

Building Green Thinking in South Africa

"Climate Change is the greatest market failure the world has ever seen"
 - *The Stern Review: The Economics of Climate Change (2006)*

Carbon footprint quantification

'Climate change has become one of the major challenges for mankind and the natural environment. Greenhouse gas (GHG) emissions released into the atmosphere in ever rapidly growing volumes are recognised to be responsible for this change. Carbon footprint quantification, analysis and reduction are key to preventing this, by enhancing energy efficiency, mitigating carbon emissions by means of green energy and then compensating for remaining GHG emissions by investing in carbon offsets, with the final goal of becoming carbon neutral.'¹

'The world is currently facing a climate catastrophe due to the accumulation of greenhouse gases. Global warming, rising temperatures and sea levels, severe climate events and the extinction of various species all threaten the planet. Experts believe we have ten years in which to reduce gas emissions dramatically or face the worst.'²

Emissions Trading

'Trading in the right to emit greenhouse gases is emerging as one of the foundations of climate change policy. Widely recognised to be a way to reduce emissions cheaply, trading permits flexibility in where and how firms make their reductions. The EU has been at the forefront [of the trading movement] with the establishment of an Emissions Trading Scheme, or ETS.

'The carbon credit note – in South African terms - is a comparatively newly introduced instrument, recently listed on the JSE, which allows South African investors the ability to invest in the carbon credit market. It is a tradable permit scheme, which provides an incentive for countries and businesses to reduce greenhouse gases (GHGs) into the air. Experts see carbon trading as one of the most effective ways of combating global warming.'¹

We come to the point where we have to make the link between global warming which is, in itself, a natural cyclical phenomenon, and the influence, if any, of buildings upon the conditions that influence or precipitate it. In other words, we need to ask ourselves: how do buildings impact on global warming and what practical steps can be taken to militate against this in the future, in the best interests of sustainable developmental infrastructure?



Global warming

Melting poles?

Placing strain upon the host

The overarching answer is in fact biological in origin, in that we are dealing with a macro-organism (Earth) which supports evolving life forms whose coexistence is placing increasing strain upon the host. What we are experiencing, therefore, in terms of anomalous weather events and accelerated warming, are manifestations of the earth mobilising to redress imbalances and – in so doing – to rid itself of the scourge, namely man.

If the forests, the lungs of the planet, are under attack, the earth will send unprecedented rain in an effort to regrow them. Nature has numberless key-codes which are attuned to the delicate balance of an enormously sophisticated ecosystem. If we upset the balance, as we do, then we cannot expect things to remain the same.

Demand for energy

Our attack upon the ecosystem stems largely from our increasing demand for energy. We have come a long way since the time of the hunter-gatherers, whose semi-nomadic existence placed little or no strain upon the land. We can look back over our recent advances with pride. We built a steam engine, which lent itself to industrial development on an unprecedented scale. In the interests of manufacture, we began to burn large quantities of coal and to push gases into the atmosphere.

Soon we invented the automobile, which ran on refined fossil fuel, to address our quest for mobility and to pump additional poisonous emissions into the atmosphere. Our convivial instinct, which had led us to live together in large numbers for centuries, saw fruition in industrialised cities of bewildering dimensions. The birth of the high-density building was upon us.

Adverse Impact

It is now becoming increasingly clear that the building and construction industries have played an ever-increasing part in impacting adversely on all aspects of life, specifically: environmental, economic and social. In their production and use, buildings in the United States, for example, consume an estimated 40-65% of the national energy total. On a global scale, it is estimated that buildings currently account for:

- 16% of the world's freshwater use
- 25% of all wood harvests
- 40% of all material flows ... *and*
- 40% of all energy flows.

From here, it is but a small conceptual step to the ideality of an environmentally friendly building. If we fast-forward to the present, we now understand that, simply by using more efficient building materials and methods, we can reduce the energy and resource consumption and/or waste production by between 50% and 60% without negatively affecting the value; in fact, the reverse would be true, i.e. values would be enhanced.

Strive for balance

Aesthetics, for example, are easily glossed over in favour of what may be seen as more practical considerations, but this reflects shortsighted thinking. In terms of the 'Green', or earth-centred, mindset, we need to strive for a balance between attractiveness and practicality, with the accent being on energy conservation and the use of eco-friendly materials.

'South-African trained architect (UCT) Rod Shaw, now working as a design engineer in Perth, Western Australia, once responded to a question about how buildings should fit in to their environment with an answer that went something like this:

Natural extension of the earth itself

"A building should rise from the earth as if it were a natural extension or development of the earth itself. Thereafter, the design and the choice of materials should complement the situation of the building, adding to the beauty and providing usefulness in equal measure – without harming nature in any avoidable way."

Although he left these shores for Australia many years ago, Rod – as do many others like him – stays closely in touch with design and building developments worldwide that fundamentally affect the way people live, work and play. When we consider that he was speaking in the late 1960's, then these were prophetic words indeed.³

Green buildings keep tenants

The reality is that attractive buildings draw tenants – and attractive green buildings keep tenants, which makes them even more financially attractive.

"Case studies in other countries have shown that, by and large, tenants *prefer* green buildings, which generally have more natural light, more fresh air, and less 'sick building' syndrome," says Nicola Douglas, CEO, the Green Building Council of South Africa (GBCSA). "This helps firms increase staff productivity by up to 15% thanks to fewer sick days, and for this reason tenants are prepared to pay premium rentals for a green building.

"Since it is estimated that buildings consume 40% to 50% of the world's energy through their construction and ongoing operation, while 'Green' buildings can reduce their consumption of energy to less than half of what a conventional building does - with similar reductions in potable water usage, runoff to sewer and solid waste - green building can have a really significant impact on resource consumption and on combating global warming," she adds.

Environmentally responsible

'A green building, by definition, is one which is energy efficient, resource efficient and environmentally responsible, i.e. it incorporates design, construction and operational practices that significantly reduce or eliminate its negative impact on the environment and its occupants. Building green is an opportunity to use resources efficiently and address climate change,

while creating healthier and more productive environments in which people *live, work and play*.

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'On a practical level, this encompasses the use of design, materials and technology to reduce energy and resource consumption and create improved human and natural environments.

Careful building design

Specific green building measures include careful building design to reduce heat loads, maximise natural light and promote the circulation of fresh air; the use of energy-efficient air-conditioning and lighting; the use of environmentally friendly, non-toxic materials; the reduction of waste, and the use of recycled materials; water-efficient plumbing fittings and water harvesting; the use of renewable energy sources; and sensitivity with regard to the impact of the development on the environment.²

According to 'Urban Sprout', a dynamic 'Green' website that engages with industry and homeowners to promote green living, a 'Green' building is one that consumes less energy and fewer natural resources than a conventional building. This is accomplished by the combined use of designs, materials and technology that collectively promote energy efficiency, which results in improved indoor environmental quality for users.

Minimises environmental impact

By its very nature, a green building minimises environmental impact, which can be achieved initially by careful orientation, screening and shading to reduce heat load, with the [optional] use of thermal mass to moderate temperature.

In high occupancy workplace buildings, for example, which are increasingly high-rise as a result of limited available land surface, the first two energy saving areas that come under scrutiny are normally air conditioning (and ventilation) and lighting. Switching to intelligent air conditioning and lighting systems, which are immediately more efficient, because they measure energy use, will result in immediate energy conservation.

Successful energy management policy

In the South African context, in line with green thinking on energy conservation, one of the most striking examples of the successful implementation of energy management and usage reduction policy would be Sandton City. 'With its eye-catching silhouette, towering buildings, skeletal tracery of moving cranes and increasingly futuristic use of glass and energy-saving cladding, Sandton's skyline is the Gauteng feature that captures the imagination.

'Sandton City constitutes a growth phenomenon, in itself the complex realisation of the confluence of desire, drive and location - compressed in time and situation into an awesome business and residential hub. In real estate terms, it is business that has fast-tracked this development exponentially.

A thinking city

This is a "thinking" city, a thriving socio-economic complex with a conscience – and, more importantly, a plan. When there is rapid

densification of activity and occupancy in a business/residential area, it is inevitable that the power usage in that area must escalate accordingly. "Not so," said Gary Vipond, formerly Centre Manager, Sandton City.

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"Despite the increases in size, capacity and traffic, we are using less electricity now than we were five years ago," he said proudly, "as a direct result of the implementation of a carefully planned energy conservation policy.

Multiple user technology

"To arrive at this point, we have had to think as a macro-entity comprising multiple user technology catering for escalating consumer demand; all this against a backdrop of rising energy prices and the increasing uncertainty of [energy] supply.

"What this has precipitated - in our case - is a multi-pronged campaign in which we have systematically reviewed every form of energy use within Sandton City itself. As a result, we have been able to introduce energy- and cost-saving mechanisms and practices throughout.

Plant runs only when necessary

"Air conditioning, for instance, is a potential gobble of electricity but, with sensible regulation and regular inspection, it is possible to ensure that air conditioning plant runs at optimal efficiency and - even more critically - only when necessary. After all, there is no point in having the 'aircon' pumping full blast in a spacious company boardroom when the room is completely empty and no meeting is scheduled for the morning, or even the whole day.

"Similarly, we have made it our practice to switch off the power to non-essential escalators and even lifts during low to zero demand periods. The savings here are twofold: firstly, we are saving on electricity by not having to drive high-consumption motors; secondly - and perhaps less obviously - we are indirectly saving on cooling, because all motors generate heat and that heat does not dissipate in a high-occupancy, built-up environment without the use of air conditioning plant - which in turn generates heat.

Substantial energy saving

"Lighting is another area in which - collectively - substantial energy saving is both possible and practical. Even without design modification which, if carefully thought through, can admit appreciably more light *and facilitate the flow of air* - both of which translate into huge savings over a comparatively short period - it is possible to save on energy consumption by reviewing critically the lighting requirements for shopping and office areas.

"The example of the [unused] boardroom applies equally to lighting," Vipond continued. "Why not fit movement sensors to rooms that are not in constant use so that, when they are vacant, the sensors control the lights and turn them off, or at least right down," he asked pointedly?

Confronting the mindset

"The problem with high-occupancy and high-density shopping areas is that, traditionally, we associate display with light and lighting. It's almost as if:

the more lighting there is, the more the product or shop etc. has to offer. This is a mindset we have had to confront. There is nothing wrong with displaying your wares or advertising your services; after all, this is the accepted practice of the merchant, or service provider, around the globe.

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“What we are encouraging our tenants to do is to implement definitive savings plans, with predetermined targets, by fitting energy-saving lighting for display and reducing the usage of lighting where it is – at least to some degree – optional or discretionary,” Vipond revealed. “While having all the lights on in a building at night may draw attention to that building, it also highlights completely indefensible and totally unnecessary energy consumption.

Reducing the carbon footprint



“We all have a duty to do our bit for the energy crisis - and by that I don't simply mean Eskom's hiccups earlier in the year (2008). We at Sandton are keenly aware of what we can do to reduce the carbon footprint and minimise energy consumption.” ~ Gary Vipond.

Taking a responsible direction

“Sandton City has become much more than just a stunning place to shop for the people of greater Johannesburg. Increasingly in the public eye as the engine of growth of the near northern suburbs, it also attracts the attention of discerning shoppers from across Africa and even abroad.

“What we are doing – and plan to do – is to utilise the increasing limelight that Sandton City enjoys in terms of tourism, commerce and retail to lead by example and – in so doing – to orient our sizeable public to the responsible direction we are taking,” Vipond concluded.

Now that Liberty Properties has officially released pictures of Sandton, City of the Future, we can all share in the far-sighted vision that will transform the Sandton that we know into an eco-friendly, energy conscious “green” entity of beauty and environmental responsibility, a global beacon accurately symbolic of our emergent nation.

How cities should behave

A closer look at the new Sandton reveals the wisdom of the projected designs. The overall impression is a breath-taking combination of beauty and space age practicality, a futuristic synergy of space, accommodation, flow and nature. This is what cities should look like; in fact, this is how cities should behave.

The key is to design both user- and eco-friendly cities that rise from the landscape as if they belong there, that complement their situation and cater roundly for the human component that occupies them – contributing knowledgeably all the while to the overall health of the planet.

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Responsive to Earth's needs

The cities of the future need to resonate with the earth. As unnatural growths upon the macro-organism that is the planet, they need to be both sensitive and responsive to her needs. With what we know today, not only is it possible to build entire cities that harmonise with the earth; it is also imperative to do so, in the interests of staving off the devastating effects of global warming.⁴

In this regard, the shopping centre - as an "engine of growth" - is positioned to exert exemplary influence by virtue of its aggregate role as shopping, meeting and entertainment venue.

Crucial and responsible role

'On the subject of the escalating influence of the shopping centre industry, former Western Cape Premier Ebrahim Rasool, whose easy manner belied a shrewd grasp of the potential impact of the expansion of the industry from the Cape upwards through sub-Saharan Africa, told the International Council of Shopping Centres (ICSC) World Summit in Cape Town that, "The impact of the shopping centre industry on a growing economy is substantial, because this is an industry that serves people from all walks of life and reaches far beyond the cities into the furthest communities. The increasing buying power of the rapidly developing middle class is translated through retail and property into the substance of material prosperity, creating jobs and fostering economic development. In this regard," he said, "the role of the shopping centre industry is both crucial and responsible."

2010 catalyst

While we are reminded daily of the countdown to the 2010 kick-off, and Rasool agreed that South Africa is poised for real and rapid economic growth leading up to the 2010 Soccer World Cup, he urged all South Africans to see this event as a catalyst - rather than a landmark - that should be used to spur South Africa on to even greater achievements beyond 2010.'

What 2010 does immediately provide is the incentive to fast track the widespread infrastructural development necessary to host and support the World Cup programme. As such this incentive constitutes a never-to-be-repeated shot in the arm for the economy, a developmental time slot that is particularly opportune for the growth of shopping centres and retail in every sphere.

Global Warming

Under the heading of environment, Clem Sunter, Chairman of the Anglo-American Chairman's Fund and internationally acclaimed speaker and mediator, spoke on "Global Warming: A Developing World Perspective". Sunter is able to punctuate even the most serious topic with hysterical humour, in inimitable fashion, but the message remains long after the echoes of the laughter are silent.

For starters, Sunter said, we are all familiar with the term “greenhouse effect” which, contrary to what we might think, is not a new term at all. He traced it back to the 1890s, when it was commonly understood by scientists that the great blossoming of combustion in the Industrial revolution had the potential to change the atmosphere’s load of Carbon Dioxide.

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In fact, in 1896, the Swedish chemist, Svante Arrhenius, wrote: “We are evaporating our coal mines into the air.” It was, however, Jean Baptiste Joseph Fourier in 1827 who first recognised that the air circulating around the planet lets in sunlight, as a “greenhouse” roof does, but prevents some of the resulting warmth from leaving.

Carbon emissions and absorption

For Sunter, there were two considerations, namely: carbon emissions and, secondly, the earth’s ability to absorb carbon. Today we may speak with some familiarity of the carbon chain, but the reality is that the issue of the world carbon footprint is being taken so seriously that a World Summit, “The Carbon Footprint Supply Chain Summit”, to bring together key retailers, FMCG manufacturers and food producers to provide a crucial framework-building discussion (on how to measure and manage carbon emissions throughout the value chain) is now an annual event.

As Sunter pointed out, the world is a rapidly changing place. When he was growing up, there were 3 billion people in the world; now there are 6,5 billion. Amongst other steps we are taking to make room for all these people – and ostensibly to free land for cultivation – are to cut down huge areas of the world’s rainforests, the lungs of the planet.

60% from power stations

Of all the carbon emissions generated by man, 60% come from power stations and 25% from cars, yet we continue to build more power stations and make more cars. Whilst some companies are researching and producing alternative or hybrid vehicles, these are mainly experimental and those actually on the road are in such small numbers [and are disproportionately expensive] as to provide no measurable mitigation of the overall carbon emission statistic.

There is a set of particularly revealing statistics, Sunter explained, which show the tons of carbon per annum per citizen in the major countries. The USA and England lead, with 20 and 13 tonnes respectively, while South Africa generates 8 tonnes per citizen. The “emerging emitters”, as Sunter referred to China and India, are currently generating less, with 1,5 tonnes each but, since both countries are currently going through their own industrial revolutions, these figures are certain to rise rapidly.

Fuel reserves running out

The world is rapidly exhausting its fossil fuel reserves, Sunter went on. Oil will run out after 100 years, while coal will only last for another 300 years.

This is good news for those of us opposed to coal-fired power stations but, since oil will have been unavailable for the preceding 200 years, the machinery in the power stations will have ground to a halt for want of lubricants.

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However, long before we manage to burn all the coal, we will have tripped the fragile balance – in terms of parts per million of CO₂ in the atmosphere – and rendered the earth uninhabitable. As it stands, with the effects of global warming already measurable, certain cities are appreciably hotter today as a direct result. Las Vegas, for one, now enjoys temperatures of 50°C, so that piped water is sprayed over pedestrians in the streets to keep them cool enough to stay and gamble. Perth, in Western Australia, and the most isolated city in the world, is perceptibly hotter. Additionally, it has seen its population increase by 50% in a comparatively short period – by world standards – but the combined result of heat and population increase is that Perth is now running out of water.

Carbon at 370 parts per million

As the carbon density in the air increases – it currently stands at 370 parts per million – so the ambient temperature will continue to rise and the global ice caps will melt. Either way, as Sunter said, we are not going to win. By the time the carbon density reaches 450 parts per million, which is not a big increase on today's figure, the Siberian permafrost will start to melt, which will contribute to massive and unforeseeable changes in the earth's atmosphere. However, with the accompanying temperature increases on the way to that point, we will, as Sunter pointed out, already be living in a microwave – which is fine, he said, if we all believe in reincarnation!

US is major emitter

In terms of what we can do to arrest the effects of global warming, Sunter took us back to the (1997) Kyoto Protocol, in which the US took a back seat. There is no point in any such agreement being struck, he said, if it is not binding upon all parties. There must be uniformity if the world is to be saved. It's a case of one for all and all for one, something like the three musketeers on a global scale.

When faced with the situation post 2012 (the first deadline of the Kyoto Protocol), world reaction is predictably simple: the US must lead, say the rest, before we will follow. This is incontestably correct, since the US is the world's major producer of carbon emissions (25% of the total emissions). However, if the US is to lead, it must first put its own house in order, with the significant financial implications that this comprehensive process will entail. ⁵

Dirty energy in SA

'According to Bruce Kerswill, chairman of the GBCSA, "The building industry seems to have been largely overlooked by the Kyoto protocol. This is despite the fact that 40% of the world's energy is consumed by buildings, either through direct consumption or through the use of products which

consume energy to produce and transport. The implementation of 'green' buildings can effectively reduce consumption by 30 to 70%. This is particularly important in South Africa, where the bulk of electricity comes from coal and is therefore 'dirty' energy," he stressed.²

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Under the Kyoto Protocol, the Developed countries agree to curb emissions by varying amounts, but generally the reduction is between 5 - 8% of their emissions in base year 1990. All parties submit annual inventories of their greenhouse gas emissions. Parties can also trade emissions – *as was explained at the start of this article* - so that countries that fail to meet targets can buy credits from a country or countries whose emissions have been reduced by more than was originally agreed.

Clean Development Mechanism

South Africa is a signatory but, as it is a developing nation, it does not have to reduce its emissions. It can, however, partake in other emission trading schemes, which allow developed countries to invest in projects that reduce emissions in developing countries (Clean Development Mechanism).

Critics of the Protocol point out that some industrialised developing countries, including South Africa, China and India, are nearing developed party's emissions, with the result that the effect on total emissions may be negligible - unless these large emitters voluntarily reduce their emissions. This is one of the reasons that the United States gave for refusing to sign the Protocol, even though it is by far the largest emitter of greenhouse gases.

Much to report from South Africa

In terms of eco-sensitive shifts in consciousness and policy, there is much to report from South Africa. After the Green Building Council of South Africa (GBCSA) Conference in Cape Town towards the end of last year, which heralded the Launch of the 'Green Star' rating tool which is, interestingly enough, closely based on the Australian Green Star rating system – the Council has been hard at work translating the meaning of 'Green' building into achievable practicality.

From the property developer's point of view, it remains likely that the ecological implications of going 'Green' are going to take second place to financial considerations, which will centre around design implications, tenant preferences, energy saving devices and optimising the use of natural light before the issue of the carbon footprint is raised.

Green Star building rating tool

Enter Green Star SA which, while being a voluntary green building rating tool, is designed to provide a framework for the assessment of the environmental attributes of new commercial office buildings, as well as major building refurbishments of existing office facilities across South Africa. Devised as a tool for use by building owners, developers and consultants to influence and steer the design of office facilities, Green Star enables stakeholders to minimise the environmental impact of their developments as well as capitalise on - and receive recognition for - their design initiatives.

According to GBCSA technical manager, Jason Buch, the objectives of the Green Star SA rating tool are to reduce the environmental impact of development, to establish a common language for green building, to set benchmarks and standards of measurement, to promote integrated, whole-building design and to raise awareness of green building benefits.

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Green Star rewards environmentally friendly outcomes

"In this regard," he insists, "our rating tool does not aspire to address the economics of green building as much as the environmental impact of such property development. Similarly, it is not a design guide, but rather encourages innovative design strategies and rewards environmentally friendly outcomes," he stresses.

The Green Star SA rating tool consists of eight environmental categories, which embrace energy, indoor environment quality, management, transport, water, materials, land use and ecology, and emissions, as well as an innovation category. Points are awarded within each of the categories, on the basis of the building's potential to minimise its environmental impact in the range of key areas.

10% premium on rentals

Developers are encouraged to undertake the rating process during the design stage, as compliance will entitle them to market qualifying property as green star buildings, thus potentially securing as much as a 10% premium on rentals.

Sustainability consultant Michelle Malanca, who helped manage the development of Green Star SA, confirms that the rating tool accurately mirrors international best practice, is technically robust and fully applicable to the South African corporate sector environment. "It is important to match the rigour of internationally recognised rating systems, while not making it excessively hard for projects to receive points," she maintains.

In the industry's long-term interest

Ben Kodisang, president of the South African Property Owners Association (SAPOA) and managing director of Old Mutual Investment Group Property Investments, a founding member and sponsor of the council, says: "It will be in the industry's long-term interest to ensure we shape the rating system through inputs across the sector. That includes architects, engineers, consultants, building contractors, as well as property owners, developers, managers, large corporate tenants, product manufacturers and distributors and relevant government departments."

The establishment of the Green Building Council of South Africa (GBCSA) is encouraging building professionals to move towards a sustainable building philosophy. The new or reprioritised considerations now being taken into account during construction include skills transfer, local procurement, suppliers, eco-design and sustainability.

Onset of environmental awareness

With the onset of environmental awareness and the increased need to reduce carbon footprints, business and industry are looking for better ways to

ensure their products are environmentally friendly. In recent times, there is strong evidence that 'Green' building is going from strength to strength as property owners, investors, blue chip tenants (public and private) have realised the importance and the possibilities of building for a sustainable future.

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There are numbers of complementary ways to 'make a difference' and, in so doing, to begin to address the issues of earth sensitivity in a practical and worthwhile manner. Whether this means installing water-conserving devices such as low-flow taps and grey water systems, using products made from renewable resources or recycled material, choosing products with low embodied energy (energy consumed in production process), opting specifically for non-toxic products (such as lead-free paint) or changing to technology to harness renewable energy sources (solar water heating), it all comes down to the application of ecologically sustainable development or environmentally responsible building practices.

Protect our environment and sustain ourselves

With the understanding of the Earth's finite resources and the knowledge that manufactured products, including all building materials, have an effect on our resources, it is becoming increasingly important to make wise decisions regarding the use of these limited resources to protect our environment and our ability to sustain ourselves. The design and construction industry is in a position to effect change in building practices through the use of resource efficient construction materials and methods.

Integrating Architecture with Nature

A recent quote from New York Green Building speaker and industrial designer, Emilio Ambasz, captures the essence of the problem in the solution: "For the last 30 years," he says, "I have striven to find a built manner in which to integrate Architecture with Nature." What he is saying, in essence, is that answer lies in holistically sensitive design.

'In much the same way as the design topography of information science is increasingly being referred to as 'architecture', so too must the bricks and mortar architecture of our world assume increasing responsibility for the way in which our physical future is 'mapped' out. We need to add value to the host planet by balancing the financial realities of going 'Green' with a "No more plastic to landfill" line of thinking, optimising our use of biodegradable and recycled materials and thereby doing our bit to save the earth.'³

Ends

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