

## Environmental Recommendations

This is a document I have created for the planners at the college, I have adapted it slightly for your use but there are hopefully some technologies to consider in here. The sections highlighted in green may not be relevant or necessary for this project to look at so just use them as background information if you want. There is a glossary at the end for words that the students may not be sure about.

### Design

In the initial design stages the Building Research Environmental Assessment Method (BREEAM) rating criteria should be considered with a view to achieving excellent rating. Further information on this can be found at <http://www.breeam.org/page.jsp?id=87> . Clear, easy guidance allowing designers to reduce the environmental impact of their construction projects can be found in 'The Green Guide to Specification' (BRE 2002).

### Materials

Materials used within the design of new buildings and structures need to be locally sourced where possible and always sustainable. Major building elements such as hard landscaping, exterior and interior walls, roofing, windows, floor coverings and the upper floor slab should all achieve an environmental 'A' rating. In addition to this;

- Recycled content building materials should be considered and used where suitable and possible.
- Timber used during construction including structural cladding, carcassing, internal joinery and all panel products should be supplied from sustainable sources, for example FSC certified or equivalent.
- All paints / wall coverings should be water based where possible and / or contain very low concentrations of Volatile Organic Compounds.
- No materials or insulants should contain Ozone Depleting Substances and materials containing CFCs or HCFCs should be avoided.
- Recycled / sustainable floor coverings with good payback periods and easy maintenance.
- Re-use of building equipment and materials where demolition and construction happen together or during refurbishment, eg; sanitary ware, radiators, panels, fixtures and fittings.
- Materials like straw bales, newspaper and car tyres can be used for walls.
- Insulation should insulate for heat but also noise – sheep wool, flax, hemp, cellulose (including newspaper), wood fibre, coconut fibre, cork and recycled cotton or denim are all good materials.

### Studying Environment

The avoidance of Sick Building Syndrome (SBS) is important. The Health and Safety Executive estimate 30 – 50% of new or refurbished buildings cause some form of SBS.

The symptoms are cold or flu like feelings and it is caused by a combination of the following factors;

- a building built during the 1960s or later
- air conditioning with cooling capacity
- lighting which causes high glare and/or flicker
- low level of user control over ventilation, heating, and lighting
- large areas of soft furnishing and synthetic materials
- a large amount of open shelving and filing

- new furniture, carpeting, and painted surfaces
- poor standards of maintenance, repair and ventilation
- insufficient cleaning
- high temperature or excessive variations during the day
- very low or very high humidity
- chemical pollutants such as tobacco smoke, ozone (from photocopiers and printers, etc), or volatile organic compounds
- dust particles or fibres in the air
- computer display screens
- open plan buildings with large windows
- other indoor pollutants such as chemicals released from carpet adhesive; cleaning fluids, solvents
- noise

### **Water**

It is important to be able to monitor the water used in a building so there should be a system within the building that the incoming supply is connected to, a monitoring and targeting system.

Water conservation and management should be considered;

- Collection and use of rainwater using permeable paving, green roofs, infiltration basins and trenches and rainwater harvesting.
- Grey water can be used for toilet flushing.
- Water efficient fittings – urinal flush controls, low / dual flush toilets, spray taps, water-free urinals.
- Mains supplied water coolers.
- Water leak detection systems for main supplies as leaks waste water.
- As the climate changes many areas are at risk from flooding. The environment agency has a section on their website where you can put your postcode in and see what risk you are at. This will help you decide whether you need to build your school/homes on elevated areas.
- Reed beds for the toilets to flush into.
- Sustainable Urban Drainage Systems (SUDS) should be incorporated where possible – traditional drainage systems encourage the water to drain away as fast as possible increasing the risk of flooding and sudden water level rises, this can cause ground water to be depleted as the water doesn't have chance to soak into the ground and contaminates, such as oil, are washed into the drains, causing pollution.

### **Pollution**

Pollution resulting from the building should be considered;

- Low Nitrous Oxide emission boilers.
- Any chemicals / oils on site during construction and building use should be fully banded with adequate storage and controls in place for their use and disposal. This would include cleaning chemicals, science chemicals and paint cleaners.
- Correct fittings should be supplied in laboratories and studios, for example paint traps on sinks, adequate signage to guide users on liquid disposal, space for storage of chemicals not suitable for mains drainage.

### **Energy**

It is important to be able to monitor the energy used in a building so there should be a system within the building that the incoming supplies are connected to – a monitoring and targeting system.

Energy efficiency is extremely important.

- Passive Infra-red detectors (PIRs) / movement sensors in toilets, low use areas such as store rooms and plant rooms, fire escapes, external security lighting if it's not required to light footpaths of access areas. Timed lighting.
- Key fobs for lights so they cannot be left on.
- Photocells and skylights to make use of natural light wherever possible internally and externally. These could also be made of things like glass bottles if they are purely to let light in and not to see through.
- Thermostatic Radiator Valves (TRVs), with upper limits
- Insulated hot water pipes, heat transfer systems.
- A or AA rated appliances should be installed possible.
- Micro – generation; solar water heating, solar / wind powered external lighting.
- Wind driven ventilation.
- Avoidance of tinted glass which blocks sunlight.
- Green energy supplied on site; Combined heat and power plant, biomass, wind turbines, ground source heat pumps.
- Voltage optimisers at the building's incoming supply.
- Careful orientation of the building to minimise solar gain and wind chill but maximise natural lighting and ventilation.

## Waste

The earth's resources are finite so the use of them needs to be reduced. This can be done using the 3 R's – Reduce, Reuse and Recycling, and composting. Using these principles reduces what is going to landfill or for incineration.

### General Waste

- Space to site recycling bins in all rooms, workshops, communal areas and externally.
- Have the bins coloured and labelled so everyone knows what they're for.
- Space for paper to be kept in classrooms to be used again if one side is blank.
- Modern, energy efficient hand driers in toilets cuts down the use of paper towels.
- Sinks for washing up, reducing the need for disposable plates, cups and cutlery.
- Consideration should be given to the use of the areas being designed and space provided for storage of reusable or recyclable items. For example, a technology workshop should have a location for storage of offcuts so they can be used again or so it can be disposed of in the correct manner.
- It is important to keep different materials separate as mixed waste is very difficult to recycle as it is classed as contaminated.
- Compost bins for uncooked food could be put in the garden area and in in-vessel composter could be put in the area for everyone to use.
- A swap shop could be created to allow people to take toys and equipment they don't need any more to, to swap for something they do need, rather than throwing it away.

### Hazardous Waste

Consideration should be given to the purpose and use of the areas in the buildings. Many types of waste are classed as hazardous so must be disposed of carefully so they don't

harm the environment. Some of these items, like electrical equipment, contains very precious materials (such as valuable metals) which can be recycled. Space will be needed for storing these things before they are collected for disposal or recycling.

### Construction Waste

- Waste from demolition should be reused or segregated for recycling where ever possible.
- Waste material during the construction phase should be segregated for reuse, recycling or disposal, **for example return of packaging or excess material to manufacturer for reuse, just in time deliveries to avoid storage and spoilage of materials or over ordering**

### Travel

Buildings in use have travel impacts, variable with the time of year and the occupancy of the building. Everyone needs to travel around but there are sustainable ways to do this. Reducing car use is a really good start. Think about;

- Areas where no cars are allowed.
- Secure motorcycle parking
- Secure bicycle parking
- Showers and lockers for people to store their kit.
- Safe and more direct routes for people to use if they are walking, cycling, skateboarding, roller blading etc.
- Good maps of the areas.
- Lots of buses or trams serving the area for people to use. You could have these running on green fuel instead of fossil fuels.
- Horse drawn carts for local trips.
- Water ways can be used – horse drawn barges, rowing boats or green fuel powered boats.
- If people need to use a car hybrid or electric cars and shared cars could be provided.
- Bike hire system so people don't have to buy one each.
- Bike powered taxis – rickshaws.

### Biodiversity / Natural Environment

The natural environment is very important, including the biodiversity of the area;

- Protection of existing ecological features – trees, hedgerows, bedding etc, during construction and when the building is finally in use
- Planting schemes after main construction complete, encouraging native species, wildlife enhancing plants and habitats and drought resistant plants requiring little maintenance
- Use of trees and other vegetation to shade the building and help create ventilation
- Green roof for people to use – recreation, research or learning environment. This also contributes to the insulative properties of the building and capture of rain water.
- Increasing the amount of green space creates places for people to play and relax. By not using mowers on them too much the diversity of the plants and insects will increase.
- Create areas where people can grow fruit and vegetables. This saves money and reduces the need for pesticides.
- Create areas for bee hives.

- Create a community farm so people can learn how to care for plants and animals as well as benefiting from milk, eggs and other produce. The animals could also be used to graze the green areas.
- Use the manure from the farm animals and horses to fertilise crops and possibly as fuel.

### **Sport**

A healthy lifestyle is connected to the environment and sustainability so consider space for sports, games and exercise.

### **Glossary**

**Biodegradable** – something which can be broken down by living organism. Generally organic in origin.

**Biomass** - living and recently dead biological material which can be used as fuel or for industrial production. Ususally plant matter grown for biofuel but also plant or animal matter used for fibre production or biodegradeable waste burnt for fuel.

**Biodiversity** – the number and variety of species in an area.

**Bunded** – an enclosed area which will keep any substances spilt contained and prevent environmental or other problems being caused.

**Carbon Footprint** – The total amount of greenhouse gas emitted over a period of time or something's life, from the raw material to it's end of life.

**Compost** – The breakdown of organic material. It happens naturally in all but very arid or very cold environments.

**Ecology** – the relationship between animals, plants, the air, water, land etc.

**Ecological Footprint** – The amount of land and water area a human population would hypothetically need to provide the resources required to support itself and to absorb its wastes, possibly using available technology.

**End of Life** – The product has been worn out , is no longer useful or is no longer wanted.

**Environment** - The space, including the water, air and land where you live and work. It can influence you just as you can affect your environment by what you do and the way you live.

**Environmental impact** – The effect on the environment of a specific activity.

**Flax, Hemp, Cellulose etc** – plant material which has many uses.

**FSC** – Forestry Stewardship Council. Paper or wood with this stamp can be traced to its origin and is produced in a sustainable way – tress are planted for what is cut down.

**Geothermal energy** – utilisation of hot water and steam from just under the earth's surface. Originally used by the Romans it is now widely used for heating and cooling with a geothermal heat pump.

**Greenhouse gases** – Gases which make up the atmosphere and maintain the temperature of the planet by trapping the sun's rays. These include Carbon Dioxide, Nitrous Oxide, Ozone, Methane and Water Vapour.

**Hazardous** – something which is possibly harmful or dangerous.

**Incinerate** – To burn something completely to dispose of it.

**In - vessel Composter** – an enclosed system for composting which does not allow birds or any other animals to access the material being processed. Used for cooked foods and raw meat for example. Often use high temperatures to work.

**Landfill** – A place where rubbish is buried.

**Non – Renewable** – Something which has a finite supply, examples include coal, oil and gas. Some things can become non-renewable if they are used in an unsustainable way. For example, if trees are felled faster than they're re-planted the supply of wood will run out.

**Organic material** – Something which was once alive or has been manufactured from a living plant.

**Ozone depleting substances** – the ozone layer protects us from harmful radiation. Some chemicals cause the destruction of this layer, these include Chlorofluorocarbons (CFCs) and Hydrochlorofluorocarbons (HCFCs).

**Payback period** – the time taken for the cost of a piece of equipment to be 'paid back' by the savings made by the equipment.

**Recycle** – To process something and / or alter its form, into something that can be used again.

**Reduce** – To make something smaller.

**Renewable** – Something which won't run out as it can be made or grown again. Renewable energy includes solar, wind and water power as these are continually available. Renewable resources include wood and leather, as they can be grown / produced again.

**Resource** – A useful or valuable item or possession. Many natural resources are non-renewable.

**Reuse** – To use something again for the same or a different purpose, instead of discarding it.

**Sustainable** – Something is sustainable if it 'meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainability relates to the continuity of economic, social, institutional and environmental aspects of human society, as well as the non-human environment.' (former Norwegian Prime Minister Gro Harlem Brundtland)

**VOC** – Volatile Organic Compounds. These are organic chemicals that easily vaporize at room temperature. They are called organic because they contain the element carbon in their molecular structures. VOCs have no colour, smell, or taste. VOCs include a very wide range of individual substances, such as hydrocarbons (for example benzene and toluene), halocarbons and oxygenates.

**Waste** - unwanted matter or material of any type, often that which is left after useful substances or parts have been removed

**WEEE** – Waste Electrical and Electronic Equipment