Smart Cities – Smart Designs

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Mumbai

SHAPE THE FUTURE 2.0

SAINT-GOBAIN

Smart Cities & Innovative Material ….Glass

AGENDA

- Smart Cities - Requirements
- Key Elements
- `Technology
- Design
- Future

Smart Cities

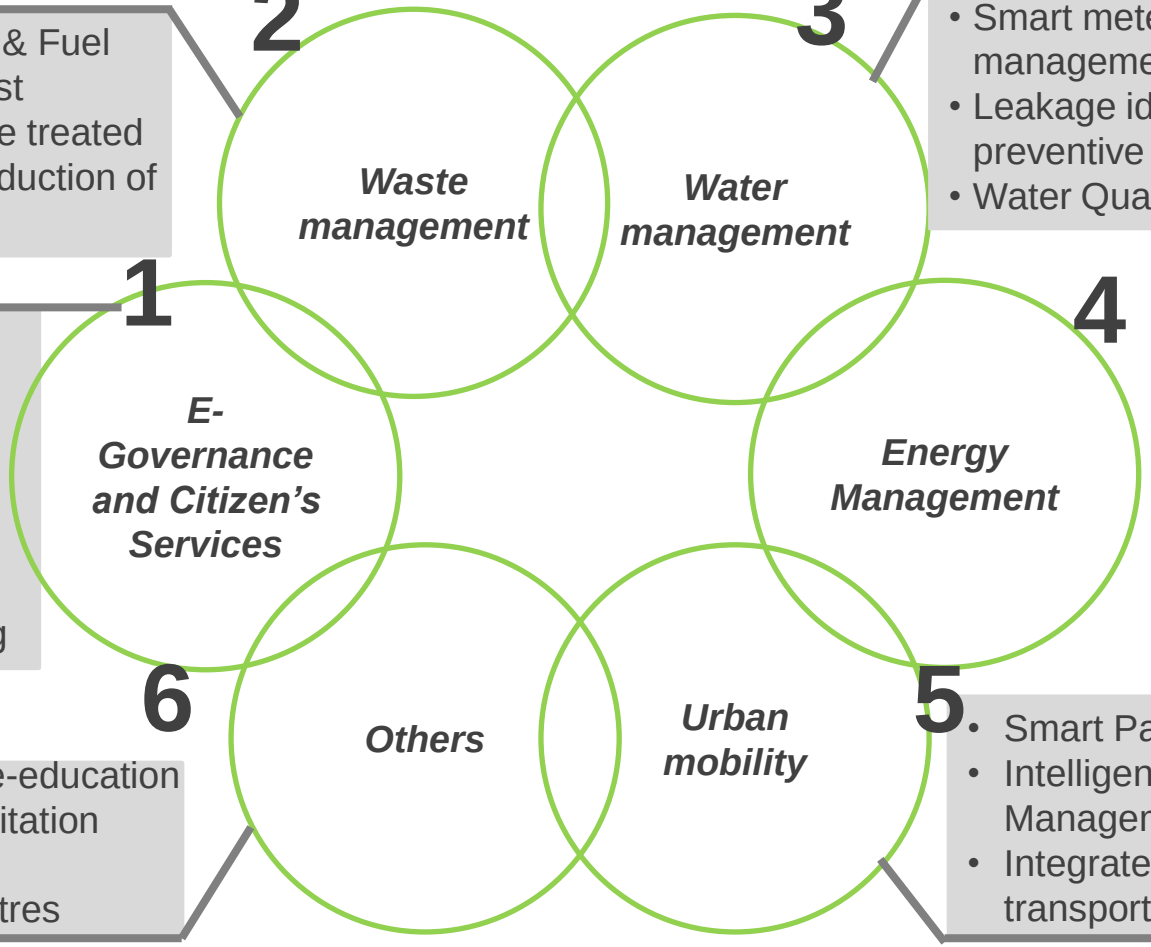
- **Smart Cities** in the ambit of India's Urban development Ministry is defined under the 4 pillars of
  - Comprehensive development-institutional
  - Physical
  - Social infrastructure
  - Economic infrastructure
- Being a guideline for aspiring cities, Cities are encouraged to add layers of infrastructure elements to attain *'Smartness'*
- The aim of Smart cities is to **renew and retrofit towns** and cities to make them citizen friendly and **sustainable**

Smart Design for Smart Cities

The core infrastructure elements in a smart city would include:

- i. adequate water supply,
- ii. assured electricity supply,
- iii. sanitation, including solid waste management,
- iv. efficient urban mobility and public transport,
- v. affordable housing, especially for the poor,
- vi. robust IT connectivity and digitalization,
- vii. good governance, especially e-Governance and citizen participation,
- viii. **sustainable environment**,
- ix. safety and security of citizens, particularly women, children and the elderly, and
- x. health and education

The primary infrastructure elements of a Smart City



- Waste to Energy & Fuel
- Waste to Compost
- Waste water to be treated
- Recycling and reduction of C&D waste

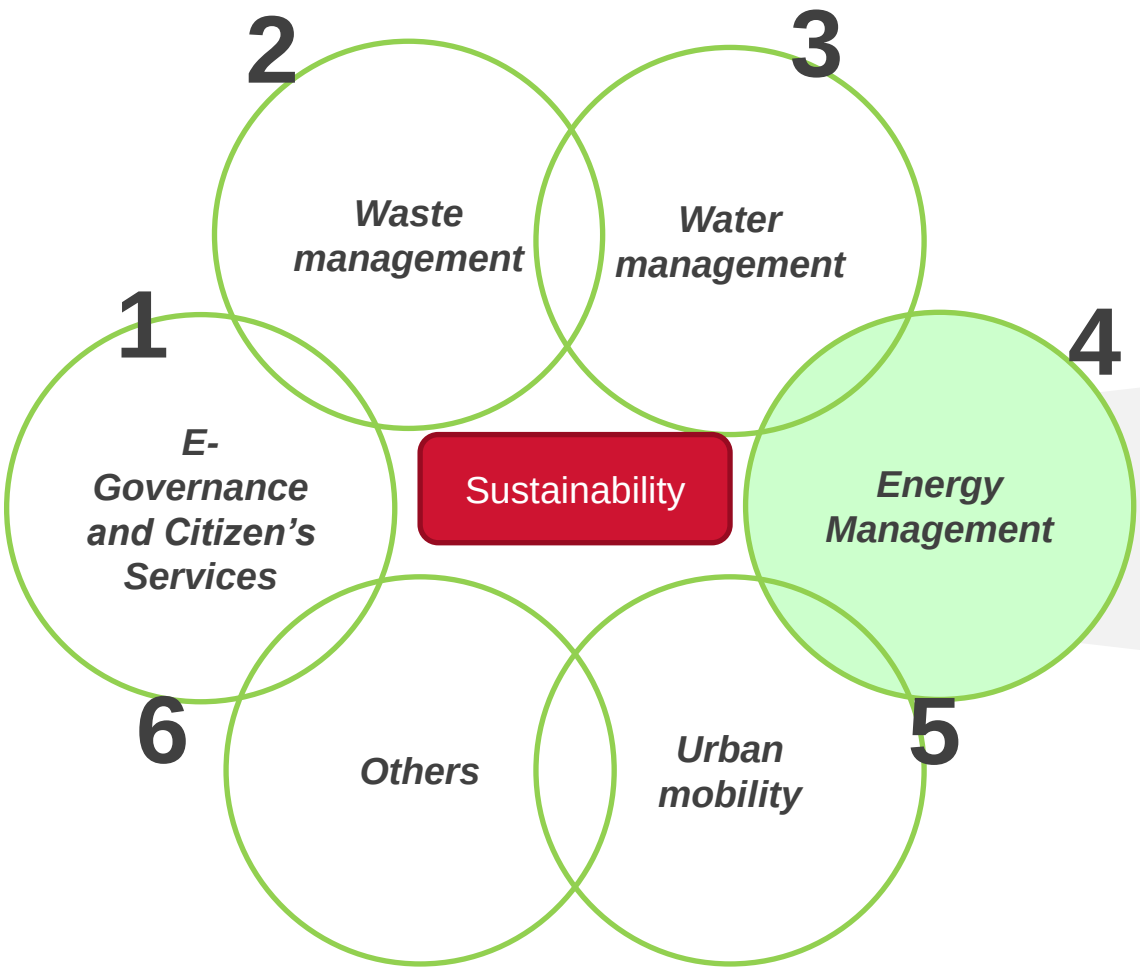
- Smart meters and management
- Leakage identification, preventive Maintenance
- Water Quality monitoring

- Public Information
- Electronic services Library
- Citizen Engagement
- Citizen's – City's Eyes and Ears
- Video Crime Monitoring

- Tele medicine and tele-education
- Incubation/ Trade facilitation centres
- Skill development centres

- Smart Parking
- Intelligent Traffic Management
- Integrated Multi modal transport

The primary infrastructure elements of a Smart City



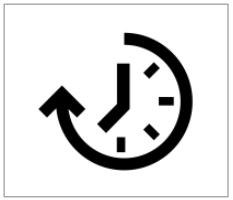
Application of Technology to Manage Energy

DECODING SUSTAINABILITY

Meaning

Key Elements

Skilling



Future

for

Sustainability

MEANING FOR SUSTAINABILITY

Energy saving

Reduced use of natural resources

Frugal operations

Too costly capex

Too technical

Literally a coded language for many !

…all positive in reality….

…but ….

…feeling of compromise, sacrifice….
…..difficult to comprehend ….

MEANING FOR SUSTAINABILITY

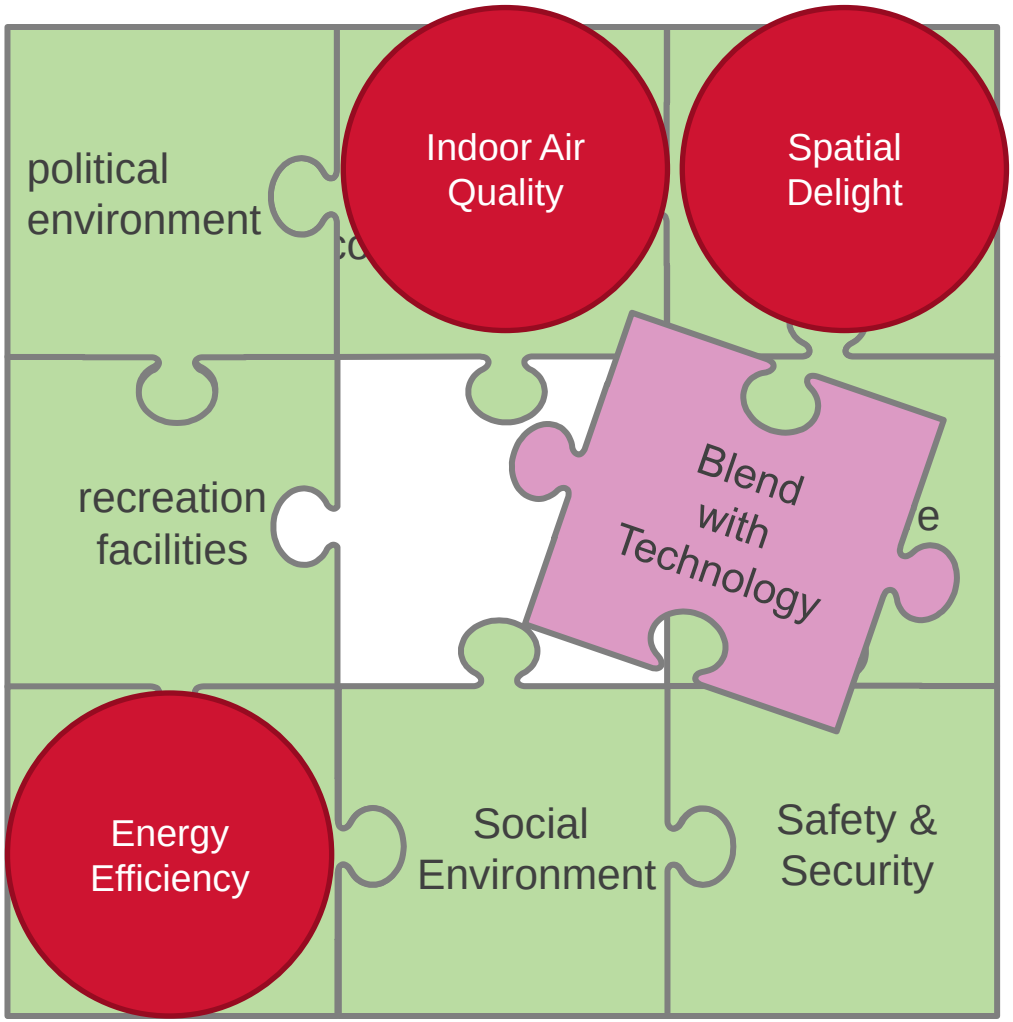
Turn it around on its head……

….Sustainability is Sustained Comfort……

Sustained Comfort – Key Elements

MAKING BUILDINGS SMART THROUGH

- **TECHNOLOGY**
- **DESIGN**



- Conventional quality of life is mentioned by the following parameters

Sustained Comfort

Energy Management

Sustainable - Glass Buildings

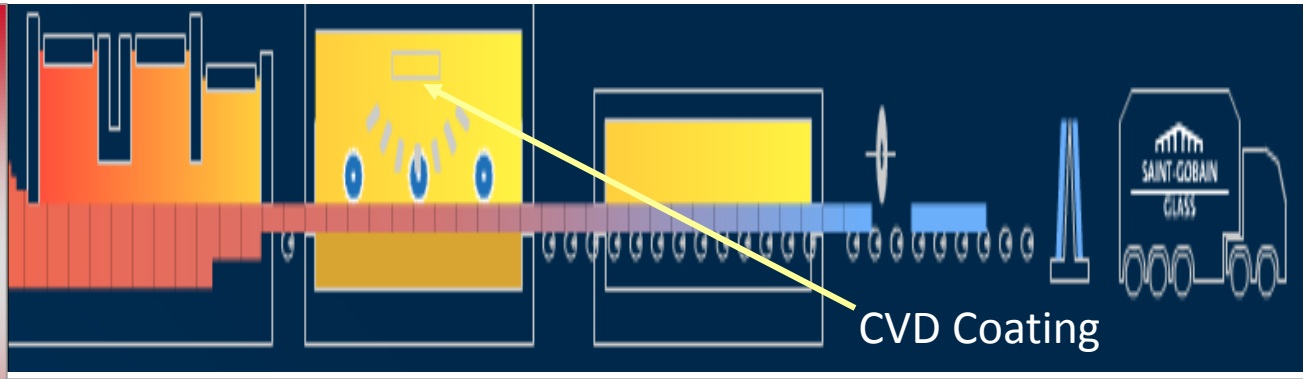
- **Performance glass** is the key to having balance between Daylight and Energy
- **Smart Glass**

Smarter glass for the future would enable to control the properties of glass either in response to the climate or as per the requirement of the user

Coating Technology

COATING TECNOLOGY

Online Coating



Manufactured during manufacturing of glass it self.
Process of manufacturing known as pyrolysis

Offline Coating

Manufactured in a separate process (offline) by
Magnetron sputtering on to raw glass

A modern glazing is a sophisticated filter

nitride - 40 nm

oxide - 54 nm

Ag - 10 nm

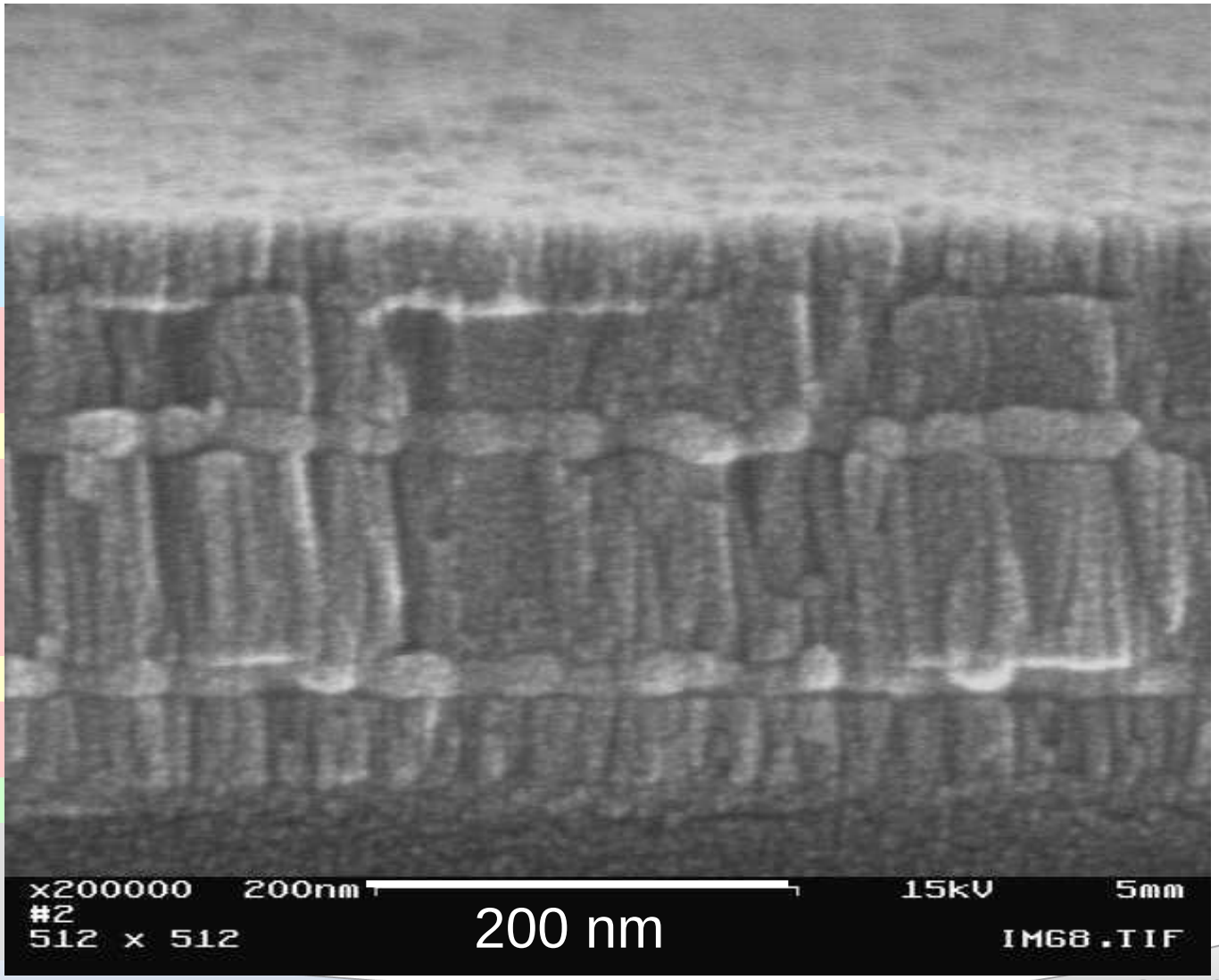
oxide - 100 nm

Ag - 11 nm

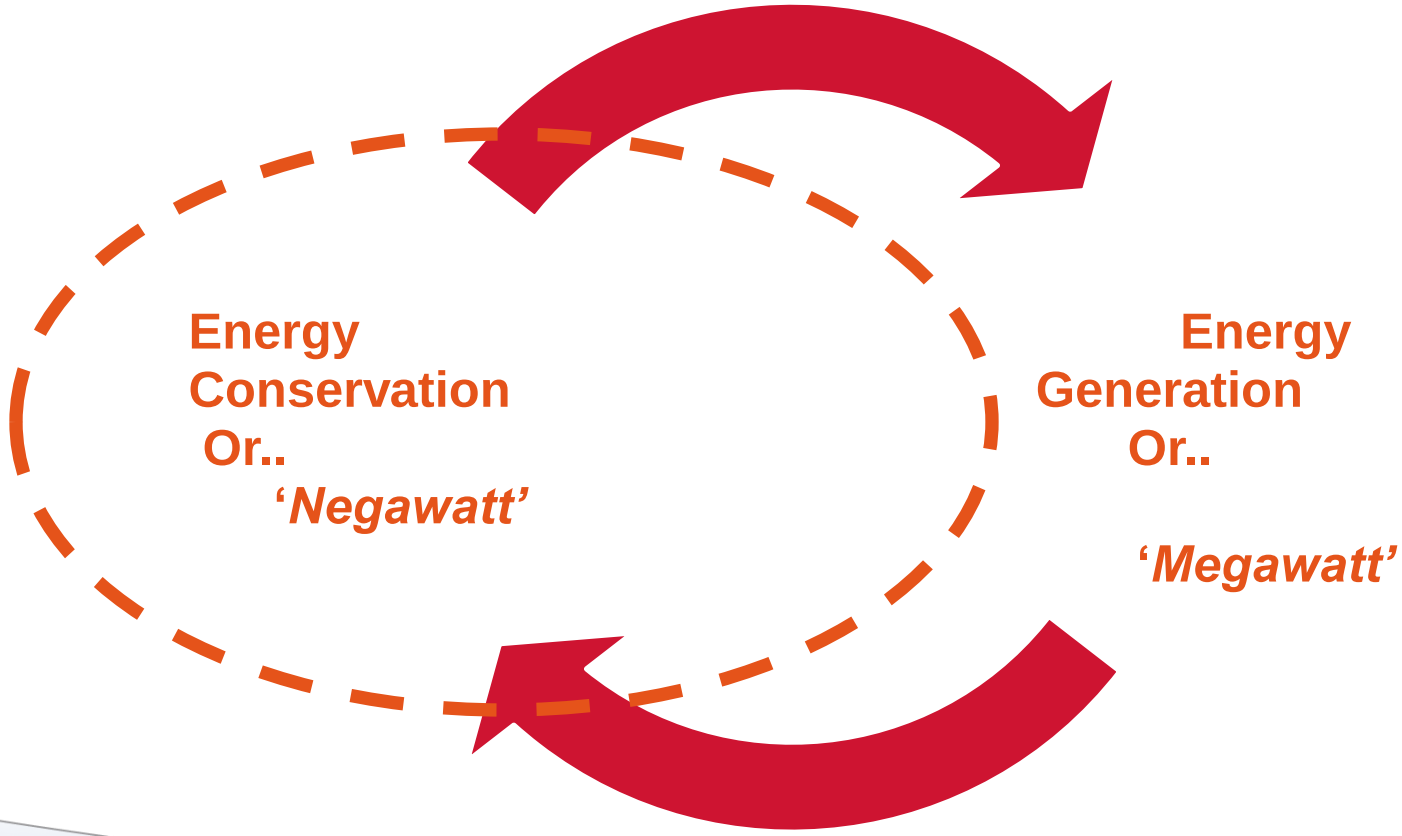
oxide - 54 nm

oxide - 16 nm

glass



Bridging the Energy Gap



Case I
Impact on Building Efficiency

Considering Heat and Daylight

A Case Study

SAINT-GOBAIN

GLASS

Case Study 1:Single Room Office-Glazing & Energy Efficiency

- Location : Chennai
- Floor to Floor height : 3.7 m
- Length : 4m
- Width : 4m
- Windows : 1 on each wall
- Window – Wall Ratio : 10 %
- Activity : Office
- Work Timings : 8 am to 5 pm

The effect of different glazing on the Energy Consumption was studied.

Energy Simulation Tool Used : eQUEST

6 Types of Glazing were studied

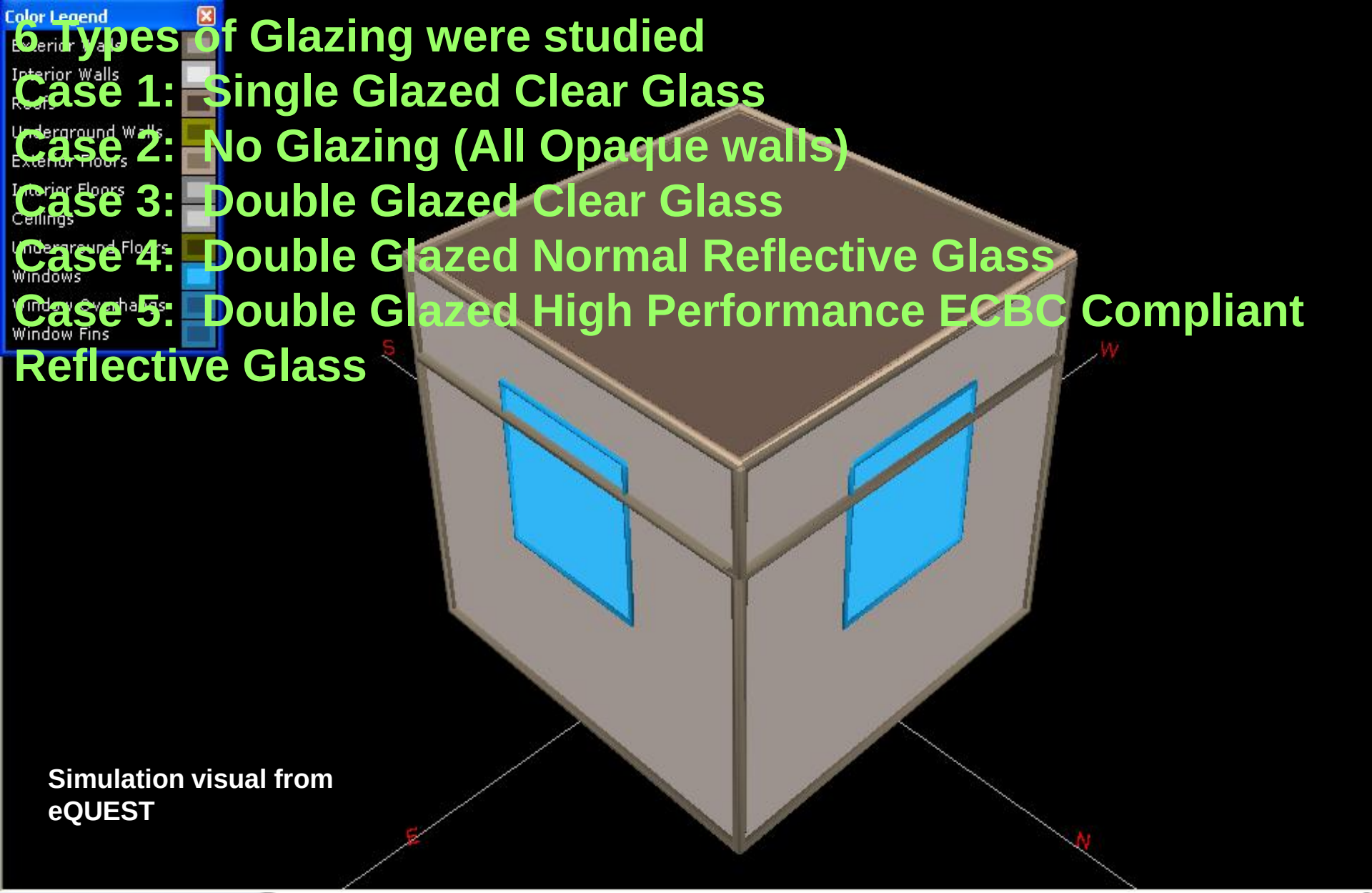
Case 1: Single Glazed Clear Glass

Case 2: No Glazing (All Opaque walls)

Case 3: Double Glazed Clear Glass

Case 4: Double Glazed Normal Reflective Glass

Case 5: Double Glazed High Performance ECBC Compliant Reflective Glass



Simulation visual from eQUEST

The Results

CASE	Solar Factor	U Value W/m2K	Light Transmission %	HVAC Consumption kWh	Lighting Consumption kWh	Total kWh	Savings / Year kWh
1. Single Clear	0.83	5.7	87	3033	160	4052	Base
2. No Glazing	NA	NA	NA	2397	504	3760	292
3. Clear Glass + Clear Glass- Double Glazed	0.71	2.0	81	2965	161	3984	68
4. Normal Reflective + Clear Glass Double Glazed	0.3	2	50	2436	292	3586	466
5. High Performance ECBC Compliant Glass	0.2	2	50	2331	292	3481	571

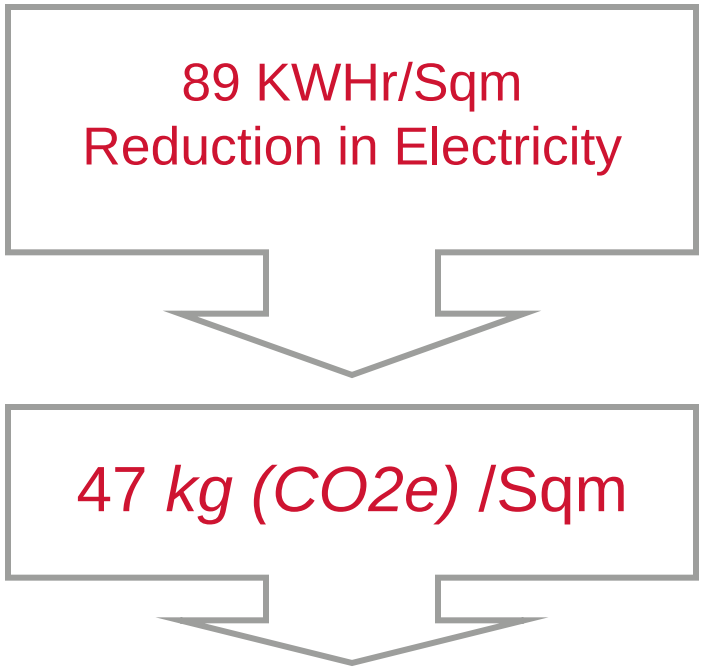
16 % Savings on Total Consumption with ECBC Compliant Glass

89 kWh/m2 of Glazing area

GLASS FUTURE 2.0

SAINT-GOBAIN

Carbon Emission Reduction



So for every 1000Sqm of glazing area we save

47Tonnes of CO_2 equivalent

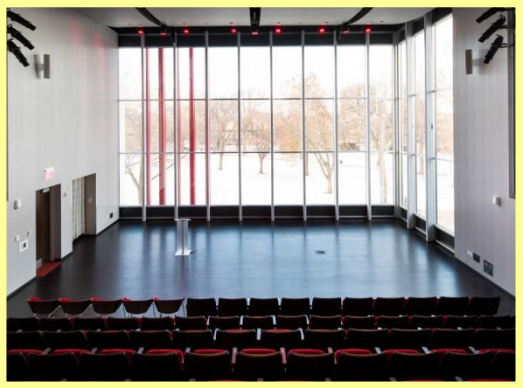
Energy emission Factor **0.53** *kg (CO2e) per kWh*

Solar Control Glass – *Supplied So Far*

S.NO	SERIES	SF	U	GLASS AREA (in sq mtr)	SAVINGS IN GWh	Savings in CO2 (in mT)	No.of trees planted	No.of trees planted (mil)
1	Base case	0.8	5.7	<varies>			<base>	
2	Reflectosol	0.5	5.6	38910960	73130	39	1761770466	1762
3	ST Series	0.27	2.57	10862946	40061	21	965116458	965
4	ET Series	0.26	3.8	1108706	3988	2	96075956	96
5	PLT T Series	0.43	1.8	1421307	3963	2	95463264	95
6	KT Series	0.28	1.84	2073947	7686	4	185161151	185
7	KS Series	0.225	1.6	156020	638	0	15367922	15
8	SKN Series	0.24	1.50	1028407	4122	2	99293642	99
	Total			55562293	133,588	71	3,218,248,859	3,218

3.2 billion Trees

Smarter facades with selectively controllable facades



DYNAMIC GLASS: Sage as a brand offers the dynamic tinting of glass

Ventilated Facades:
SGG Lite-point

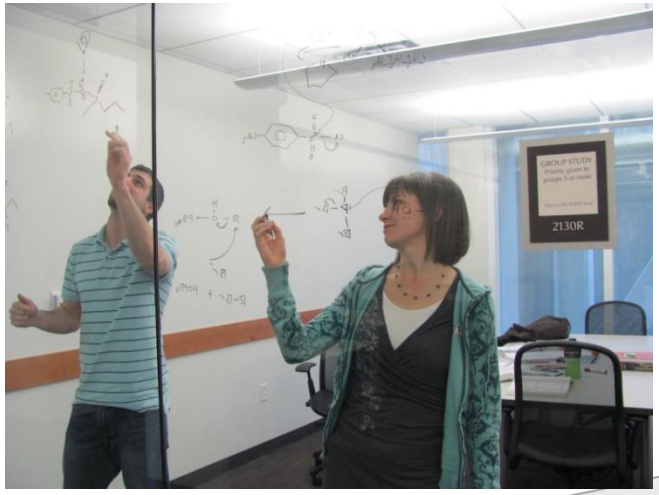
Ball State University: Muncie

Sustained Comfort

Spatial Delight

Spatial Delight -Technology & Design

- Compartmentalization by Transparent Glass
- Thinner Glass Walls
- Walls turning **into writing spaces**
- Open, expansive floor plan
- Unobstructed lines of sight.
- **Biophillia**
- Day lit Floor Area
- Day lit Corners



Smart Design- Spatial Delight

Open Office

Day lit Spaces

Modularity – Sliding

Seamless Walls

Unobstructed View

Designing Spaces- Made possible by glass-Selgas
Cano's Architecture office, Madrid Spain

Functional spaces defined by contrasts- Walking area, Work areas and shelving

Biophillia -close to nature

Sustained Comfort

Indoor Environment

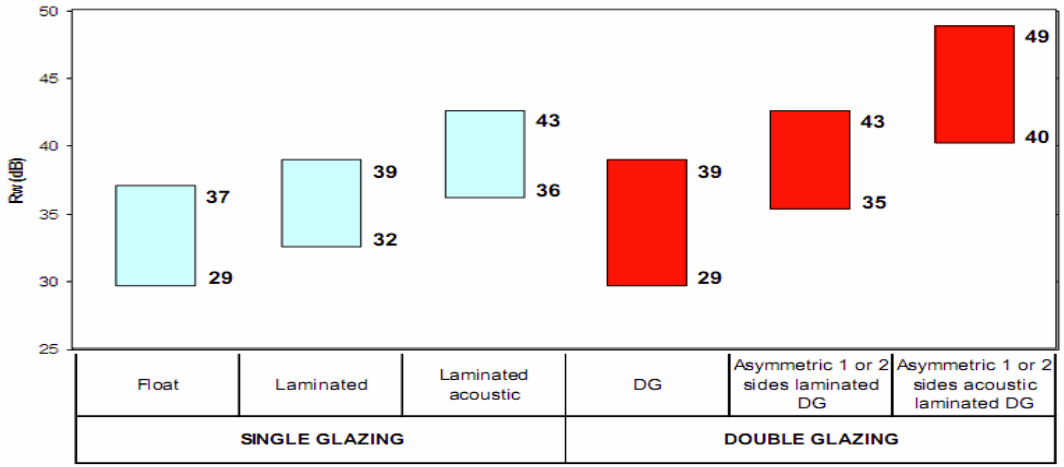
Indoor Environment

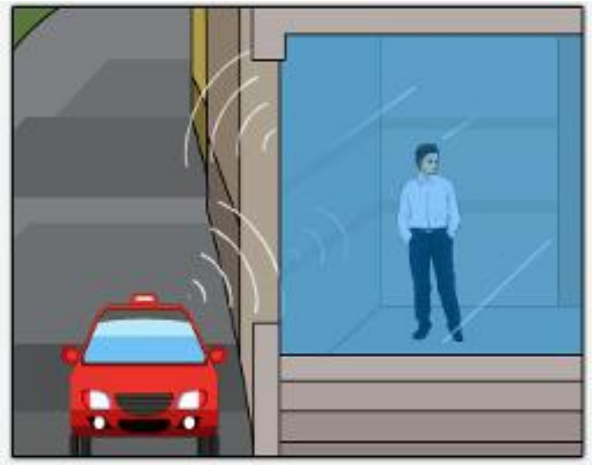
No VOC in Air- Crucial as long hours spent indoors
Smooth Finish- Always lively

SMART SURFACES

Color Rendering Index

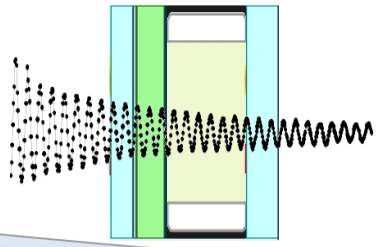
Human Wellbeing – Acoustic Comfort





4mm + 1.52mm PVB + 6mm - 12mm - 6mm

Rw- 39dB



Outside noise

Less than 45dB

Table 29.2 Acceptable indoor noise levels for various buildings

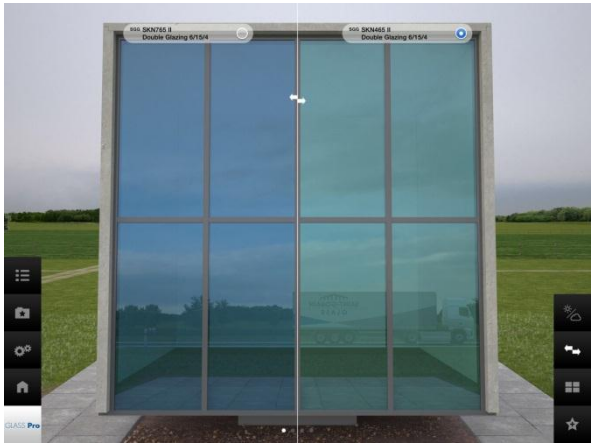
Location	Noise level dB (A)
Auditoria and concert hall	20–25
Radio and television studios	20–25
Music rooms	25–30
Hospitals and cinema theatres	35–40
Apartments, hotels, and homes	35–40
Conference rooms, small offices and libraries	35–40
Court rooms and class rooms	40–45
Large public offices, banks, and stores	45–50
Restaurants	50–55

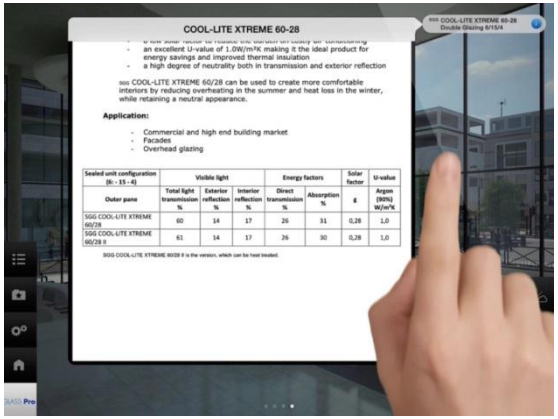
SKILLING FOR SUSTAINABILITY

GLASS ACADEMY

Apps FOR SUSTAINABILITY

- ***Glasswizard***
- ***Glasscompass***
- ***Glassselect***
- ***GlasssPro***
- ***GlassPro live***
- ***ECBC App***





Sustainable Comfort , rests on Infinite Possibilities

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SHAPE THE FUTURE 2.0

GLASS

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Thank you..for your attention!

Together Towards Sustainable Future…