

rethinking design

environmental/ecological design: materials design-interior

Daniel Cruden

What/Why:

The 1987 UNESCO Brundtland Report titled; *Our Common Future*, states, “sustainability is defined as meeting today’s needs without compromising the ability of future generations to meet their own needs.”

The notion of the closed loop cycle, as a fundamental environmental/ecological design idea is important to understand in terms of design and design processes, it is a method which allows the previously outlined statement about, meeting today’s needs without compromising the ability of future generations to meet their own needs, to be implemented. Design processes must begin to adhere to this regenerative concept by designing in a smarter, new age manner. These ideas are beginning to become more and more evident in today’s society. Houses become more than just a built environment for people to inhabit and undertake daily routine, they become a self manufacturing vessel, one which produces its own power, water and crops by renewable resources such as solar and wind qualities. The production of power often exceeds the consumption of these self-sufficient homes; this excess is then harnessed, in some cases, as a resource that supplies the wider community and their needs. Understanding, as a designer, the notion of regenerative design, allows the way in which we produce, think about, and employ any object, material or system to be done in a more sustainable manner. Materials in any instances is an important thing to consider, how and why they are used and the implications of their use must be understood to try and reduce the carbon foot print that often results due to poor planning and making.

Who:

Architect William McDonough, and chemist Michael Braungart, in their text *Cradle to Cradle: Remaking the Way We Make Things*, propose that current modes of waste reduction and environmental protection do not follow the closed loop cycle, they instead state that there is an emphasis on recycling, or as the authors call it, “downcycling”. Material design is a field which struggles to incorporate the closed loop notion. Many examples of “sustainable” materials describe the way that they are “sustainable” because they are created from recycled materials. The ideas that are pertinent in McDonough and Braungart’s text are how materials should be made for what they are to be used for and that instead of replacing them when it no longer suits the purpose which it is being used for, and ending up in the tip, they can then be harnessed in other projects where it will suit the role of its initial intent. This is even evident in the design of the book “the book itself serves as the prototype of a truly recyclable product in which materials are reused without degradation of quality”. The idea of the book is that when you no longer require it you are able to send it back where the pages will be stripped of their words and re-printed with a new text, hence removing the need to downcycle the book into something else, other than its intended use.

"The mkLotus was designed as an oasis. We wanted to create a house that provides a sense of tranquility. It is about connection. Connection to the natural, and to the landscape. It can be perfect for a vacation home, or a home where you feel like you're on vacation." Is how designer Michelle Kaufmann describes the regenerative oasis. The home not only works with the environment but also becomes a part of it. The green roof replicates a grassy plane, the home doesn't obscure the landscape, rather it celebrates and adds to it, it collaborates with the land. This home offers the latest high-performance systems and sustainable materials and methods, which dramatically reduces its impact on the environment, the implications of such methods, solar power, grey water collection and a green roof, all aid in reducing the costs and environmental impact of those who inhabit the home. The mkLotus house embraces numerous renewable materials, Rapidly Renewable Bamboo Flooring, No-VOC Paint by Yolo throughout, Countertops by Concreteworks: Fly Ash Concrete, Rice Hull, and Recycled Porcelain Aggregates, and FSC Certified Wood Cabinetry (over Roseburg Skyblend Particleboard) These all aid in reducing environmental waste.

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mkLotus house, Michelle Kaufmann Designs. Images sourced: http://www.mkd-arc.com/homes/mklotus/green_living.php

How:

A simple gesture which comments on these environmental issues, whilst not directly embracing the closed loop cycle, can be seen in the droog design piece *peepshow wallpaper* by designer Gijs Bakker. The wallpaper is a simple roll of wallpaper with numerous different sized holes which aim to highlight the existing wall coverings of the interior, "The simple design of plain paper with cut out circles can be put directly on top of existing wall decoration. The wallpaper gives a new look but with windows to look back on past memories"



Peepshow Wallpaper. Source: <http://www.droog.com>

As a response to ideas of closed loop cycles in terms of materials, designers have been challenged and encouraged to harness and employ methods of capturing ways of creating regenerative materials. One designer who has fronted this challenge is Daniel Flahiff. His creation of the Polli Bricks, which, whilst not fully addressing the closed loop idea, creates, using recycled plastic bottles, bricks which become a focussed idea to make use of a medium which is in abundance around the world. The bundled bottles allow for uses other than the key materialistic qualities hence implying the closed loop qualities. Each of the bottles can take on roles which aid the lived environment by becoming, an insulator, trapping heat and gradually releasing it, becoming a material which harnesses solar energy, as a method of heating. In some cases the bottles become devices for production, as a medium which can contain plant life, and can also become a "self" light shade.

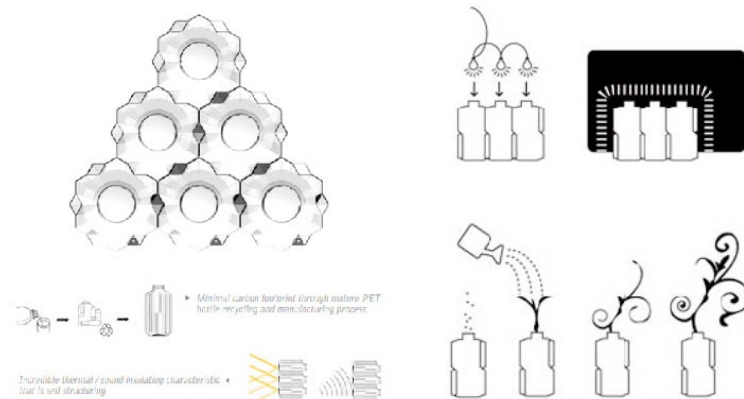


Diagram of Polli Bricks by Daniel Flahiff. Source: <http://www.inhabitat.com>

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Rethinking design:

Our daily routines within the home produce unharnessed “by products”. These in many cases, have no role within the home. Moisture is a by product of inhabitation, which is largely produced within the home from the simple acts of cooking, cleaning or bathing. Devising a simple material/object, a superficial lining, which can capture this moisture and be harnessed as a means to help plant growth. The lining pods are constructed from felt, a product naturally produced from wool. The fibres of the wool pick up moisture, which is then captured within the soil in the pod, giving it to the plant. The pods line areas where moisture damage will not occur: i.e. a window or tiled surface. Once growth has become well established the entire pod returns to the ground, breaking down and allowing the plant it nurtured to give back to the natural environment.



Pod details



Pod linings installed on kitchen window



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environmental/ ecological design

amanda jones

What:

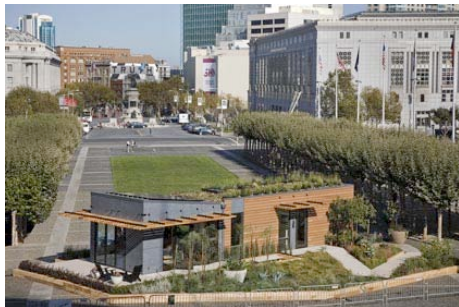
Ecological design is described as any form of design that minimizes destructive impacts on the environment, and integrates itself with living processes (Van der Ryn & Cowan, p 18). It is a form of engagement with nature's processes "that generate, rather than deplete" (Van der Ryn & Cowan, p 102). Ecological design is made up of biotic (living organisms) and abiotic elements. A regeneration of the health of our planet it needed and this can come by man and nature working together. Ecological design "is making things that fit gracefully over long periods of time in a particular ecological, social and cultural context" (Orr, p 26 The green braid) and therefore "ecological design must become a kind of public pedagogy built into the structure of everyday life" (Orr, p 29). McDonough and Braungart suggest that "buildings, systems, neighbourhoods and even whole cities can be entwined with surrounding ecosystems in ways that are mutually enriching" (p 87). Everything in the ecosystem is recycled, so we need to design in a way that mirrors this. When designing we need to firstly consider the environment and the affect that our designs will have on it. How can we be proactive, take action and engage in a process of making change? We need to work in mutuality with the environment. There is a need for a paradigm shift in the way that we think in relation to nature, by creating patterns of designing that are healthy and restorative. Ecomimetic design is a way of responding to the biotic and abiotic together. There is a potential for positive buildings to create energy for our tomorrow. It is our job as designers to facilitate the processes underlying sustainability, because we are constantly forced to make decisions that will shape the future. Sustainable design is a complex and challenging agenda that "will not be easy; it requires stepping boldly into a contested sphere" (Ryan, p 7). By rethinking the way in which we design we can grasp ideas from natural environmental processes to create architecture that benefits the ecosystem and therefore the ecosystem can benefit architecture.

Who:

William McDonough and Michael Braungart's book '*Cradle to Cradle*' (2002) is a major source of inspiration in terms of Environmental and Ecological design. McDonough and Braungart are aiming to create more "health, nourishment, diversity, intelligence and abundance for this generation of

inhabitants on the planet and for generations to come” (p 78). They look at the concept of a tree and suggest that buildings should be reflective of this because the tree is “inextricably and productively” engaged with the systems around it (p, 79). Specifically looking at the cherry tree as a symbol for how to design and the process whereby blossoms decompose when they have fallen, feeding organisms, micro-organisms and supplementing the soil. Here the earth’s major nutrients can be cycled and recycled (p 92). McDonough and Braungart suggest that by converging old and new technologies we can create very intelligent designs, achieved by connecting to natural flows (p 130). This connection to natural flows will be gradual and transitional therefore we need to grasp onto the ideas of the existing systems of the ecosystem.

The team at Ecological Design Collaborative also make reference to the tree as a source of inspiration “a living testament to nature’s energy, exchange and beauty”. Michele Kaufmann is a leader in green design and a member of the Ecological Design Collaborative, specialising in thoughtful sustainable design. When designing, Kaufmann considers the indoor and outdoor and successfully creates. Michelle uses materials in her designs that are renewable, recyclable, long lasting and low maintenance and re-usable and attempts to collaborate with the environment. Kaufmann works with five Eco-principles when designing, which are: smart design, eco materials, energy efficiency, water conservation and healthy environment. The latest pre-fab design by Kaufman is the ‘mkLotus’. The green roof is a feature of this design which makes the home more energy efficient.



<http://www.mkd-arc.com/homes/mklotus/>

Ken Yeang is another leader in green and low energy design who is aiming to handle diversity and integrate nature. He looks at the idea that everything is recycled in the ecosystem. Yeang suggests that when designing, we first need to look at the site’s ecosystem and consider ways in which we can integrate the new design with the current ecosystem, connecting the natural environment with the human built environment. TR Hamzah and Yeang’s ecological project ‘*Editt Tower*’, which began in

1998, is a 26 story high-rise to be constructed in Singapore in response to it's sites ecology. It consists of a vertical, spiraling insulated living wall of local organic vegetation, which rehabilitates the surrounding ecosystem. Photovoltaic panels, natural ventilation and biogas generation make up this living wall. Walls can be moved or removed to allow for future compliability. A grey water rain collection system is integrated into the building for 55% self sufficiency, and there is a potential to convert sewage into biogas and fertiliser. This design is a step forward in design thinking which considers it's surrounding environment in an attempt to connect the built environment with the natural environment.



<http://www.inhabitat.com/2008/10/15/editt-tower-by-trhamzah-and-yeang/>

White Design Architects' '*BaleHaus*' in the UK is a zero carbon housing solution. After 100 years the BaleHaus can be dismantled, re-used and re-cycled. Using passive design techniques, the BaleHaus reduces the demand for heating. By using load-bearing Modecell frames made from timber and insulated with locally sourced straw, the house is sustainably constructed with low embodied energy and has minimal use of materials. These panels can also be insulated with hemp or straw.



<http://www.white-design.co.uk/WhiteDesign/Balehaus.html>

When designing with materials in mind it is important to think about the way in which the material(s) can work with the environment as the choice of materials affects the impact the building has on the environment. Materials are better for our health if they are closer to their natural state. Materials are considered to be in a cycle of nutrients that are separated into the biological metabolism or the technical metabolism in closed-loop cycles, a concept brought to the fore by McDonough and Braungart. We need to model designs based on these regenerative cycles. Most materials requires some form of processing before they can be used for construction and these may have destructive effects on the environment. Energy is required here which may cause waste generation and pollution. It is important to choose materials that are closest to their natural state so the amount of embodied energy is at it's least. By using materials fro m the local environment, local enterprises are able to profit.

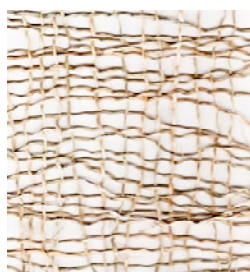
Rethinking Design:

The design response critically reflects upon ideas and thoughts towards Environmental and Ecological design. The Seagrass netting works as a bracing system for soil. Seagrass grows in saline marine areas and is a plant with long narrow leaves. Effectively a material has been taken from the ocean, dried and weaved it to create a net. The life of the Seagrass netting varies, and decomposes over a length of time. The designed material can be used to effectively control coastal erosion, preservation of lakes and the construction of wetlands. This is an effective design solution because it takes materials from the natural environment, creating them in a way that benefits nature's processes. Due to varying weather conditions the material decomposes over time and feeds the soil, similar to the notion of the Cherry Tree discussed by McDonough and Braugart.



Close up of
Seagrass
Erosion Net

This design response shows the Seagrass erosion net in a context in which it would be used



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environmental/ecological design: lighting

Amy Miller

What/Why:

There are many ways to look at green design issues. Environmental design considers environmental systems and aims for closed loop cycles. It is the process of addressing surrounding environmental parameters when devising plans, programs, policies, buildings, or products. The environmental movement began in the 1960s and the concept has become more explicit since. Environmental design is important because there is a growing need for regenerative design ideas. This is because world resources are running out; these are problems with the environment, such as environmental degradation, climate change, waste mountains and resource reduction. These are all evidence of a design problem that can be changed through the application of environmental design. As *Mahat magandi once said*, "You must become the change you wish to see in the world" This is speaking of the action we must take in this world to bring change and Environmental design is just one of many ways to do that.

Who:



Michelle Kaufmann's new eco-prefab home mkLotus house is a pre configured sustainable home that is pre packaged to make it easy for people to go green. There is a zero electric bill by making use of solar panels, installing energy efficient appliances and led lighting which is 90 times more efficient than a standard incandescent bulb. The main energy saving goal is to never have to turn on lights during the day, this is done by maximising natural light where possible. The eco-prefab home has skylights that work as a natural cooling effect, this is achieved by opening the skylight and as a result, all the hot air rises and instantly cools the house, the whole eco-prefab house can be powered by the sun. Another sustainable solution is maximising the efficiency of water by minimising waste with a green roof system that helps with storm water run off and also works as an insulator. Water is collected off the roof and runs into a water catchment system which is a pool, this helps filter water and can be used as irrigation for the plants. The grey water from the washing machine and sink is used in the toilet, this reduces waste considerably and maximises material use.

Al Gore starred in the 2006 documentary, director *Davis Guggenheim*, *An Inconvenient Truth*, which won the Academy Award for documentary feature. This movie became influential world wide, addressing the need for a paradigm shift. Gore then went on to write a book *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*. He is currently the founder and chair of Alliance for Climate Protection, which is an organization founded in the United States in 2006 aiming to "persuade people of the importance, urgency and feasibility of adopting and implementing effective and comprehensive solutions for the climate crisis" (Al Gore) The Alliance is launching a three-

year, \$300 million campaign aimed at mobilizing Americans to push for aggressive reductions in greenhouse gas emissions. This campaign is one of the most ambitious and costly public advocacy campaigns in U.S. history according to the organization, research in January 2007 indicated that while 77% of Americans believe that there is solid evidence that

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the Earth is warming, only 47% believe the link with human activity. The Alliance believes that explaining this link, and motivating people to take action, is the organization's key challenge.

How:



The *Sunlight-Transport Device* by a company called *Sunlight Direct* collects sunlight on the roof and funnels it via fiber optics to different rooms in the house, completely eliminating the need for artificial lighting. Sunlight Direct combines sunlight transport with fluorescents and a photovoltaic energy system - so during the day lamps emit sunlight from outside, but at night emits fluorescent light, powered by the solar panels. This is called Hybrid Solar Lighting (HSL) - the storage of solar energy to power fluorescent tubes in cases of low sunlight, such as on cloudy days, or at night. This Sunlight-Transport Device works by using a parabolic mirror to collect sunlight. The system then filters out the heat-causing UV light, and pipes the remaining natural light into interior spaces. Currently the light can only be sent about 30 feet or so, due to loss of light as it travels through the lines. One unit delivers 50,000 lumens, or roughly the equivalent amount of light needed to illuminate 1000 square feet. To maximize the light in a given room it is possible to choose light colours and reflective materials for walls, ceiling and floor. These include light-coloured and shiny flooring options like linoleum or polished wood can reflect a lot of ambient light, brightening up the space.

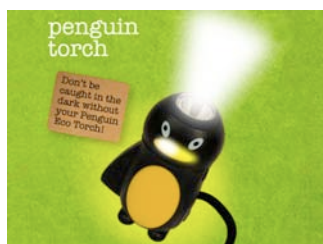


Vincent Gerken's, Blight is a new twist on venetian blinds. Rather than blocking the sun's rays, the design re-envision blinds as sun-soaking solar panels that store energy during the day and illuminate the interior at night. The design takes advantage of the large surface area of extended venetian blinds, by lining each panel with flexible solar cells. Once night falls, stored energy is transferred to a layer of electroluminescent foil, which provides energy-efficient light. Gerken states: "With Blight we have not produced a new object; we have just created the design of an everlasting product: the Venetian blind. We use all the current functions of this object and add a little technology to give it a new function - to catch solar energy and convert it into electricity." Gerken's statement speaks of this as regenerative design, as it is totally renewable.

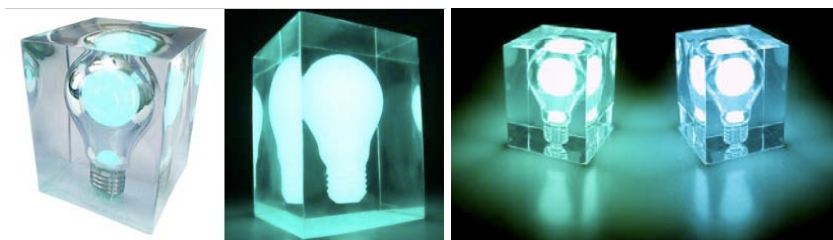
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Alkaline disposables continue to present an environmental problem; *Sungwoo Park* and *Sunhee Kim* have designed the *Energy Seed*. It is an illuminating way to encourage battery recycling. The street lamp is powered by the residual energy left in old batteries, this establishes an immediate visual connection with the act of recycling. By depositing dead batteries in the cylindrical storage compartment the energy is pooled to power a luminescent LED halo. Disposable alkaline batteries are a particularly charged environmental conundrum; their hazardous composition and single use life cycles reap grave environmental repercussions if they are simply tossed in the trash. Their composition includes heavy metals such as mercury, lead, cadmium, and nickel, all of which can seep out and contaminate the earth unless they are properly disposed. The lamp's base features slots for almost every size battery. Once the compartment has been filled to capacity, the batteries can be easily collected and recycled.



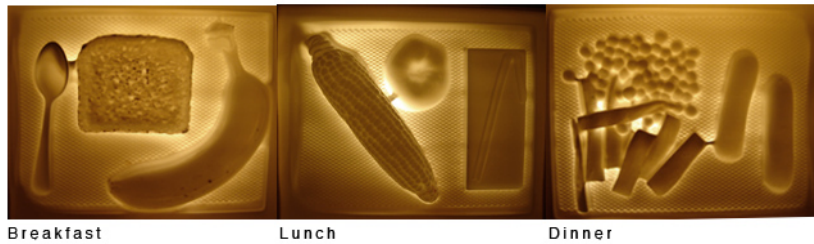
This penguin eco flashlight eschews a landfill bound battery for a pump powered kinetic charger that provides an hour of light for each minute spent pumping. It is capable of functioning as either a nightlight or a flashlight; it's also a great way to teach children about renewable energy!



The Glow Brick, designed by *Sam* and *Jude* of *Suck UK*, is a cordless nightlight made from a phosphorescent light bulb in other words, a real light bulb, embedded in a block of acrylic. It requires no electricity and can glow for up to three hours, powered only by light it soaks up from the sun or other artificial light sources, making it as energy-efficient and eco-friendly as it is clever. The Glow Brick employs an often-overlooked material for efficient energy generation. Phosphorescence is an extremely promising source of energy efficient light.

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Rethinking design:



The food trays are an extension of the TV meal. The notion of waste, plastic, laziness and pre-packaged culture is evident here. We are literally eating ourselves and the world we live in, by adhering to the “easy option”. The plastic vacuum formed food trays are a comment on our everlasting footprint that is being left on the planet. This statement is a thought provoking wall light, which makes us stop and think, next time we buy pre-packaged foods, and fill the car at the petrol pump. In the hope that tomorrow we will be environmentally and ecologically considered.

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Environmental/Ecological design: Energy generation design

Molly Potter

Environmental design is about addressing the natural environment factors when designing products, buildings, systems and programs. We are constantly designing the environment we live in through culture, technology and materials, so at the forefront of all design should be the impact on the existing environment. Part of environmental design is ecomimetic design, which is about mimicing the ecosystem, including the biotic and abiotic. When designing anything new we need to consider physical, systemic and temporal elements with the impact on the site/environment being the most important. Us, as humans, are using up the earths resources and producing copious amounts of waste. This is forcing the natural climate to change and putting all living species in danger. Sustainability is about maintaining ecological processes, functions and productivity into the future. The Earths resources need to be used at a rate, in which they can be replenished, not die out. Regenerative design is about producing a greater output than the input. It's about redeveloping current systems with a greater-than absolute efficiency. We need to start creating an overabundance to allow for the continuation and development of all living species.

Cradle to cradle is a company that believes in creating products with a cradle-to-cradle lifecycle, rather than one of cradle to grave. It focuses on maintaining materials and maximising value without damaging the ecosystems. It believes we need to concentrate on minimising waste, pollution and natural resource depletion and maximise energy availability using wind, solar and other natural energy generators. McDonough Braungart Design Chemistry and the Environmental Protection and Encouragement Agency are just a couple of the companies that are applying the cradle-to-cradle methodology in designs for new processes, products and services. They believe in creating buildings that are like trees in the way they produce more energy than they consume. MBDC wants a world of abundance not one of limits, pollution, and waste.

Since the 1880's solar cells have been used to convert light into a direct current of electricity. Over the years solar power is getting more refined and more widely used especially at larger scales. Tall solar towers have been designed in Australia to

generate energy using minimal land area. Joseph Cory designed helium filled balloons coated with photovoltaic solar cells to generate unlimited energy and they don't take up much land area as they float in the sky.



(Figure 1, *SunHope solar balloons*)

A sports hall in Germany has incorporated a photovoltaic façade to generate electricity not only for the sports hall but un-used electricity is fed into the national grid for the rest of the community.

Wind turbines are also used to convert wind energy into electricity with 1.5% of the worlds' electricity at this time coming from wind energy. Wind turbines are also being experimented at higher altitudes where the energy output can double from that of turbines at ground level. Magenn Power is in prototype stages of the worlds first floating wind turbine. The Magenn Air Rotor System is a stationary blimp kept afloat by helium and tethered into place on an electrical grid.



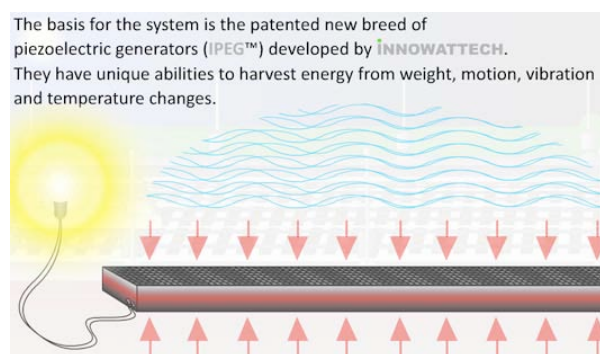
(Figure 2, *Floating wind turbine*)

Chad Maglaque designed micro-wind turbines to plug into homes to provide energy for small sites. Modular Architecture Wind Microturbines are small silent turbines seamlessly integrated into the parapets of buildings, catching wind as it escalates up the buildings side. Michael Jantzen has designed a Wind Shaped Pavilion as a proposal for a large fabric structure that rotates in segments around a central support frame generating energy.

It is not just wind and solar that can produce energy. Waves, water currents and even human energy can all generate electricity and several companies and designers are experimenting with these all over the world.

One of the greatest energy resources is the ocean. Wave-powered generators are being explored throughout the world but it is the underwater currents that could be the most powerful energy source. Researchers at the Center of Excellence in Ocean Energy Technology have developed underwater turbines that they want to place in the middle of the Gulf Stream current to capture the energy from the strong underwater current. Geothermal plants are slowly occurring more and more around the world mining the heat from both the hot rock and flowing water below ground. The heat in turn produces steam that drives turbines at the ground level, producing electricity.

Kinetic energy is a source of renewable energy that has hardly been touched. Humans are a huge generator of energy. When we walk, dance, work out, run, and move, we create energy. Through new technology this energy can be harnessed into usable energy to cycle back into our buildings. This can already be seen in the Sustainable Dance Clubs and Hong Kongs human powered gym. The East Japan Railway Company has installed a piezoelectric energy-generating floor. The system harvests the kinetic energy generated by crowds to power ticket gates and display systems.



(Figure 3, *Energy generating road*)

Rau architecture firm in the Netherlands designed an energy generator installed in a revolving door. Meaning every person that walks through the door produces energy for the store. The University of Utah Physicist Orest Symko and his students have even developed a way to turn excess heat into sound and finally into electricity. Technology and processes are being refined to harness viable renewable energy from methane, a greenhouse gas, produced from animal manure. Norcal Waste Systems in San Francisco have been collecting dog feces throughout the city. The waste is put into an anaerobic digester, which uses bacteria to convert organic waste into methane gas. Burning that gas produces energy in the form of electricity, natural gas and liquefied natural gas. This gas is then captured and used to power equipment that normally runs on natural gas.

Sustainable cities or eco-cities are also becoming widely popular with several countries redesigning whole communities to be cleaner and greener. Kenya, Ecuador, Ireland, China, U.S, U.K, and Abu Dhabi are just some examples of those designing Sustainable/eco-cities.

Kjellgren Kaminsky Architects in Sweden have devised a Super Sustainable City. It envisions Gothenburg, Sweden with a utopian ideal. It incorporates energy harvesting roads, towering solar arrays, transit paths that capture solar energy and soaring wind turbines.



(Figure 4, *Super Sustainable City*)

Ideas from these eco-cities could easily be incorporated at a smaller scale into existing cities as parks or gardens. A park or garden is hugely beneficial to a community as it enhances the aesthetic of a city and helps improve health and wellbeing. A park can also be quite agricultural by becoming a home for animals and a place to grow trees, flowers and even fruit and vegetables. A park also has the potential to generate

electricity for the community. The incorporation of wind and solar generators can harness energy and convert it into electricity for the surrounding community. Shelter can be provided within the park, which can incorporate solar panels to harness energy from the sun. The ground can be laid with piezoelectric crystals to harness the energy from the footsteps of those walking through the park. This way the community gets to enjoy the park and is able to give something back to the community as well.

Something that I feel has great potential is creating sculptures that generate energy. A solar or wind generator could be designed into a sculpture to harness the energy it comes in contact with and then convert that into electricity to give back to the surroundings. Wind belts or piezoelectric film harness the energy from the wind and could easily be incorporated into any form of sculpture. Wind sculptures are already present all over the world, using the wind to enhance the aesthetic of the sculpture. These sculptures should be harnessing the wind energy and converting it into electricity for the surrounding environment. In Wellington there are several wind sculptures reflecting the speed and movement of the wind through the city. If these designs were reconsidered with the idea of harnessing wind energy to generate into electricity, only small changes in materials would have to be considered. The design and visual aesthetic would be able to remain the same.



(Figure 5, *Tower of Light*)



(Figure 6, *Pacific Grass*)

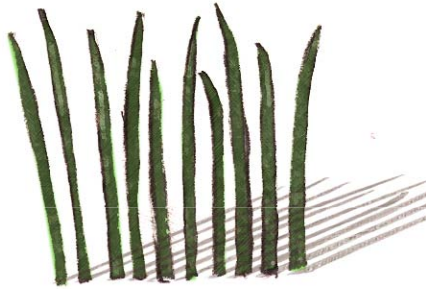
The Tower of Light by Andrew Drummond, already harnesses the energy of the wind, in the rotating flanges at the top, to light the neon rings below. This wind energy could be utilised more by incorporating wind belts into the rings, which harness energy from the vibrations of the wind on a tensioned membrane. Pacific Grass by Kon Dimoupoulos, could be re-designed to change the polyester resin rods into piezoelectric rods that only need minor flexing for a charge to be generated. With the

rethinking design

6

amount of rods already incorporated into the design this sculpture has great potential to generate a sufficient amount of energy.

Looking at existing sculptures I have come up with a few designs that can generate energy as well as enhancing an environment through aesthetics.



Similar to Pacific Grass these designs are made from piezoelectric rods and sway in the wind.



These designs also sway in the wind and could also incorporate solar cells into the discs and leaves to harness energy from the sun.



This design works like a windchime, it is made up of piezoelectric panels and when they knock against each other in the wind they generate more kinetic energy.



(Figure 7, *Energy generating park*)

Conceptual park showing the sculptures as aesthetic features that harness the wind, solar and kinetic energy that is stored in generators underground.

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rethinking design

Environmental / ecological design: furniture

Cayla Parkinson

Ecological design is defined as any form of design that minimizes environmentally destructive impacts by integrating itself with living processes, it is an ecologically responsible design discipline. Ecological design is seen from a sustainable design perspective it is a means of designing by finding an alternative method or material to produce which are better for the environment.

David W. Orr suggests there are four characteristics of ecological sustainability. First, people are finite and infallible. Second, a sustainable world can be redesigned and rebuilt only from the bottom up. Third, traditional knowledge that co-evolves out of culture and place are a critical aspect. Fourth, the true harvest of evolution is encoded in nature's design. These characteristics imply that this is the only long-term approach to developing a sustainable world and with that ecological sustainability requires patience and humility.

Ecological design of environmental design prides itself to use the materials that are friendly to the earth such as, grass, trees, foliage etc with some designs needing to have some man made objects within them for structural or bonding purposes the majority of ecological designing is using the natural materials around us.

An important entity to look at is William McDonough and Michael Braungart. Architect, William and Chemist, Michael came together to produce this sustainable idea of 'cradle to cradle'. This idea is put in place to start to change the world into a fully sustainable environment. The idea proposes to use materials that are bio-degradable and can last longer than most man made materials, these materials of course being natural objects, such as trees, sun, wind. The book "Cradle to Cradle" focuses in on the idea of the cherry tree, they see this type of tree as something that 'produces thousand of blossoms in order to create another tree' this idea informs ecological design through reducing, reusing and recycling, it is producing more things from one, i.e. Creating more trees from the one tree. William And Michael have also fused together to design sustainable living through architecture and 'plans' to help make the world change. Another designer that uses the ideas of 'reduce, reuse, recycle' is Jurgen Bey. A sole designer but also a design within Droog design company. Jurgen Beys' furniture structures use the ideas of collaborating materials together some sustainable materials and some not sustainable, but the pieces still hold the ideas of reduce, reuse, recycle. For example his integrating of two similar objects; a chair made from wood and a tree trunk itself, they hold the same quality but when joined together to produce a piece of furniture it holds a sustainable quality. This emphasises the idea of reusing the old furniture pieces to create a new different piece. These designers/ researchers as well as many others including another designer within the Droog company, Tejo Remy, they all use the ideas of reduce reuse and recycling objects to re-invent them into new objects with different meanings and purposes.

Jurgen Bey



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Garden Bench

Bey brings nature indoors by taking plant waste from the garden and using high-pressure extrusion containers to generate benches of dried grass, leaves and woody pruning's. Durability and longevity of the seating depend on the extent of use and the inherent strength of compressed raw materials. At the end of its natural life span the furniture can be broken up and left to rot in the garden compost heap. This can be considered as biodegradable furniture.

Tejo Remy



Rag Chair

Waste rags and pieces of cloth are bound over a wooden frame using steel bands, mimicking the process of binding bales of recycled textiles, to create a comfortable yet unique easy or lounge chair. Remy has observed the textile industry recycling its products and neatly translated the idea into eclectic furniture that boldly states its origins.

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Chest Of Drawers

An assortment of salvaged drawers is reincarnated as a new chest of drawers in Remy's functional yet quirky design. The drawers look as if they could have been strapped on the back of a pick-up truck and indeed the designer encourages this metaphor by binding the drawers together with the webbing and steel ratchet used by truckers. Chest of drawers is an object suspended in time, neither permanent nor transient, and demonstrates the recycling or dozens of original (drawers) designs that fashion has consigned to the junk shop.

Jane Atfield



Plyboo

In late nineteenth-century London there were over thirty manufactures making furniture from imported bamboo. Following a theme of her earlier designs using recycled plastics, Atfield lets the materials of Plyboo give character to the object, contrasting the random natural characteristics of the bamboo with the processed, standardized, manufactured look of the birch plywood. Steel rods are used to reinforce the bamboo at critical points. The result is durable seating that may well revive the fortunes of bamboo as a material for the new

rethinking design

millennium, casting off the unwanted associations between bamboo furniture and colonial verandas, conservatories and swimming pools. Bamboo is here again. It is modern, renewable, recyclable and toxin-free and is a ferocious producer of biomass in the right climate.

Rethinking design:

As well as working on this piece for my major project I have chosen a lounge seater to work with that was free from trash palace. I have de-constructed the chair to have each bit of the chair separate from each other, from here I decided to manipulate and reconstruct different pieces of furniture from the existing pieces from the existing lounge seater. Here is my process and just a quick design of how a new piece of furniture (chair) may look from the existing pieces.



rethinking design



New design manipulated and re-constructed (on the computer) with the previous lounge seater pieces.

DESIGN ONE



DESIGN TWO



rethinking design

regenerative/environmental: heating and cooling

Serena Dixon

Sustainable design's intention is to "eliminate negative environmental impact completely through skillful, sensitive design". Sustainable designs require no non-renewable resources, impact on the environment minimally, and relate people with the natural environment. Regenerative design is a process-oriented systems thinking approach. The basis is derived from natural systems with a closed loop input-output model or a model in which the output is greater than the input. A way to insure what is being produced, helps something else in another way.

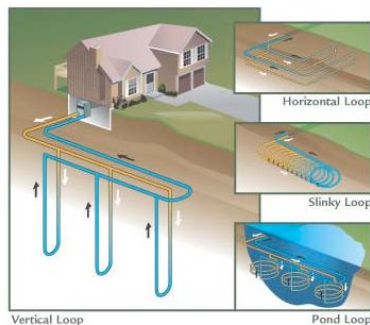
Environmental/ecological design deals with development of structures and communities that are ecologically sustainable, environmentally safe and aesthetically in harmony with the surrounding site, region and climate. The core concepts are closely related to sustainable development, which is defined as meeting the needs of the present without compromising the needs of future generations. Ecological designs have become a major imperative with the increasing understanding of the global environmental problems that the developed world's building practice has helped to create.

Heating and cooling systems are not the sole culprit of global warming, however its use looks set to increase not decrease with the ever-changing climate change. We attempt to avoid the effects of global warming through non-environmental methods; this results in half of an average homes energy bill being used on heating and cooling. Air conditioning puts enormous demands on the electrical system, contributes to dirty air, acid rain, and global warming. A radical change is needed to reach a wider application and protect our environment for the future.

Geothermal and Ground source heat pumps

Ground source heat pumps have been named "the most energy efficient and environmentally sensitive of all space conditioning systems" by the environmental protection agency.

The concept of a ground source heat pump is that it takes advantage of the earth's constant temperature, approximately 55 degrees, to heat and cool a building.

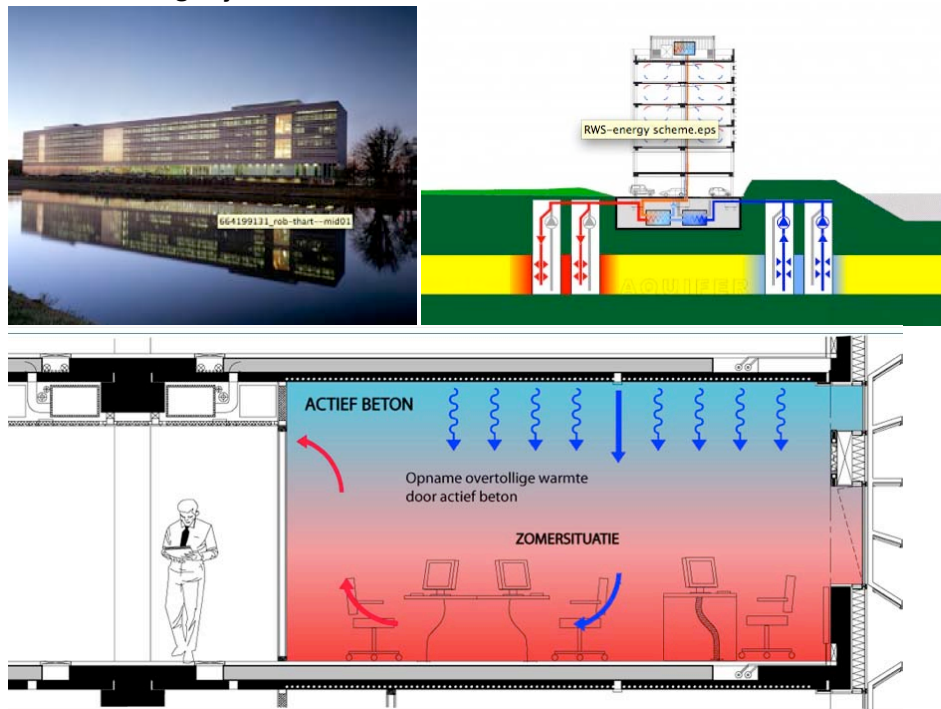


Ground source heat pumps work by circulating water or water/antifreeze solution through a closed loop of polyethylene pipe that is buried in the ground or set closed and open loop systems beneath the water. It can be laid out in different orientations depending on the situation.

It moves heat that already exists in the earth eliminating the need to burn a combustible fuel. By tapping this steady flow of heat from the earth in winter and displacing heat in the earth in summer, a geothermal heat pump can save homeowners 40-70% in heating costs and 30-50% in cooling costs compared to conventional systems. Geothermal energy is an underused resource that emits little to no greenhouse gas emissions, it is highly reliable, and it is produced locally. Geothermal energy can be used in a variety of ways, such as using a reservoir to generate electricity at a power plant, using piped hot water for warm buildings or melt snow, or using shallow ground energy to heat and cool buildings.

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Office building Rijkswaterstaat - Paul de Ruiter



The southern façade consists of 50% glass, while the northern façade is 100% glass. The glass admits a lot of daylight. By incorporating extra fanlights above the windows on the sun side facing the canal, daylight can enter from a high angle and penetrate deeply into the building by the reflection of the slats and the white ceilings. The slats not only ensure that the heat of the sun is kept out of the building, but also that the distribution of daylight inside is optimized so that less artificial lighting is needed.

The use of 'active concrete' in combination with underground cold/heat storage results into an energy saving of 40% to 50% over traditional cooling and heating methods. Cold water pipes are fit in the concrete floors of the upper storey's, which are also the ceilings of the storey's below them, and these activate the concrete mass. When the office space heats up, the floor/ceiling absorbs a great deal of the heat, while at the same time releasing coolness. The active surfaces allow the ventilation rate to be drastically reduced. In winter the cold is stored in the cold/heat storage about 65 meters below ground level and used in summer to cool the floors/ceilings. The heat carried away in the summer is stored underground in a separate storage. In winter heat pumps bring the heat back into the building. This system guarantees a pleasant working temperature in every season, without extra energy being required.

Solar and Wind

Wind and solar energy are constantly replenished as opposed to fossil fuels, which draw on finite resources that will eventually become too expensive or too environmentally damaging to retrieve.

Active solar heating uses aids of pumps or fans. Energy is transferred into a liquid where it is pumped through a heat exchanger. Passive cooling is the process of cooling without mechanical means. The most effective way to cool your home is to keep the heat from entering in the first place.

Wind energy is the process by which the wind is used to generate mechanical power or electricity. Wind energy is a form of solar energy; it is one of the lowest-priced renewable

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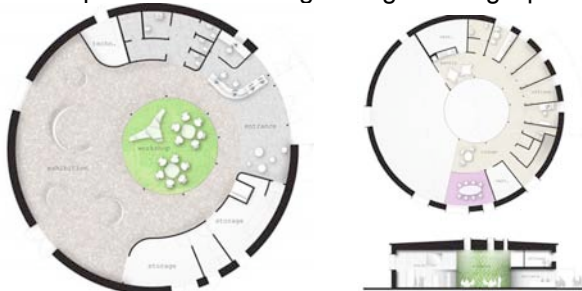
energy technologies available today.

The Ulricehamn Visitors Center and City Museum



The low energy requirements are achieved through strategic building design, which yields efficient and cost effective structures. Swedish architects Kjellgren Kaminsky are modern 'passivists', recently unveiling plans for the Ulricehamn Visitors Center in Southern Sweden which will maximize natural climate control, productivity, and wellbeing with a passive energy design strategy.

The Ulricehamn Visitors Center and City Museum will be the first of its kind employing passive energy. Nearly all of the heat needed will come from the building's existing appliances. Electricity and water heating will come from solar panels to be installed on the roof. Well-insulated walls preserve heat generated by the people and appliances inside for winter warming. And passive cooling works by transferring heat outside and reducing direct solar impact on the building through strategic placement and orientation.



Insulation and Ventilation

To maintain comfort, heat lost during the winter must be replaced by the heating system and heat gained during the summer months must be removed by the air conditioning system. Insulation makes your home more comfortable and saves money. By slowing and trapping air, insulation acts as a barrier to keep home temperatures more constant. Heat is "trapped" in air pockets between the fibers of the insulation. The thickness and type of insulation affect the amount of heat that enters your home. Insulation is available in a variety of forms; batting, blankets, rigid foam board, spray foam, blown-in blanket, and loose-fill, each type is designed to fit a particular part of your house.

Recycled materials are now being used for insulation. Bonded logic is utilising recycled denim, their Natural Fiber Insulation is made from 85% post-industrial cotton fiber. They're taking scraps from the manufacturer. The insulation is treated with a natural fire retardant; it's 100% recyclable, VOC-free, and formaldehyde-free.



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Green Roofs for Healthy Cities North America's mission is to increase the awareness of the economic, social, and environmental benefits of green roof infrastructure across North America and rapidly advance the development of the market for green roof products and services.

A green roof system is an extension of the existing roof, which involves a high quality waterproofing, and root repellant system, a drainage system, filter cloth, a lightweight growing medium and plants.

OS House / NOLASTER



Green roof development involves the creation of "contained" green space on top of a human-made structure. Protection of roof membrane results in a longer material lifespan (it is estimated that green roofs will last up to twice as long as conventional roofs), resulting in decreased maintenance and savings in replacement costs; savings on energy heating and cooling costs, depending on the size of the building, climate and type of green roof. Shading the external surface of the building envelope has been shown to be more effective than internal insulation. Green roofs insulate buildings by preventing heat from moving through the roof. Green roofs could play a role in reducing greenhouse gas emissions and adapting urban areas to a future climate.

A recent study by Florida Power and Light showed that the whiter (and more reflective) the roofing material, the lower a home's energy bill. White metal or cement tile roofs can reflect more than 70% of the sun's energy and also have the ability to cool quickly at night. Instead of increasing the insulation of a roofing system, "white roofing" can be used to reduce cooling energy consumption by increasing the amount of heat that is reflected (instead of absorbed) by the roof of the house.

Cheltenham: The Underground House



Underground homes absorb the heat from the earth creating insulation. Most of this house is

rethinking design

built underground. They used a system of hollow polystyrene blocks filled with waterproof concrete, despite being thin, these walls give good insulation, waterproofing and strength. Glass ceiling panel and glass walls were used to bring in light and heat from the sun.



Ideas for rethinking design

Heat sensor walls



A space where at least one wall is filled with solar heat sensory devices that detect temperature. A system that takes your body heat into account when you walk into the space so the room temperature adapts accordingly. It takes the average temperature from everyone in the room and changes the temperature to one that you have previously set on a temperature gage. This will reduce the amount of energy used, it will never use too much or too little.

Or using body heat as energy to possibly heat and cool, creating systems that pick up our movements and heat in the carpet and furniture.

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The idea of how we sweat to cool us down when we are overheated, how this might apply to a building. By using the rainwater collected from a green roof to pump through irrigation system in the home from solar panels. When the house temperature gets too hot, the water pumps through slowly on concrete walls to cool it down. The water collected could then be used for other purposes; putting it back into the green roof.

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Environmental/Ecological: Waste

O'Dwyer S. Gemma

There are many ways of looking at environmental and ecological waste. The major one that I will be investigating is the 3 R's Reduce, Reuse, Recycle. To Reduce your waste you need to be aware of what you are using and seeing if there is anyway of Reducing your intake. For example you carry your lunch in a plastic bag with glad wrap and you replace these every day. You could Reduce your intake by Using that bag over and over again and get plastic lunch boxes that can store your loose food. This box can be washed and used over and over again limiting your daily intake. This would be in the category of Reuse. Reuse is where a lot of our waste can be Reduced It's a form of Recycling that we need to adapt in to our daily lives. It's about changing the way we look at waste.

There are two ways this can be done, through Green Waste/Managing Food and transforming an old object or waste into something new. Almost half of the average household rubbish bag contains garden and organic food waste. When deposited in landfill this produces methane and leachate which can pollute local waterways and soil. It is easy to use the goodness from these materials to improve your soil, grow healthier vegetables etc, and improve the environment through compost.



Why compost?

It will enhance your garden.

Compost:

- encourages plant growth
- improves drainage in heavy clay soil and conserves water in light sandy soil
- keeps the soil cooler in summer, warmer in winter
- increases aeration in compacted soil

It saves you money because it:

- halves rubbish removal costs
- reduces the need to water the garden
- reduces the need for artificial fertilisers

All you need to do is gather together waste organic materials and mix them in a compost bin or heap. Worms and other critters will do the rest.

It saves the environment

Reducing rubbish and your reliance on water and artificial fertilisers is a simple way to help the environment. When everything ends up in the landfill we are throwing away precious resources and creating potential problems. Some of these problems are expensive, such as long term monitoring of filled landfills.

Materials you can compost are:

- vegetable and fruit scraps, tea leaves and coffee grounds
- vacuum cleaner dust and untreated wood ash
- old potting mix, leaves, garden and lawn clippings, weeds (if they have not gone to seed)
- sawdust, straw, animal manures, and seaweed.
-

Materials not to compost are:

- meat, fish, fats or cooking/salad oils (these may create odour and fly problems)
- wood, bones, diseased plant material
- plant foliage with residues of chemical sprays, especially hormone type weed killers
- oxalis, and other problem weeds such as live twitch, convolvulus, docks and dandelion.

To learn how to make your own or learn more please visit the Website:

<http://web.tdc.govt.nz/index.php?Composting>

To Reduce, Reuse, Recycle can be applied to waste materials. We throw away unwanted cloths, carpets, bottles, glass, soft toys, wood, metals, and plenty more which go in to the landfills which takes years to break down or they may not break down at all in our life time. To Reduce this amount of waste these materials can be Reused and Recycled to become something new. Campana Brothers deal with the idea of Reusing these materials by turning unwanted objects and materials into furniture pieces. Shigeru Ban Architects also deal with waste products in a similar way but on a much larger scale. They have taken unwanted paper tubes and turned them into structural elements within architecture. These waste materials can either be reused by you and turned in to something else or be Recycled where you put them in a special recycling bin cleaned and disposed of properly where the rubbish man can then pass it on to a company who will then reuse the product.

Fernando + Humberto Campana Brothers

Fernando + Humberto Campana brothers are furniture designers. They work with Found objects, waste products like scrap wood and fabric of cut, rubber hose, tissue paper, string

and furry toys. They celebrate these materials in new and innovative ways getting a lot of their inspiration from the Brazilian street life and carnival culture.

Materials are central to their work; they work with poor objects and materials and transform them into something decadent. 'Their Sushi chair transforms strips of brightly coloured plastic and carpet underlay into decorative rolls which then 'upholster' a basic frame. This process of transformation has injected a new energy into contemporary design by presenting a bold, vibrant alternative to the rationalist ideals of the long dominant European modern movement.'



Banquete Chair, 2002



Anemona Chair, 2000



Favela Chair, 1991



Sushi Chair, 2002

Website: <http://www.designmuseum.org/design/fernando-humberto-campana>

SHIGERU BAN ARCHITECTS 坂茂建築設計

PAPER TUBE STRUCTURES

Shigeru Ban Architects work with Unwanted Paper tubes, on a very large scale. They do this through architecture allowing these waste products to become a major part of the architecture's structure and aesthetics. Its temporality plays a major part in its role in architecture. It's a statement on the way we can use waste products in architecture and how architecture is always fleeting, it doesn't last forever, especially in today's city. Shigeru Ban Architects don't only build new and exciting buildings, they build them for those who are in need. Church volunteers whose house of worship was destroyed by Kobe earthquake in 1995 built the community center below. Materials were donated by a number of companies, and the 160 volunteers completed construction in only five weeks. The plan (10 x 15m) is enclosed within a skin of corrugated, polycarbonate sheeting. Within this, 58 paper tubes (325mm in diameter, 14.8mm thick, and 5m high) were placed in an elliptical pattern. The eclipse is based on those in Bernini's church designs, and the space between the eclipse and the outer edge of rectangular-shaped site formed a corridor and provided lateral support. At the entrance to the eclipse, the spacing of the paper tubes was widened, and the facade fully glazed to form a continuous, unified space between the interior and exterior.

More than 2 million people became homeless when civil war broke out in Rwanda in 1994.

The office of the United Nations High Commissioner for Refugees (UNHCR) normally supplied plastic sheets and aluminum poles to be rigged as temporary shelters. Rwandan refugees would sell the aluminum poles and then proceed to cut down trees to use branches for structural support. Contributing to already critical deforestation, it was obvious that alternative materials had to be found. A low-cost alternative, paper tubes, was introduced. The proposal was adopted and development of prototype shelters began. Three prototype shelters were designed and tested for durability, assessed for cost and termite-resistance. Since paper tubes can be manufactured cheaply and by small and simple machinery, there is the potential to produce the materials on-site to reduce transportation costs. In 1998, fifty emergency shelters were constructed in Rwanda and monitored to evaluate the system in practical use.



**PAPER CHURCH - Nagata-ku, Kobe, Japan,
1995-2005 (disassembled)**



**PAPER EMERGENCY SHELTERS FOR UNHCR
- Byumba Refugee Camp, Rwanda, 1999**

Website: http://www.shigerubanarchitects.com/SBA_WORKS/SBA_PAPER/SBA_Paper_index.htm

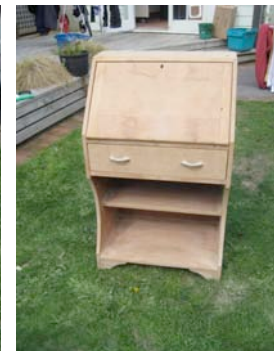
My Proposal and work on Reduce, Reuse and Recycle:



Before



After



This desk was found on the side of the road. To prevent it from being a waste object, I began to restore it, the transformation started by sanding it down, to take away the varnish and major indents, then fixed one of the legs by placing a bit of wood underneath to make it level, and the drawer was a little wonky so replaced the piece of wood. This reduced waste by not sending the desk to the land fill. It has been recycled and is now being reused.



Before



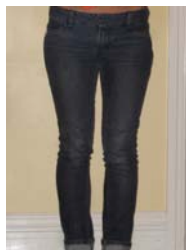
Deconstruction and cleaning



After



I found this object at the dump; to reduce waste I have taken it home to transform it into something new. The processes begin by pulling it apart, through it's disenabling some parts broke. It was soaked in hot water for a few hours and then scrubbed clean. I found the silver dish at The Salvation Army for 50cents, this worked very well for the top. I then brought a new pole and bolts to hold up the structure and attach all the pieces together. Creating a nice little table for the garden.



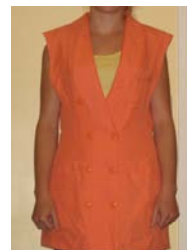
Before



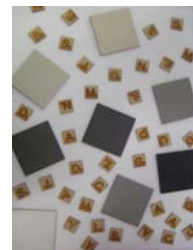
After



before



After



Painting from
Unwanted objects

I have also transformed my unwanted cloths or found cloths at the op-shop. I no longer wanted these jeans they were very worn out and hade become loose and not fitting. So I cut them to into short shorts for in the summer. This vest was found at the op shop and I cut off the sleeves, which also had shoulder pads in them and turned it into a stylish vest. I have also found a white piece of canvas that had be damaged and to hide the damage and to create a piece of art for the new flat I found unwanted objects and placed them in a random lay out. These items now look new and have begun to take on a new life reducing, reusing and recycling waste.

This process can be done with nearly any waste material and objects. It's up to us to think differently about waste and find new and exciting ways to do this. The 3 R's not only help the environment but also you benefit from the out come.

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ecological design: food regeneration

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What/Why:

Ecological design is based on natural systems and considers ways in design of minimizing waste, creating energy generation systems and preserving habitat. It is ecomimetic, responding to both biotic and abiotic factors of environment. Current modes of production oppose natural, closed loop cycles, hindering rather than assisting the environment. Through ecological design, environmental energy flows are encouraged through organic methods of food production. The influence of industrialization has led to inefficient and degenerative agriculture but ecological design seeks to generate an understanding of natural systems, in order to develop better industries in agricultural with social, economic and environmental benefits. Ecological design is important because it encourages the use of safe and healthy materials that replenish can be recycled, and that benefit all forms of life. In nature the waste of organisms cycles through the eco system. It is a constant cycle of production, recovery and remanufacture. Ecological design aims to integrate rather than separate, to leave a positive human footprint.

Agriculture, as the foundation of civilization, is important to our health and our environment. Ecological food regeneration is thusly important. Studies have proven that Western diets consisting of highly processed foods are more susceptible to heart disease, obesity, cancer and other ailments. In his book *The Omnivores Diet*, Michael Pollen suggests that we reclaim control of the food we eat. The expansion of ecologically designed agriculture has positive ramifications for our cities and our environments, as well as our nutrition. Self-grown, organic agriculture is also the only certainty of omniscience. Agriculture in this form does not require pesticides, fertilizers and fossil fuels. Organic produce, using no agricultural poisons, does not run the risk of using carcinogenic, mutagenic or teratogenic poisons. In America, the average food item travels 1500 miles from its place of production to its consumption. Food transportation amounts to 28% of all road freights. This report focuses on urban agriculture. With mass urbanization and escalating populations, new initiatives are required for food production. Particularly in cities where agricultural production doesn't meet demand, innovative designs and developed agriculture are required. An estimated 75% of the world's population is expected to live in cities by 2050. We need to make use of obsolete city spaces, vacant lots and buildings to cultivate plants. We need production in small-scale areas. We need to create cultural, social and economic sustainability.

Who:

In cities, landscape urbanism and landscape architecture have become modes of ecological design. In *Architecture*, Kenneth Yeang has instigated veg.itecture (vegetated architecture). Vegitecture is the fusion of landscape and urbanism, placing vegetation on buildings. In addition to placement, many of the buildings develop in their designs surrounding seasonal changes, temperature and rainfall, ecological lighting and materials. Yeang is renowned for his designs of bioclimatic skyscrapers. These settlements closely resemble the stability and resiliency of natural eco-systems. Furthermore, his work within this field has led to a greater interest in green architecture and leads the fore of green architecture. The integration of Agriculture seeks to enhance the urban experience whilst nourishing occupants and assisting in natural cycles. Landscape urbanism derives from territories and potential, finding adaptable systems to meet the needs of industry and nature. More often, landscape and architecture are designed in conflation with environment.

The concept of closed cycle design manifests itself in the book *Cradle to Cradle*, written by William McDonough and Michael Braungart. The book is a reference for ecological design. They explain that our current way of working is in a Cradle to grave like manner. We produce, we use and we waste. The book sets forth a series of guidelines so that products imitate the natural flow of ecosystems and have a positive, rather than negative effect on the environment. The authors also made set of guidelines called the Hanover principles, which

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encourage renewable energy and imitate the concepts of Cradle to Cradle. These principles insist on coexistence of humanity and nature through ecological means.

Urban solutions to food production



The concept of the Gastronomic Garden, envisioned by Taebeom Kim, makes use of obsolete highways. His designs reconceptualize concrete highways, reconfiguring their use for agriculture. Each garden has recycling waste towers.



Organoponics is the use of organic gardening methods within the city. This promotes the recycling of organic and inorganic materials to produce healthy food. Also known as community gardens, they have become increasingly popular since their conception in Cuba, encouraging sustainability and self-sufficiency. By co-operative efforts they also create a sense of community. Groups use degraded plots of land, producing fresh fruit and vegetable. 100 to 200 million people take part in growing schemes in developing countries. Some cities in Africa meet up to a third of their demands in this way. Urban farmers create 80% of fruit and vegetable produce in Shanghai. Cuba was first to usher the movement of organoponics. With large exports to America and Russia a lot of produce went overseas. To feed its own people the government allowed unused inner city land to be used for agriculture. In Havana 26,000 people are now involved in urban agriculture, providing up to 50% of the cities supply of fruit and vegetables. Production beyond the needs of its members can be sold for profit. All growth is organic. Urban gardens can be found in vacant lots, unused car parks, on abandoned buildings and between road spaces. Due to its proximity, little packaging is required and food transportation is not an issue. In Mexico a group of women calling themselves Sembradores urbanos (urban cultivators) work with the same logic. They practice and educate on organoponics. Their methods help to transform waste into agricultural product, producing soil, clean food and income. They also use worm bins, vertical gardening systems and hydroponic systems.

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Along the lines of organoponics there is the potential to use old boats in British waterways for food regeneration. 100 mile canals that stretch through London could provide a green corridor where urban can collect fresh fruit and vegetables. It would also be an opportunity for local school groups to learn about agriculture and sustain the produce. The boats, which would otherwise be sent to the dump, would be an idyllic escape from the city.



Alexis Rochas designed SYNTHe, an urban rooftop garden located in Los Angeles. SYNTHe is a fertile oasis in the sky that will ultimately grow a variety of edible plants. It is a self-sufficient ecosystem. As well as helping to filter pollutants, it provides thermal insulation for the roof and reduces stormwater runoff. Food is grown, consumed and then returned to the cycle in the form of compost from the premises. The tiered structure optimises solar exposure. Growth channels hide mechanical rooftop equipment. SYNTHe could potentially bring agriculture to the city. The garden is tended to by residents and chefs of the Los Angeles Blue Velvet restaurant and produces fruit, herbs and vegetables it's a good solution when you consider the number of urban roofs that have no other productive purpose.

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Kelly Sinoski has designed the first vertical greenhouse. With the growing popularity of rooftop gardens, vertical greenhouses are the next step. Vertical farms could be as high as 30 storeys with glass walls, solar panels and irrigation systems.



The Cultivate system for Indoor Botanicals is a fruit and vegetable system that functions on the wall of the kitchen. The hydroponic trays hold up to three plant pods. The units also supply the power and water (grey water from the sink) necessary for the system. The units can be removed so that you can take the vegetables to the preparation area of the kitchen.



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Green living technologies uses wall surfaces with specially designed aluminium panels to grow herbs, vegetables and fruit. As well as producing food, the walls create beautiful facades. They recently took part in a project that provided low-income earners in Los Angeles with fresh produce such as tomatoes, leeks, cucumbers and strawberries.



Hydroponic and aquaponic plant production uses water rather than soil. In Hydroponics, plants are grown in a solution of water, nutrients and soil. Hydroponic culture generates 10 to 20 times more than field agriculture. It also uses 4 to 10 times less water, doesn't require fertilizer and reduces water pollution plant production. By comparison aquaculture is the growth of fish and plants together. Fish waste provides nutrients for the plants and in return the plants filtrate. Aquaponics has not fully been established but there is strong interest in the industry as its technologies continue to be refined. Both aquaponics and hydroponics eliminate the cost and labour of plant production and are space saving methods of regeneration. The River plant aquarium by Mathieu Lahanneur works on the concept of hydroponics. The vegetables use water and nutrients from the fish tank, and in turn, purify the water for the fish to reuse. For urban dwellers with no outdoor space (or rooftop) it is an effective solution.



Biocities or eco-cities have become a popular urban concept, inspired by Kenneth Yeang. Urban Plant is an architectural proposition that deals with current global issues of energy, water, transport and food, integrating them under one roof. Hydroponic vegetable gardens and renewable energy systems are also a part of the project, helping to reduce energy use and make the urban dweller a part of the natural cycle. There are 400 apartments and in each uses hydroponic technology to feed its occupants with fresh fruit and vegetables, all of which is powered by renewable energy.

Response:

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Taking inspiration from the Antipode Planter developed by Patrick Morris, I have designed a suspended herb bed for apartment dwellers. Hanging from the kitchen ceiling, chives, parsley and mint are all easily accessible. The bed has an internal water reservoir that uses grey water from the sink. Soil is locked in with a shutter system. Each compartment can be removed to replace or grow a new plant. This is an alternative vegetable bed that makes use of unused space.

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