Climate Change Research Institute

Awareness on Green Building Responsible Education in Schools

Mentoring and Inspiring Youth towards Sustainable Energy

Indira Paryavaran Bhawan

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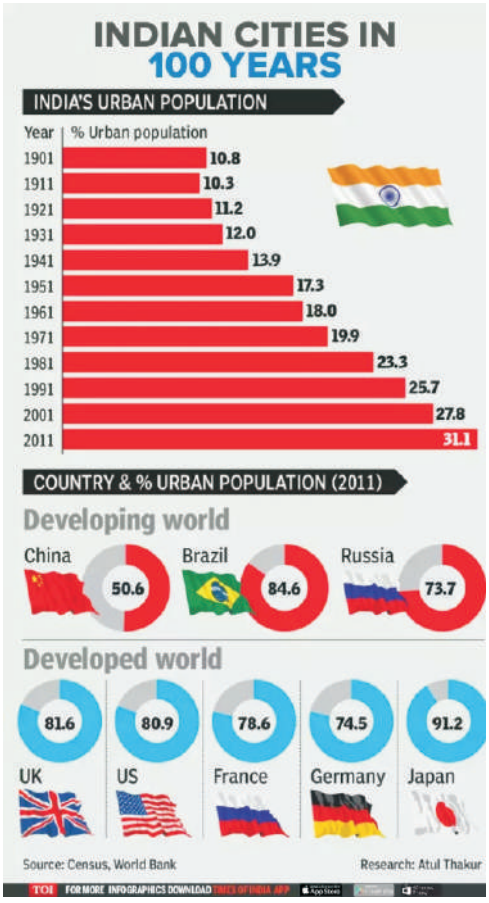
Awareness on Green Buildings Responsible Education

Background

India will lead the World in Urban Growth by 2050. From 1900 to 2000 in 100 years urban population in India has doubled.

India has made tremendous strides in renewable energy development by achieving 78,000 MW of installed capacity.



Starting in 2011, Chief Executive of the Climate Change Research Institute Dr. Malti Goel has held a series of Awareness Workshops on Green Building Responsible Education for youth in the urban context in its various forms.

- Green and Sustainable Cities
- Green Buildings & Smart Cities.
- Solar Energy in Green Buildings.
- Sustainable Growth of Cities
- Solar Rooftop

These Awareness Workshops have provided a platform to intensive and interactive learning with the Eminent Experts on the emerging issues about sustainable energy use in buildings.

More such workshops are being planned for those in schools to sensitize them to choose science as future career.

Solar Rooftop Awareness Campaign

From left **:**
Dr. Malti Goel, CCRl; Prof. N.K. Bansal, CEPT; Dr. V. S. Verma, CERC; Dr. Anil Misra,GiZ; Mr. Lavleen Singhal, ACIRA

"What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another."

– Mahatma Gandhi

Teachers' Day Awareness Campaign

From left :
Dr. Malti Goel, Honorable Dr. S. Z Qasim, Prof. D. P. Agrawal, Dr. T. N. Hajela, Dr. R. K. Khandal, and Mr. Sushant Baliga in the Awareness Workshop held on September 7, 2011.

Green Buildings Concepts
held on 7th September 2011

Dr. Malti Goel, Programme Coordinator and Executive Director, CCRS observed that green buildings are necessary in view of the fact that India is going to witness huge infrastructure growth in the coming decades. Challenges posed by climate change are the major concerns. Ways to develop educational tools by integrating design parameters and scientific solutions for saving energy and materials as well as to increase the use of renewable energy in buildings were introduced.

Prof. D.P. Agrawal, Chairman, Union Public Service Commission, Govt. of India inaugurated the Workshop. He commended this effort and said that there is lack of awareness about Green Building principles in our country. While there is great deal of concern among people on Vaastu principles, there is hardly any movement for being energy conscious. There is a need for a special roadmap for India and not to copy the western model of living.

Eminent scientist, Dr. S. Z. Qasim, Former Member, Planning Commission released the book “ABC of Green Buildings Responsible Education” on this occasion. The book aims to provide scientific understanding and information about green building concepts in a lucid manner - learning as A. B. C.D. with pictorial depiction.

Green Buildings Concepts

Dr. R. K. Khandal, Director, SIIR presented the need for energy efficient green materials and technology upgradation by the use of nanotechnology. Some of the Executive Summary 4 commonly used approaches, which have shown promise include introduction of functionalities in the polymer structure, modification of surfaces for unique optical properties as also surface properties, development of hybrid materials.

Sh. Sushant Baliga, Ex-Additional Director General, CPWD said minimizing the use of energy without loss of functionality is the need of the day. For designing buildings in an energy efficient manner and mitigating any adverse impact to the environment, the GRIHA rating system takes the entire life-cycle of a building into account and has become mandatory for public buildings.

Sh. R.G. Gupta, Former Commissioner, DDA chaired the Technical Session. He enlightened the participants about the global, national and city level responses to the need for maintaining ecological balance in terms of 'To Stop & Control Water, Air, Noise and Soil Pollution'.

Green Buildings Concepts

Dr. S.N. Maity, Chief Scientist, CMERI, Durgapur said that land requirement for solar energy use is huge and runs into kms. A Solar Tree has been designed, which can meet the renewable energy needs in buildings with space limitations and was greatly appreciated by the audience.

Sh. Deependra Prashad, Principal Architect and Chief Consultant, DPAP outlined the need for environment learning and presented architectural design for the SJH School building in Meerut to describe green building parameters.

Ms Maria-Sube Elodie, EU-India Action Plan said the deliberations are very interesting and India needs to have a Roadmap of its own. Participants, particularly students of architecture echoed these sentiments and found this workshop unique and extremely useful.

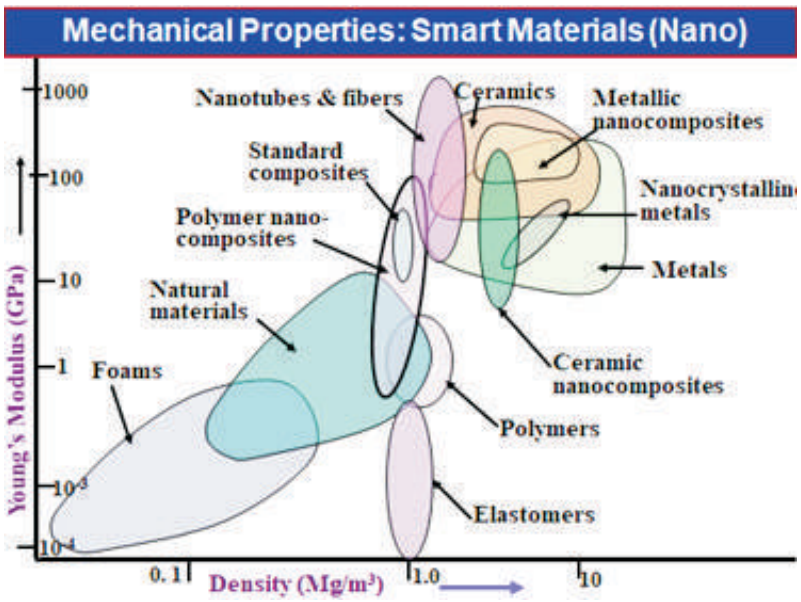
Ms. Neha Goel, Student, Department of Environment Planning, School of Planning and Architecture, Presented Vote of Thanks.

Green Buildings Concepts

Dr. Malti Goel - What do we need for Green Buildings?

Use of Renewable Energy in Buildings

Use of Local Materials like Sandstone



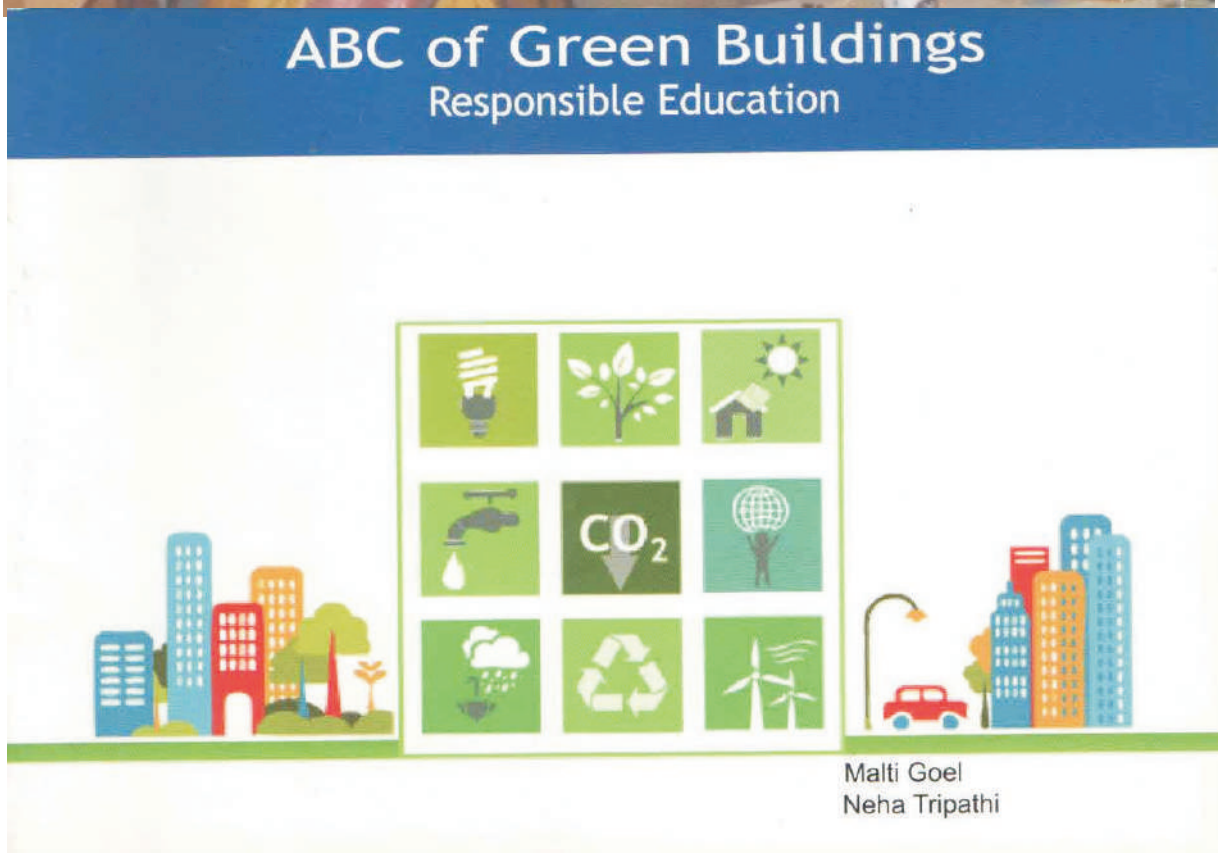
Use of Energy Efficient materials

A Solar Power Tree

Environment Friendly Building and Pedagogy

Teacher with school children

Green Buildings Concepts



A Solar Rooftop in Green Buildings
held on 13th March 2013

"Dr. (Mrs.) Malti Goel, Executive Director, CCRI and Programme Coordinator for the eveny held on 13th March 2013, introduced the theme to the students and delegates. She said key question before us is; Can Solar Rooftop be a Game Changer Technology for India?"

V.S. Verma, Member, Central Electricity Regulatory Authority and Member (Planning) Central Electricity Authority said, "versed with the data and forecasts would be required to have constant interaction with the regulators to make it usable".

Prof. N. K. Bansal, Ex-Vice Chancellor, MVD University and Ex-Prof. IIT Delhi said, "In India we have Green Buildings and Energy Conservation Building Codes (ECBCs). There are difficulties faced in practical situations sometimes in implementing these guidelines. There is a scope for improving energy efficiency in buildings. The policy should be consumer friendly, so that it can be easily implemented."

A Solar Rooftop in Green Buildings

"Dr. Anil Misra, Senior Programme Advisor, GiZ on Solar Rooftop programme in Germany, Describing lessons to be learnt, he observed that Germany gets one tenth of solar radiation on average in comparison to India, but has thirty times greater production. We need to learn the application of technology management from Germany."

Mr.Lavleen Singal, President, ACIRA Solar said, "selection criteria for Rooftop installations and the economics of it, both are important. The success of a Solar Rooftop would depend onvarious localparameters and the available options".

Students of Architecture from Universities attended and interacted with eminent panellists with zeal and enthusiasm.

Audience Participation

Green Buildings and Smart Cities

held on 31st January 2014

"Dr.Malti Goel, Former Advisor, Department of Science & Technology, Govt. of India said Green Buildings and Smart Cities have similarity on three fronts, namely; (i) Energy and fuel saving - Both have to save fuel through improving energy efficiency and maximising use of renewable energy (ii) Information technology - Use of Information Technology is very important for finding solutionsto green buildings as well as smart cities. (iii) Quality of life - Both are targeting at improving quality of life".

"Sh. G. Pradhan, Chairman, Central Electricity Regulatory Commission. Urbanization in our country is taking place at a very rapid pace. By 2050, more than 60% of our population will be in cities. It is estimated that 68% of the GDP of the world will come from 600 cities. Much can be done in terms of using renewable forms of energy in the building related activities. Although one of the most critical issues we are facing today is that of integration of renewable energy with the present day grid".

Dr.Arun K. Tripathi, Director, Ministry of New and Renewable Energy said "We need to find solutions for green buildings and smart cities through large scale application of renewable energy. Today India has installed capacity of 2,30,000 MW and the share of renewable sources is only 30,000 MW. Our target is to reach 20% share by 2022. Green building GRIHA rating has been developed and already 425 buildings have been registered. Paryavaran Bhavan newly constructed building has been designed as net zero emission building. It has around one megawatt solar PV installations".

Green Buildings and Smart Cities

Shri R.G. Gupta, Ex-additional Commissioner, DDA said “In big cities like Delhi we have faced many challenges of juggi clusters and slum areas. Delhi has 369 urban and rural villages, about 500 unauthorized residential colonies and 1600 unauthorized industrial colonies. With so many unauthorized clusters and over 100 thousand commercial areas with unauthorized parking, there are the practical problems in Delhi Smart city development is very challenging when growth is unplanned”.

Prof. A.K. Maitra, former Director, School of Planning & Architecture “We have had existing Indian Oil Corporation building as smart building in Delhi and they have got solar panels all around the building and you don't even notice them. India would need 3000 new towns of at least one lakh population in the next 20-25 years and these can be designed as green cities”

“Dr.Mahavir chaired a Technical Session on Green Buildings and Smart Cities at the Workshop on Awareness in Green Buildings Responsible Education in Buildings, organised by the Climate Change Research Institute and IIC, at New Delhi, on 31st January, 2014”

Green Buildings and Smart Cities

Dr. Kakoli Saha, School of Planning & Architecture, Bhopal
Use of Information Technology in assessing the solar potential of a region in Bhopal city

Dr.Sudhakar Sundaray, TERI
Solar rooftop programme of TERI

Mr. Karan Mangotra, UNDP
What About Smart City and Green Buildings?

Floor Participation

Green Buildings and Smart Cities

Feedback

- The deliberations at the green building and smart city workshop evolved around the need to create awareness about these emerging topics in the context of climate change and expose the participants to key issues that could lead to sustainable future.

- 'Smart Cities' in the urban growth offer an opportunity to develop cities neat and clean with e-governance.

- We want to have good cities and good houses; both are linked with human comfort and are addressing environmental challenges like reduction in pollution, climate change mitigation etc.

- Smart city is futuristic, but planners look for long-term perspectives and smart cities are just that.

- The workshop is very innovative and informative towards increasing awareness among youth and capacity building in related concerns of green buildings as well as how to build new cities'.

Recommendations were made and conveyed to local authorities for accelerating the process.

Sustainable Habitat and Learning Environment

held on 6th June 2014

Dr (Mrs) Malti Goel, President CCRI quoted ""At Climate Change Research Institute we take action to create awareness about the Planet Earth, its weather, climate, conservation of its natural resources and environment to different strata of society to educate youth from schools & colleges, and to researchers in academia & industry. We shall work for all the 3 Es, Energy, Environment and Education as our agenda".

Dr. S. Chatterjee, Registrar Jawaharlal Nehru University "What you construct today and how it helps the nature or disturbs the nature in the long-run, becomes important. Sustainability is the key issue in balancing between chaos and discipline. The lack of discipline results in chaos in mega cities.The challenges before us can be liberal arts/skill oriented and are considered essential in order to take an active part in civic life."

Prof. G.D. Sharma Former Secretary UGC "We need leaning environment in building sustainable habitat. Major breakthroughs are taking place in the world today and there is an Alternate Model of Development integrating with environmental knowledge and innovation. `Smart' should be smart in the context of your requirement. Technology enables us to achieve the smartness."

Sustainable Habitat and Learning Environment

Mr. Peter Cox, PCA Directions, Australia gave his perspectives on Australian and Indian buildings for Smart & Sustainable Cities. “A balanced approach to planning gives demonstrable benefits and the potential for a positive return on investment. Additional investment required to achieve the desired performance of the cities or building,s. Government of India has recently introduced excellent initiative with new legislation under the Corporate Social Responsibility program. I am hoping the related investments will lead to a lot of more innovative thinking”.

Green Campuses in India - Mr.Sandeep Goel, SGA Designlab, said “ we develop facades in green buildings using simulation and software. It could be detailed out to the extent how much is the open area requirement. From the vernacular architecture view point the amount of area of opening that could actually be juxtaposed into a sort of a modern 'jally'. One could have more opening in the north side and less opening in the south side or west side. We estimated that enormous amount of energy as much as about 1 MW could be saved in a large complex. We are concerned with conservation of energy, environment, materials, and other resources.

Ar. Christopher Mitchell, AWW Inspired Environment, UK “We do mainly higher education buildings and universities. We develop Building Information modeling. It cuts an enormous amount of waste. Driving architectural efficiency and the better use of materials is significant for the sustainable buildings. Understanding the educational needs is really very important. We need to make concrete, imaginative and inspirational environments because that is really important”.

Dr. S. Y. Quraishi, Ex- Chief Election Commissioner of India in his Valedictory Address said “We should take pride and pleasure that we all want to do something different and something new at whatevercost. In India environment consciousness in the government level is pretty high. Lot of greening of India has come through the directives of Supreme Court and we should thank them for it. Green Tribunal has been set up. Internationally, we will try to create a model of Green Election in a Democracy.”

Sustainable Habitat and Learning Environment

Mr. Karan Malhotra, UNDP
Energy Efficient Buildings and Smart Cities

Er. Ajay Raj, A2S Consultant, New Delhi
Challenges in green Buildings-MNIT Lecture Theatre

Mr. Avinash Kumar, SGS
Sustainable Habitat – Green Ratting

Ar. Sachin Rastogi, Zero Energy Design Lab
NIAB Hyderabad – A Green Building

Feedback

Prof. G.D. Sharma Former Secretary UGC congratulated Dr. Malti Goel for undertaking a big task of making people aware of the climate change and particularly the educational institutions.

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We are the future give us a chance!

Annexure- I

Climare SAR Bulletin for Information Dissemination

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Climate *SAR* सार

Climate Science And Research

Green Building

Climate Change Research Institute
Science & Technology Solutions for Sustainable Energy Future
C- 85 Shivalik, New Delhi - 110017

FROM EDITOR

'Climate Change is about change in the climate patterns resulting from global warming due to anthropogenic changes'.

Accumulation of greenhouse gas emissions in the atmosphere is giving rise to global warming and climate change. Carbon dioxide emissions occur from combustion of fossil fuels in thermal power plants for generation of electricity. Depleting resources and increasing industrial and building activity are causing environmental degradation on the Planet earth.

In this issue I discuss about Green Buildings. A green building should be able to reduce its carbon footprints in the environment during its construction, operation and occupation. It saves on energy, water and material resources and is favorable for healthy environment.

Climate Change Research Institute has started this bulletin on Climate Science and Research- 'Climate SAR'. In this issue you learn about what is a green building, what makes it green, its benefits and how do you certify a building that it is green.

Happy reading and send your feedback to contactus@ccri.in

Dr. Malti Goel
Climate Change Research Institute

WHAT IS A "GREEN BUILDING"?

Green Building, Green Rating and Green Economy are currently 'buzz' terms for non – greenhouse gas emissions related growth and development. A Green Building functions using an optimum amount of energy, consumes less water, conserves natural resources, generate less waste and create spaces for healthy and comfortable living, as compared to conventional buildings. Increasing use of renewable energy and a solar rooftop is desirable in a Green Building.

Green Buildings are high performance buildings. They protect and restore human health and environment during operation.

WHAT MAKES A BUILDING "GREEN"?

A building is environmentally responsible and resource-efficient throughout its life-cycle. These objectives incorprate design concerns of economy, utility, durability, and comfort.

Green buildings use sustainable materials in their construction (e.g., reused, recycled-content, or made from renewable resources) create healthy indoor environments with minimal pollution (e.g., reduced product emissions) and have landscaping that reduces water usage and is in harmony with external environment (e.g., by using native plants that survive without extra watering).

HOW DO BUILDINGS AFFECT CLIMATE CHANGE?

The energy used to heat or cool and power our buildings leads to the consumption of large amounts of energy, mainly from burning fossil fuels - oil, natural gas and coal - which generate significant amounts of carbon dioxide (CO_2), the most widespread greenhouse gas. Buildings contribute 14-40 per cent of the total carbon dioxide emissions.

Reducing the energy use and greenhouse gas emissions produced by buildings is therefore fundamental to the effort to slow the pace of global waeming. Buildings may be associated with the release of greenhouse gases in other ways, for example, construction and demolition debris that degrades in landfills may generate methane gas, and the extraction and manufacturing of building materials also generates greenhouse gas emissions.

WHAT ARE THE BENEFITS OF GREEN BUILDING?

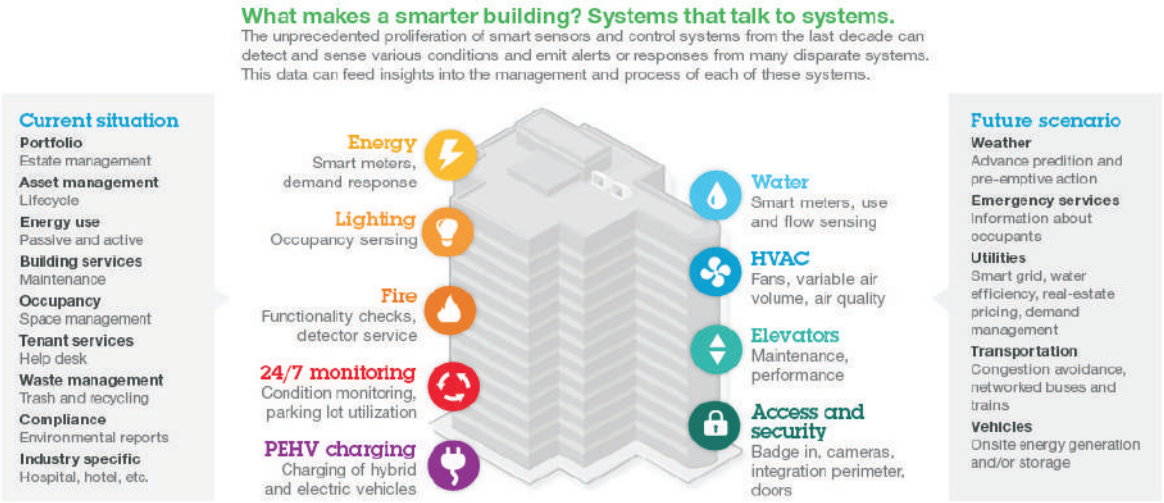
The successful adoption of green building strategies can maximize both the economic and environmental performance of buildings. Benefits of Green buildings are:

- Using less energy, water saving and recycling of resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environment degradation

HOW IS GREEN BUILDING RELATED TO SMART CITIES AND SUSTAINABLE DEVELOPMENT?

Smart city development serves the economy, the community, and the environment by supporting healthy communities, create jobs and economic prosperity without burdening future generations with environmental degradation. Sustainability, or sustainable development, is the ability to achieve continuing economic prosperity while protecting the natural systems of the planet and providing a high quality of life for its people.

Green buildings help in achieving the objectives of both smart cities and sustainability.



WHY SHOULD WE CARE ABOUT GREEN BUILDINGS?

Buildings account for about 70%-80% of a city's electricity consumption, nearly 40% of its energy use and close to 40% of all its greenhouse gas emissions according to the Energy Information Administration, USA. Compared to standard buildings, green buildings have been shown to approximately

- **Lower maintenance costs by over 10%**
- **Reduce energy use more than 25%**
- **Lower greenhouse gas emissions by 33%**
- **Significantly increase occupant satisfaction**

HOW A GREEN BUILDING IS CERTIFIED.

Two green building rating systems in India are being used by design professionals as:

LEED: Leadership in Environmental and Energy Design is building rating system adopted by commercial buildings in India. It is developed by Indian Green building Council in association with Confederation of Indian Industry. Buildings are rated as Platinum, Gold and Silver.

GRIHA: Green Rating for Integrated Habitat Assessment is a green building 'design evaluation system', and is suitable for all kinds of buildings in different climatic zones of the country. GRIHA rating system consists of 34 criteria categorized under various sections such as Site Selection and Site Planning, Conservation and Efficient Utilization of Resources, Building Operation and Maintenance, and Innovation points. All future buildings in India are expected to meet GRIHA requirements and award points on a scale of 100.

Eight of the 34 criteria are mandatory, four are partly mandatory, while the rest are optional. Each criterion has a number of points assigned to it. Different levels of certification (one star to five stars) are awarded based on the number of points earned. The minimum points required for certification is 50.

New Lecture Hall Complex, IIT Delhi

New Lecture Hall Complex at Indian Institute of Technology is GRIHA rated Green Building at New Delhi. Indian building Congress has also awarded the architect for its Design.

ECC LECTURE SERIES - 2015

Third Lecture on "CO2 Sequestration : A Fresh Outlook"

Climate Change Research Institute organized third lecture in the Environment and Climate Change (ECC) series 2015 on 'World Environment Day'. The lecture entitled 'CO_2 Sequestration: a fresh outlook' was delivered by Prof. Malti Goel, Former Advisor & Emeritus Scientist, Ministry of Science & Technology on 5th June, 2015 at India International Centre, New Delhi.

Fourth Lecture on "Energy and Fossil Fuel"

The fourth lecture in the Environment and Climate Change (ECC) series 2015 on 'Energy and Fossil Fuel' was delivered by Shri. Gautam Sen, Executive Director, ONGC on October 16, 2015. He explained the concepts in a lucid manner. Chief Guest on the occasion was Prof. D. P. Agrawal, Former Chairman, UPSC and Chairman GC, CCRI.

ECC Lecture Series was attended by a large number students from various schools.

ACBCCS 2015

Awareness and Capacity Building in Carbon Capture, Storage and Utilization:

Towards a Low Carbon Growth Strategy

A capacity Building workshop on Carbon Capture Storage and Utilization was recently organized by Climate change Research Institute at India International Centre, New Delhi from July 27-31, 2015. In the inaugural address Dr. Madhukar O. Garg (DG, Council for scientific & Industrial Research) said Power, Transportation and Industry are major sources of carbon dioxide. In this five day workshop delegates nominated by various stakeholder agencies participated. Technical Sessions focused on CO_2 utilization and industry perspectives. It was recommended that a pilot facility be set up for testing results of CO_2 capture.

The concluding session held on 31 July 2015 was chaired by Shri R.K. Sachdev (Ex-Adviser Min. of Coal). An open roundtable discussions on CCSU: acceptance as a low carbon strategy was held.

For more information about Green Building solutions.

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