CPWD 'S PERSPECTIVE ON GLASS AS A GREEN BUILDING MATERIAL

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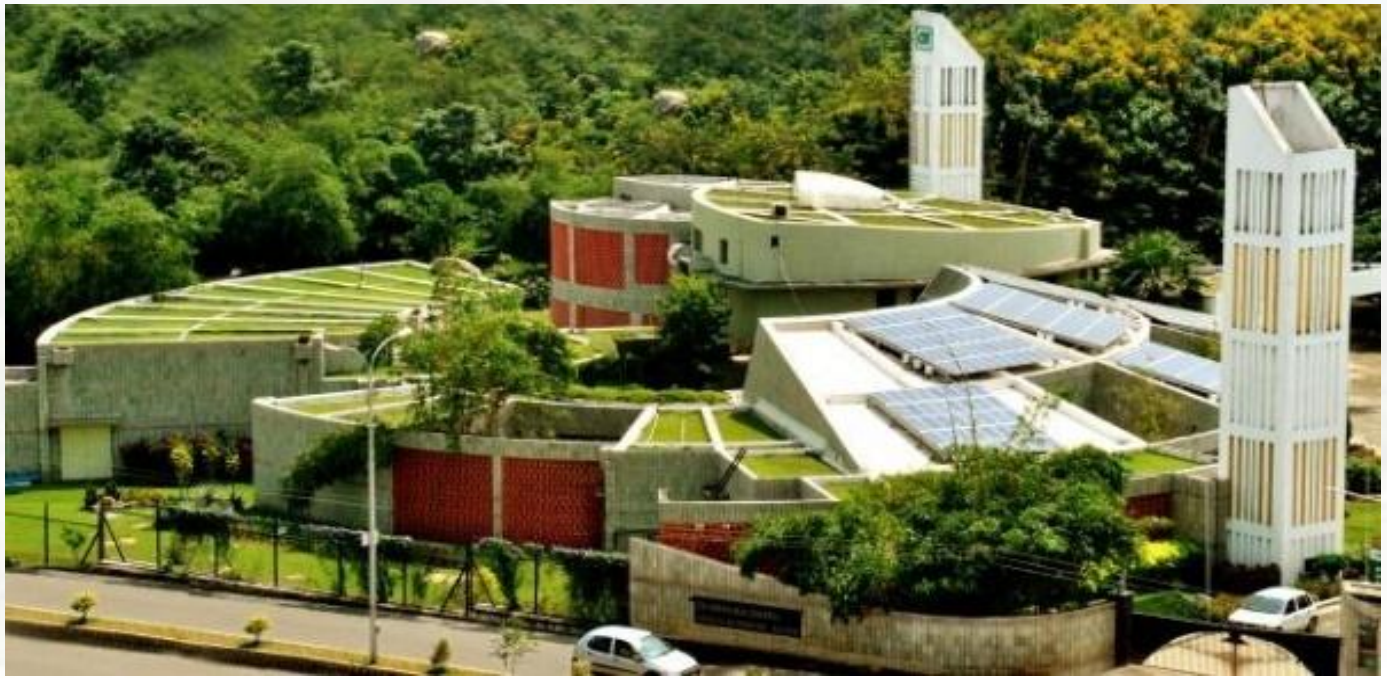
GLASS IS NOT JUST A MERE MATERIAL, BUT A MATERIAL OF OUR FUTURE WORLD AND GLASS ARCHITECTURAL BUILDINGS AROUND US PORTRAY THE SAME

GLASS BUILDINGS IN BKC MUMBAI

GREEN BUILDINGS

GLASS BUILDINGS ARE ALSO GREEN BUILDINGS.

A green building is water efficient, energy efficient, conserves natural resources, generates less waste and provides healthier spaces for occupants as compared to a conventional building.



SALIENT FEATURES OF GREEN BUILDING

- Minimal disturbance to the landscape and site condition.
- Use of recycled and environmental friendly building materials.
- Use of non-toxic materials.
- Efficient use of water and water recycling.
- Use of energy efficient and eco-friendly equipments.
- Use of renewable energy.
- Ideal indoor air quality for human safety and comfort.
- Effective control and building management systems.

ROLE OF GLASS IN GREEN BUILDINGS

Solar control glasses which reflect heat or UV rays and make the building energy efficient.

Transparency- increased natural light gives pleasing aesthetics and better panoramic views , reduces the need for artificial lighting and energizes the interiors.

Low reflection reduces the glare.

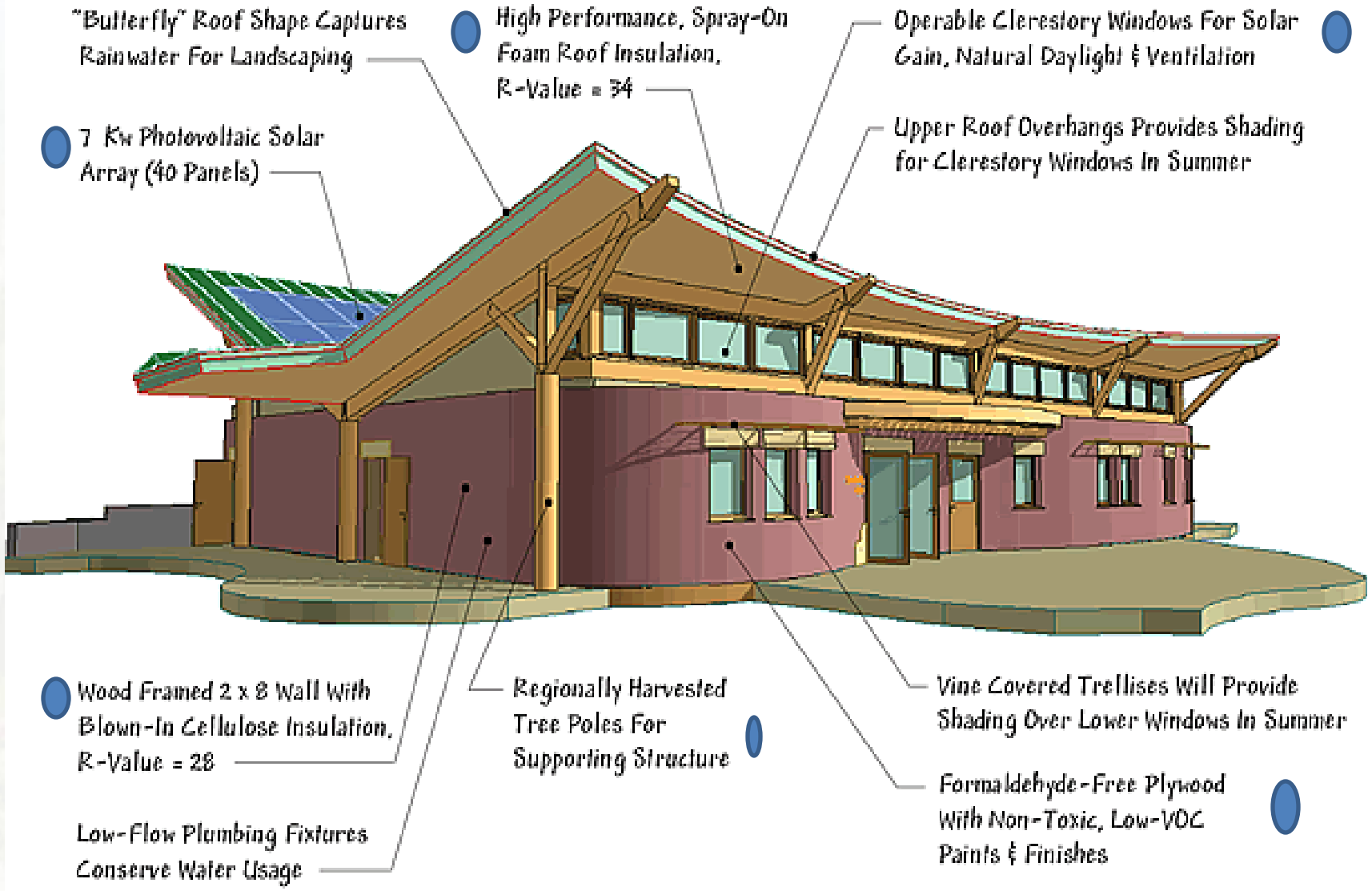
Recyclability makes it Green.

Double glass adds to acoustic comfort thereby giving control over the outside noise.

Glass reduces the weight of your structure.

Coated glass provides **advanced thermal insulation**.

GREEN BUILDING FEATURES



GLASS --A CHOICE FOR SUSTAINABLE BUILDINGS

Glass is made of mainly non-polluting raw materials & is recyclable.

Its manufacturing process is highly energy efficient, requires low levels of water and generates little waste.

Recent life-cycle studies have shown that windows represent a very minor share of a building's environmental impact compared to other components of the building.

GLASS IS A GREEN MATERIAL.....

GREEN BENEFITS OF GLASS

1. Day-lighting - reduces elect. Consumption.
2. Transparency - Good views improve the productivity and health of the occupants
3. Recyclability - is an important parameter of Green building material.
4. High performance glass -helps in Achieving energy efficiency .
5. Innovative applications - interiors, sculptures, transparent fire doors, furniture, murals & remote controlled glass that can change appearance of glass.
6. Double glazed glass - acoustic - Controls noise
7. Self Cleansing - keeps itself clean on its own and brings out an ever sparkling effect.

LOW ENERGY BUILDINGS THAT USE LARGE GLAZED AREAS INTELLIGENTLY ALREADY EXIST THROUGHOUT EUROPE. THESE BUILDINGS ARE THE MOST COMPELLING EVIDENCE OF THE HIGH ENERGY EFFICIENCY PERFORMANCE OF GLASS PRODUCTS.

OFFICE BUILDING. ZEBRA TOWER WARSAW, POLAND

- **The building obtained the LEED Gold certification.**
- **New building completed in 2011.**

CBI BUILDING , 4 STAR RATED

NET ZERO BUILDING WITH LARGE GLAZED AREAS

LITEX TOWER,
SOPHARMA COMPLEX
SOFIA, BULGARIA

- **The building meets NZEB requirements and obtained the DGNB Gold certification.**
- **New building completed in 2012.**

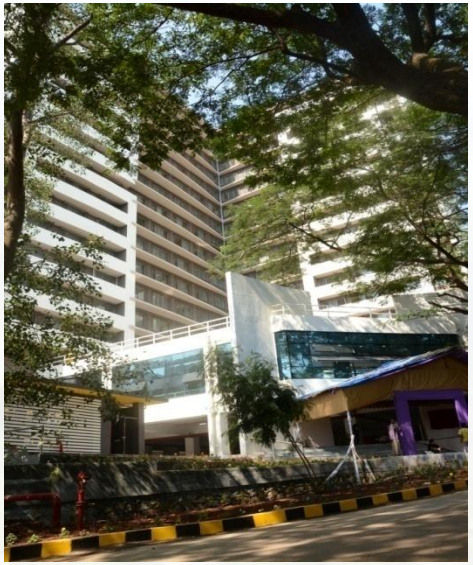
NET ZERO BUILDING : INDIRA PARYAVARAN BHAWAN CONSTRUCTED BY CPWD

USE OF GLASS IN CPWD

- **FUNCTIONAL BASIS**
- **AESTHETICAL BASIS**
- **FUNCTION CUM AESTHETICS**

BUILDINGS WITH EMPHASIS ON FUNCTIONAL REQUIREMENT

ADMN. & LIBRARY BUILDING FOR NITIE



HOSTEL FOR NITIE

INCOME TAX FLATS, BKC

BUILDINGS WITH EMPHASIS ON AESTHETICS

CBI BUILDING

PROPOSED CUSTOM OFFICE, MUMBAI

RTI, FOR INDIAN AUDIT & ACCOUNTS DEPTT

SEBI BUILDING MUMBAI

INCOME TAX BUILDING, BKC, MUMBAI

Regional Passport Office at Bandra Kurla Complex, Mumbai

BUILDINGS WITH EMPHASIS ON FUNCTION CUM AESTHETICS

COMBINATION OF BLDGS. WITH MORE / LESS GLASS AREA DEPENDING ON THE FUNCTIONAL / AESTHETICAL IMPORTANCE REQD.

NATIONAL INSTITUTE OF SECURITIES MARKETS


HOSTELS


RESIDENTIAL
BLOCK


DINING BLOCK

ACADEMIC BLOCK


ORIENTATION BLOCK


RECREATION BLOCK

GREEN BUILDINGS

- LOOKING AT THE IMPORTANCE OF GLASS IN GREEN BUILDINGS, CPWD HAS DECIDED TO CONSTRUCT ALL BUILDINGS CONFORMING TO MINIMUM GRIHA 3 STAR RATING NORMS, THOUGH BUILDINGS WITH 4 & 5 STAR GRIHA RATINGS ARE ALSO BEING CONSTRUCTED.

- CPWD HAS ALSO CONSTRUCTED NET ZERO ENERGY BUILDING IN DELHI.

- GLASS IS GOING TO BE A MAJOR BUILDING MATERIAL IN ALL FUTURE BUILDINGS DUE TO FUNCTIONAL AS WELL AS AESTHETICAL REQUIREMENTS.

BUILDINGS REGISTERED FOR GRIHA RATINGS

- **CENTRAL BUREAU OF INVESTIGATION BUILDING (CBI) - COMPLETED**
- **BUILDINGS OF NATIONAL INSTITUTE OF SECURITIES MARKETS (NISM) – IN PROGRESS**
- **NATIONAL TEST HOUSE (NTH) – IN PROGRESS**
- **INDUSTRIAL DEVELOPMENT BANK OF INDIA (IDBI) – IN PROGRESS**

USAGE OF GLASS IN GENERAL

- **WINDOWS**
- **STRUCTURAL GLAZING**
- **DOORS**
- **PARTITIONS**
- **MURALS ON GLASS**
- **SPECIAL USES e.g. FIRE RESISTANT GLASS, SOLAR REFLECTIVE GLASS, BULLET PROOF GLASS**


WINDOW

STRUCTURAL GLAZING

STRUCTURAL GLAZING & INTERIORS

CANARA BANK

CBI BUILDING

GLASS FAÇADE WITH GRANITE & ACP


DOOR

FIRE RATED DOOR


PARTITIONS

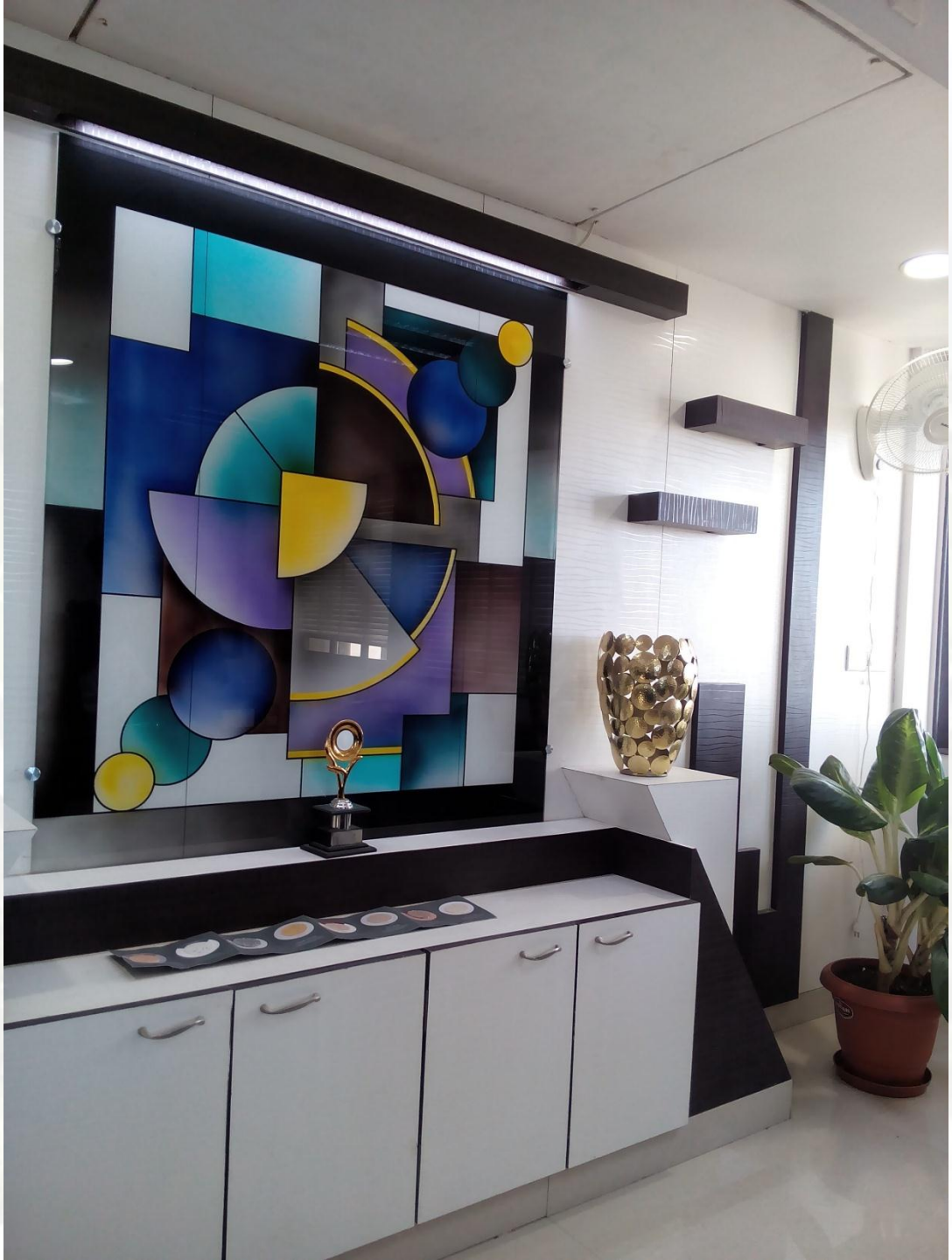
PARTITIONS WITH AESTHETICS & REDUCED TRANSPARENCY

PANELLING, PARTITION & DOOR

PARTITIONS

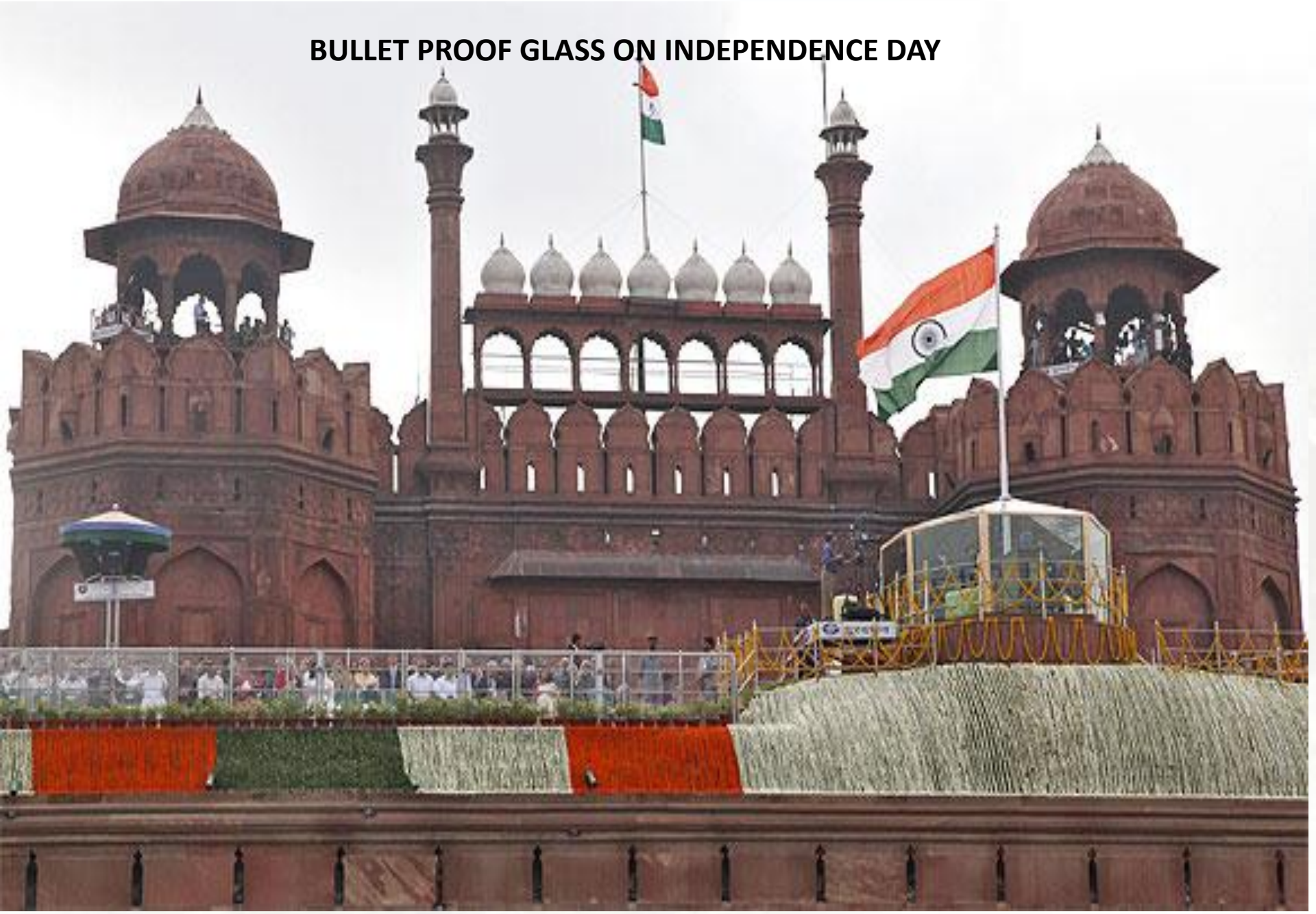
PARTITION & PANELLING

MURALS



FIRE RATED DOOR AND GLASS PANELS IN LOBBY OF CBI BUILDING

BULLET PROOF GLASS ON INDEPENDENCE DAY



The Cabinet has approved application segment wise targets for the three phases of National Solar Mission (JNNSM). The targets under Phase-I, Phase-II and Phase-III and the achievements till date are as under:

Application Segment	Target for Phasel (2010-13)	Cumulative Target of Phase-II (2013-17)	Cumulative Target of Phase-III (2017-22)	Achievement till date
Grid solar power (large plants, roof top & distribution grid plants)	1,100 MW	10,000 MW	20,000 MW	2,208 MW (including those under state initiative)
Off-grid solar applications allotment	200 MW	1,000 MW	2,000 MW	275.2 MW

CONTRIBUTION OF CPWD IN SOLAR PV

CPWD HAS DECIDED TO INSTALL ROOFTOP SOLAR POWER PARTICULARLY ON FLAT SURFACES HAVING AN AREA OF 1500 SQM OR MORE AND HAS ALREADY COMPLETED INSTALMENT AND STARTED ELECTRICITY GENERATION IN MANY BUILDINGS IN DELHI AND EVEN OUTSIDE DELHI.

THIS HAS BEEN DONE THROUGH MOUs SIGNED BY CPWD UNDER POWER PURCHASE AGREEMENTS WITH RESCO (RENEWABLE ENERGY SERVICE COMPANIES) COMPANIES AND UNDER CAPEX (CAPITAL EXPENDITURE) MODEL.

Table 1: Solar Power Installed by CPWD on Roofs of Existing Buildings as on 25.10.2015

S.No.	Name of Bldg.	Capacity in Kwp	Date of Completion of work	Date of Power Generation	Remarks
	A. In Delhi				
1	Pushpa Bhawan, New Delhi	500	25.10.2015	31.10.2015	Work Completed and Plant Commissioned
2	Nirman Bhawan, New Delhi	200	23.10.2015	31.10.2015	Work completed
3	Shastri Bhawan, New Delhi	250	31.10.2015	07.11.2015	100 KWp Plant Commissioned
4	East Block, New Delhi	250	07.10.2015	15.10.2015	Work completed & power generation started
5	Sewa Bhawan, New Delhi	100	07.10.2015	15.10.2015	Work completed & power generation started
6	C.G.O. Complex, New Delhi	150	30.10.2015	07.11.2015	Work in progress almost 80% work completed
7	Transport Bhawan	100	15.12.2015	27.12.2015	Work yet to be started

	B. Outside Delhi				Plant Commissioned and power generation started
1	GPOA Complex, Shastri Bhavan, Chennai	100	17.01.2015	14.08.2015	
2	GPOA, Rajaji Bhawan, Chennai	100	07.01.2015	25.09.2015	Plant Commissioned and power generation started
3	Boys and Girls Hostel in NIFT, Taranani, Chennai	22	09.01.2015	30.11.2015	Work in Progress
4	O/o Principal CCT, Income Tax Department, Chennai.	200	05.08.2015	31.12.2015	Work in Progress

Grid Interactive Roof Top Solar Power Plant

500 KWp Pushpa Bhawan New Delhi

250 KWp at East Block R.K. Puram, New Delhi

100 KWp at Sewa Bhawan, R.K.Puram, New Delhi

Solar Rooftop Panels in Indira Paryavaran Bhawan, New Delhi installed during construction

110 kWp at Chennai

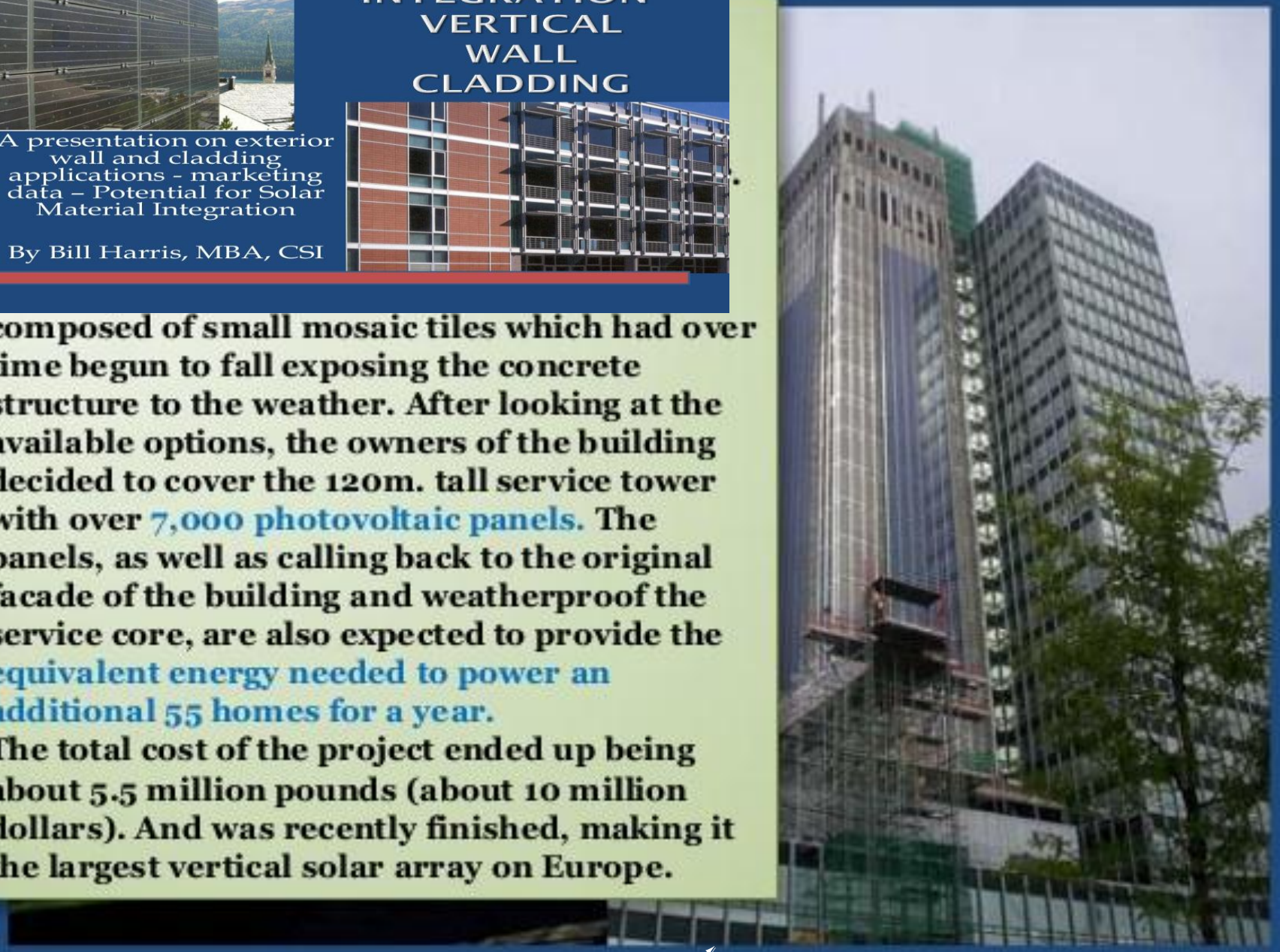
SOLAR PANEL INTEGRATION – VERTICAL WALL CLADDING

A presentation on exterior wall and cladding applications - marketing data – Potential for Solar Material Integration

By Bill Harris, MBA, CSI

composed of small mosaic tiles which had over time begun to fall exposing the concrete structure to the weather. After looking at the available options, the owners of the building decided to cover the 120m. tall service tower with over 7,000 photovoltaic panels. The panels, as well as calling back to the original facade of the building and weatherproof the service core, are also expected to provide the equivalent energy needed to power an additional 55 homes for a year.

The total cost of the project ended up being about 5.5 million pounds (about 10 million dollars). And was recently finished, making it the largest vertical solar array on Europe.



COMPLETE GLASS BLDG WITHOUT SOLAR REFLECTION

ENERGY EFFICIENT

SMART WINDOW THAT TURNS INTO A TV SCREEN

internet infrastructure of

can take years. NYT NS

A snake colony on uninhabited island in US?

Boston: The US state of Massachusetts is planning to set up a colony of venomous rattlesnakes on an uninhabited island, sparking fears that the serpents could escape and attack people. The department of fisheries and wildlife wants to make a Quabbin Reservoir island home to the venomous timber rattlesnake, which is indigenous to the state.

"By creating a colony on an island like that, they are far less likely to run into people who are on the trails and working their way around Quabbin reservoir than they would if we did nothing," said governor Charlie Baker. PTI

Coming, a 'smart' window that turns into a TV screen

Toronto: Imagine a window in your living room that could double as a giant thermostat or a big TV screen. A new glass technology may make it possible.

Researchers at University of British Columbia in Canada have found that coating small pieces of glass with extremely thin layers of metal like silver makes it possible to enhance the amount of light coming through the glass. This, coupled with the fact that metals naturally conduct electricity, may make it possible to add advanced technologies to windowpanes.

The next phase of this research will be to incorporate the invention onto windows with an aim to selectively filter light and heat waves depending on the season or time of day, said lead researcher Kenneth Chau. Chau questioned what would happen if they reversed the practice of applying glass over metal — a method used in the creation of energy efficient window coatings. "It's counter-intuitive to think that metal could be used to enhance light transmission, but this was actually possible," Chau said. PTI

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HI-TECH SHOW

'Financi stress lea physical

Washington: Peopl that their financial shaky may actually ce more physical those who feel eco secure, scientists, one of Indian-origin

The findings in link may be driven b lack of control over "Results show econ curity produces phy reduces pain toler predicts over-the-co killer consumption dy author Eileen C University of Virg pattern was same af including age, empl re taken into accoun

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of its services.

Since its debut in 2011, Zi-

Google employees using Zipongo ate more fruits and

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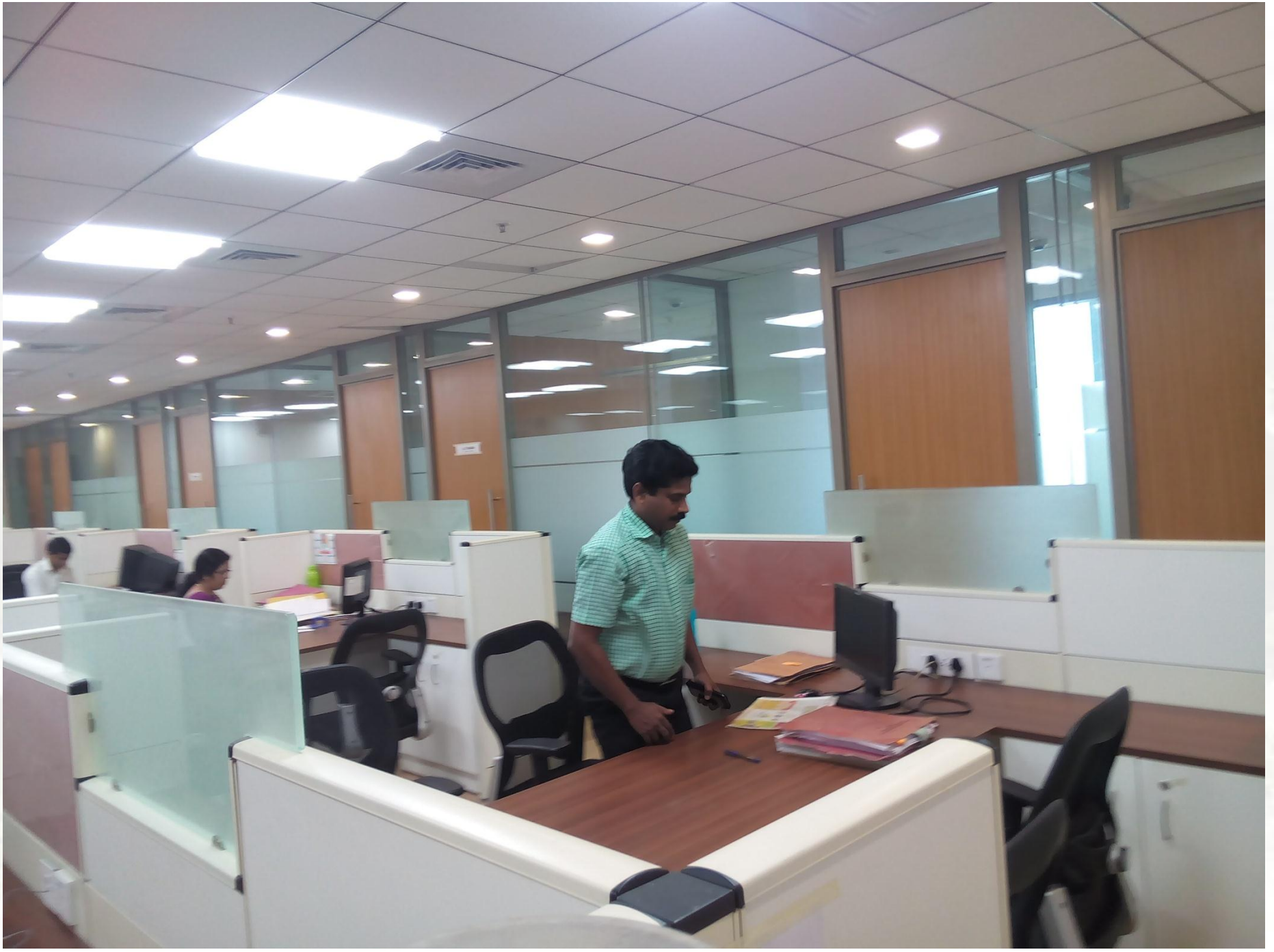
tional counselin employees.

- Research at University of British Columbia in Canada
- Fantastic property
- **WILL GIVE COMPLETE NEW LOOK TO INTERIORS**



VIEWCONNECTING INTERIOR WITH EXTERIOR

WELL LIT INTERIOR WITH REDUCED ARTIFICIAL LIGHTING

TRANSFER OF LIGHT FROM EXTERNAL ROOM TO INTERNAL ROOM THROUGH GLASS PARTITION

CHANGE IN INTENSITY OF LIGHT BY CURTAINS

CONNECTION OF INDOOR & OUTDOOR

SMALL AREA OF GLASS ENHANCING THE BEAUTY OF SPACE

CONCLUSIONS

- GLASS IS A VERSATILE & GREEN MATERIAL.
- GLASS HAS MANY PROPERTIES & THUS SPECIFICATIONS OF GLASS NEED TO BE SELECTED AS PER THE REQUIREMENT OF THE BUILDING.
- AWARENESS TO SELECT SUITABLE GLASS NEEDS TO BE GENERATED AND CAPACITY BUILDING REQUIRES AMONG ARCHITECTS AND ENGINEERS.
- SAFTEY IS FIRST & FOREMOST REQUIREMENT TO BE CONSIDERED WHEN GLASS IS USED ESPECIALLY IN MUMBAI WHERE MOST OF THE BUILDINGS ARE MULTISTOREYED.
- ORIENTATION OF BUILDING AND USE OF GLASS TO BE BASED ON COMFORT AND LOW ENERGY USAGE REQUIREMENTS OF THE BUILDING.
- GLASS FOR SPECIAL REQUIREMENTS TO BE MADE COST EFFECTIVE
- USE OF SOLAR PV ON VERTICAL SURFACE TO BE EXPLORED w.r.t. AESTHETICS


Thank you ...