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SQ

raising the Sustainability Quotient

In this Issue

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Editorial

Build Green and Live Green

This issue of SQ focuses on green buildings. Green buildings mainstream sustainability in planning and design, while making choice of materials, energy and technology and in selecting equipment and fixtures so as to reduce life cycle impacts/risks to humans and ecosystems.

Several green rating systems have emerged in the last decade that guide and inspire architects, planners, builders and material/equipment suppliers to come up with green buildings at various shades of green. Focus has also emerged on low carbon buildings where greenness of the building is assessed based on Greenhouse Gas (GHG) emissions. These buildings are called as climate responsive.

In the early years, constructing green buildings was considered to lead to cost overruns by factors as high as 20% but today because of the favourable policies/ regulations, market demand/ recognition, technology / material innovations, the cost differential between a green and a "conventional" building has greatly reduced. When costed over life cycle, green buildings are in fact more competitive. We should by default build every building green.

While much attention is given to the greenness of the building on its "built form", communication of its green features to the occupiers is often overlooked. The use phase of the life cycle of the building thus faces a disconnect and sustainability is confined to "half of the circle".

Green buildings typically have a rainwater harvester, a vermi-compost pit and grey water recycling unit amongst several other features. You sometimes find rainwater harvesters discontinued as they become source of mosquito breeding grounds or compost from vermicompost pit does not get used in the gardens or practices of grey water recycling are abandoned due to foul smell. Reasons are several - some of these are low understanding/sensitivity, lack of ownership and many times sheer poor maintenance.

Efforts are needed to ensure that occupiers to a green building understand how to live green! Living green actually changes occupier's mindset and lifestyle so as to make staying in a green building more meaningful. This is where the term sustainable habitat comes in taking us beyond physical form of a green building or green infrastructure and bringing in sustainable lifestyles.

Green rating systems need to expand and include follow up monitoring with dialogues with occupiers as a criteria to renew the green certificate. Such requirements would mean that green ratings or certificates are not given one time on a permanent basis but require to be renewed based on how the green buildings are actually used. So if we really intend to promote sustainability then let us not just build green but live green!

- Dr. Prasad Modak

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Concepts on Green Building

This article has been facilitated by Ms. Beroz Gazdar and her team, Mahindra & Mahindra, Mumbai

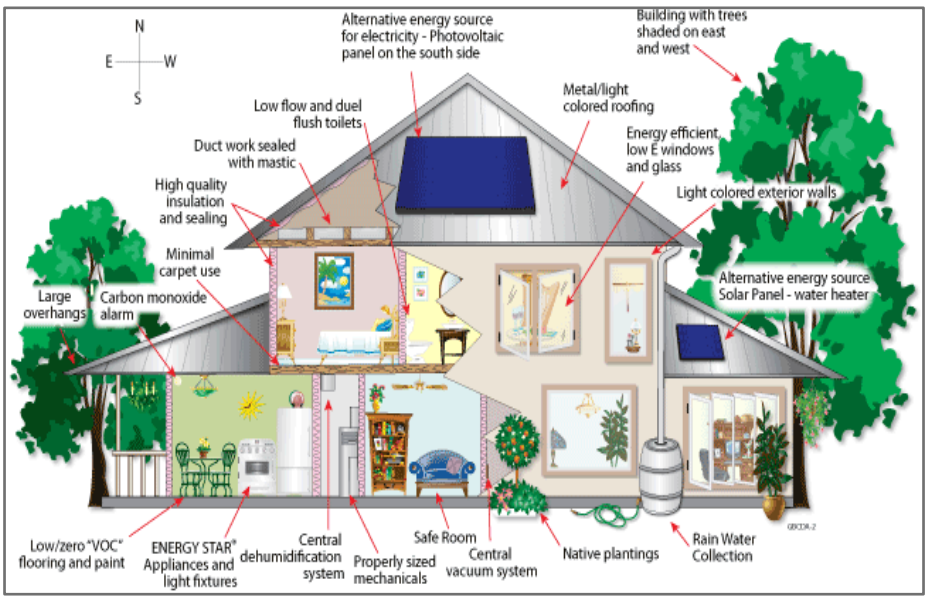
What is a Green Building?

A Green building is a structure that is built using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition.

A typical building will comprise of some basic concepts of sustainable architecture shown in Figure 1.

What are its benefits?

A Green building can have tremendous benefits, both tangible and intangible. The immediate and most tangible benefits include reduction in water and operating energy costs during the entire life cycle of the building. Some intangible benefits include; enhanced air quality, excellent day lighting and enhanced indoor environment for the project.



Source: http://blog.indiacube.com/wp-content/uploads/2010/08/Green-building.gif

Figure 1: Green Building components

Do Green Buildings cost more?

The cost could be slightly higher than a conventional building initially but over its life cycle, due to substantial reductions in operational cost, the total cost of ownership is invariably lesser.

What is the Green building rating system?

A green building rating system is an evaluation tool that measures environmental performance of a building through its life cycle. It usually comprises of a set of criteria covering various parameters related to design, construction and operation of a green building. Each criterion has pre-assigned points and sets performance benchmarks and goals that are largely quantifiable. A project is awarded points once it fulfills the rating criteria. The points are added up and the final rating of a project is decided. Rating systems call for independent third party evaluation of a project and different processes are put in place to ensure a fair evaluation.

The need for creating green building rating systems were felt as buildings started to be recognized as major contributors to the world's energy usage, landfill waste and diminishing green space [4].

Some of the International green building rating systems include:

- BREEAM (Building Research Establishment's Environmental Assessment Method)
- CASBEE (Comprehensive Assessment System for Building Environmental Efficiency)
- GB Tool
- Green Globe U. S.
- LEED (Leadership in Energy and Environmental Design)

What are the Green Building rating systems prevalent in India?

Table 1 illustrates some of the Indian green building rating systems:

Table 1 : Indian Green Building Rating Systems

INDIAN GREEN BUILDING COUNCIL (IGBC) [1]	LEED INDIA [2]	GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT (GRIHA) [3]
The IGBC Green Homes Rating System is a tool which enables the designer to apply green concepts and criteria, so as to reduce the environmental impacts which are measurable.	LEED India is the indigenized version of the LEED rating system. It sets the performance benchmarks and encourages the project team to achieve them with optimal resource inputs in their context.	GRIHA is the National Rating System of India. It is a green building 'design evaluation system', and is suitable for all kinds of buildings in different climatic zones of the country.
Types of buildings addressed?		
New and major renovated residential buildings	All types of new commercial buildings	New buildings (buildings that are still at the inception stages).

Levels of rating -

Certification Levels	A	B	C
Certified (Best practices)	32-39	30-36	51-60
Silver (Outstanding performance)	40-47	37-44	61-70
Gold (National excellence)	48-59	45-55	71-80
Platinum (Global leadership)	60-80	56-75	81-100

A – Points for projects with interiors
B – Points for projects without interiors
C – Points for Factory building and SEZ

Certification Levels	Points Required
LEED Certified	26-32
LEED Silver	33-38
LEED Gold	39-51
LEED Platinum	52-69

Certification Levels	Points Required
One star	50-60
Two star	61-70
Three star	71-80
Four star	81-90
Five star	91-100

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1. http://www.igbc.in
2. http://www.grihaindia.org/
3. Mayra Portalatin, Kristina Koepke, Maureen Roskoski and Teena Shouse (October 2010): Green Building Rating Systems
4. www.teriin.org

Creating Sustainable Habitats @ Mahindra Lifespaces

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Catalytic urbanization coupled with quicksilver infrastructural development, an exodus of populace into metros for better lifestyles and careers - India's growth curve is moving ahead rapidly. Yet, such exponential growth can continue to happen smoothly only when the wealth of natural resources is harnessed, sensibly and carefully. Therefore, it is crucial to maintain a harmonious balance between all round progress and environmental stability. At Mahindra Lifespaces, we understand the need for sustainable economic growth. While participating in India's growth saga, we also want to emerge as the flag bearers for environmental sustainability. With this philosophy ingrained in our conscience, we espoused 'Green Design' and 'Healthy Living' as the foundations for all the projects at Mahindra Lifespaces and Mahindra World City.

'Green Design' is our selfless way of giving back to the environment what we take from it. Splendidly showcased in our residential projects such as Aqualily, Splendour, Royale, Chloris, Eminente, etc., it is also evident in our commercial properties like Great Eastern Plaza, HDFC Bank, Great Eastern Centre and Mahindra Towers. Residential or commercial, all our structures are energy efficient, environment friendly and cost effective. So, while the environment revels in good health, people bask in the glow of healthy lifestyles.

Taking the motto of sustainability a step further Mahindra World City builds communities on the concept of "work, live, learn and play."

Mahindra Lifespaces specializes in real estate development and is an integral part of the Mahindra Group. Mahindra Lifespaces, as the name signifies creates spaces for healthy living, focussing on quality and true value offerings to customers. Mahindra World City spread across 4,600 acres has two Integrated Business Cities with futuristic amenities, facilities and numerous career opportunities that stem from the prestigious MNCs housed here. By improving lifestyles and work-styles, we strive to bring the best to our discerning customers.

Green Initiatives

The present article discusses the initiatives that are taken while designing and planning our projects. Some of these initiatives are discussed below –

I. Energy Efficiency

Use low emissivity (low-e) glasses for building fenestration (See Figure 1). It has high light transmission ratio with low shading coefficient and hence induces more day light effect than normal glasses. Due to low Solar Heat Gain Coefficient (SHGC), the entire fenestration system reduces the heat ingress thereby reducing the energy requirement for indoor air-conditioning substantially in comparison with normal fenestration.

Designed and developed low energy density Flyash bricks (see Figure 2) for internal as well as external walls of the buildings. The brick has been tested by IIT-Bombay and the average thermal conductivity is 0.19 W/meter

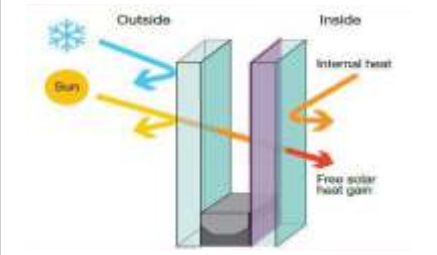

Figure 1: Fundamental of low emissivity glasses

Kelvin. These bricks envelope and protect the building from water leakage and act as a better insulator thereby reducing the energy demand for air-conditioning.

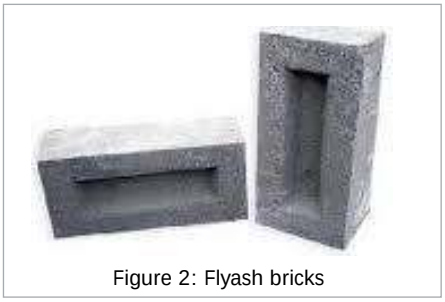
Figure 2: Flyash bricks

Cover the terrace roof with high albedo insulating material having SRI (Solar Reflectance Index) value greater than 78 to reduce the heat absorption and energy demand for air-conditioning.

Other energy efficient products used are –

- Use of BEE 3-star rated products for external lighting and sprinklers in gardens to minimise the energy requirement of buildings.
- Use of CFC free refri-gerants in air conditioners.
- Use of timer based sensors for external lights and sprinklers in gardens.

All the above initiatives help achieve the energy efficiency in our buildings.

Other than the above we have commissioned a 75 KW rooftop solar plant at Mahindra World City, Chennai, a step towards harnessing green energy resource. This is expected to generate approximately 1,16,000 units (kWh) of clean electrical energy annually and offset emissions of nearly 60 tons of carbon dioxide per year.

II. Maintaining Healthy Indoor Environmental Quality:

Initiatives taken to achieve healthy indoor environment quality are –

- Provision of more open-able window space to floor ratio than the stipulated norms to improve the ventilation effectiveness.
- Use of low VOC (Volatile Organic Compound) paints, adhesives and insulations inside the flat for improved moisture management. It also helps in increasing the occupants productivity.
- Design in a way that day lighting for at least 75% of the regularly occupied area is available.
- Provision of cross ventilation between each dwelling unit.

III. Preservation and Conservation of Soil and Water

Some of the initiatives that are observed in all our buildings are -

- We preserve the top soil during and post construction and build innovative erosion and sedimentation control management systems.
- Provision of rain water harvesting systems and storm water management to recharge the ground water table.
- Reuse of the treated wastewater for flushing and landscaping thereby reducing the municipal water demand.
- Use of low flow water faucets and fixtures in every flat of the residential building.
- Use of drought tolerant species with xeriscaping in landscaping to reduce water demand in gardening.

IV. Material Management

We prefer selecting the manufacturer and supplier from within a 250 km radial distance from the site. We give much emphasis to use of materials with recycled content without compromising on quality.

V. Waste Management

Some of the initiatives under waste management are -

- All sites reutilize more than 75% of construction waste; these are used in building roads & pavements.
- An in-house solid waste management plant is constructed to take care of all the municipal waste. The waste is processed and recycled as manure and used for landscaping purposes.
- An in-house STP (Sewage Treatment Plan) is also constructed for treatment of sewage.

VI. Labour Welfare

During the time of construction, we not only provide basic facilities to our labourers but also additional facilities such as -

- Establish informal schools and crèches aimed at providing basic education and a safe environment for children of construction labourers when the parents are at work.
- Imparting vocational training to labourers in trades like electrical maintenance, electronic goods repair, computer fundamentals, garment design and stitching,

beauty treatment and hair dressing.

- Conduct health camps in labour camps (i) vaccination camps for labourers and their family members (ii) Regular health check-ups and mobile medical facilities.

Case Study: 'Mahindra Chloris', Faridabad

We employed most of the above mentioned initiatives in one of our projects 'Mahindra Chloris', Faridabad which is Platinum rated under the CII – IGBC green home rating system (India's second completed residential development to achieve the highest rating in the multi-dwelling units category).

The following impacts have been measured for Mahindra Chloris, Faridabad as per the IGBC Green Homes Rating system during the design phase.

Environmental Impact

- Reduction in energy demand upto 144 KW as 80% requirement for hot water is met through solar water heating systems.
- Reduction in energy demand upto 11.34 KW through solar street lighting.
- Reduction in GHG emissions as more than 90% of the construction material is purchased within a radius of 250 km from the site.
- Reduction in water consumption as 100% of the waste water is reused post treatment .
- Water conservation due to rain water harvesting systems for 100% of the runoff volume from the roof.
- Reduction in fresh water use of more than 30% due to installation of water efficient fixtures.
- Reduction in waste as more than 75% is reused within the site.

Economic Impact

- Savings in energy upto 20% as green homes are more efficient than their conventional counterparts.
- The company was able to negotiate Home Loans for its customers from State Bank of India (SBI) at 0.25% less than the prevailing interest rate resulting in an economic benefit to those customers who availed of this facility.

Social Impact

- Improvement in the quality of living of all contract labourers due to the provision of healthy dwelling facilities in the form of labour camps.
- Improvement in health due to regular health checkups and medical camps for labourers.

Concluding Remarks

Developing green buildings for achieving mere 'ratings' is not an end in itself; instead, it is the beginning of the journey towards a higher purpose and a larger end.

It is a myth that 'green necessarily means higher cost'. It was realized that an innovative approach and application of technology coupled with stretched targets and fixed timelines can not only create opportunities for innovations, but also save capital cost as well as life-cycle costs.

The measure of our success is not the 7 million sq ft of projects we've completed nor is it the over 8 million sq.ft. of new projects under construction. Instead, it is the smiles we create on every face and the lives we improve.

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Implementing Sustainability at Masdar City

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ABSTRACT

Masdar is Abu Dhabi's multi-faceted renewable energy company advancing the development, commercialisation and deployment of renewable energy technologies and solutions. The company serves as a link between today's fossil fuel economy and the energy economy of the future - developing the “greenprint” for how we will live and work tomorrow. Masdar City, a low carbon, low waste development, is an integrated unit of Masdar that not only embodies Abu Dhabi's commitment to a sustainable future, but also pioneers best practices in sustainable urban planning, design, development and operation.

Future cities will need to be envisioned, planned, and developed based on a systems approach. This moves past sub-optimization of different aspects of the city; which have led to inefficiencies and non-sustainable infrastructure. Scenario development and technology innovation can be tested and selections made based on current and future needs. Using systems modelling and other tools, Masdar is able to optimize water sources of supply and reduce level of treatment required for each use, recoverable resources, energy demands, construction timing, and lower the carbon footprint.

The present article demonstrates how Masdar envisioned the future cities and presents a unique example of innovative technologies and concepts. The successful integration of water, energy and waste is achieved at Masdar through innovative planning, design and procurement. The vision, models and tools and practical lessons learned from Masdar can be readily translated to the Indian situation.

Introduction

Masdar City covers an area of 6 square kilometres and is strategically located in Abu Dhabi, which has easy access to the growing market in the Gulf Cooperation Council (GCC) region and is a gateway to the rapidly expanding markets of Asia. The city is being built in phases, first phase is Masdar Institute of Science and Technology which is completed.

The rationale behind creating Masdar city was to showcase a multifaceted approach to planning, designing and implementing the emerging and clean technologies and optimal resource utilization in urban set up. Masdar City is a project aimed at testing and pushing the boundaries of energy efficient building technologies, urban design and sustainable construction materials. As a technology cluster, Masdar City aims to attract clean technology companies and international organizations to establish an environment ripe for technology innovation and development; for example, Masdar City will be home to the International Renewable Energy Agency (IRENA) and technology companies such as Siemens and General Electric. It is expected that the population of the city eventually will include 40,000 residents, along with an additional 50,000 commuters who work within the city.

The design and construction of the city has a low carbon low waste philosophy, making this city a global blueprint for urban sustainable development. Masdar's aim is to bring a commercially viable solution to the marketplace that will change the global landscape. The implementation process is expected to benefit the development of all these sustainable technologies.

The main focus of this paper is to provide an overview of implementation of various sustainability practices which includes evaluation of technologies, holistic and systems approach.

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Technology Evaluation

Masdar has a technology roadmap to attract and develop innovative technologies. This involves implementing the best innovative technologies of today, while developing and evaluating technologies that will eventually lead the market tomorrow.

One of the largest obstacles facing technology is the delivery and implementation. In order to achieve this goal, Masdar has set out a process by which to identify,

Figure 1: Technology Selection for Testing and Implementation

evaluate, study, test, and eventually implement the best practice to fit desired needs. Figure 1 shows a schematic view of the stages involved in the process for technology evaluation.

Masdar City vision required a balance between delivery and technology where flexibility is built into infrastructure as it is designed and implemented. Masdar has a piloting and testing programme that will complement the best-practice of today and eventually supplement technology. After the city transitions into the operation stage, testing of innovative technologies will remain. It is envisioned to have a piloting area designated at Masdar for continual testing programs, upgrades, and city advancement. Specifically, a cost-benefit, financial and risk analysis will be performed for each of the technologies implemented. If a technology shows limited success for the cost required for its use, it will be re-evaluated. The city design builds upon flexibility and ability to enhance technology based on the feedback from the testing program. This process helps in identifying optimal site-specific solutions.

Holistic & Systems Approach

Energy Management

Masdar City encourages research into lowering energy costs and, also ensures energy efficiency in its buildings. The current Masdar Institute buildings and surrounding infrastructure features world-class insulation technologies -- nearly all domestic hot water is provided by roof-mounted evacuated tube solar thermal collectors; shaded streets allow for areas inside Masdar buildings to be relatively cooler than elsewhere; and the latest low-energy lighting specifications ensure lowered costs. Energy and water metering systems monitor consumption and produce data that is readily accessible to students and faculty. Last year Masdar buildings achieved 51% reduction in electricity consumption, 54% reduction in water consumption and 50% reduction in cooling needs compared to average consumption across United Arab Emirates (UAE).

The entire energy needs of Masdar Institute buildings are generated on premises. The 10MW solar photovoltaic (PV) plant, the largest grid connected solar power plant in the Middle East, and the 1MW solar PV panels located on the roofs of Masdar Institute buildings meet the energy requirements of Masdar City. Any excess power generated is fed back into the grid. Research is on to explore other sources of energy: waste energy recovery, and possibly both geothermal heat exchange and enhanced deep-rock geothermal energy. This multi-faceted approach is intended to supply both electrical and thermal energy for city usage.

Waste Management

Not restricting to energy only but waste and water aspects has also been addressed. In the first construction phase at Masdar City, only 50% of waste within the city has been diverted to landfills. The components of the waste stream are separated for reuse in various technologies for possible energy production. The long-term target is more than 90% diversion of waste from landfill, a target that will be achieved if Abu Dhabi-implements waste-to-energy plant.

Water & Wastewater Management

Masdar City adheres to the “One Planet Living Principles of Sustainable Water” (Bioregional, 2008). The aim of these principles is to achieve a positive impact on local water resources by implementing water use efficiency measures, re-use and recycling; minimising water extraction and pollution. The objective is to

reduce the current footprint by almost 50% percent by fostering sustainable water and sewage management in the landscape and restoring natural water cycles.

It is planned that there will be separate conveyance systems for different uses of water. There will be separate water conveyance systems employed at Masdar City to serve a variety of defined uses over at least 3 distinct treatment levels. Planning for such intensive water management strategies requires the development of infrastructure and technology to meet these ultimate goals. The plan is to undertake an indirect recycling scheme which utilises minimal amounts of desalinated water as a primary source. Greywater[4] and Blackwater[5] streams are collected, treated to desired levels, and then returned to the city's water cycle for reuse.

A vacuum sewer system is planned to be constructed to convey wastewater to a central treatment plant. Temporary membrane bioreactors (MBR) are being utilised for treatment, while technology innovations are underway for future construction phases and piloting. After treatment, wastewater will be used for landscaping, district cooling, and for recharging aquifer.

Although, optimising water supply and mapping it with current consumption patterns within city will pose a significant challenge; also, to meet the growing demand as construction begins and afterwards during operation, to mould the consumption behaviour of people will be a challenge too. But this challenge will be addressed through the use of various communication tools and dashboards for raising awareness of the end user.

The Masdar Initiative recognizes the integration of water management with other resource sectors, including energy and solid waste. This requires consideration and integration of all systems. Implementation decisions in the city cannot be solely made by one utility group. For all water treatment systems, robust investigation needs to evaluate the energy consumption and waste produced.

Monitoring

To assist in technology decisions and to measure sustainability performance, a web-based management system was developed to meet industry-recognized sustainability standards and principles and will monitor the following key aspects of sustainability for Masdar City, shown in Table 2.

The web-based management system developed will help achieve programme objectives in the following ways:

- Promotes more accurate scenario planning.
- Facilitates scenario analysis and decision making.
- Helps educate the public.
- Provides tools and guidelines for the programme management team and other programme stakeholders.

Table 2: Key Sustainability Targets to be Monitored

Key Aspect	Target
Greenhouse gas (GHG) Emissions	Minimize GHG emissions through the efficient management of energy and the reduction of CO_2 (e) in facility design, construction, and operation; transportation; and user behaviour.
Waste Management	Minimize waste through elimination, reduction, reuse, recycling, and recovery.
Resources	Provide a sustainable water supply and or enhance or protect local biodiversity.
Social	Create and maintain a high quality of life in a sustainable manner through optimizing positive and minimizing negative impacts associated with land, water, air, noise, light, health and well being.
Economics	Increase sustainable business development in the UAE
Project Management	Metrics for measuring performance in these key areas have been developed. SMS is being designed to track the performance of both the programme management team and the Masdar City development according to these metrics.

[4]Greywater is defined as spent water from sinks, showers, and wash basins possessing low BOD and pathogens. This excludes spent water from toilets, dishwashers, and kitchen sinks.

[5]Blackwater is the waste water from toilets, dishwashers, and kitchen

When fully implemented, the management system will serve as a platform that fully integrates sustainability requirements into planning, construction, and operations.

INDIA Application

In both the United Arab Emirates (UAE) and India, water management and conservation are critically important. In the UAE, the available water resources are seawater and groundwater (which is limited and depleting resource). India in recent years has faced severe water shortage that requires careful planning and management.Masdar's experience with water conservation and water reuse can readily be applied through the use of closed loop systems, therefore reducing India's reliance on potable water supply.

The integration of renewable energy into the water framework can be a critical aspect to the Indian case. India also sees a predominate amount of sunlight throughout the year, which will benefit solar installations. Additionally, in rural areas of India, solar energy could be utilised so there is no reliance on a central grid connection.

Many of the lessons learned from Masdar can be directly applicable to India, especially in arid and desert areas. Masdar City is a test bed for research and innovation and a cleantech cluster which is already attracting the world's best in all areas of sustainability from renewable energy to biomass. All types of companies from innovators, incubators, research and development, pioneers and solution providers are becoming part of the journey to create, work and live in Masdar City. Part of this uniqueness is that Masdar is a large-scale and, eventually, citywide testing ground. This leads to practices that are studied at Masdar will be easier and cheaper to implement elsewhere. The knowledge gained or successful experience with some new technology will make it more likely that it will be implemented elsewhere, including in India.

More broadly, the fact that Masdar has achieved its low carbon, low-waste goals in such a harsh environment proves that such levels of sustainability are practicable and therefore more likely to be pursued in other places.

Conclusions

Masdar presents a unique opportunity in its ability to demonstrate innovative technologies and concepts. The construction of the city focuses on minimisation principles while pairing with innovative technology.

Technology development requires a thorough process for selection. From gap identification, to a multi-step evaluation process involving modelling and technology analysis that may eventually lead to a study or implementation.

From the groundbreaking work being developed at Masdar, the lessons learned and challenges faced will aid in delivering future sustainability goals and projects. Individual projects or indicators can be repeated in new locations, such as India, or used as a template for future application. The knowledge gained from Masdar is critical in curbing climate change while also providing ideals for others to follow.

Acknowledgments

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Reducing the Housing Footprint:
Building Sustainanble Green Homes through Housing Innovations

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As India steps into an era plagued with energy shortages, efficiency seems to be the need of the hour. Research indicates that an appropriately chosen design, the use of local construction materials and the incorporation of indigenous construction practices reduce energy consumption and pollution by thirty percent[6]. Aside from reducing fuel and power consumption, energy efficient building technologies save the homeowner considerable costs in the long run. These dual benefits highlight the importance of investing in sustainable construction practices.

Habitat for Humanity India has been building sustainable homes across India for over the last 30 years. This article discusses a few of the principles of sustainable construction that Habitat for Humanity India has adopted and examples illustrating the impact of the same.

Habitat home partner at a construction site for his home

Owner-driven construction

Ensuring local participation in decision-making processes is one of the principles of sustainable construction. Habitat for Humanity India ensures that all its home partners have the freedom to decide how to build their own homes in terms of design and structure under our shelter assistance programmes[7].

Habitat also involves home partners in the entire construction process, mandating a stipulated number of hours that home partners give towards building their own homes. This contribution, otherwise known as 'sweat equity' has resulted in the development of sense of 'ownership' amongst Habitat for Humanity India's home partners towards shelter assistance programmes. Moreover, because the home partner family is so closely involved in the construction process, the shelter assistance provided is experienced as a 'hand-up' not merely a 'hand-out'. The result of enhanced self-esteem is on account of this principle of owner-driven construction.

Furthermore, research findings suggest that owner driven construction facilitates better maintenance and preservation of homes post-construction.

Keeping the local context alive

Another principle of sustainable construction focuses on the use of local knowledge, materials and practices while building houses. Traditional construction practices have developed over time and hence are often the best indicators of sustainable measures.

Habitat for Humanity India relied on local knowledge during the aftermath of the Leh disaster and subsequent reconstruction process. Twenty-four homes were built by Habitat for Humanity India using simple, effective construction methods. These methods included the orientating homes to trap maximum sunlight, constructing multi-layered flat roofs, using willow rafters with sawdust insulation and building Trombe walls.

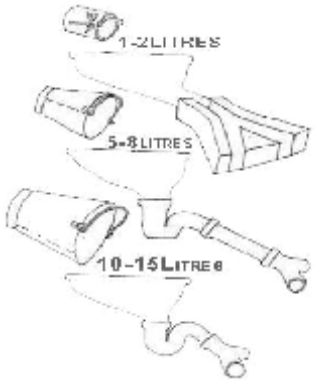
[6] *Environment Protection Agency: http://www.epa.gov/cleanenergy/eeactionplan.htm*
[7] *Habitat for Humanity's Shelter Assistance Programmes comprise: construction of new homes, rehabilitation of houses, incremental constructions, home repairs & home improvements.*

Habitat home in Leh with a Trombe wall

A Trombe wall is a sun-facing, thick wall that is designed to trap solar energy during the day and release it within the home at night. In Leh's sub-zero degree winters this simple technology, replaces the need for conventional heating options. Trombe walls are built from local materials such as saw dust, concrete, bricks and provide low-income families with an affordable, sustainable option for heating their homes.

Using appropriate sanitation systems

Aside from the home, sustainable construction also emphasizes the need for appropriate sanitation which involves optimal use of water and proper disposal of waste.



Habitat home with high slope pan toilet
Source: Center for Science for Villages, Wardha (CSV)

Habitat for Humanity India homes are built along with eco-friendly, socio-culturally acceptable and economically affordable sanitation units. Given the paucity of water in rural areas Habitat for Humanity India builds high slope pans that require minimal water for flushing. These toilets comprise a pan with a steep slope of 35 degrees, especially designed to reduce water usage by 15%.

Recycling and re-using waste material

Sustainable construction mandates the use of recycled material wherever possible. To save natural resources and energy, an effort must be made prior to construction to check whether recycled material can be used.

Habitat for Humanity India developed a housing innovation that uses recycled material – Tetra packs – to build roofs. These roofing sheets made out of 100% recycled wastage have been proven to be fire retardant and anti-fungus under extreme weather conditions. The semi-reflective surface of the sheets make it more luminous and saves substantially on power bills as fewer lighting fixtures are needed. Tests have shown that the Tetra pack roofing sheets keep homes cooler by about 25% compared to conventional roofing systems. Due to lightness of the product and zero water absorption property the product proves to be economical in long run as investments in structural fabrications gets reduced by almost 50%.[8]

As illustrated in the above examples, Habitat for Humanity endeavours to build sustainable green homes through implementing innovative technologies and practices. Habitats for Humanity India's sustainably built homes not only transform the lives of beneficiary families, but also the surrounding environment and communities.

References

United Nations Environmental Programme (UNEP). After the Tsunami: Sustainable building guidelines for South-East Asia. 2007

[8]Green Roofs for Healthy Cities: www.greenroofs.org/

Are 'Green Buildings' Just another Marketing Stunt?

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One of my industry colleagues was remarking the other day that every building today seems to be advertising itself as a Green Building, and he further added that it is very evident now that Green is just another marketing stunt, implying that the claims are not necessarily valid or in other words, the buildings are not really Green. I know that many share this view. While his conclusion does not directly follow from his observation, he might still have a

point. Just because every building is a rated Green building, it does not necessarily mean that it is a mere marketing stunt. It surely means that Green rating is no more a major differentiating factor and in that sense has reduced marketing stunt value. But the real question to ask is 'Are Green rated Buildings truly Green?' If they are, then we have reasons to be happy from the planet's perspective, irrespective of whether it is providing any useful brand differentiation for the developer. But, if they aren't truly Green, then we have reasons to be concerned.

Now, this is not an easy question to answer because nobody can claim the sole right to define what is truly Green. At its best, it could just be an 'ideal' that everyone strives to achieve, and as we get closer to the ideal, we keep setting the bar higher. This approach would mean that, at any point, there would only be a few buildings that are successfully rated Green. Considering that we have many Green rated buildings (See Figure 1), it is quite obvious that we are not following this approach. We are either setting the bar quite low or the process of awarding a rating is not strong enough. All this calls for greater exploration of this subject, and I am presenting my views here in the hope that it will lead to improvements.

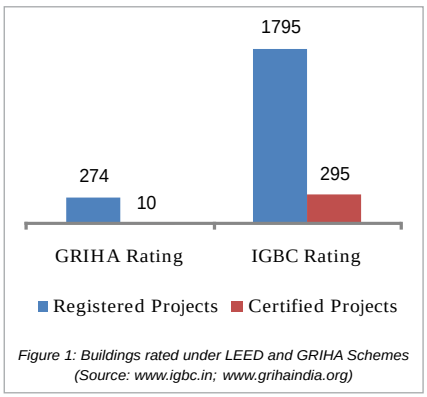


Figure 1: Buildings rated under LEED and GRIHA Schemes (Source: www.igbc.in; www.grihaindia.org)

One of the first things to understand is that there are many internal conflicts in the way the system is structured – the first conflict arises from the fact that Green rating is a voluntary compliance concept i.e. it is a challenge that one sets for oneself to achieve, and if successful, it provides a stamp of recognition of environmental performance of the building. The conflict is as follows – if the standards are very high, then it might discourage a lot of people from attempting the challenge and this may eventually lead to the death of the system. And if multiple systems co-exist, then the one that is easier to achieve becomes more popular. It would take many years for a system that sets a higher standard to develop its 'halo' as the 'ultimate' of all systems. An example of this could be the 'Living Building Challenge' system in the US that attempts to pursue 'deep Green' ideas. It is also widely recognised that the Indian GRIHA rating is more difficult to achieve than an IGBC LEED[9] rating. Many systems try to take care of this issue by providing multiple rating levels – from the minimum to the ultimate. However, the conflict that I talked about applies even to the entry level or the minimum level of the rating system. Hence, what often happens is that the stricter system gradually dilutes its

[9] *To know about IGBC LEED rating visit : http://www.igbc.in/site/igbc/index.jsp*

entry levels to gain wider acceptance and popularity.

Another conflict pertains to the need for rating systems to be very objective and this often requires a breakdown approach, while sustainability is an idea that is based on holistic thinking. While not totally insurmountable, there are situations when a truly Green and sustainable building loses its rating for want of one parameter, while a not so sustainable building gets a high rating level. A subjective assessment often can take care of this, but the world has swung so much towards objective evaluation that subjectivity has become unthinkable. Figure 2 gives the parameters where

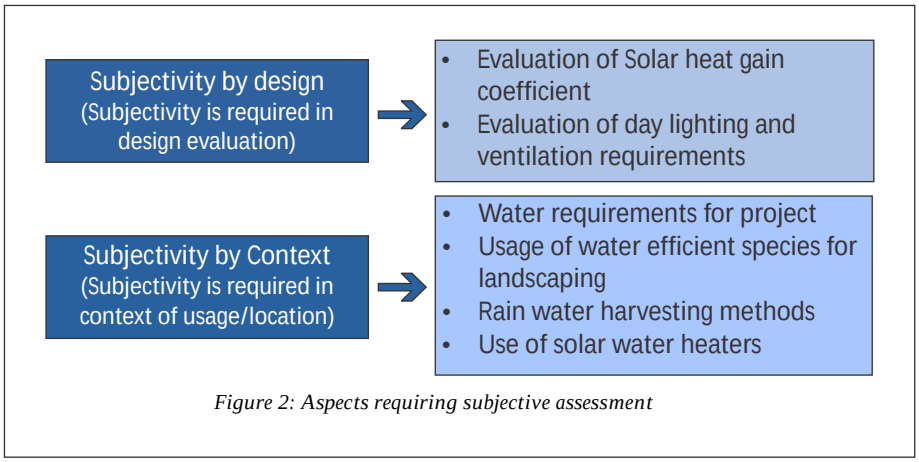


Figure 2: Aspects requiring subjective assessment

subjectivity may be introduced in awarding points in the rating system.

Further, there are also many other kinds of drawbacks in different rating systems. For a variety of reasons, some rating systems like the LEED rating system look at energy performance in a relative manner i.e., it tends to compare a building's energy performance (based on a model developed using the design intent) with an equivalent building designed for minimum accepted standards (like ASHRAE[10]). It then awards points based on how much the building in question exceeds the equivalent standard building. This approach does not take into account any absolute benchmarks for energy consumption. The argument here is that every building's context is very different and the performance assessment should be relative to that context. The contexts cover aspects such as climate considerations, usage considerations, etc. (See Figure 3). In the absence of simple and easily measurable benchmarks, this system allows the modeller to creatively show superior performance by choosing and

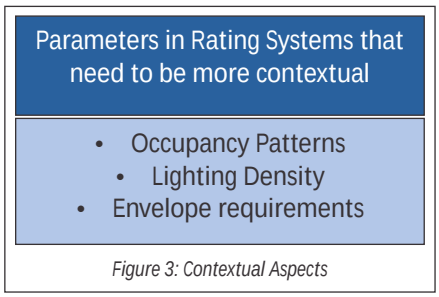


Figure 3: Contextual Aspects

defining contexts creatively. While not casting any aspersions on the genuineness of modellers, it is again widely acknowledged that many real life situations cannot easily be modelled and hence suitable assumptions have to be made. This potentially creates distortions between actual performance and modelled performance.

Another drawback arises from the fact that most rating systems take into account design intent and the Developer is expected to self-certify if the design intent has been complied with. Ratings are awarded on the basis of such declarations. While again not casting aspersions on people's integrity, it is possible that in the hurly-burly of completing the project, one may not pay close attention to whether the design intents have been strictly observed or not (see Figure 4 for examples). Such discrepancies are often

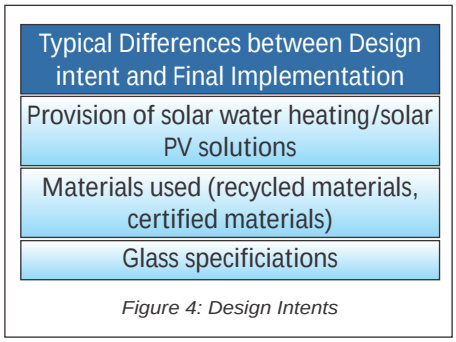


Figure 4: Design Intents

observed between pre-certification and certification stages. A larger question is whether the actual post occupancy performance is taken into account while giving a rating because this aggregates everything. The

[10]*ASHRAE is a building technology society with more than 50,000 members worldwide. The Society and its members focus on building systems, energy efficiency, indoor air quality and sustainability within the industry. To know more about ASHRAE standards and guidelines , visit: http://www.ashrae.org/standards-research--technology/standards--guidelines*

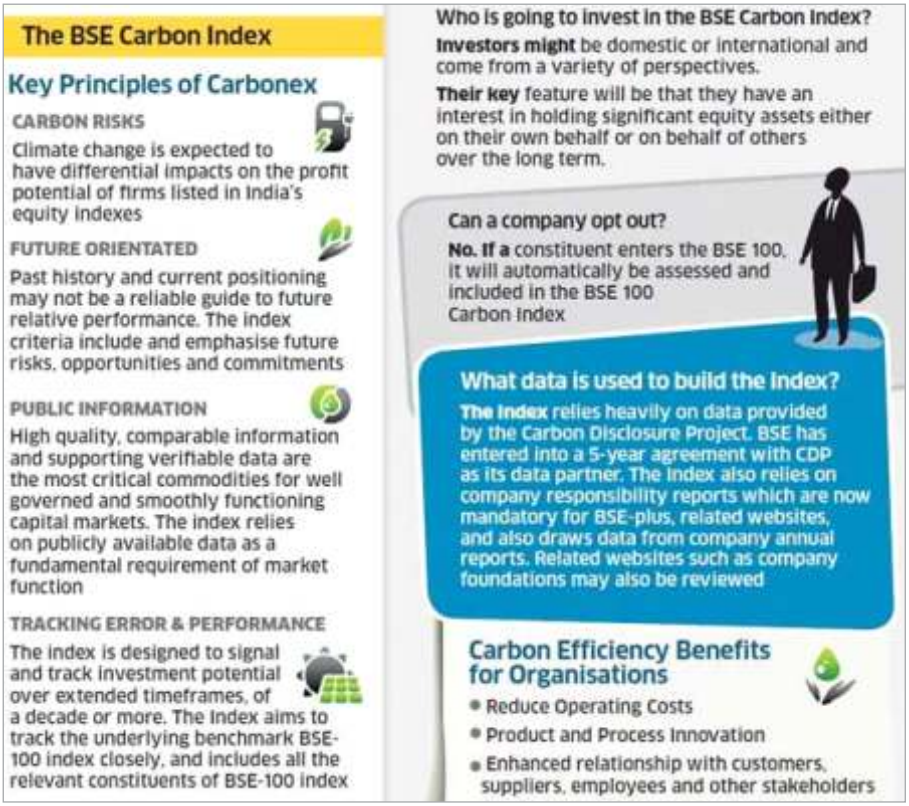
answer is that in most cases the actual performance does not form the basis of the rating and there are many reasons for this – firstly, it pushes the rating award by a couple of years which is usually the time taken for buildings to be fully occupied, and secondly, it is not easy to measure actual performance of the building very accurately post occupancy. On the same note, many rating systems do not have mechanisms to review performance post commissioning and re-evaluate ratings already awarded. It is conceivable that in the case of certain buildings, particularly commercial buildings, which have secured a good rating award on the basis of certain efficient systems installed; one may find that the installed system is not functioning as intended beyond commissioning.

Another point is that of embodied energy – some rating systems like LEED do not account for embodied energy of the materials of the building. It is widely acknowledged that this could be as important as operational energy and hence needs to be recognised.

In summary, I would like to say that a voluntary compliance idea like the Green Building rating system concept will succeed only if the integrity levels in business and society at large are of a high order. It is quite clear, if we go by the prevalent business practices, that we still have a long way to go. We see short term orientation and opportunism all around us. In this setting, it is likely that the conclusion drawn by my industry colleague is not far from the truth i.e., most of our Green Buildings are not truly Green – it is just another marketing stunt. But, everything has to begin somewhere. I am glad that we are at least talking about Sustainability and trying to understand what true Sustainability means. Hopefully, as integrity and ethics in business and more particularly in the real estate sector improves, these rating systems will also become more reliable and would serve a more useful purpose.

The BSE Carbon Index: BSE CARBONEX

The Bombay Stock Exchange (BSE) in collaboration with UK Government launched its first thematic carbon based index to disclose companies' commitment to climate change mitigation on 30th Nov 2012. Modelled on UK's FTSE CDP index, the BSE CARBONEX aims at creating a benchmark and awareness about the risks posed by climate change. It gives investors a method to track long-term climate change risks and opportunities in their investment strategy, which is not adequately considered in analytical approaches to company performance.



Greendex Index (Survey 2012)

The Greendex is an index of sustainable consumption that scores the environmental impact of each consumer's behavior in four categories or sub-indexes: housing (30% weighting), transportation (30%), food consumption (20%) and goods (20%). The goods sub-index is further divided into everyday purchases and disposal and big-ticket items such as appliances.

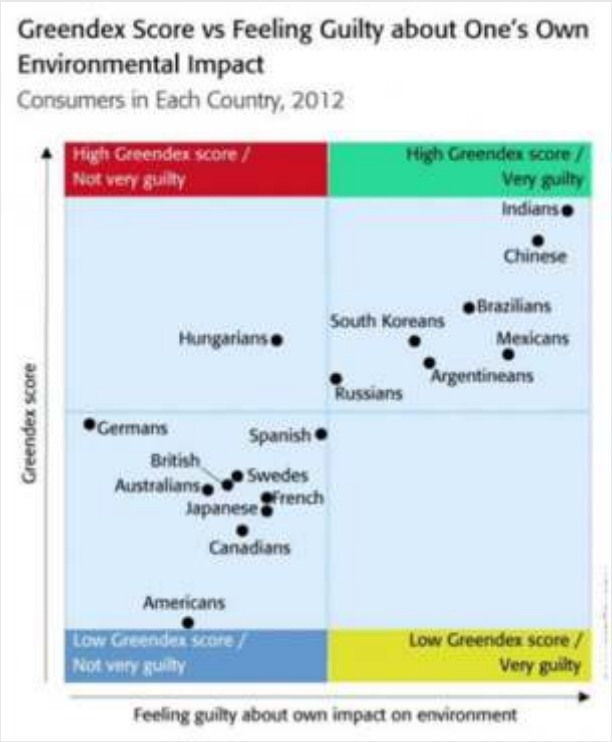
The Greendex Survey was conducted by the National Geographic Society and research consultancy GlobalScan. The results of the survey were presented in The Annual Greendex report 2012. The survey was conducted on 17,000 consumers in 17 countries to quantitatively measure the number of environmentally friendly people all around the world.

The survey was a measure of consumer behaviour in 65 areas relating to housing, transportation, food and consumer goods.

The results of the survey were found that Indians had the most sustainable behaviour, followed by Chinese and Brazilians. Americans ranked last in the survey and France ranked last in the Europe. According to the survey, India was on the top with a Greendex score of 58.9, followed by China at 57.8, and then Brazil at 55.5. USA scored 44.7.

The people who had the highest footprint were found to be least bothered about the result of their impacts on the environment. Despite the highest sustainable behaviour, 45% of the consumers from India and China were found to exhibit guilt over the consequences of their actions. Only 21% of American consumers did so.

In contrast, only 21% of US consumers were found guilty about the impact they have on the environment.



To read more about the survey, visit : http://www.globalsherpa.org/green-consumer-research-sustainable-consumption

The Update section has been compiled by Sonal Kaushik, Environmental Management Centre, Mumbai

Sustainability Committee

FORTHCOMING PROGRAMME

1. **Field Visit to Godrej Company at Vikhroli** - Plant 13, Multi Purpose Convention Center on Friday, February 21, 2013.
   For more details kindly contact Ms. Usha Maheshwari / Ms. Mani Nair, Tel. 49100214/223, E-mail: um@bombaychamaber.com / nairma@bombaychamber.com

2. **Workshop on Social Return on Investment (SROI)** on February 21, 2013 at Bombay Chamber Conference Room, Mumbai.

Objective :	To understand the importance and applicability of social return on investment, the methodology to calculate SROI and Measurement and tracking of CSR and the challenges faced by the companies.
Speakers :	Dr. Meena Galliara, Director, Center for Sustainability Mgmt. and Social Entrepreneurship, NMIMS & Prof. Ananya Prabhavalkar, Visiting Faculty, NMIMS
Contents :	What is Social Return on Investment?; Need for SROI in companies; How to calculate SROI?; Impact mapping; Challenges in calculation of SROI & Tools and Techniques for measurement of CSR, (Environment, Community, Workplace, Marketplace).
Participation Fees :	For members - Rs.2,000/- Per person (inclusive of Tax) Non-members - Rs. 2,200/- Per person (inclusive of Tax)
Mode of Payment :	Cheque/DD/electronic transfer in the name of Bombay Chamber of Commerce and Industry
RSVP/ Registration:	Ms. Mani Nair / Usha Maheshwari Tel. 49100223/214, Email - nairma@bombaychamber.com / um@bombaychamber.com

The Committee has organised following events during October to December 2012.

1. Interaction with the visiting Delegation from Japan to "Share experiences of Japanese Companies on sustainable use of BES (Biodiversity and Ecosystem Services) - October 12, 2012.
   [For report, please visit : http://www.bombaychamber.com/Uploads/Committee/ Committee WhitepaperDocument/ Report_on_Japnese_delegation.pdf]

2. Partnered with London Global Convention on Corporate Governance and Sustainability - October 10-12, 2012 at Marylebone Cricket Club, Lords Ground, LONDON, NW8 8QN, UK.
   [For report, please visit : http://www.bombaychamber.com/Uploads/Committee/ CommitteeWhitepaperDocument/Report.pdf]

3. One - day Workshop on Corporate Social Responsibility - in collaboration with Narsee Monjee Institute of Management Studies (NMIMS) and supported by HPCL. It has also received non-financial support from Dept. of Public Enterprises, GoI. Mr. O. P. Rawat, IAS, Secretary DPE inaugurated the workshop and delivered key note address.
   [For report, please visit : http://www.bombaychamber.com/Uploads/Committee/CommitteeWhitepaper Document/REPORT_CSR_Nov_2.PDF]

4. Short Courses on Energy, Water & Sustainability Understanding the Nexus - December 6, 2012 & Improving Energy & Water Efficiency - December 7, 2012
   [For report, please visit : http://www.bombaychamber.com/Uploads/Committee/ CommitteeWhitepaper Document/Report_for_BCR.pdf]