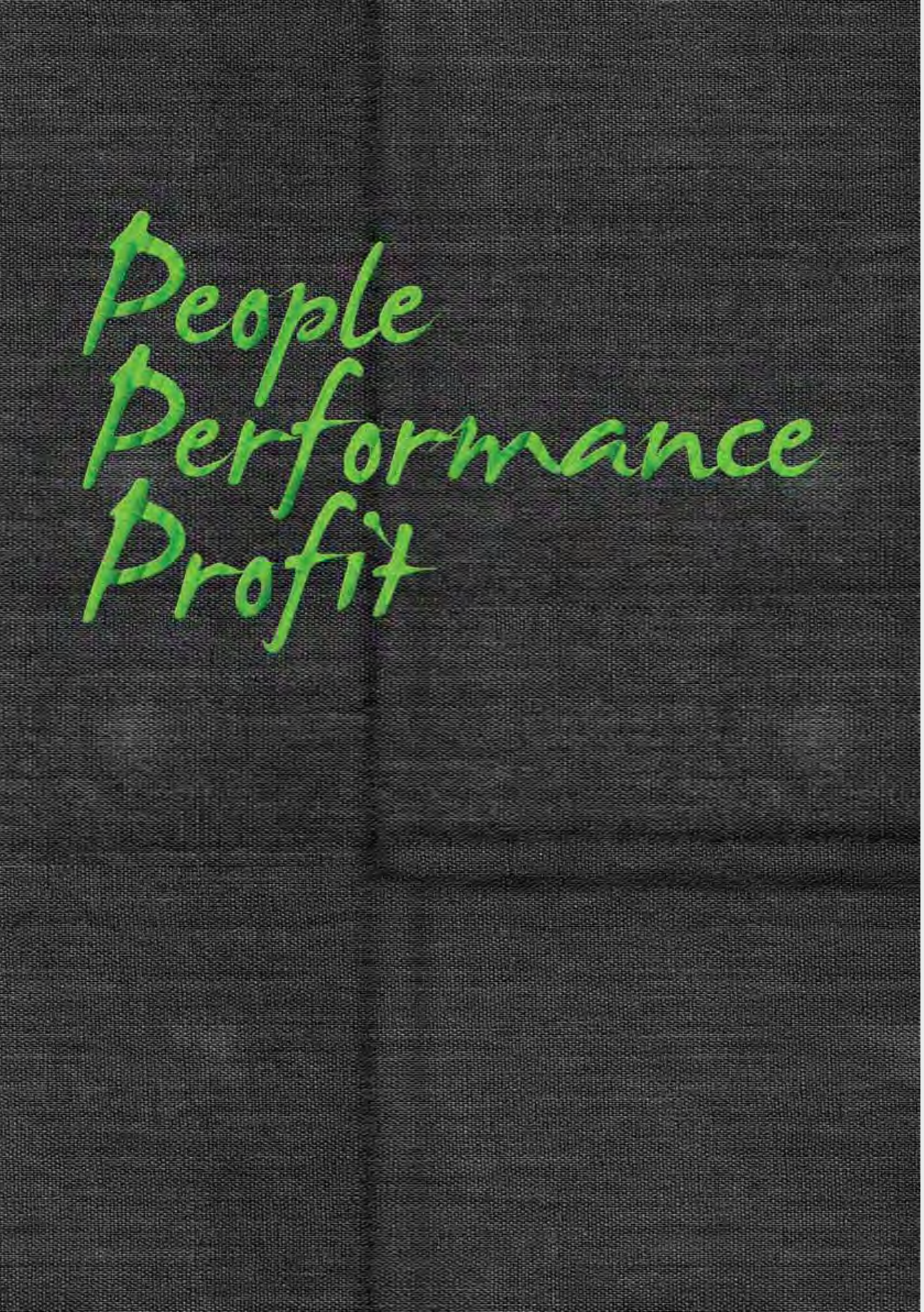
DREAMS ARE THE SEEDS OF CHANGE. NOTHING EVER GROWS WITHOUT A SEED AND NOTHING EVER CHANGES WITHOUT A DREAM.

Debby Boone



Dear fellow greeners,

Imagine a city, which not just focuses on ad-hoc tree planting but extensively engages in enhancing its green cover. Think of a city where architecture is not just created to cater to present needs but is built to absorb years of forward demand. Consider a city where nature is not built into architecture but architecture is built as a part of nature.

At Bio Wonder, we have attempted to precisely achieve these objectives.

To think of Bio Wonder as a standalone structure or just another building would be like missing the big picture. The fact is that Bio Wonder is a concept that will unleash a green revolution in Kolkata, setting a benchmark for all future constructions where nature and architecture will talk to each other, will be comprehensively integrated with each other and will promote an environment of healthy and spirited living.

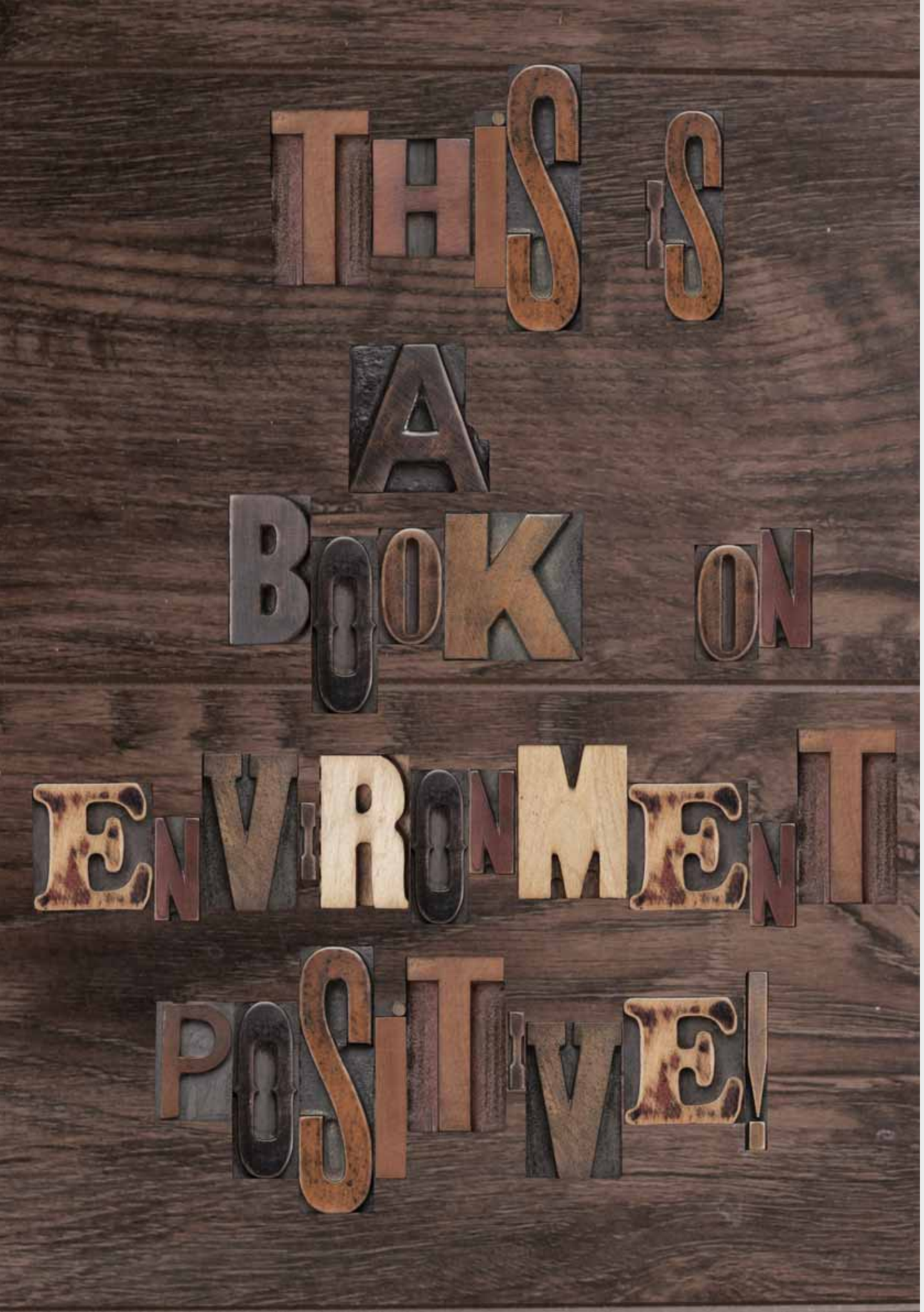
I must mention that the foundations of Bio Wonder have been laid on the 3P principle: People, Performance and Profit, and in that order.

Bio Wonder has been conceived with the sole objective of encouraging human-nature interconnectedness, where a strong emphasis has been given on establishing the rhythmic relationship between people and nature. This unison will enable Bio Wonder's inhabitants (People) to live and work in a de-stressed, peaceful and serene atmosphere. This productivity-enhancing environment in turn, would raise the Performance bar, resulting in higher returns on the capital employed (Profit).

I strongly believe that this sequential order of the 3Ps - People-Performance -Profit - will enable Bio Wonder to be positioned as a landmark development with a green quotient that will emerge as an industry reference.

With my very best regards,

Ashok Pasari
Developer



My dear readers,

This is not a book on shifting landmasses, declining population of the arctic penguins, increasing temperatures in cities, growing global water wars, waning urban green covers or melting ice caps.

This is a book on how - despite all the issues and challenges facing us today - there is hope because inspired individuals the world over are taking up the cudgels to do their bit to protect the environment.

This is a book on one-man armies, groups, societies and communities that have gone against the tide to participate in environmental causes not by writing lengthy petitions but by silently planting seeds and enhancing the green cover. This is a book on real life instances of green warriors championing the environmental cause.

This book is a collection of stories that find resonance with us as we embark on integrating nature with architecture to create India's best green commercial complexes in one of India's most happening cities - Kolkata.

The creation, christened Bio Wonder, will not only harness nature's bounty but also enhance workplace efficiency and productivity. The complex will not only establish a world-class working environment but will also incorporate a 120-room business hotel boasting of world-class amenities.

The simple idea behind Bio Wonder is the establishment of a green pincode that will catalyse corporate activity, strengthen work-life balance and raise the overall standards of living.

At Bio Wonder, we are an environment positive group as much in the business of nurturing nature as in developing exciting real estate landmarks.

Inspired environment positivist,

Vivek Rathode
Chief Architect

Inspiring environmental stories

TO SEE THINGS IN THE SEED, THAT IS GENIUS.

Lao Tzu

ARE YOU BREATHING STALE AIR?

Authentic research has demonstrated that a rising number of workers breathe yesterday's air, inhale each other's carbon dioxide, work in monotonous spaces under a field of fluorescent lights and pretend it is all healthy because their workplace is air-conditioned.

If you have eye-strain, suffer from lethargy and respiratory disorders and have mild headaches by the time you switch-off your laptops, the culprit could well be your office. Doctors indicate that the doubling of asthma since 1980 is a result of foul indoor air. Pollutant levels indoors are two to five times - and surprisingly on certain occasions, 100 times - more concentrated than the outdoors. It is estimated that US companies could save as much as USD 58 billion annually by preventing sick-building illnesses. Better still, financial benefits of improving office climates could be almost ten times higher than the costs of making those improvements!

CURE FOR SICK BUILDING SYNDROME IS A GREEN MEDICINE!

Repeated complaints of ill-health among workers were earlier dismissed as an excuse to skip work. But modern thinking recognises that continual lethargy may really be something called the ‘sick building syndrome’ (SBS) that simply calls for a serious look into workplace design rather than employee character!

In 1982, the WHO had acknowledged the presence of SBS, which was increasingly characterised by skin, breathing (sore throat, persistent cough, blocked nose and sinusitis), muscular, joint (stiff shoulder and back ache) and neurological issues (tiredness, headache and digestion disorder). More importantly, it estimated that one out of every three workers could well be slaving away in a workplace that could be making them sick.

Probable sickness-inducing features include

1. Carbon monoxide and other contaminants being sucked into a building especially when air-intake vents lie close to exhaust-filled loading docks and parking garages
2. Volatile organic chemicals (VOC) seeping out of building materials, furniture, office equipment, carpets, paint and pesticides
3. Moulds and bacteria funnelled through dirt-filled heating, ventilation and cooling systems (HVAC)

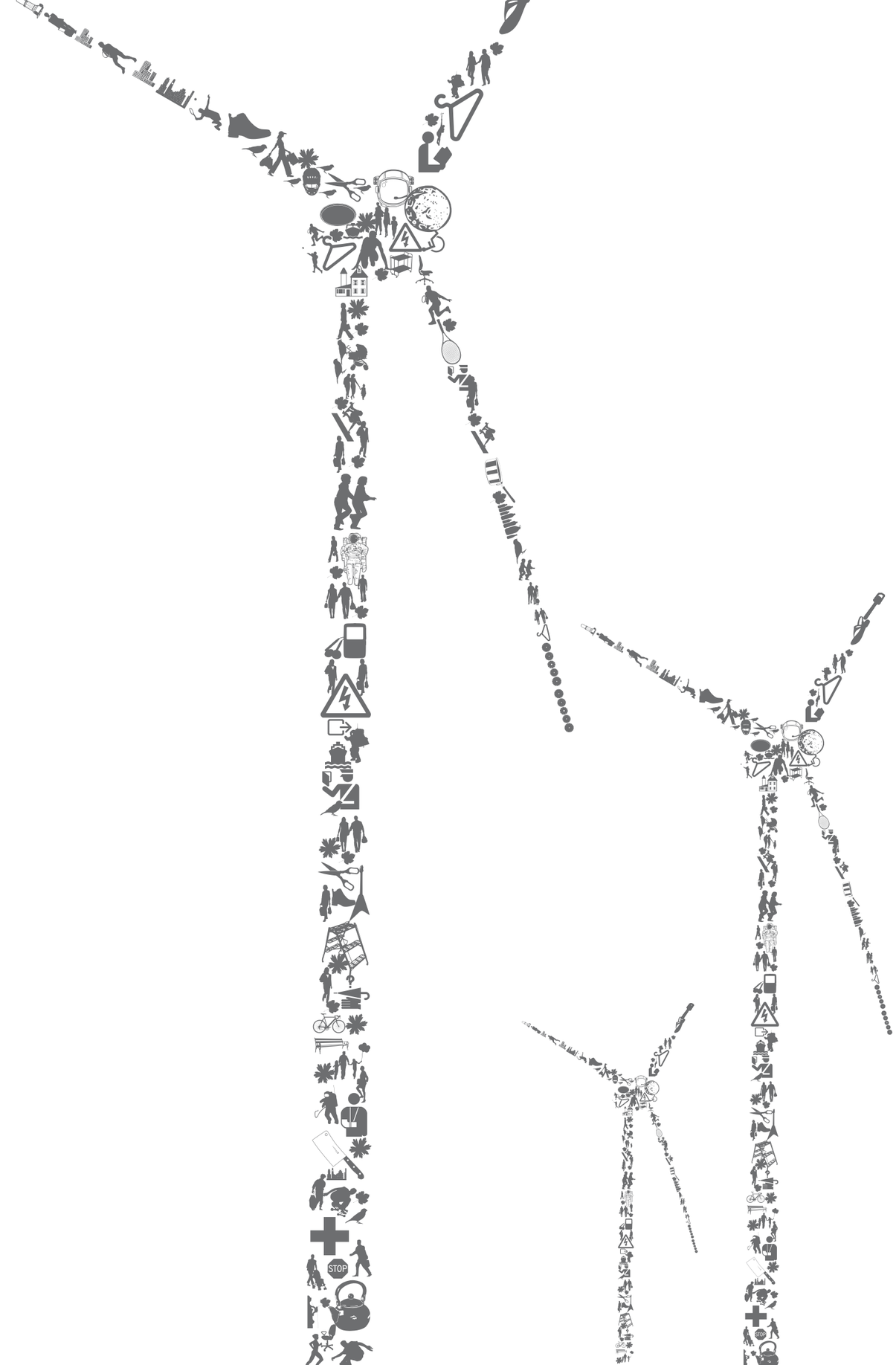
The answer to this problem? Green buildings.

Architects the world over are offering green solutions through designing offices and homes that protect occupant health through improved air quality, lower storm water runoff and heat island effect. They are also paying growing attention to increasing efficiency with which buildings use and harvest energy, water and materials, leading to lower costs.

GREEN ENCOURAGEMENT

To encourage the green movement, the US Green Building Council (GBC) has formulated a set of parameters called Leadership in Energy and Environmental Design (LEED), which promotes a refreshing whole-building approach across five key areas comprising sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

This encouragement was enough for furniture maker Herman Miller to create its factory (in Michigan), marked by 100% fresh air and daylight. Productivity improved 1.5%, enough to pay-off the building's USD 15 million mortgage. Around 16 workers who quit in 1999 for better-paying jobs returned within two weeks. Similarly, a Danish study showed that typists increased their output by 6% in offices with cleaner air. In many cases, indoor air systems suck in 0.14 cubic metres of fresh air per minute per person, whereas the American Society of Heating, Refrigerating & Air Conditioning Engineers (ASHRAE) recommends that HVACs pump in 20 cubic feet of fresh air per minute per person, a level below which symptoms increase.



GREEN LAW

In 2005, Washington became the first state in the US and possibly in the world, to enact the green building legislation. According to the law, all major public agency facilities with a floor area exceeding 5,000 sq.ft. were required to meet or exceed LEED standards. The benefits of the LEED standards are such that it is only a matter of time before every building will need to have a distinctively green side to it.

The projected benefits from this law are

- 20% annual savings in energy costs
- 20% annual reduction in water costs
- 38% reduction in waste water production
- 22% reduction in construction waste

20 % annual savings in energy costs

20 % annual reduction in water costs

38 % reduction in waste water production

22 % reduction in construction waste

Natural light flows in, even in the basement. The taps let out a mere 1 litre of water per minute - compared with 4 litres let out by neighbourhood taps. Over 40% of the household electricity is generated from solar power with a near 60% savings in electricity bills a mere 6 months after moving in. The two-storey, 15,000 sq.ft. structure is the only residential building in India to be bestowed with the internationally-recognised PLATINUM tag. Welcome to Arjun Vallery's residence!

GREEN LIVING

The new Hyderabad international airport is Asia's first airport to register under the USGBC's LEED NC certification for silver rating and will emerge as the world's first certified green building. The airport consumes 25% less energy than an identical facility without environment-friendly installations. Its energy-efficient features comprise reduced overall walls and roof conductance, high-performance glass with low shading coefficient, optimum visual light transmittance, efficient chillers, ample day-lit common spaces with photo sensor-controlled electric lighting and automatic temperature controls based on heat and passenger loads.

GREENER FLIGHTS

GREEN RECRUITMENT

With a massive scramble among companies to maintain the ‘green’ tag, to market themselves as being environment-friendly and earn a good name among consumers, the demand for sustainability officers has shot up now than ever before. Consultants say that demand for such officers has increased over 40% year-on-year. Many organisations have seen their businesses being shut due to protests from locals, owing to environmental concerns. A sustainability officer looks into the impact of products on the environment and devises strategies to protect the atmosphere. For instance, Essar’s BPO Aegis has a separate sustainability team called ‘Happy World’ working on green issues. Coca Cola has a full-fledged green team led by a general manager, also boasting of a hydro-geologist. Moreover, each of its bottling plants has dedicated environment resources. A study by Green Economy India, a portal dedicated to green jobs and education, shows postings from at least 8-10 mid- to small-sized companies for environment professionals.

Wipro's campus in Bengaluru's Electronics City

It is a normal sunny day where everything appears to be the usual. But look closer and you will find that the humming windmills supply power to the campus streetlight, and methane gas produced from food waste provide fuel to the kitchens. The technology giant meets almost 52% of its water requirement from recycled water; it has designed and implemented its data centres in such a fashion that it saves the company almost 20,160 units electricity per month. That in turn saves over 45 kg of carbon di-oxide emissions per year. Moreover, Wipro's environmental responsibility stretches to the extent that the company does not engage with suppliers and partners who do not adhere to energy efficiency and waste management norms.

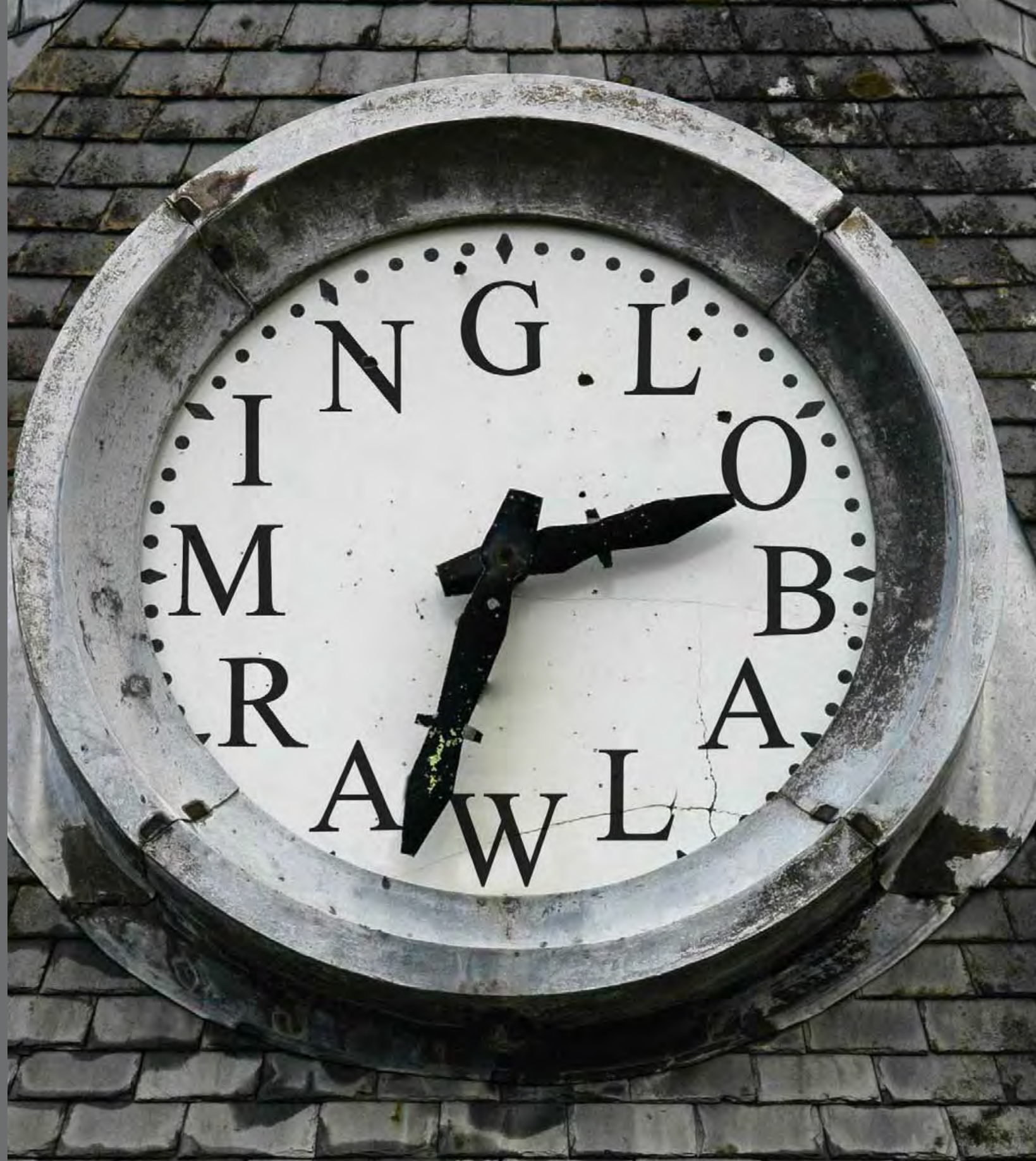
CORPORATE ENVIRONMENT RESPONSIBILITY

THE TRIPLE BOTTOMLINE APPROACH

ITC's Sonar in Kolkata has emerged as the first hotel in the world to obtain certified emission reductions (CERs) issued under the UNFCCC (United Nations Framework on Climate Change Convention). The effect of this is that the hotel will save over Rs 8 million per annum, which equals almost 20% of the hotel's annual electricity bill. Besides, the sale of CERs will provide an additional revenue stream of ₹1.5 Cr over the next couple of years. This unique commitment reflects ITC's triple bottomline commitment - that of enhancing the economic, environmental and social capital of the country. This approach has already made the FMCG giant a carbon positive and water positive enterprise.

GREEN TRUTH

Al Gore, author of the book and documentary, ‘An Inconvenient Truth’, shared the Nobel Peace Prize with the United Nation’s Intergovernmental Panel on Climate Change for being **probably the single individual who has done most to create greater worldwide understanding of the measures that need to be adopted to combat global warming.**



"TREAT
THE EARTH WELL
IT WAS NOT GIVEN TO YOU
BY YOUR PARENTS
BUT WAS LOANED TO YOU
BY YOUR CHILDREN"

Old African Proverb

All biophilic buildings are green but all green-certified buildings may not be biophilic. The challenge is to calibrate architecture in such a way that it is in rhythm with nature. Bio Wonder attempts to precisely achieve that.

From a small seed a mighty trunk may grow.

Aeschylus

WHAT IS BIOPHILIA?

In its simplest definition, biophilia refers to the relationship between the natural human condition and the natural world. In other words, it describes how individuals need an outlet to their natural environment and illustrates how a building should emphasise on the health of its occupants and focus on its environmental and social impact.

Who was one of the first proponents of biophilia?

Edward Wilson, a Harvard biologist, coined the term biophilia in his book by the same name. Wilson is widely considered as the father of biophilia as he elaborated on its concept and advocated on its benefits in an extensive article in as early as 1984. He argued that human beings have an innate affinity for nature and defined biophilia as “the connections that human beings subconsciously seek with the rest of life.”

Wilson’s original ideas influenced architects to consider how nature can impact constructed spaces and the environment through their design. Reference to projects and case studies strengthen Wilson’s ideas that natural connections exist between human built forms and nature’s fluid and organic geometries. His postulations confirm that humans instinctively desire a connection with the natural environment and other sustainable forms which help ensure their overall well-being.

Can biophilia bring buildings to life?

Over the past 30 years, places have been created with a ‘soul’, buildings that are alive, that deeply connect its inhabitants and occupants with the rest of creation. Biophilic architecture is the means to create places that stir our hearts, give us peace and serenity and enrich our lives. Biophilic architecture emanates from a profoundly different place and culture than our currently dominant one. It is a much bigger concept based on life-enhancing values, not greed. It is based on a physics that extends into the energetic realms, not just the material ones. It is based on the awe arising from the connection with the sacred. It is natural to build this way when we are not divorced from the rest of the creation.

As opposed to the engineering model central to our present culture, this architecture is an integrative rather than analytic process. Dealing with wholes rather than fragmenting distinctions, its process is a good model for operations in our new culture. This ‘living architecture’ dissolves the demarcation long existing in our culture between architecture and landscaping, between building and nature, between what we contribute to the design of a place and what is contributed by other life. The sacred, the earth, the sun, the spirit sung in making places are all present and alive. Living architecture, in a culture aware of the role of life-force energy, fulfills a different role, and holds a different focus in a materialistic culture. It focuses on place, no space - as our existence extends far beyond a space-time realm. It focuses on relationships rather than structure as dynamic interconnectedness, not unchangeable rigidity, as paramount. It focuses on meaning instead of aesthetics, as inner rather than surface characteristics are of central value. The ‘design principles’ of materialistic architecture are subsumed by higher priority needs, in an energetically-based society.

Why is biophilia the need of the hour?

There are two distinct reasons for this: one, it is becoming increasingly clear that biophilic elements have real and measurable benefits relative to such human performance metrics as productivity, emotional well-being, stress reduction, learning and healing. Two, from an environmental standpoint, biophilic features foster an appreciation of nature, which should lead to greater protection of natural areas as well as emphasise efforts to eliminate pollution and maintain a clean environment.

It is important to note that one of the most compelling reasons to incorporate biophilic design features in buildings is to inspire interest in and promulgate appreciation of nature. This appreciation, in turn, can catalyse individuals to protect the environment and preserve natural areas.

Can biophilia actually propagate an appreciation for nature?

Absolutely! Richard Forman, a professor of landscaping ecology at Harvard and a widely published author in landscape design and planning indicates that in addition to the anthropocentric benefits of buildings, biophilic design offers significant benefits to nature itself. He mentions that structures can be designed to provide habitat for targeted rare species, to enhance surrounding natural system, to attract their richness of fine-scale nature on the texture of building surfaces, and even to educate individuals, leading to nature protection elsewhere.

The National Wildlife Federation (NWF) schoolyard habitats programme provides educators and school administrators with the framework for using the school grounds as an interdisciplinary teaching resource that also enhances natural habitats on the school property. To date, NWF has certified over 2,000 schoolyard habitat sites in 49 States of the US.

What are the specific advantages of green architecture?

It has been scientifically proved that occupant health and interactions have benefitted from biophilic design. Biophilia and increased exposure to nature reduce workplace stress and foster measurable improvements in productivity levels, therefore helping raise overall living standards through maintaining a prudent work-life balance.

Some specific advantages of biophilic architecture comprise

1 Maximum usage of available natural light without dependence on artificial sources

2 Reduced ambient temperatures and prevention of formation of HEAT ISLANDS

3 Energy savings through the use of renewable energy sources, wherever possible

4 Extensive rainwater harvesting

5 Comprehensive waste management policies and practices

6 Enhanced green cover to promote the creation of a ‘natural habitat’

Why is the concept of biophilia important now than ever before?

It is interesting to understand that global warming is actually a global warning. Consider the following: atmospheric levels of carbon di-oxide were 379 ppm (parts per million) in 2005, higher than at any time in the past 65,000 years! The wide-scale impact of global warming can be gauged from the fact that of the 12 warmest years on record, 11 occurred between 1995 and 2006. Biophilia is a concept that celebrates the return to nature. It traces its roots to the earlier times when construction was not exclusive of the surroundings but inclusive; how architecture and nature went hand-in-hand.

Bio Wonder is a prudent blend between the practices of the past and the developments of the future as it incorporates biophilia to promote GREEN ARCHITECTURE.

Is green architecture the way into the future?

Absolutely, and it is just a matter of time when this concept will be wholly embraced across the world. Green buildings focus on reducing their carbon footprint and minimising their environmental impact right from the time construction is started, by maximising the consumption of natural resources. The architecture of the green building is also such that it maximises the use of natural light to reduce fossil fuel consumption and promotes a healthy and efficient workplace environment.

Bio Wonder is a concept that will unleash a green revolution in Kolkata, setting a benchmark for all future constructions where nature and architecture will talk to each other

Ashok Pasari
Chairman, PASARI GROUP

AH, LIFE!

I have often asked myself, just what is life? I have pondered over the obvious and argued over the conventional, agreed with some and differed with others, got lost in thought gazing up at the crystal sky on the maidan greens and wondered with amazement at an ardent adda session over a Mohun Bagan goal.

And there I got the answer. On the very streets of my city. Kolkata. The City of Joy. And Life!

Where else in the world would you find someone buying illish maach appraising every part of the fish in detail and only then nodding their consent of approval? Where else in the world would you find upcoming artists patiently sitting on the streets for days on end just to perfect that brushstroke? Where else in the world would you see a sea of humanity descend on the streets, chase their everyday dreams, catch a Nandan performance in the evening and scurry back to the railway station, satisfied at the fulfilling day?

Kolkata represents the very epitome of life. The city's countless poets, writers, painters, musicians and filmmakers have immortalized Kolkata life in countless poems, artworks, lyrics and films. The daily wage earner can still have a cha and biscoot without spending more than 4 rupees. The skyline of Park Street still finds the happy coexistence of legacy heritage structures and gleaming modern day skyscrapers.

Kolkata is changing faster than ever. One really embraces these changes, which only add to the warmth of the city. But what about today? What are we creating today that will serve the needs of tomorrow? How are we planning the proportions of the city to ease the life of a common man? How are we protecting our environment and at the same time decongesting and de-clogging certain arterial parts of the city? As a builder, I am constantly battling with these questions to come up with suitable answers.

And I have found my answer!

Today architectural experts see green surfaces and related features as functional components of building systems (rather than mere appendages), with evolving standards, clearer metrics and definable benefits. The idea that is rapidly gaining momentum is that people function best in environments like the ones we evolved in - in spaces that are more like habitats than like Cartesian boxes.

The concept of biophilic and bioclimatic architecture represents one of the most promising ideas in sustainable building. They outline a new movement that aims to create environmentally-friendly, energy-efficient buildings and developments by effectively managing natural resources.

Biophilia gives the green buildings natural lighting and outdoor air, plants, water and generally blurring the boundaries between buildings and landscapes. Moreover, it gives more of a soul than merely improving HVAC and fluorescent lighting. And I sincerely feel that biophilic architecture is the bridge that will reconnect us with life.

An expanding body of research on the relationship between productivity and exposure to nature suggests that commitment to biophilia can greatly impact business revenue streams. Terrapin Bright Green is four years into a five-year productivity study of workers in a Leadership in Energy and Environmental Design (LEED) Platinum office building, which has measured workers' improved well-being, resulting from the incorporation of biophilic elements, such as day lighting, views to parks and the incorporation of natural materials.

Green building and adopting green standards in construction is particularly relevant to a building like BioWonder, where Kolkata's premier businesses are slated to set up their workstations. I am confident that BioWonder will be positioned as a meaningful and effective step towards increasing the city's productivity manifold.

I would like to express my deepest gratitude to Salient Design for their comprehensive support, knowledge feedback and meaningful dialogues, leading us to a life-friendly architectural blueprint! I would also like to acknowledge the efforts of the engineers, technicians and managers who are actively involved in the execution of this green project. Without their dedication, enthusiasm and cooperation, BioWonder would have remained a dream. But just as the foundations have been laid for Bio Wonder to turn real, I know deep down in my heart, that we have also laid out the very basis of a green corporate culture in Kolkata.

- Ashok Pasari

Stakeholder insights

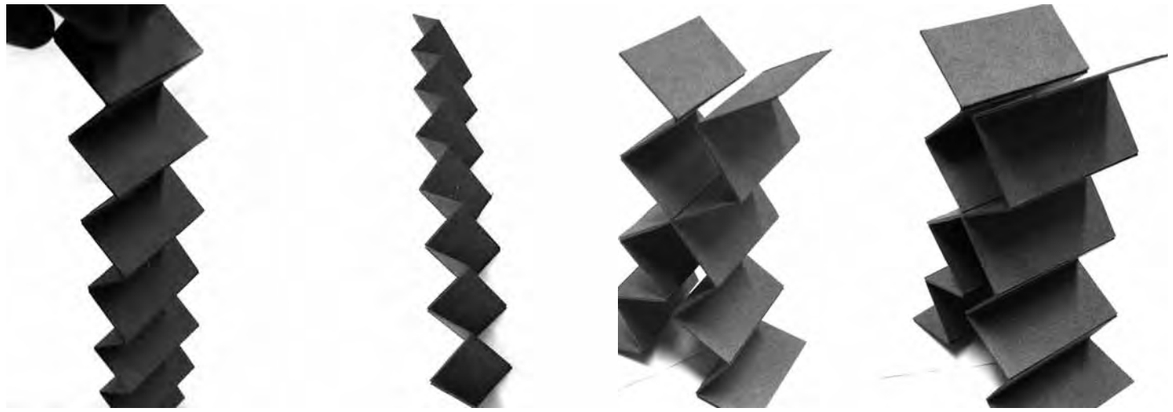
Before the seed there comes the thought of bloom.

E.B. White

Bio Wonder is an attempt to re-establish a sustainable biological relationship between humans, architecture and nature. Though this affiliation existed, with time it has to be evolved.

Vivek Rathode
Principal Architect, BIO WONDER

BIO WONDER
AMONG INDIA'S FIRST BIOPHILIC STRUCTURES



A review of findings from environmental psychology amply demonstrates that humans possess a biological inclination to affiliate and associate with the natural system, which in turn, reflects a positive enhancement in their health and productivity levels. However, opportunities for contact with these elements are reduced in modern urban life. Scientific investigations have substantiated that this evolution can have subtle but non-trivial adverse effects on psychological and physiological well-being. These can be countered by integrating key features of natural contents/elements and structural landscape features in the built environment, collectively referred to as biophilic architecture.

It is interesting to note that the advantages of biophilic architecture are manifold.

One, the biophilic structure strongly acts as a stress buster with a profound impact on health, healing and well-being.

Two, this architectural style encourages the use of renewable solar energy and rainwater harvesting, ensuring maximum energy efficiency.

Three, biophilic design minimises the adverse impacts on the earth due to thoughtless and careless construction activities.

To put it simply, biophilia is about evolving a space for man around nature.

The importance of LEED gold certification for Bio Wonder

Leadership in Energy and Environmental Design (LEED) is an internationally-recognised green building certification system, providing third-party verification that a building or community was designed and built using strategies intended to improve performance, measurable in metrics such as energy savings, water efficiency, carbon di-oxide emission reduction, improved indoor environmental quality and resource stewardship and sensitivity to their impacts. We are proud that Bio Wonder has successfully met all these criteria laid down under the LEED programme.

Bio Wonder's architectural 'offsets'

Offsets are devices that help considerably increase the percentage of green within the premises. The concept makes provision for every office in the podium building to have a terrace and dedicated clear area for tree plantation. This leads to a vertical distribution of green that not only compensates but also adds to the horizontal green cover. The terrace areas that alternate as regards the placement are referred to as offsets and provide the structure a stack-of-books look. Offsets serve in creating shadow zones, cutting-off the oppressive afternoon heat and also facilitate rainwater harvesting and renewable energy production. The stack-of-books structure offers a unique geometrical advantage - that of increase in the perimeter of nature-interaction through intelligent architectural modifications.

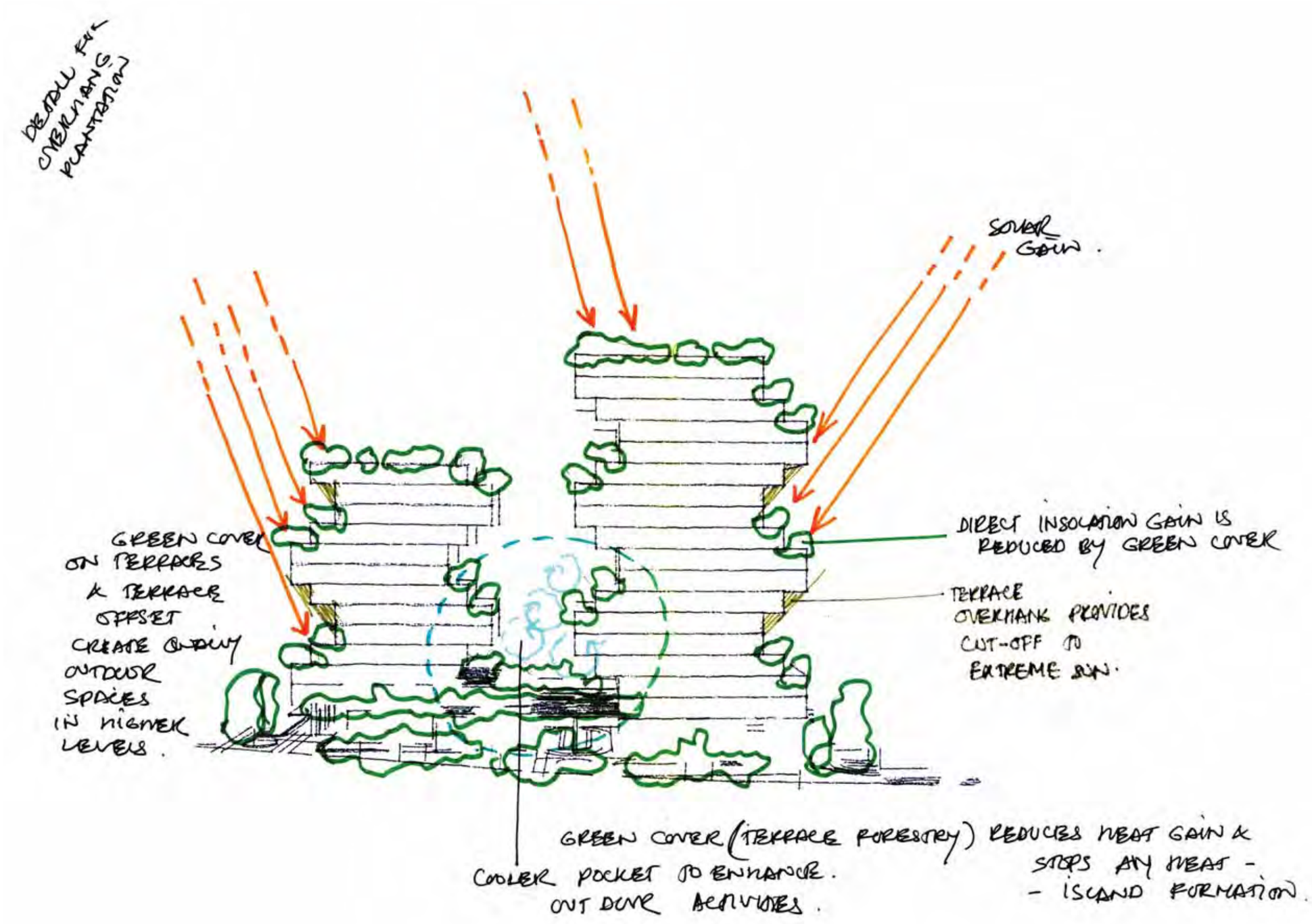
Architectural "Offset" arrived from stack of books

Sunlight - key to biophilic design

Sunlight plays a vital role in biophilic design and architecture. Humans have an internal biological clock, the circadian clock, set externally by visible light, essentially ultraviolet light (UV). UV also helps control the circadian rhythms in our body and mind and body hormones. Our feelings of joy, contentment, gloom and despondency are also because of this.

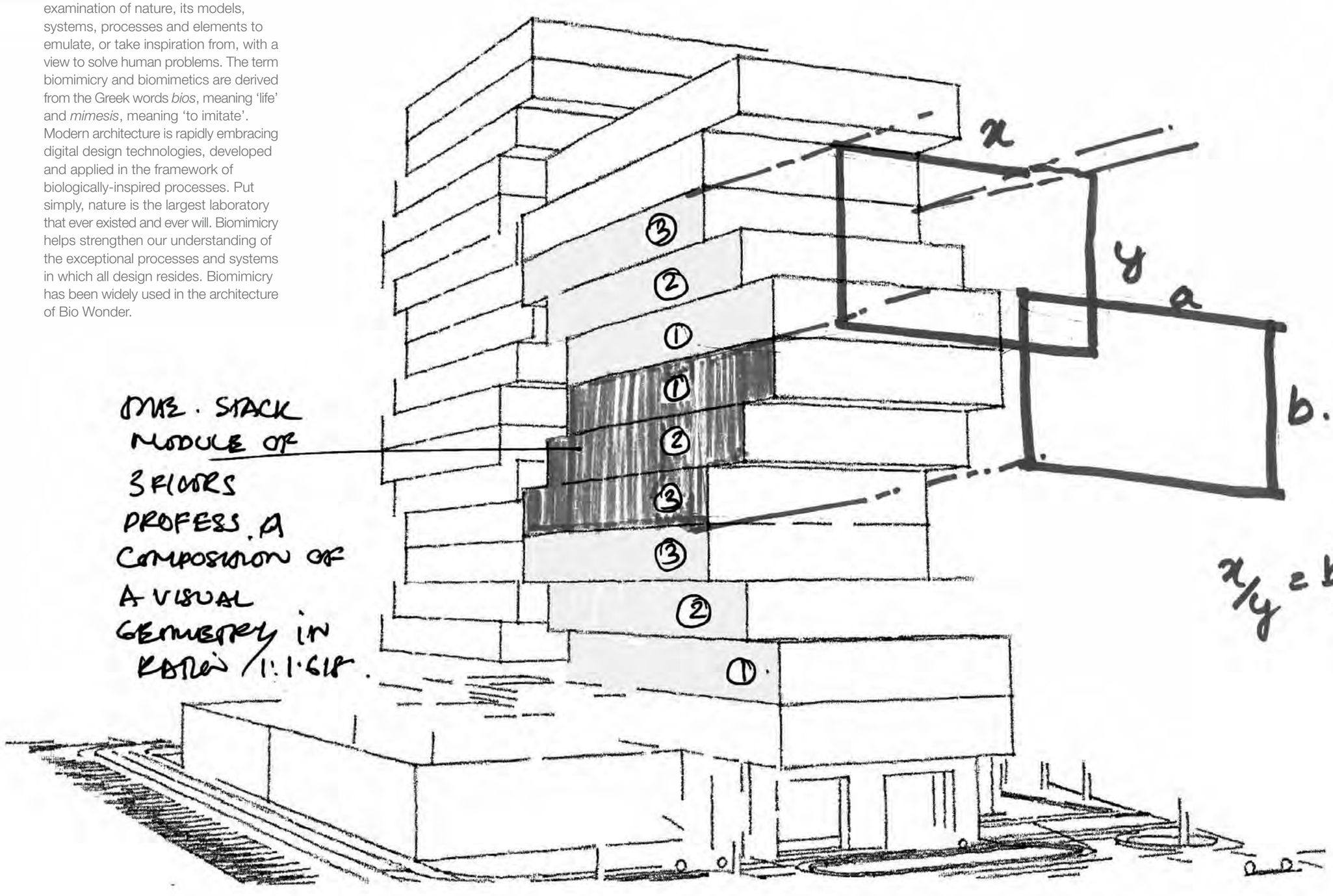
The most significant difference between our experience of natural and artificial light is that natural light is constantly changing in direction and intensity. The overall rhythm of sunlight, moving from day to night and from season to season, reveals and highlights colours, patterns and textures; subdues and constantly changes them; then reveals them again in an entirely new way. Changing patterns of brightness and shadow and sparkle and reflection capture and redirect our attention, helping relieve stress and mental fatigue.

The correct placement and orientation of windows and skylights in buildings is therefore critical to capture dynamic natural light. Light should enter spaces from at least two different directions to enhance the experience of the sun's movement, eliminate glare and provide changing patterns of brightness and shadow. Each of the four directions provide distinct lighting effects and experiences. The design of Bio Wonder incorporates the dynamic, natural light in a variety of ways and enhances workplace health and well-being.



Exciting concept of biomimicry

Biomimicry or biomimetics is the examination of nature, its models, systems, processes and elements to emulate, or take inspiration from, with a view to solve human problems. The term biomimicry and biomimetics are derived from the Greek words *bios*, meaning 'life' and *mimesis*, meaning 'to imitate'. Modern architecture is rapidly embracing digital design technologies, developed and applied in the framework of biologically-inspired processes. Put simply, nature is the largest laboratory that ever existed and ever will. Biomimicry helps strengthen our understanding of the exceptional processes and systems in which all design resides. Biomimicry has been widely used in the architecture of Bio Wonder.



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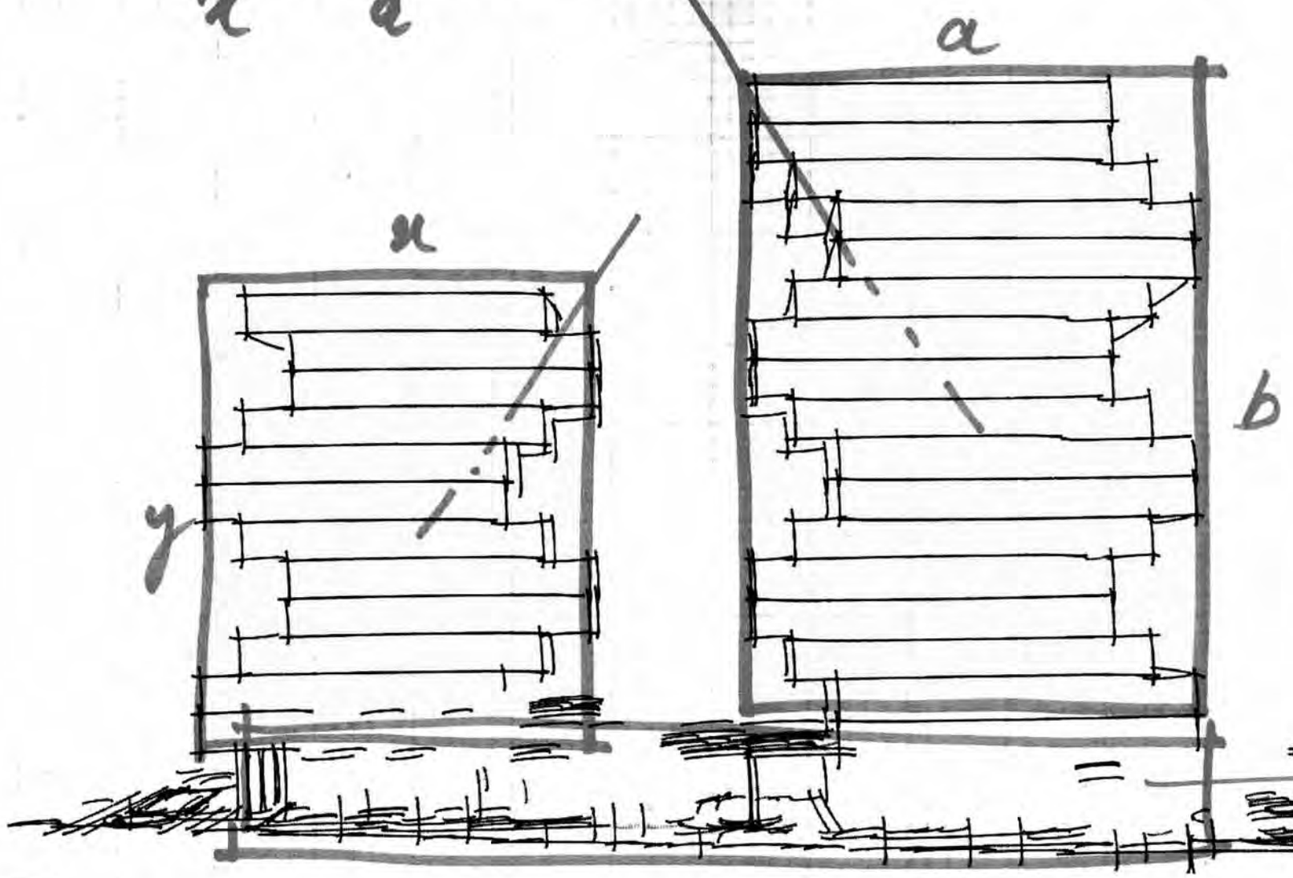

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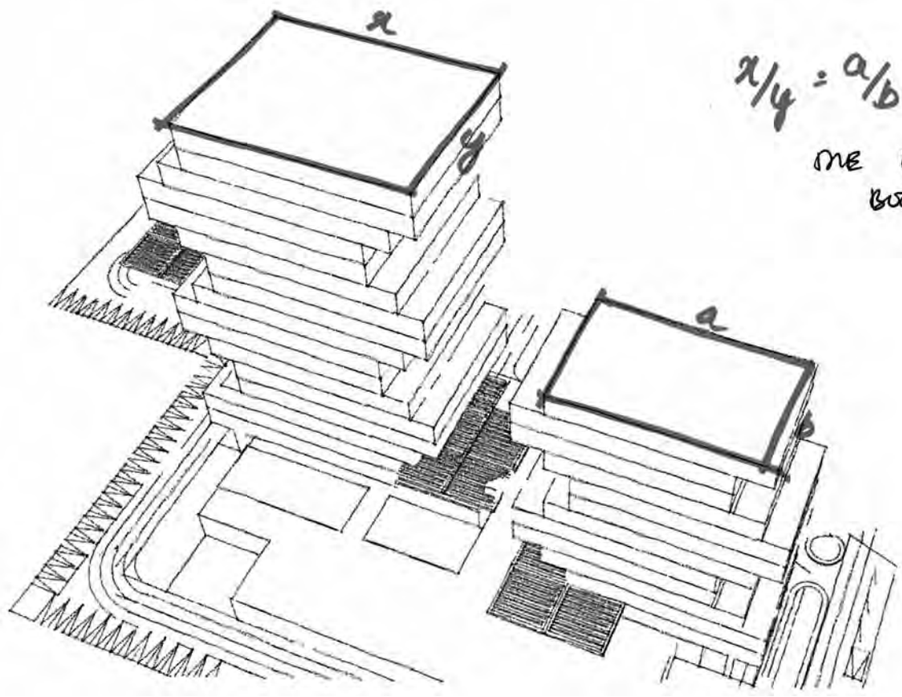

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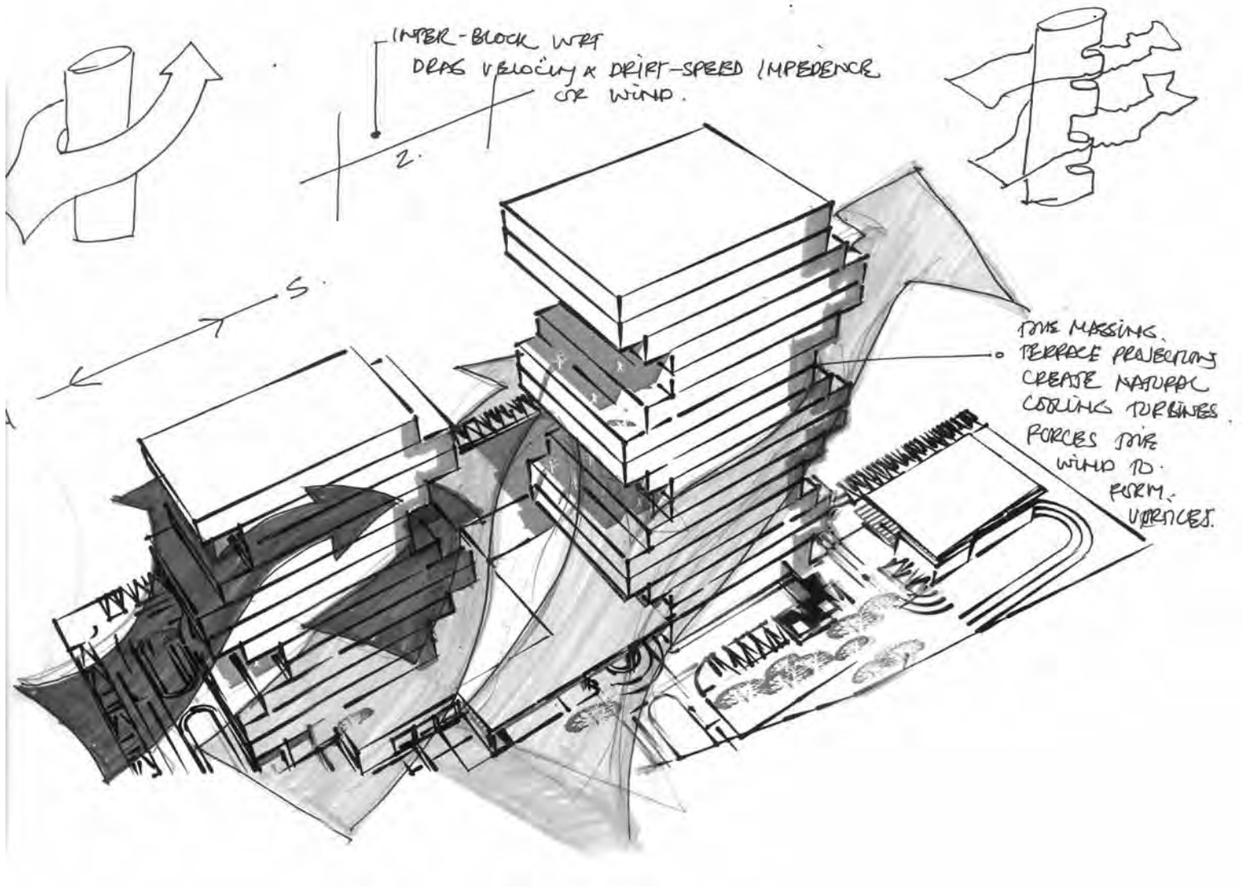
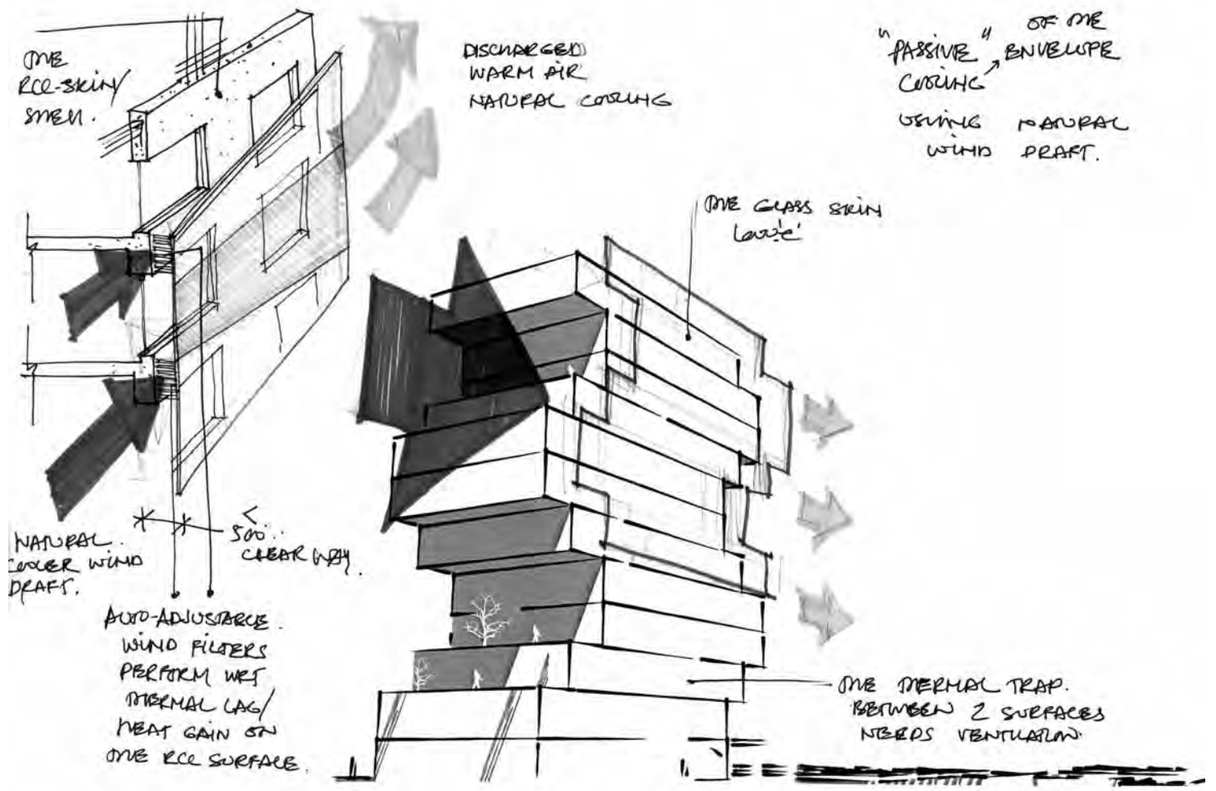
THE PLAN MODULE OF BOTH BLOCKS IS IN GOLDEN-RATIO. 1:1.618.





Technophilia and biophilia

With technology catching up with the two seemingly polar opposites of biological and technological aspirations, this movement will gain momentum to arrive at a synthesis of the two within the foreseeable future. This process represents a tectonic shift or evolution on the precipice of occurrence within the human society where our mechanised achievements of the past three centuries are being superseded by Moore's Law, under which biological approaches are fast replacing past technologies.

Architects must be willing to respond to these changing conditions and learn how they can adopt these revolutionary ways of biological manipulation. Architects in both professional practice and academia are already adopting terms and processes from both the biological and scientific realms and have been doing so for some time now. Combined with new modelling capabilities and mathematical models, designers and scientists are closer than ever to bridging the gap between biology and technology. In doing so, we must cautiously move ahead, critically challenging the systems before leaping forward and changing the face of the earth as seen in the modernist era.

Bio Wonder promoting Kolkata's transformation as a biophilic city

It is widely argued that planners and landscape architects must design cities for its occupants to feel intimately connected with nature. A biophilic city is one that puts nature first. It recognises the critical need for daily human interaction with nature as well as the many environmental and economic values bestowed by nature and natural systems. In addition, these cities are places where residents spend time enjoying biological wonders. Moreover in biophilic cities, residents are truly concerned about nature and work on its behalf, locally and globally. Now whether Kolkata will get transformed into such a city is something that only time can reveal. But Bio Wonder will definitely catalyse the start to this revolution.

It is important for me to mention that biophilic architecture is relevant to every human being. Kolkata is changing at lightening speed, facing new challenges everyday. Today, the city has to support a whole new generation of entrepreneurs and professionals who demand more from their workplace. More than an office, they need an environment. This is just the right moment in Kolkata's evolution to have an energy-efficient building across its skyline that will ensure comprehensive cost optimisation, combining commerce, hospitality and nature.

In closing, I must mention that Bio Wonder has been designed for experiential living, promoting an almost-forgotten bond between the soul and nature. I wish all the occupants of Bio Wonder the very best of experience!

The landscape design of Bio Wonder is a clear intention to show the greatest respect for nature.

Anuradha Rathode
Principal landscapist BIO WONDER

The landscape of Bio Wonder has been created with the singular purpose of seamlessly blending nature with architecture. There are several instances of this reality. The dense ground floor plantations, first and second floor terraces and large green terraces are planned to develop a dense ‘urban forest’ ambience. This will not only contribute towards a healthy and green look but also participate in adding to the ecological cycles of urban environment.

OVERVIEW

A GREEN PARADISE

Bio Wonder, touted as the urban biodiversity park, will empower urban ecology in the following ways

1 Sequester gaseous air pollutants and particulates

2 Help to settle out, trap and hold particle pollutants like dust, ash, pollen and smoke that can damage human lungs

3 Absorb carbon di-oxide and other harmful gasses and replenish the atmosphere with oxygen

4 Produce oxygen on each acre, enough to provide 18 people with fresh intake everyday

5 Soak up enough carbon di-oxide on each acre per year, amounting to emission of the gas when a vehicle is driven 26,000 miles

6 Extend the green cover for creating a ‘basin’ that absorbs gaseous pollutants through leaf surface pores; particulates are trapped and filtered by leaves, stems and twigs and washed to the ground by rainfall

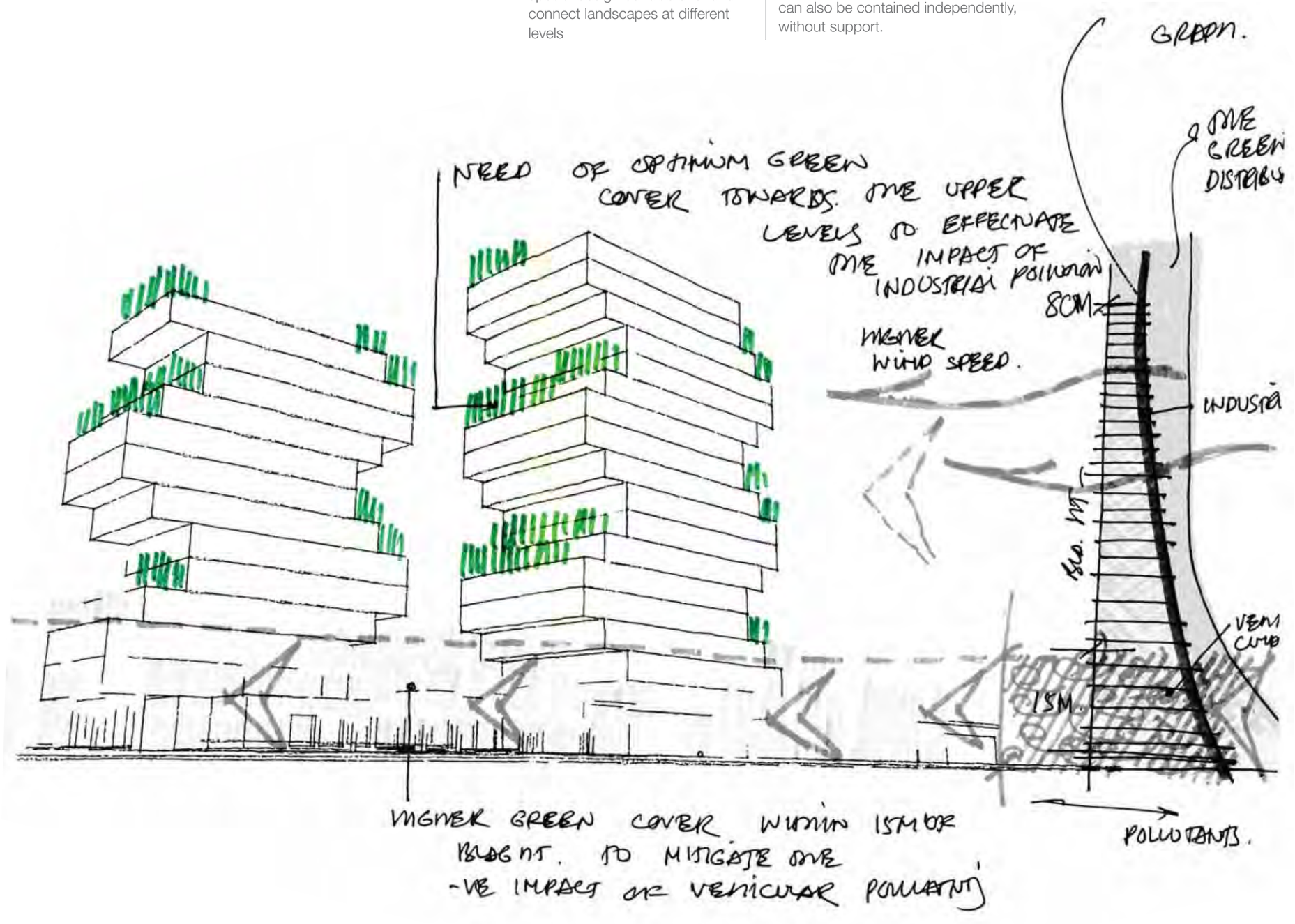
7 Energy conservation through transpiration cooling, shade and wind reduction

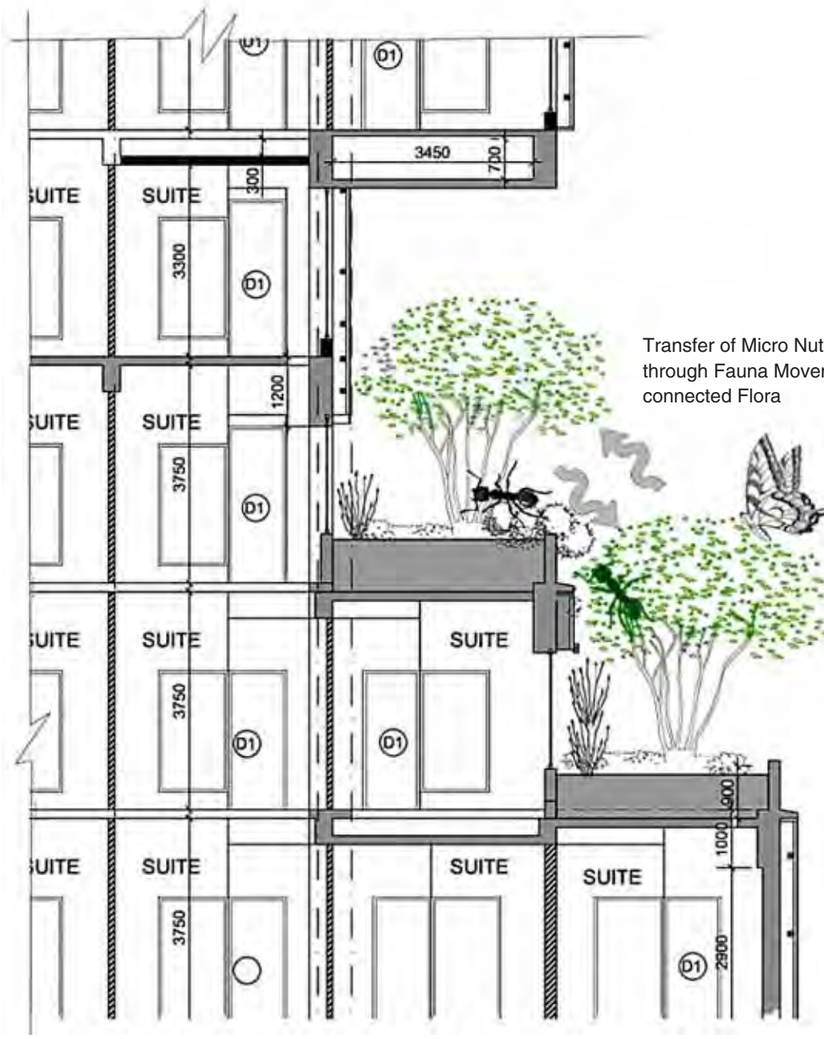
8 Storm-water attenuation that reinforces ground water recharge and increases soil nutrient levels

9 Noise buffering through intensifying density of leaves, bark, branches and mounds, among others

10 Provision of wildlife habitat to reverse declining fauna through special design considerations to connect landscapes at different levels

Birds, insects and other small park visitors play a vital role in establishing urban park biodiversity. Several case studies have revealed that nutrient abundance can be a reality only if the terraces on lower and upper levels are physically connected. Interconnected terraces at different levels multiply fauna growth and provide them with a comfortable ambience. At Bio Wonder, this is achieved through interconnected plantation to catalyse and simplify fauna movement to share and transfer nutrients. This way, the terraces can also be contained independently, without support.



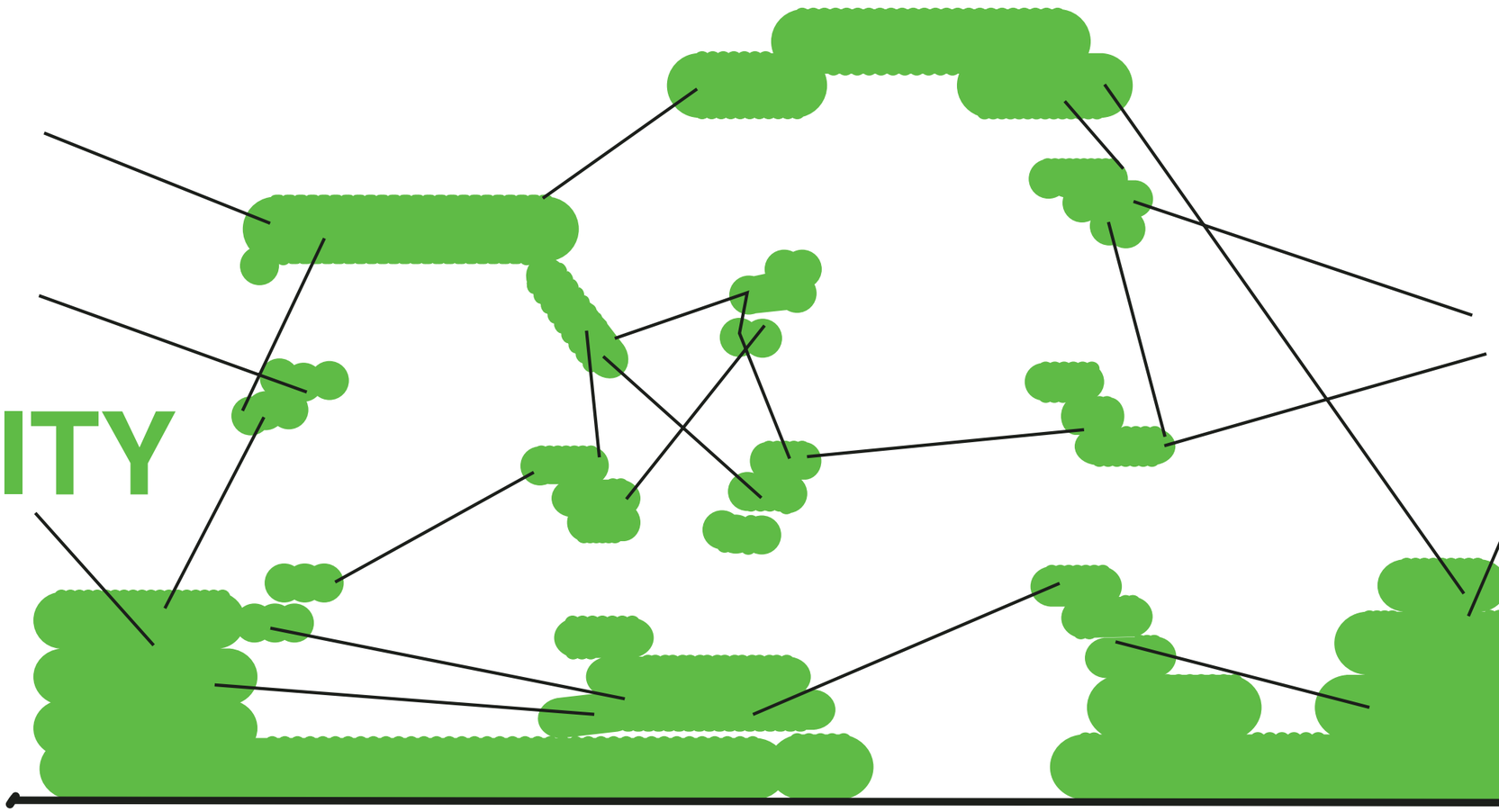


Transfer of Micro Nutrients through Fauna Movement and connected Flora

What connects property values, aesthetics and psychological well-being?

It is widely recognised that apartments and offices in wooded areas rent out more quickly, have higher occupancy levels and tenants typically stay longer. On similar lines, corporate office spaces in wooded developments find their occupants are more productive with relatively lower absenteeism. In fact, several studies have confirmed that the value of intangible urban forest environmental services was six times than that of material goods. Result: Increased property values, improved aesthetics and psychological well-being are all connected to one reality - the green cover.

BIO WONDER
A BIODIVERSITY PARK



Bird flight routes on Bio Wonder

Xeriscape landscaping

Bio Wonder's terraces extensively use Xeriscape landscaping, *xeri* meaning 'dry', utilising drought-resistant plants in an effort to conserve resources and reduce maintenance costs. Trees with lush leaves have been chosen for greater foliage content.

Bottom Land Woods

At the Bio Wonder's Bottom Land Woods, the ground floor thicket of 15,000 sq. ft is being developed as a thicket of maximum tree plantation. Most of the area with virgin soil will be dedicated for structural tree plantation. The tree palette is developed after comprehensively analysing foliage texture and density with a view to maximise absorption of particulate matter and other pollutants.

Thick plantation of shrubs and ground covers in the base will contribute towards lower level filters and water sieves. It is observed that a large number of fauna survives in this lowest layer and is continuously involved in the delicate ecological and mineral distribution cycles of nature.

From the first floor onwards, the landscape will be composed of Xerophytes, Crassulacean Acid Metabolism (CAM) and other hardy plants, which typically consume less water.

Spring Broccoli

The second floor-level terrace of 3,500 sq. ft is connected to a specialty restaurant, Spring Broccoli. A small farm is proposed within the area to promote the growth of ornamental seasonal vegetables as well as other perennial plants. The menu board dishes will reflect the ambience of the terrace kitchen garden across various seasons. Pomegranate, lemon, dwarf mangoes and guava trees will be there in addition to the sowing of broccoli, brinjals, cauliflower, tomatoes, cabbage, carrots and ladyfinger, among others.

Oval Bay

Water is a refreshing element. A large 1,500 sq.ft. oval-shaped Lily/fish pool is being introduced as a revitalisation and reinvigorating element. Fishes and other small fauna along with bog plants will be used to develop a lentic ecosystem.

Oasis Garden

The charm of an oasis in a desert is similar to the aura of a tropical fragrant urban green terrace on the first floor. This terrace will be used for Alfresco dining, for promoting occupant interactions through small gatherings or for simply enjoying a cup of coffee after a successful meeting. This terrace garden will possess the seasonal bloom which will connect urban dwellers with the nature's cyclic phenomena.

It is interesting to note that the seasonal changes will invite varieties of new birds, butterflies and other insects, creating a chirpy environment!

Rural Reliquaries

The spacious terraces spread over 15,000 sq. ft are important architectural elements and form an integral part of Bio Wonder's landscape. A thoughtful composition of CAM, xeriphytes and other small-leaf plants - which minimise transpiration losses and are able to withstand high-speed winds at heights - will also be planted. Creepers and other tall plants will be allowed to grow over to the next balcony so as to enable exchange of micro-nutrients and encourage movement of small organisms. Bamboos and other grasses will constitute the main plants along with small foliage hardy creepers.

Biophilia is the powerful and far-reaching concept of bringing buildings to life to connect humans with nature. Bio Wonder will be a fine example of 'living architecture!

Juzer Kothari
Conserve Consultants, Green Buildings Experts

JUST WHAT DOES GREEN REPRESENT TO ME?

Green is not just another colour but stands for everything that is natural. As a corollary, anything natural is green. Any building which comes close to nature may be referred to as a ‘green’ building.

Today, green buildings have become synonymous with LEED certification. But the truth goes far beyond this. Let me explain this interesting perspective.

One of the primary objectives of the Indian Green Building Council (IGBC) is to evolve and transform the architectural buildings space into a sustainable industry and alter it so that it comes closer to nature and in other words, becomes green.

For this transformation to transpire, all stakeholders comprising buyers, architects, suppliers, consultants, builders and promoters have to be encouraged and motivated to adopt and embrace green standards.

But the challenge arises when one has to measure the green quotient of a construction and find out just how green is green? The LEED rating, or for that matter any other green building rating system, is the most preferred tool of measurement to quantify this intangible. The rating systems create uniform metrics, which allow projects to compare and benchmark its progress with others. This evaluation pushes them to raise the bar a little higher along the way. This process makes them come as close to nature as possible and hence become green.

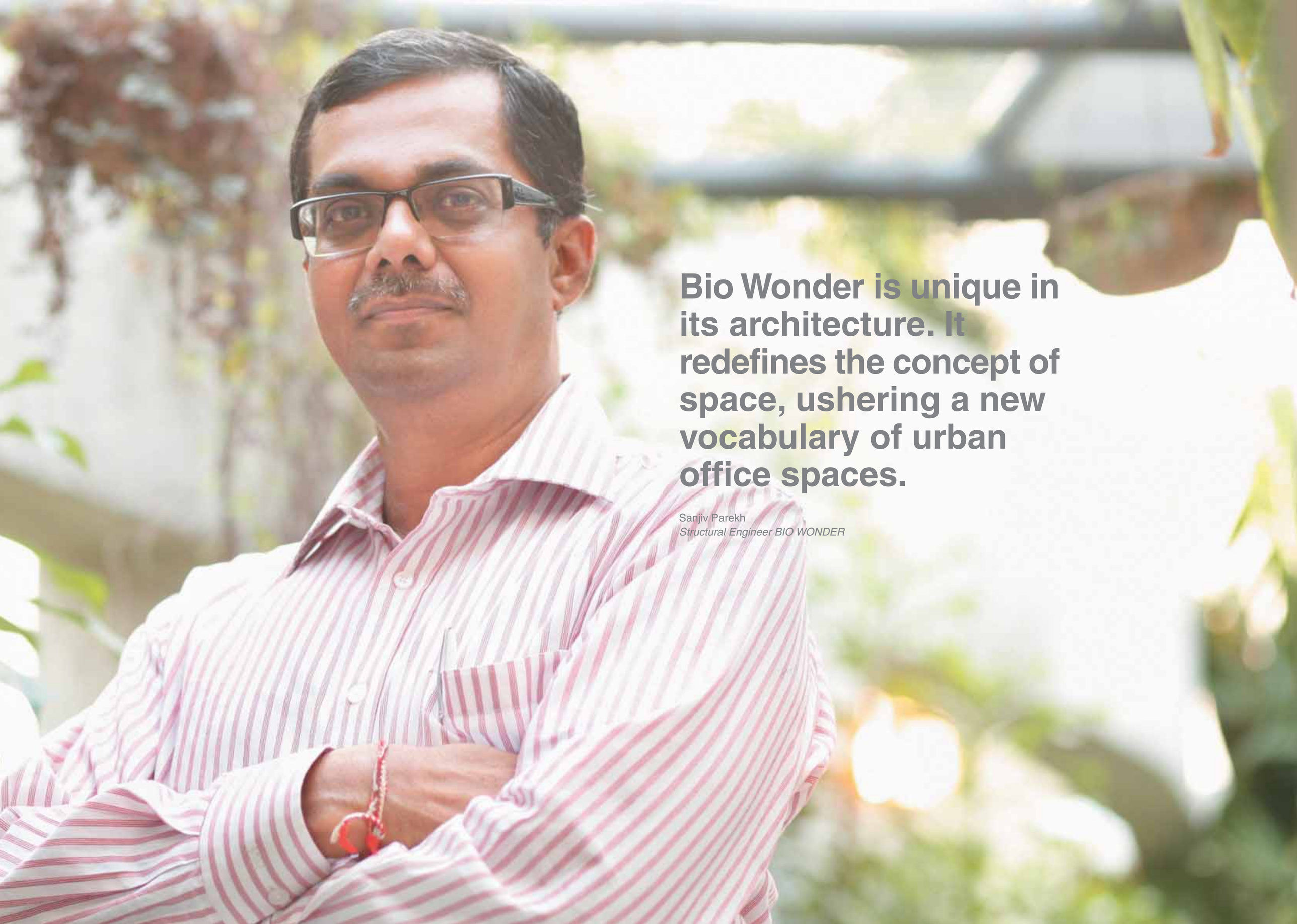
The rigours of the rating system are such that they direct project teams to focus on sustainability goals, enabling them to arrive at informed and calculated decisions.

Vivek and Anuradha Rathod’s architecture goes much beyond the realm of a market-defined green building explanation. The structure has been conceptualised such that it can effortlessly merge form, sense and functionality with sustainability and an abundance of green landscape. This is what I would typically call a ‘Deep Green Building.’

It is interesting to note that Bio Wonder, with almost []% of green area, will have more trees and green landscape than the site had before the construction began. This incremental amount of green will play a transformational role in providing additional benefits than what nature had actually intended the site to be. Bio Wonder is an outstanding example of a Biophilic building and ‘live architecture’.

Bio Wonder's design inspiration has been derived from biometrics in nature.

Alpa Seth
Structural Engineer BIO WONDER



Bio Wonder is unique in its architecture. It redefines the concept of space, ushering a new vocabulary of urban office spaces.

Sanjiv Parekh
Structural Engineer BIO WONDER

OVERVIEW

Bio Wonder will redefine Kolkata's skyline on account of its unique structural architecture. The challenge posed by the principle architect, Vivek was to enable seismic stability to the entire book-stack structure and yet make it biophilic. To this extent, the terraces are pulled out of the building artfully, strategically ensuring that the centre of mass is maintained along the centre of the building's axis.

Highlights

Some of the building's structural engineering highlights comprise:

1 Wonderful symmetry to the slab pullouts without it appearing so

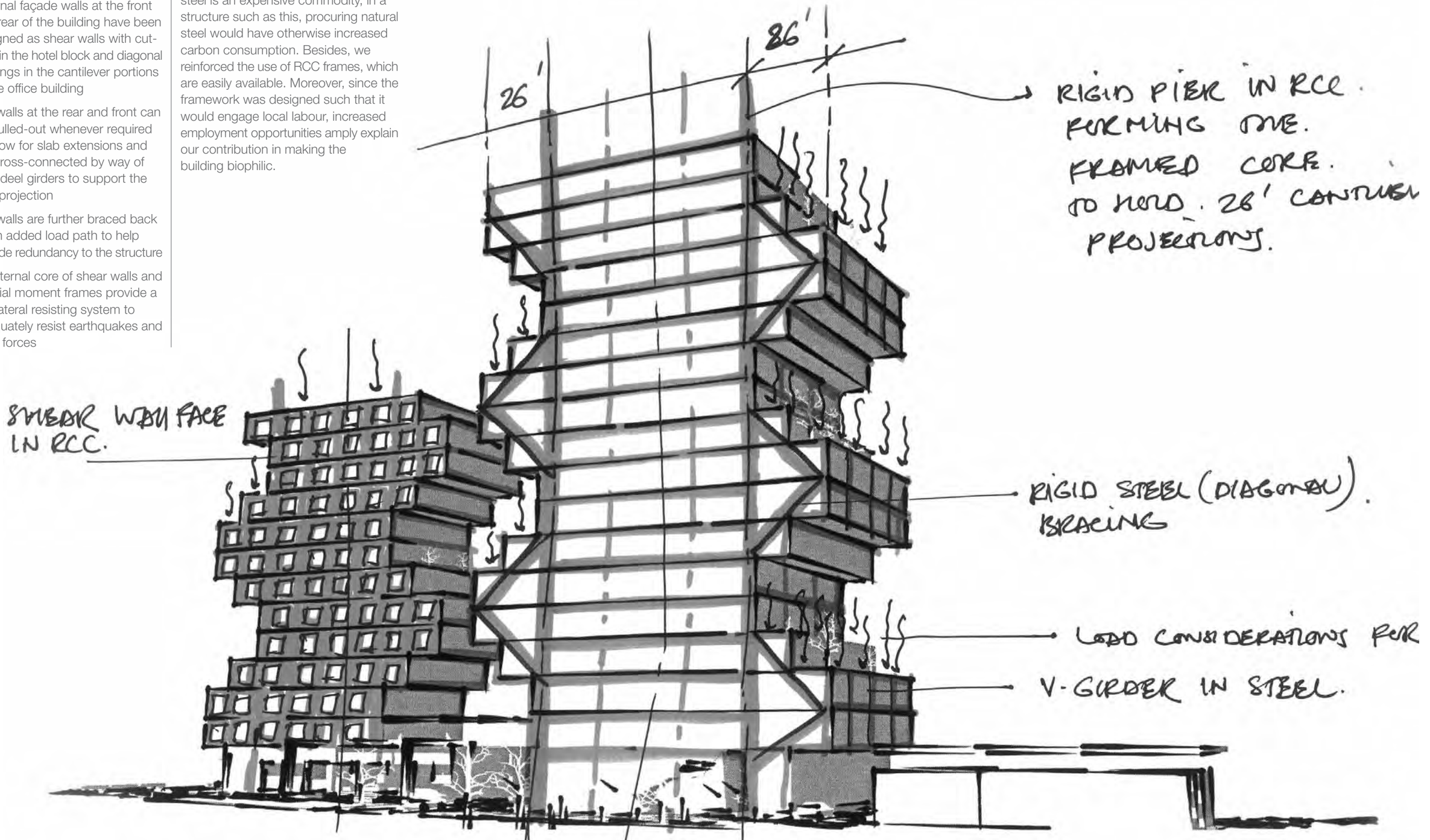
2 These large slab pullouts pose a structural challenge with conflicting requirements of shallow internal beams, which do not allow for such large cantilevers; hence, the external façade walls at the front and rear of the building have been designed as shear walls with cut-outs in the hotel block and diagonal bracings in the cantilever portions of the office building

3 The walls at the rear and front can be pulled-out whenever required to allow for slab extensions and are cross-connected by way of Virendeel girders to support the slab projection

4 The walls are further braced back as an added load path to help provide redundancy to the structure

5 An internal core of shear walls and special moment frames provide a stiff lateral resisting system to adequately resist earthquakes and wind forces

The architecture of the building required the terraces to have an uninterrupted view and minimise carbon consumption to the maximum extent possible at the same time. This seemingly contrarian requirement was dovetailed with our formulation of a 95% RCC structure plan using steel only at the bracings. This solution enabled reduction in the carbon footprint in a strikingly unique way. It made the structure less heavy and since steel is an expensive commodity, in a structure such as this, procuring natural steel would have otherwise increased carbon consumption. Besides, we reinforced the use of RCC frames, which are easily available. Moreover, since the framework was designed such that it would engage local labour, increased employment opportunities amply explain our contribution in making the building biophilic.



Value engineering is also about valuing nature and it was interesting to learn that real value engineering is all about optimising natural resource consumption.

Shantanu Mukhopadhyay
Electrical consultant BIO WONDER

OVERVIEW

We have embarked upon innovative planning and design principles for Bio Wonder. Proposals have been made for substantial contributions in energy savings in the consumption of power, water and air-conditioning systems. In the course of designing the building, we have kept a close watch on the following towards optimal electricity consumption with a view to minimise carbon emissions.

HIGHLIGHTS

Reduced loop length of distribution networks

Network lengths and cable cross-sections have been optimised to achieve minimum copper losses and heat generation, thereby imparting a longer life.

Reduction of sub-station area

We have minimised the sub-stations area with the provision for indoor switches, providing more open spaces for green landscaping.

Installation of capacitor banks across strategic points.

Carefully-designed capacitor banks have been commissioned at load centres for reactive compensation and optimisation of power flows in the distribution networks, which strengthen overall energy efficiency.

Double busbar arrangement

With a view to achieve a higher degree of power supply reliability, an innovative approach of providing double busbars has been made to enable faster supply change-over during maintenance.

State-of-the-art metering

The most contemporary and superior solid state energy meters with the highest accuracy levels have been implemented for exact energy consumption registration.

Energy-efficient lighting

Designed with latest LED technology, the illumination will result in optimal energy consumption. Up to 30% reduced LPD has been considered during load calculations. Moreover, bright facade with controlled light and shades has been used to create a misty look to minimise electricity consumption.

Air-conditioning and handling units

The electrical designer has suggested metering and regular monitoring of air-conditioning system efficiency towards minimising electricity consumption.

Solar power generation

Provisions have been made of commissioning 35-KW solar power to run in tandem with the system. The resource will provide green power and support the environment.

Systems earthing

Multi-point earth with powdered carbon technology has been used to prevent discontinuity of earth grid to protect the electrical system from potential hazards following electrical faults.

Provision of full-capacity backup generator

Robust reliability and power quality is the ultimate objective of a distribution system. Provisions have been made for complete back-up power with auto-synchronisation systems.

Conclusion

Cumulatively, these initiatives will enable energy efficiency maximisation and reduction in carbon footprint, providing consumers with the highest degree of power reliability.

Water is the soul of biophilic design and Bio Wonder has been designed to respect one of the most universally-shared symbols of life - water.

Vinod Menon
Hydromechanical and PHE Consultant BIO WONDER

OVERVIEW

The first thought that biophilic plumbing evocates is water. Water is one of the most evocative symbols of life and a powerful biophilic attribute with robust visual, acoustical and symbolic qualities. As humans, we are instinctively drawn to water as a source of survival and for its aesthetic and recreational pleasure. In addition to our primordial instinct of habitat selection near water sources, some of the most cherished and revered buildings around the world use water as a primary design element. Biophilic buildings incorporate water management as a key sustainable design element and as project engineers, we have endeavoured to support the biophilic concept conceived by the architect, principally by trying to consciously design a system that will make the building sustainable.

Biophilic green building sustainability measures

We have embarked on a number of initiatives to help strengthen the biophilic structure's sustainability levels. These comprise:

1. Use of dual-type cisterns of 6/3 litres and state-of-the-art urinal sensors
2. Use of STP for recycling of flushing, landscaping and air-conditioning cooling tower make-up water, thereby reducing water demand by a staggering 70%
3. Use of automatic irrigation system for landscaping areas, reducing water consumption by up to 50%
4. Use of rainwater harvesting system to recharge groundwater
5. Use of VFD-type state-of-the-art hydro-pneumatic systems for controlling water demand
6. Use of organic waste composting units for in-house composting of wet organic garbage, thereby managing waste disposal in an environment-friendly way and also reducing burden on the city garbage collection system
7. Use of waste heat recovery from the chiller system for meeting hot water demands, thereby incurring savings of at least 50% on hot water generation

Sewage treatment plant

The sewage treatment plant will extensively treat the building's wastewater, which will be reused for flushing, air-conditioning, cooling tower make-up and irrigation, saving almost 70% on the total water demand.

Irrigation systems

Irrigation can greatly increase plant growth rate, their rate of evapo-transpiration and their possible contribution to summertime cooling strategies. Vegetated roofs, facades and designed landscapes can allow downsizing of conventional plumbed storm water systems, helping reduce system overloading. Extensive green roofs (with 4 inch substrate) have been shown to retain 70-100% of summer rainfall and 40-50% of winter rainfall.

Designed landscapes such as bioswales, rain gardens and constructed wetlands purify storm water and allow it to percolate into the ground to recharge the aquifers instead of entering a piped sewer system. Landscaped swale for storm water infiltration and rain garden to infiltrate excess storm water avoid storm water flow to the combined sewer. Using storm and gray-water can also contribute to storm water management and waste water treatment systems.

Green roofs

These include thin ‘extensive’ green roofs (2-6 inches), thicker ‘intensive’ green roofs (typically an accessible roof garden) or removable modular green roofs. Extensive green roof plants are typically sedums and other rocky alpine plants as they are able to tolerate extreme conditions and are virtually maintenance-free. Intensive green roofs can support a much larger variety of plant species. Although some green roof systems incorporate a rainwater detention layer, many green roofs will need supplemental irrigation, which can be provided by gray-water (stored rainwater). This can be dispersed by a drip irrigation system or by a layer of felt below the surface and irrigated from one edge. It is interesting to note that a well-irrigated green roof can keep the roof much cooler throughout the summer than a dry green roof.

Use of state-of-the-art VFD hydrowater supply booster pumps

This environment-friendly installation reduces water consumption by a significant 30-40% over conventional pumping systems.

Biophilic composting system

Composting is not just for granola gardeners and agri-businesses. Biophilic composting systems also reconnect people with nature in the workplace. Biophilic compost incorporates an aesthetically-stunning living wall into the office environment and requires minimal upkeep and maintenance. The idea of compost comes from the biophilia hypothesis, which propagates that there exists an instinctive bond between human beings and living systems. For instance, when inhabitants walk towards the garbage can, upon seeing the living wall they are subconsciously reminded that their food waste is part of a natural system. This encourages them to toss the banana peel or sandwich crust into the compost. In addition to the behavioral and waste-reducing benefits of the biophilic compost system, the unit is stylish and as the living wall begins to grow, will add a dose of workplace inspiration!

It is interesting to note that natural systems possess an acclimatisation technique, which helps optimise consumption. Bio Wonder's architecture employs this principal of self-acclimatisation.

C. Ramchandani
HVAC Consultant BIO WONDER

HVAC INSTALLATIONS

Bio Wonder's HVAC installations comprise the following:

1 Water-cooled green chillers with low energy consumption and high COP (proposed); the refrigerant proposed is R-134a, which is a CFC and HCFC free green refrigerant

2 Thermal storage is planned with a view to meet peak-day requirement and reduce maximum demand electrical load; charging of thermal storage has been planned during the night when energy tariffs are relatively lower

3 Chilled water circulation has been planned across two stages; the primary chilled water pumping within chillers is based on fixed flow and the secondary chilled water pumping with variable flow has been incorporated to reduce pump power during lower load demand

4 All AHUs will have variable frequency drives and its cooling coils will possess hydrophilic coating to facilitate carry away of condensate water; this will enhance cooling coil life as well as increase efficiency due to increased heat transfer

5 Highly efficient, CTI-certified low-noise cooling towers will be installed with a view to minimise electrical consumption as well as water losses

6 The sewage treatment plant will be used to generate cooling tower make-up water

7 Zone control VAV boxes or independent FCUs will be used to maintain thermal comfort and conserve energy when the space is unoccupied

8 CO sensors will be provided in the basement to modulate fan speeds based on demand patterns

9 All fan motors will be the highly-efficient efficiency 1-type motors

10 Heat recovery wheel will be provided for recovery of cool air before its atmospheric discharge

Seedsmen reckon that their stock-in-trade is not seeds at all. It's optimism.

Geoff Hamilton

pasarigroup
Hello Life!

A legacy of pioneering excellence

The renowned Pasari Group was found on the philosophy of ‘real estate is not about construction but about constructing a beautiful future’. Founded in 1980 in Kolkata by Mr. Ashok Pasari, the Group has gone from strength-to-strength to emerge as a force to reckon with in the country’s real estate sector. Equipped with providing integrated end-to-end solutions, the Pasari Group’s team includes professional architectural and civil engineering teams supported by a contemporary equipment bank. The result has been that the Group has created several landmarks the define Kolkata today. The Group’s rich track record and niche experience is reflected in the fact that it has always developed projects on time, within extended schedules and possesses robust credible intellectual capital.

STUDIO FOR ARCHITECTURE LANDSCAPE INTERIOR AND ENTERPRISE PVT LTD (SALIENT)

Focused on architectural and design excellence

Salient Private Limited is a boutique design setup, engaged in evolving rich design concepts derived out of extensive research. It undertakes design and development assignments from the fields of architecture and planning, landscape and interior and product design. Its young and enthusiastic team of architects, designers and engineers aim to deliver benchmark solutions with speed and simplicity.

Salient's landscape projects are aimed at developing micro-level ambience bio-climatic control together with developing aesthetically-designed environments. Maximum effort is expended on rejuvenating and conserving the existing ecosystem around lakes, small water bodies, orchards and other plantations along with developing new ones. Designs attempt to create an ambience that is a celebration and embodiment of nature's elements. In the urban context also, designs endeavour to maximise the green cover and impart a natural experience, unique for urban dwellers.

Multi disciplinary projects, which include Malls & Mixed Use Development, Life Style Residences, Corporate Offices, Hospital & Healthcare, Film City & Studios, Automobile Mall, Resorts, Hotels, Clubs & Restaurants etc.

To name a few - City Centre Malls at Raipur, Patna & Haldia, Genexx Square, Kolkata, Ganga Awas Development, Club Verde Vista, Eco-Hub, Regent Paradise, Guwahati, Neotia Hospitals at Siliguri & Kolkata etc.

AWARDS & ACCOLADES

Recognized nationally and received awards from Times of India, Archidesign, IIID, ABID, Indian Achievers Award, Bharat Gaurav Award, Durian Awards etc., for various projects in Architecture, Landscape & Interior Design.

CONSERVE CONSULTANTS PRIVATE LIMITED

Stewarding the green cause

ABOUT CONSERVE

Conserve Consultants Private Limited, a global green consultancy firm, aims at delivering performance through a unique combination of people, processes and technology. Our expert team of professionals and specialists employ innovative methodologies and technical know-how to effortlessly bring eco-friendly superstructures to sustainable life.

Within a short span, the Company has earned an unmatched reputation in India and the Middle East through the successful execution of a wide range of landmark residential, commercial, industrial, retail, healthcare and hospitality projects. Conserve combines resource knowledge, design techniques, energy analysis, renewable energy systems, carbon credits and green certifications to serve specific needs and provide best-fit solutions to clients.

Conserve's team of globally-qualified professionals, backed by decades of rich industry experience, help clients navigate through complex choices on a wide range of issues spanning from building orientation to achieving specific energy goals. Our team comprises LEED-accredited professionals (LEED AP), IGBC-accredited professionals (IGBC AP), BEE-certified energy auditors and managers, trained energy modelling software professionals, lighting design experts, renewable energy specialists, commissioning experts and clean development mechanism (CDM) specialists, among others.

Conserve's projects are today's landmarks in India and across the globe. Some of our notable projects comprise

Turbo Energy, Chennai: LEED USGBC Platinum (Greenest LEED-certified building in India and the second greenest in the world)

Larsen and Toubro, Hazira: LEED USGBC Platinum

Larsen and Toubro, Talegaon: LEED India Platinum

Supreme Chambers, Mumbai: LEED India Platinum

Infosys Limited, Jaipur: LEED India Platinum

TECOM, Dubai: LEED USGBC Gold

Godrej Waterside, Kolkata: LEED India Gold

General Electric, Bengaluru: LEED India Gold

Ashok Leyland, Chennai: LEED India Gold

Besides the above-mentioned assignments, Conserve is working for many other prestigious brands comprising Mumbai International Airport, Kolkata Metro Railways, GMR, MARG Properties, Indian School of Business (ISB) and ETA Star among several others.

FAÇADE CONCEPT DESIGN PRIVATE LIMITED

Empowering customers with cutting-edge solutions

Located in Mumbai with a branch office in Delhi, Façade provides consulting services towards sustainable development through designing structures in an ecologically-responsive and cost-efficient way. It achieves this through engaging in precise design and engineering and proper material and resource selection. With our deep facade and structural engineering expertise, we also provide extensive services globally with our consulting offices located in the US and Oman, working closely with corporate, architects and developers. We are committed to provide integrated solutions specialised in design, engineering and consultancy services with the ultimate intention of exceeding customer expectations. We collaborate to provide solutions that are innovative, effective and unique.

S.P.A. CONSULTANTS

Raising the bar with state-of-the-art structural engineering solutions

With a near two-and-a-half decade experience, S.P.A. Consultants specialises in providing comprehensive structural engineering solutions. The firm, established by Mr. Sanjiv Parekh, commenced operations as a small unit and today, has grown in size with a rich intellectual capital pool comprising associates, design engineers and CAD engineers.

The firm provides consultancy services across diverse projects, comprising

Institutional Buildings

Industrial Projects

Housing Complexes

High-rise Buildings

Malls

Hotels

IT Parks

Our dedicated and innovative designs supported by contemporary technologies have enabled us to partner with a number of industry leaders

Godrej Properties Private Limited

Bengal Ambuja Housing Developers Limited

Infinity Infotech Parks Limited

Vipul Infrastructure Development Limited

Silver Spring Projects Private Limited

Mani Group

MKJ Developers Private Limited

Avani Global Infrastructure Private Limited

Keppel Land International Private Limited

Siddha Group

Forum Projects Limited

Bengal Shelter Housing Development Limited

Bengal Greenfield Housing Development Company Limited

VMS GROUP

Providing structure to infrastructure

The VMS Group was established in 1959 in response to the growing needs of a young India, by three brilliant engineers (Vakil, Mehta and Sheth). Today, the Group comprises VMS Consultants Private Limited (located in Mumbai) and VMS Engineering Design Services (situated in Ahmedabad). The Group's passion and commitment to structural engineering remains undiminished over the years even as it diversifies to embrace newer structural engineering opportunities. The Group's teams (over 30 in Mumbai and more than 45 in Ahmedabad) combines the legacy of over 50 years to provide modern solutions.

HYDRO MECHANICAL CONSULTANTS

Focused on providing superior mechanical and electrical engineering solutions

Established in 1971 by Mr. E.G. Menon, Hydro Mechanical Consultants is a privately-owned consultancy firm specialising in providing professional consultancy services in the fields of mechanical (plumbing, fire-fighting, public health, boiler and steam engineering), electrical engineering and HVAC-R solutions for buildings and industrial applications. Our corporate mantra is to provide superior mechanical and electrical engineering and HVAC-R consultancy, keeping in mind customer requirements and interests and is aligned with the best prevailing engineering codes and practices in India and abroad. Our associates in HVAC-R and electrical divisions comprise senior professional engineers, well-known across industrial circles on account of their long-standing experience and expertise in their respective fields.
We also enjoy a robust pan-India customer base.

Some of our brand-enhancing past customers include

Oberoi Sheraton, Mumbai

Oberoi Grand, Kolkata

Lanka Oberoi, Colombo

Lake Palace Hotel, Udaipur

Holiday Inn, Juhu, Mumbai

Taj Coromandal, Chennai

Soaltee Oberoi, Kathmandu, Nepal

Deluxe Service Apartments, Dubai

Taj Madras Flight Kitchen

Haj House, Mumbai

Bharat Diamond Bourse, Mumbai