such as earth means the potential for building with these materials remains constant, provided they are properly managed. Much energy and labour goes into the production of materials and the creation of buildings, so that if a material is more durable or can be used again, the associated costs to the user and the environment are reduced.



- 2. 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 until to their 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, releasing harmful particles or creating non-biodegradable landfill.

- 3. 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 rather than demolishing it means what cannot be reused can be recycled.



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

Many modern homes are of extravagant size. Smaller, simple buildings use less material to build and take up less land, as well as being easier to heat, cool and clean. Good design means that circulation space is minimised and main spaces can work well for several different functions, but still feel spacious.

**5. 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. This lessens the impact on the environment, and gives the user a greater degree of autonomy and resilience. Using minimal energy in day-to-day living is achievable through good design and mindfulness without having to sacrifice comfort.

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

Fossil fuel use for transport can be reduced or eliminated if most people's needs are met locally. However, there will always be some need for longer haul journeys, so an efficient network of commuter or goods transportation, using renewable sources of fuel, lessens the impact on the environment.

**7. 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. Efficient water use ensures neither the supply nor the disposal exceeds the natural capacity of the area. Purification of water supply and treatment of wastewater needs to mimic natural water purification processes.



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

Water loses its vitality when polluted, heated or forced to run in straight channels. It needs to be used with non-toxic cleaners and body care products and returned into the natural environment cleansed, cooled and revitalised through in-winding movement so it can continue its natural course without loss of quality.

**9. Choose to redevelop existing buildings and built areas for their resources and heritage, and to avoid locking up useful open spaces or building on marginal land not suited for habitation.**

Fleeing to the countryside to live a sustainable lifestyle is not what everyone wants, nor is it appropriate to discard everything we have already and fill up our open landscape with yet more buildings. Rehabilitation of existing building stock will make a larger impact and must be a major focus of eco building.

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

Healthy and sustainable living does not stop at the walls of the building, but includes the site and its watershed. Growing food on or near one's property makes for greater resilience in times of adversity, as well as lessening the impact of travel either to buy food or supply shops. Permaculture principles exemplify healthy and sustainable living and land use.

## Healthy Building Principles

- 11. Design buildings to be free from technical electro-magnetic 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 electro-climate, 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. These 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.

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

These criteria can apply to both natural and synthetic materials – so selection needs to be careful. Some people have allergic reactions to natural materials but not synthetic ones, which again affects your ultimate choice. Generally however, synthetic materials are more likely to off-gas irritating or harmful chemicals.

- 13. 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.**

At certain times or in situations where having open windows is undesirable, the breathing qualities of the building surfaces is essential to help keep the indoor climate fresh, free from bad odours and chemical build-up. The breathing materials also keep the structure dry and free of mould.



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

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

- 15. Heat and ventilate the building using natural and manually adjustable means.**

Heated air can create drowsiness and mechanical ventilation can transfer airborne diseases. Natural radiant heating and fresh air ventilation is not only healthier, but is also less cost to the user and less harmful to the environment. This is harder to achieve in climates of extreme temperatures, or in highly polluted environments, but much can be achieved with well-considered design.

- 16. 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.**

Moderate temperature differences between rooms stimulate the body as it moves around a building, as do fluctuations in room temperature that reflect (to a lesser degree) the day/night cycle. 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, beyond that discomfort and health issues arise if the temperatures are prolonged. Aim for not more than 2° Celsius differential between floor and ceiling temperatures.



- 17. Insulate against or isolate from unwanted noise and vibration.**

Unwanted noise and noise-induced vibrations within buildings or penetrating into them from outside can cause stress to the occupants.

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

Natural light is important for physiological functions to occur, and outside light or a suitable full spectrum replica source is essential for people spending all day indoors. However, at home in the evening a warmer spectrum light akin to late afternoon and sunset light is more relaxing.

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

An outlook to nature helps de-stress one's body at a physiological level as well as a psychological one. If people are spending long periods of time in stressed, toxic or electro-polluted indoor environments, then access to fresh air, sunshine, water and greenery is necessary for rejuvenation.



- 20. Design for ergonomics and safety.**

Ergonomics considers a user's comfort when using a piece of furniture or moving around, using dimensions and ratios that conform to the average human body. This reduces the risk of accidents as well as discomfort from long-term use and repetitive actions. Precautions against falling, slipping, tripping, fire, burns, electrocution, cuts, being run over and drowning also need to be built into the design.

## Harmonious Living Principles

### **21. Use colour to promote the psychological well being of the occupants.**

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

### **22. 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 these 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.



### **23. 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. Buildings that reflect the heritage, culture, beliefs or philosophies of individuals or the community help people create a connection with the place they live.

### **24. 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 place will feel more like home and visitors will also enjoy the character of the place.

### **25. Design buildings to foster healthy family and community relationships.**

Buildings and communities that respect the different relationships people have, providing boundaries and spaces for privacy as well as communality, will ease tensions and promote healthy interaction.

### **26. 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 community. This is best achieved by a true understanding of the spirit of the place, rather than slavish copying of traditional details, or fashion trends.



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

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

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

Heavy industry businesses should be located together, and well away from living zones. However, light industry and businesses add life to a housing neighbourhood and means people travel less to their workplaces.

**29. 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.

**30. 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.

