

SUSTAINABLE URBAN DEVELOPMENT: LESSONS FOR EMERGING MARKETS

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INTRODUCTION AND BACKGROUND TO THE STUDY

“We are witnessing a massive and unprecedented collision between our civilization and the Earth.”

Al Gore in the 2006 documentary, *An Inconvenient Truth*
(Webster 2007: Online)

The escalating environmental crisis which is compounded by conditions such as unyielding population growth and rising urbanisation, demand context-specific, sustainable urban densification strategies in the emerging markets of the world. Were developing nations to follow a route to industrial maturity that were analogous to their developed counterparts the impact on the environment would be ruinous. An analysis of the advancement of the global sustainability imperative and the green building movement results in the availability of a body knowledge and resources that must be drawn upon for insights and lessons on how to transform the urban environments of the developing nations of the world.

This research paper fulfils three principal objectives: 1. To provide a synthesis of progressive trends and leading-edge developments in the sustainable urban development movement with a view to extracting applications for developing nations and emerging markets. 2. To outline notable contributions in sustainable tall-building design with specific reference to design

strategies and construction technologies 3. To propose a multi-tier outline for the facilitation of mature, green building economies within any one of the developing nations modelled on developed nation processes.

THE RESEARCH AND THE OUTCOMES

The research contained in this study is presented as a compendium – a compilation of inductive reasoning and case study research into leading global trends in sustainable urban development with an interpretation and application thereof intended for emerging markets. The research methodology is both quantitative and qualitative – an exploratory and analytic data and textual analysis of existing reports, papers, documents, and books intended to contextualize and integrate their content into an informative account. This account is then subsequently used as a basis for recommendations, making use of both inductive and deductive forms of reasoning. In conclusion this paper elucidates on what developments should occur in emerging nations, in order for a strong green building economy to prosper as part of the advancement of a sustainable urban future.

THE DEVELOPING WORLD

According to the United Nations Populations Fund (UNFPA) *State of the World Population Report* (2007 p.1. Online), in 2008, the world will reach an invisible but significant milestone: For the first time in history, more than half its human population, 3.3 billion people, will be living in urban areas. By 2030, this is expected to swell to almost 5 billion. Also, the report details other significant urbanisation trends. At the world level, the 20th century saw an increase from 220 million urbanites in 1900 to 2.84 billion in 2000. In comparison, the world's rural population is expected to *decrease* by some 28 million between 2005 and 2030. At the global level, *all* future population growth will thus be in towns and cities. Most of the new urbanites will live below the poverty threshold, thus necessitating innovating urban strategies with sustainability as the cornerstone. Because nearly 80 percent of the worlds population will live in the developing world by 2030, their future, the future of cities in developing countries, the future of humanity itself, all depend very much on decisions made *now* in preparation for these developments (Ward, 2007: 35)

Urbanisation is a phenomenon that is not only transformative but incalculably threatening if managed poorly. Sharp contrasts and class disparities are still evident in most developing nation's cities and poverty stricken nodes filled with urban grime are many. Considering urban planning, congestion, public transport and crime problems Johannesburg compares with Sao Paulo in Brazil, and when examining the administrative complications, political strife, corruption and gang violence in South Africa's Western Cape, comparisons with Kinshasa in the Democratic Republic of the Congo come to mind.

Modern-day urbanisation in the developed world is seeing the emergence of several super-regions mega-cities, conglomerated metropolitan areas with populations of over 10 million people. Some of these contain the essence of development, social order and quality of life, while elsewhere they represent the epitome of human misery. The contrast between São Paulo and New York or between Johannesburg and Singapore encapsulates this dichotomy.

Urbanisation can be argued as being positive and provided it takes on an evolutionary nature which remains in step with the pace of human development, it can lead to an improved lifestyle and access to better facilities (Jenkins, 1997: Online). One of the key challenges is the potentially crippling 'dysfunctionality' where an increasingly crowded urban region implodes under the strain of inadequate transport, environmental control, land-use planning, economic development and straight-forward housing

Urbanisation and agglomeration tend to go together, the one being the concentration of people and the other of business. The benefits are many given adequate management and effective facilitation and they are, inter alia; efficiency and convenience of service and facility provision, resource sharing and concentration of resources, diversity and specialisation in commerce, knowledge spill-over, bigger labour pools/human capital and allowing for the creation of institutions like universities which could not exist in sparsely populated rural areas.

The imperative to conserve the environment through energy-efficiency technologies has never been greater. Technologies must integrate design techniques, products and materials that minimize environmental impacts. In many of the developing nations the current pattern of urban development has long been recognised as unsustainable. It can be described as loosely managed, economically aggressive, and with insufficient regard to the environment. Metropolitan planning and development strategies deliver poor environmental outcomes in relation to energy production and when the enforcement of building regulations, planning

permissions, regulatory control are critically examined many of these developing nations leave much to be desired.

THE GREEN VANGUARD

Initially, the green building movement concentrated on area of energy-efficiency and the mechanical systems that heated, cooled, lighted and ventilated the buildings were the first areas targeted for energy reduction. The purchase of renewable or clean energy sources (solar, wind or hydroelectric) soon followed. Since its earliest days the industry has come along way, and in fact is transforming the paradigm in which it has evolved. Gissen solicited contributions from thought-leaders in the field of sustainable urban development and the articles and transcripts of interviews in his acclaimed book all point to the evolving of the '*Green Zeitgeist*'. He envisions the proliferation of buildings that generate their own clean and renewable energy with enough left over to contribute to the cities power supplies (Gissen 2002:19) According to Braungart (Gissen, 2002: 124) the future can already be seen in The Adam Joseph Lewis Centre for Environmental Studies at Oberlin College, designed by William McDonough + Partners which fits its surroundings "like a tree in the forest" The building is said to be enmeshed in the energy flows of its surrounds accruing solar energy, making oxygen, filtering water and using geothermal wells to heat and cool the building. A constructed marsh-like ecosystem is responsible for processing of materials and water. Braungart calls this kind of design "intelligent building design" which means that the building in fact contributes more that it takes from the environment and leaving an ever-larger positive ecological footprint on the world. Occupancy health and wellbeing is also an area where buildings are called upon to *promote* health in their occupants whereas for centuries the negative impacts on occupant health were merely minimised. Along similar thought process and ideas, the acclaimed eco-architect Kenneth Yeang said in an interview with Nina Rappaport (2002) that he is searching for solutions through, and designing by, imitating nature (biomimesis) and by designing using analogies of ecosystems and ecology (ecomimesis) and that the end goal is buildings that function as an entire urban ecosystems (Gissen, 2002 :175). Yeang wishes, through his professional efforts, to integrate architecture with the organic host system and to contribute to the organic mass of the city and bring in the biotic constituents.

Also on the leading-edge of the green building movement is the company McDonough Braungart Design Chemistry led by William McDonough and Michael Braungart, Architect and Chemist respectively. These vanguards advocate a recasting of the urban design assignment and a

different paradigm of environmental conservation. They have dismissed the concept of sustainability as inadequate and eco-efficiency as lacking in suitable intention (McDonough & Braungart 2002: 178). Tired of “working to be less bad” they have conceived of and have successfully implemented a design intention that will effectively reverse the worst consequences of industrialization (“industrial re-evolution”) by creating materials and building systems that provide nourishment (“Biological or technical Nutrients”) to the environment within closed-loop cycles. Examples are buildings or self-regulating mechanical systems modelled on natural systems that take from the environment but always give more back. Their buildings release positive emissions and have nutritious effects and increase bio-diversity, and mechanical systems used in their projects clean the air and water as opposed to polluting it. Factories they have contributed design efforts to, produce products and by-products that nourish the ecosystem with biodegradable material and recirculate technical materials instead of disposing of them (McDonough & Braungart 2002: 157-171).

GREEN BUILDING INDUSTRY: PAST AND PRESENT

Growth in the green building industry is unquantifiable for any given period considering the many diverse stakeholders across the globe, and to date no comprehensive study has been conducted on an international scale. By looking at a microcosm of the entire industry, namely the United States Green Council (USGBC) and its rating system, Leadership in Energy and Environmental Design (LEED), one does get a reliable indication of the progression of what many now call the “green revolution”.

According to the USBCG website, since its inception in 1998, LEED has grown to encompass over 14,000 projects in 50 US States and 30 countries covering 1.062 billion square feet (99 km²) of development area. (USBCG 2007: Online). From 1994 to 2006, LEED grew from one standard for new construction to a comprehensive system of six interrelated standards covering all aspects of the development and construction process. LEED also has grown from six volunteers on one committee to over 200 volunteers on nearly 20 committees and three dozen professional staff.

In 2006, the U.S. Green Building Council's (USGBC) LEED green building rating system recorded a 50 percent increase in cumulative LEED-registered projects (those intending future certification) and nearly a 70 percent increase in LEED-certified projects. As of November 2007, more than 8,000 projects representing more than 1.5 billion square feet of space had registered

under the LEED system and more than 1,100 projects had received certification. (Yudelsohn 2007: Online)

In January 2007 Jerry Yudelsohn, Chairman of Greenbuild and the author of “Marketing Green Buildings” and “Developing Green,” predicted the immediate future of the green building industry with particular reference to the United States (Yudelsohn, 2007: Online).

Some of his predictions are as follows:

- Green homebuilding will soar...
- Cumulative LEED project registrations under all systems (excluding single-family homes) will approach 10,000. This will put them well on track to achieve USGBC CEO Rick Fedrizzi's late-2006 prediction of 100,000 LEED-registered commercial building projects by the end of 2010...
- LEED will register more than 100 non-US and non-Canadian projects for certification for the first time...
- The number of LEED Accredited Professionals (LEED APs) will grow by 15% or more, to a total exceeding 38,000 by the end of 2007...

Modern Leadership: Councils & Rating Agencies

Environmental building assessment was born outside the United States in the United Kingdom, where the green movement took root at approximately the same time as it did in the United States. The Building Research Establishment (BRE) was founded as part of the British Civil Service 1926 as part of an effort to improve the quality of building research. BRE was initially government-owned but was later privatised. BRE's Building Research Environmental Assessment Method (BREEAM) was introduced in 1990 as the first environmental assessment tool to be used internationally. BREEAM is now one of several assessment method or evaluation resources worldwide. Eco-Quantum, a software program that expresses environmental performance on the basis of life cycle analysis, has been developed by IVAM, a research agency affiliated with the University of Amsterdam, under the direction of Jaap Kortman. Another is the Eco-invent 2000 database from the Swiss Centre for Life Cycle Inventories. The Leadership in Energy and Environmental Design (LEED) Green Building Rating System, developed by the United States Green Building Council is the standard across the US and in

Australia the Green Building Council of Australia (GBCA) has developed a green building standard known as Green Star.

Product labelling programs have also been established in a number of European countries to promote sustainability. Germany's Blue Angel program, introduced in 1977, was the first such national 'ecolabelling' program in Europe. The Northern European countries of Norway, Sweden, Finland, Iceland, and Denmark participate in a voluntary ecolabelling program called Nordic Swan, introduced in 1989. An emerging nongovernmental organization at the international level is the World Green Building Council, founded in 1999 aimed at creating Green Building Councils worldwide.

The need for a global method of rating buildings, particularly one that focuses on greenhouse gas emissions related to buildings, is being addressed by the International Initiative for a Sustainable Built Environment. The iiSBE is headquartered in Ottawa and is managing the Green Building Challenge. This is a consortium of about 20 countries that is developing an environmental performance assessment system intended to produce a global standard that facilitates the exchange of information between countries. The Green Building Challenge assessment method defines, structures, and scores a range of collectively agreed performance criteria — the Green Building Challenge assessment framework — and uses a software program called the GB Tool (now called the SB Tool) which is intended as a "toolbox" designed to allow countries to create their own locally relevant rating systems (United States Green Building Council, 2003: 18).

There are a number of Other alternatives to LEED including Green Globes™ Environmental Assessments for Buildings developed by the Green Globes Initiative (GBI) and launched in the U.S. in 2004 (The Green Building Initiative Website, 2007: Online) Sustainable Project Rating Tool (SPiRiT) developed by the Army Corps of Engineers' Construction Engineering Research Laboratory, based on LEED, and mandated for use in military construction in 2001; ENERGY STAR for Commercial Buildings, developed by the U.S. Environmental Protection Agency with a focuses on energy efficiency; The Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) which was developed in Japan and is available in English - CASBEE assesses energy efficiency; resource efficiency; local environment; and indoor environment; Green Globes is a web-based sustainable design tool for new commercial construction based on the work of the BREEAM system.

SOLUTIONS AND STRATEGIES

Tracking the progression of the green building movement leads one to a foreseeable conclusion: the movement has moved considerably beyond its inception phase and has gained significant momentum, especially in the more developed, progressive countries of the world, and in doing so is becoming another major industry sector. Its growth will continue steeply. Regarding the many developing markets of the world and their built environments, it is evident that in order for a country to progress from a state of indifference to transformation of their built environments a certain path might be advisable and certain checkpoints might be inevitable.

What follows is a multi-tier outline of potential solutions which can be used on the path of transforming a city or cities within developing countries built environments. This outline with its component parts should inform a strategy to transform such built environments through the laying of essential *foundational elements* that would allow for a green building economy to prosper. The process begins with the government as legislator and administrator of the law, because without the legislative essentials the impetus cannot generate enough force. With the correct legislation in place the man-power and human capital is likely, as a consequence, to be allocated and assigned and what should follow is the backbone of a green building economy that would result in the direct impact of the commercial heartbeat - the profit drive. Economic/financial incentives and motives are the crux of any property development, and when these incentives are tangibly felt, a rating system will quickly follow that will allow for an objective assessment of a building or new developments sustainability credentials. Dissemination of knowledge will result and end-user education will occur, the result being that the supply and demand economics will shift in dynamics. In a self-perpetuating and self-generating cycle, a developing country's' green building economy will gain the requisite momentum it requires.

Many countries in the world can now boast thriving green building industries. What do they have in common with regards their process of maturation? What preconditions should exist in order for the green industry to take off in a developing country? What gives it impetus, and what ensures its expansion? The outline that follows is a consequence of the research into these questions.

The Government as Legislator and Administrator of the Law

Incentives for private developers to build green, appears to be the most foremost and simplest legislative development to promote the growth of the movement in any economy. The profit motive drives commerce in capitalistic societies, and in the development world this fact is plainly seen. According to Yudelson whose firm was hired by the National Association of Industrial and Office Properties, USA, to conduct a study into developer incentives to build green, it was found that “nearly a hundred local and state governments are offering green building incentives to private developers” (Yudelson 2007: Online)

The research found that most incentives fall into three categories: those that offered priority or fast-tracked permitting; tax incentives such as tax abatements for LEED-Silver or better; and greater density or floor-to-area ratios. Other incentives are direct incentive payments from utility energy efficiency programs, direct monetary payments from a city or county (grants, rebates or reimbursements), special marketing and publicity through strategies like awards, state income tax credits, property or sales tax rebates or abatements, access loans/loan funds and full or partial refunds for development fees. To illustrate the impact of financial incentives to developers, consider the outcome of the Industrial and Commercial Business Board’s tax incentive program in New York City in the years 1981 and 1982. In those two years alone, twelve office buildings comprising more than 7 million net square feet were completed on Manhattan’s already very densely developed midtown East Side (Fainstein 2001: 59). Incentives to developers represents part of the solution to create *supply*.

It can be asserted in the absence of available case studies, that the creation of *demand* might be the most critical of strategy components in building the green economy. Demand would be created by incentivising corporate tenants to occupy green buildings. Incentives in the city of New York during the early eighties for corporations to relocate to or stay in Manhattan again serves for useful analysis. Mayor Guiliani granted more that \$2 billion in tax breaks and other incentives to more that forty eight corporations in a controversial program that was regarded as successful in the reaching of its goals, and was repeated again in the ‘90s (Fainstein 2001: 59). This illustrated to what lengths corporations would go to positively impact their bottom lines. Mobilising this corporate drive for profit will have the same desired impact if end-user tenants begin insisting on green credentials. Developers would respond, and in doing so will create a

demand for the green technologies that are fitted into the structures they build. In this way an economy is created and stimulated.

Legislation at National Level

- A National Environmental Advisory Forum can be established to provide leadership in the areas of environmental management and governance and it in turn would develop a task-force focused specifically on sustainable urban densification
- A developing country might adopt a strategy for the greening of the urban environments and apply for financial assistance from the Global Environmental Facility and the Clean Development Mechanism (CDM), the arrangement under the Kyoto Protocol
- Laws should be amended requiring national and provincial departments to compile environmental management plans pertaining specifically to greening the cities and in doing so provide a legal framework for sustainable environmental development
- National Environmental Management and Biodiversity laws should be amended to provide regulatory framework to protect valuable species, ecosystems and its biological capital in the central cities districts *as well as* the more remote areas.
- Energy Efficient Strategies should be amended to delineate the goals for improved energy efficiency in cities by targets that should be set according to deadlines.

Legislation relating to the built environment

According to Watermeyer & Milford (2003: 1) any definition for sustainable urban development must reflect emerging societal expectations captured in Agenda 21 (1992), the Habitat Agenda (1996), the Millennium Declaration (2000) and the outcomes of the World Summit (2002). A sustainable, performance-based description for sustainable urban development must accordingly be framed around the best-use maximisation of a finite amount of land, the provision of affordable accommodation with a sense of place and community, strict adherence to best-practice environmental conservation and ecological design and relief of the problems arising

from congestion and poverty. The authors would like to propose the following measures that the government might implement to achieve greater, and even ideal, energy efficiency within the built environment.

- Funds from any of the social housing programs (in whatever form they might or might not exist) or the related governmental departments or finance corporations servicing the housing sectors or any urban reconstruction initiatives should be pooled and diverted away from ineffective initiatives and into programs dedicated to culturally informed, socially pleasing, and environmentally-friendly cities.
- Establish an Energy Efficiency Commission to re-evaluate energy policies related specifically to the built environments of the respective countries. Such a Commission should consist of members of the government across all tiers who are in a clear chain of accountability. This strategic platform should also include a few select members from the business and academic communities.
- A function akin to a task-force would be accountable for research and proposing measures and instruments to further the development and dissemination of new, sustainable technologies for consideration by the Energy Efficiency Commission.
- Establish a program with measures such as energy efficiency targets, green building codes, preferential technology procurement, and a compulsory rating system that would result in classifications.
- Create tax incentives for buildings and developers that comply with the rating standards suggested in 3 above. The better the classification, the less the tax burden.
- Reduce the cost of borrowing to build green buildings by offering lending institutions incentives to lower interest rates for development finance.
- Improve municipal energy planning and environmental outcomes through appropriate legislation.

- Dictate sustainable production standards and quantities, which when violated would produce hefty fines.
- Deny the use of harmful technologies or ingredients, thereby creating a ban.

Proposals for a Uniform Regulatory System

Building regulations establish minimum requirements that satisfy governmental, agency and societal expectations and these expectations must somehow be captured to represent the full spectrum of societal concerns and prospects in and for buildings in a uniform and systematic manner. Performance-based (on sustainability criteria) standards and building regulations should be developed so that two or more buildings can be fairly compared after an appropriate description/standard for sustainable buildings is articulated which reflects global expectations. The national building regulations and building standards' laws must be amended to empower the relevant Minister to issue new national building regulations related to environmental conservation and energy efficiency to enable minimum standards to be enforced. Legislators must provide a framework for regulating aspects of buildings, the issuing of specific prescriptive building regulations and the establishment of the administrative infrastructure relating to the regulation of buildings. Best-practices which establish functional requirements should be developed in respect of the sustainable development factors as laid out hereafter in the absence of an accepted rating system.

A model of development features and their strategic objectives

There is no universally accepted way to compare green development attributes. The definition of what constitutes a sustainable building design is constantly changing and all the councils and rating agencies differ in their indices, objectives and principles relating to the subject. They balance various dimensions of "greenness" through a necessarily subjective weighting. Because of the wide range of sustainable attributes, no single scientific denominator exists, and weighting reflects consensus best judgment rather than scientific determination. Despite their differences, the doctrine and the principles coincide to a large degree. The following development features and their strategic objectives are adapted from the Framework of Sustainable Development Factors (FSDF) in Ward (2007: 73). In the absence of a globally accepted and approved rating system framework they serve as a useful base for a rating tool that should ultimately be country-

specific. Furthermore, the development features should guide designers in the conceptualising stages of building development.

Model 1. Model of development features and their strategic objectives

DEVELOPMENT FEATURES		STRATEGIC OBJECTIVES
Land Utilisation		<ul style="list-style-type: none"> . Optimal Site Selection & Utilization . Habitat Conservation . Viable Storage Facilitation . Open Space Maximisation
Transport		<ul style="list-style-type: none"> . Public Transport Facilitation . Motivate Use Of Alternative Transport . Implement Mobility Plan For External Persons
Pollution		<ul style="list-style-type: none"> . Reduce Noise, Heat, Light, Water Pollution . Reduce Emissions
Water		<ul style="list-style-type: none"> . Potable Consumption Reduction . Improve Operational Efficiency . Landscape Efficiency . Wastewater (Rain & Grey Water) Exploitation
Energy		<ul style="list-style-type: none"> . Reduce Operation Energy Consumption . Improve Operational Efficiency . Employ Green Energy Sources
Indoor Calibre	Environmental	<ul style="list-style-type: none"> . Neutralise Effects Of Tobacco Smoke . Enhance Natural Ventilation . Reduce Harmful Emissions From Building Materials . Raise Detection Capabilities Of Unwanted Elements . Improve Indoor Climate Control And Occupant Comfort . Air And Lighting Quality Enhancement
Resources & Materials		<ul style="list-style-type: none"> . Redevelopment: Re-Use Max Existing Materials . Efficient Waste Management . Maximise Use Of Materials High In Durability/

<p>Building Services</p> <p>Innovative Contribution</p> <p>Ownership & Management</p>	<ul style="list-style-type: none"> Upgradeability Minimise Use Of Environmentally Burdensome Materials Maximise Use Of Materials Extracted/Processed/Manufactured Locally High Standards Of Building Safety & Security Convenient And Sufficient Ablution Facilities Premium It And Communications Infrastructure Space And Storage Optimisation Create High-performance Workplaces Demonstrate Ingenuity In The Use Of Existing Design Technology Inventive Contribution To The Industry's Knowledge Base Exceed Known Benchmarks Green Procurement: Design Phase Green Procurement: Ongoing Maintenance Green Skills And Intellectual Capital: Building Management Openly Accessible Environmental Policies & Procedures Excellence In Operational Management And Record Keeping
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Source: Adapted from Ward (2007: 73)

Pioneering Professionals: Services for Hire

What follows is a brief list of architectural pioneers and their firms in the green building movement and examples of their work. These architects and their experience are available to developing nations and they are listed because their expertise will need to be imported when these urban environments begin their green transformation in earnest. An attempt at an exhaustive list of all important contributors to green building, especially the praiseworthy pioneering engineers is beyond the scope of this paper. These are just a few who translated their convictions into valuable literary works, important creative contributions and progressive designs that have become icons of environmental conservation.

Kenneth Yeang

Perhaps the individual most deserving the first mention is the Malaysian architect mentioned elsewhere in this paper, Kenneth Yeang, who has dedicated his life and career to research and development work on the bioclimatic approach to large building design and the pioneering of a sub-set of broader environmentally responsive design strategies. Educated (Doctorate) in Ecological Design from Cambridge University, he is currently the principle of the firm T.R. Hamzah & Yeang in Kuala Lumpur. (Gissen, 2003:15). As early as 1992 Yeang designed the Menara Mesiniaga Building in Malaysia, which according to the collaborating engineering firm Battle McCarthy .is a virtual catalogue of his earlier “bioclimatic techniques, including the daring vertical sky-gardens, external louvers to reduce solar heat gain, extensive natural ventilation and lighting, and an “Active Intelligent Building” system for automated energy savings (Battle McCarthy Engineers Website (n.d.) Online)

William McDonough

William McDonough (mentioned elsewhere in this paper) is a world-renowned architect and designer and winner of three U.S. presidential awards: the Presidential Award for Sustainable Development (1996), the National Design Award (2004); and the Presidential Green Chemistry Challenge Award (2003). Time magazine recognized him as a “Hero for the Planet” in 1999, stating that “his utopianism is grounded in a unified philosophy that—in demonstrable and practical ways—is changing the design of the world.” (William McDonough + Partners Website (n.d.) Online) McDonough is the founding principal of William McDonough + Partners, Architecture and Community Design, an internationally recognized design firm practicing ecologically, socially, and economically intelligent architecture and planning in the U.S. and abroad.

Richard Rogers

Famous for his design of the futuristic Lloyd’s of London Building, Yale graduate Richard Rogers has been at the forefront of ecological tall building design in Europe for many years. Principle of the firm Richard Rogers Partnership, he became famous when he won, along with Renzo Piano and Peter Rice, the design competition for the Pompidou Centre in 1971. This building established Rogers’s trademark of exposing most of the building’s mechanical services on the

exterior thereby leaving the internal spaces uncluttered. (Rogers Stirk Harbour and Partners (n.d.) Online)

Robert Fox and Bruce Fowle

A firm that can lay claim to the title of leading designers of sustainable high-rise buildings in the United States is the decorated Fox & Fowle Architects, P.C. who were the designers of the Conde Nast Building at Four Times Square in New York, the Reuters Building on 7th Ave New York, and the Helena Apartment Building (also New York). All are models of sustainable design. Robert Fox and Bruce Fowle formed Fox & Fowle Architects in 1978. In recent years the firm has been honoured with numerous design awards, including the coveted Medal of Honour by the AIA New York Chapter, two awards from the AIA New York State, an Honour Award for Outstanding Architecture for the National American Institute of Architects, and four awards from the Society of American Registered Architects (New York City Architecture (n.d.) Online)

Cesar Pelli

Competing for the hypothetical title of Top Skyscraper Designers in the United States' is the firm Pelli Clarke Pelli Architects. According to their webpage "the work of Pelli Clarke Pelli has been internationally recognized with over 100 awards for design excellence, including over 40 design awards from National, Regional and local chapters of the American Institute of Architects (AIA). The AIA awarded Cesar Pelli the 1995 Gold Medal, which recognizes a lifetime of distinguished achievement and outstanding contributions. In 1991, Cesar Pelli was selected as one of the 10 most influential living American architects. In 1989, Pelli Clarke Pelli was the recipient of the AIA's Firm Award" (Pelli Clarke Pelli Architects Webpage (n.d.) Online). The firm designed the groundbreaking 292-unit, The Solaire at 20 River Terrace in New York City, which was the first large-scale residential high-rise to be developed and modelled under the Leadership in Energy and Environmental Design (LEED) rating system and was the first green high-rise residential building in the United States.

Norman Foster

Foster and Partners, with headoffices in the United Kingdom is one of the most prominent architectural firms worldwide and strongly associated with their founder, Norman Foster. They

have shown innovation in many of their environmentally conscious designs. The firm designed the controversial cone-shaped Swiss Re Headquarters at 30 St Mary Axe in London which is a model for energy-efficient design and also the highly acclaimed Hearst Tower which was at the time of its completion, arguably one of the most environmentally conscious skyscrapers in the world. The Commerzbank Tower, designed by the company and completed in 1997 in Germany, is regarded by the firm itself and most architectural critics as the world's first ecological office tower, and was the tallest building in Europe for several years (Foster and Partners Website (n.d.) Online). Foster and Partners recently received the commission to design 200 Greenwich Street, a 78-storey office tower, which is to form part of the redevelopment of the World Trade Centre site in New York and that will be designed to the highest standards of environmental conservation. The commission is one of the most important urban planning and architectural challenges of recent times and 200 Greenwich Street will seek to achieve the gold standard under the Leadership in Energy and Environmental Design (LEED) by the US Green Building Council.

Other architectural firms noted for their environmentally conscious designs are commended in Gissen (2003) include: Croxton Collaborative; Envision Design; FTL Design Engineering Studio, MVRDV and Skidmore Owings & Merrill.

CONCLUSIONS AND RECOMMENDATIONS

In most developing countries the green building economy is still in its infancy, and the needs and benefits of Green Building are not well understood. Much research, information dissemination, lobbying and capacity building is required. The intellectual, organisational and economic foundations are now only beginning to be cast, still in their infancy (Sustainable Energy Africa (n.d.) Online). It is imperative that momentum is gained so that eventually, the sustainable development and green building economy will be interwoven into the fabric of mainstream property development in all its forms.

In the case of the built environments of most developing countries, benefits for building green buildings do not accrue directly to the developers *as yet* and thus incentives for doing so are all greatly reduced. Any unit of conservation that a green building can effect at this stage will be undone by the many other developers who will quickly take advantage of the lower cost of production that building without regard for the environment yields. The following is thus

apparent: Our built environments require extensive input to develop and maintain. Up until a recent point in history, demand for environmentally harmful products has been high worldwide, and producers have been plentiful, with environmental abuses rampant. Also the total cost for producing green technologies has been too high in all but a few select cities in relation to the demand and consumer willingness to pay. When our societies demand less of the harmful products prices will decline until it is no longer viable for the producers of these goods to remain in business – net benefits will disappear as costs remain relatively constant. At the other end of the scale, as demand for environmentally-friendly products increases a healthy industry will be borne as it has been in several progressive cities in developed nations where it will be viable, because of high consumer demand and the right profit possibilities, for consumers to invest in green technologies.

In conclusion, the following summary of strategies is offered as necessary to stimulate a green building economy and to ensure its ongoing expansion together with examples of intervention measures and the anticipated results they will bring.

- **Intervention at the governmental legislation level**

Policy reform in the form of new laws, the implementation of punitive legal measures against offenders and the outright banning harmful materials and systems etcetera will influence the behaviour of developers by compelling them to comply.

- **Establishment of commissions, councils, teams, from Government and private sectors for research, development and planning**

The drafting of planning documents, development frameworks, energy efficiency targets etcetera together with the re-drafting codes of best Practice/Green building codes will create the platform for the creation of an accepted building rating system (e.g. LEED Adapted for a specific country). Such bodies and forums will provide crucial leadership and create accountability for progress, and also create a standard to which developers can conform and be held accountable.

- **Governmental and private Sector financial incentives**

Creating financial incentives is key to any strategy. Examples are tax relief for developers building green, tax abatements for end-users of green buildings, the allocation and availability of development funds and seed capital for green-product start-up firms, and preferential finance rates on borrowed money. The effect of a basket of incentives will be to create strong supply and demand dynamics in the marketplace and to stimulate the growth of the green economy by providing the financial means for its growth.

- **Consumer and Personnel education/marketing campaigning by all stakeholders**

Introduce training initiatives around the countries to educate key personnel on the crisis and developments. Also, create national public awareness campaigns and competitions to raise awareness and educate the populace also celebrating shining examples of progress. This will place necessary pressure on the real-estate marketplace to assume responsibility and act in accordance with environmental conservation practices

- **Transformation of state-owned infrastructure into acceptable green standards**

The government taking the lead by re-developing old state structures into green models and procuring all new state developments to green developers is an important way to generate momentum, models and examples of what is possible and ultimately to powerfully stimulate the green economy

- **Identify and utilize the vast experience and intellectual capital of leading figures in the industry**

Developing nations can fast-track their progression to transformation of their built environments by soliciting and procuring the services of many successful firms and professionals that readily take on international assignments. Here the government and the private sector must avoid costly and lengthy learning processes by making use of the skills in existence.

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