



**AIS**

**Sustainability with Affordability  
Through Glass**

# What we have been doing...



Technology in every sector



Investments

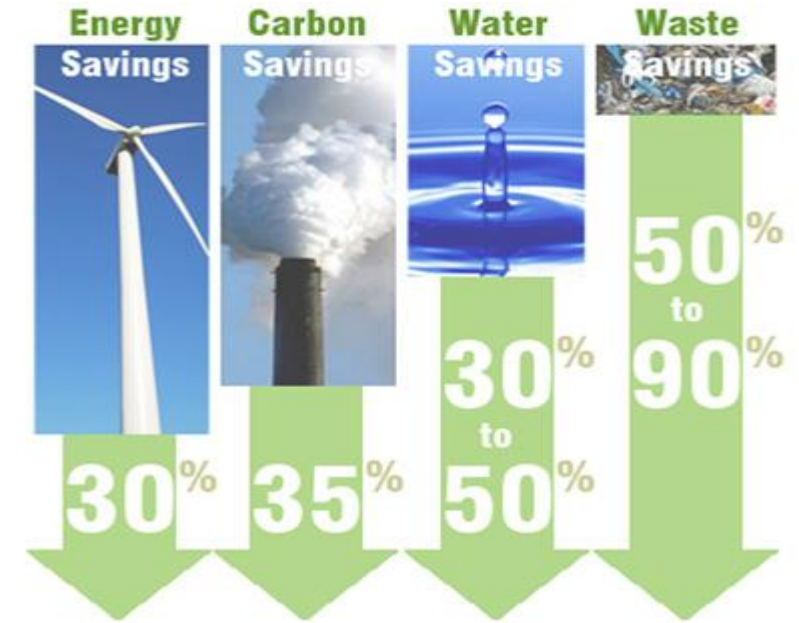
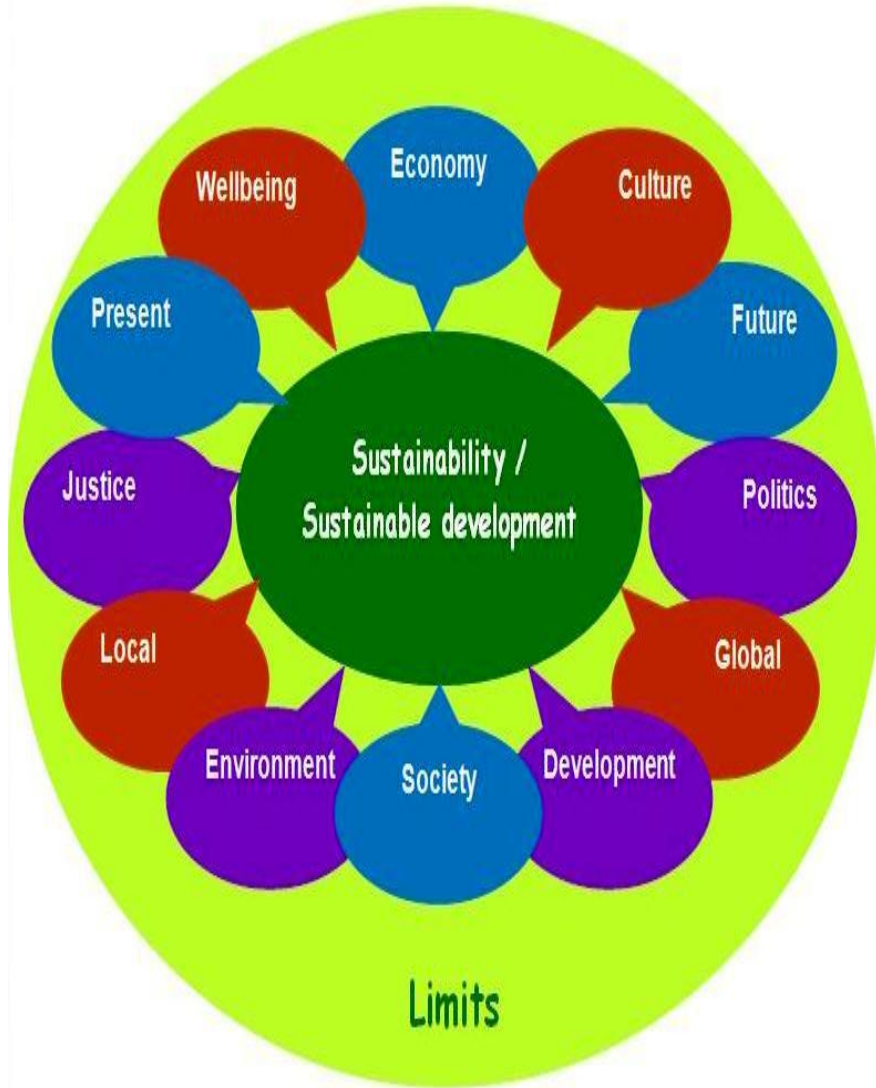
- Extinct Animal & Plant species
- Deforestation
- Loss of glaciers



Dissatisfaction



# Sustainability



Annually **three billion** metric tons of raw materials are consumed to manufacture building materials and products.

The building industry is the second largest consumer of raw materials, after the food industry.

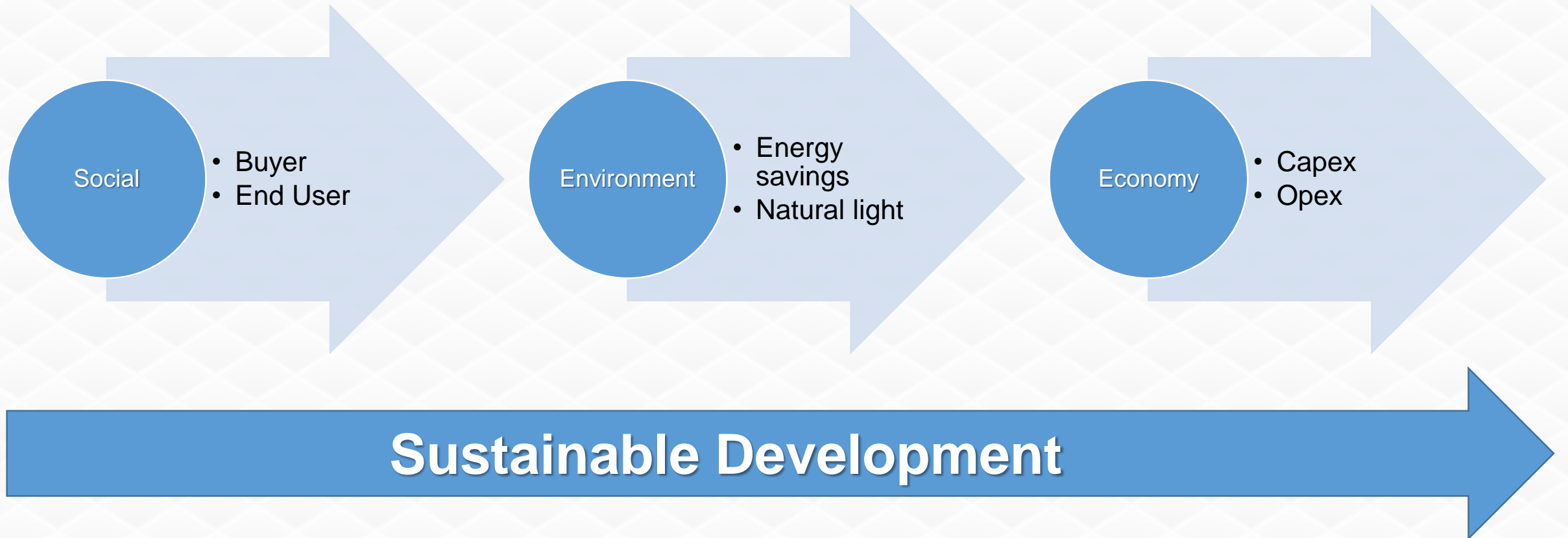
# What is Sustainability..?



**Collaborative Approach**

# Drivers of Sustainability

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# Development focus started with

Buildings and associated uses are responsible for a large part of the environmental load caused by humanity.

42%	of all energy consumption
40%	of all atmospheric emissions
30%	of all raw materials used
25%	of water usage
25%	of solid waste
20%	of liquid waste

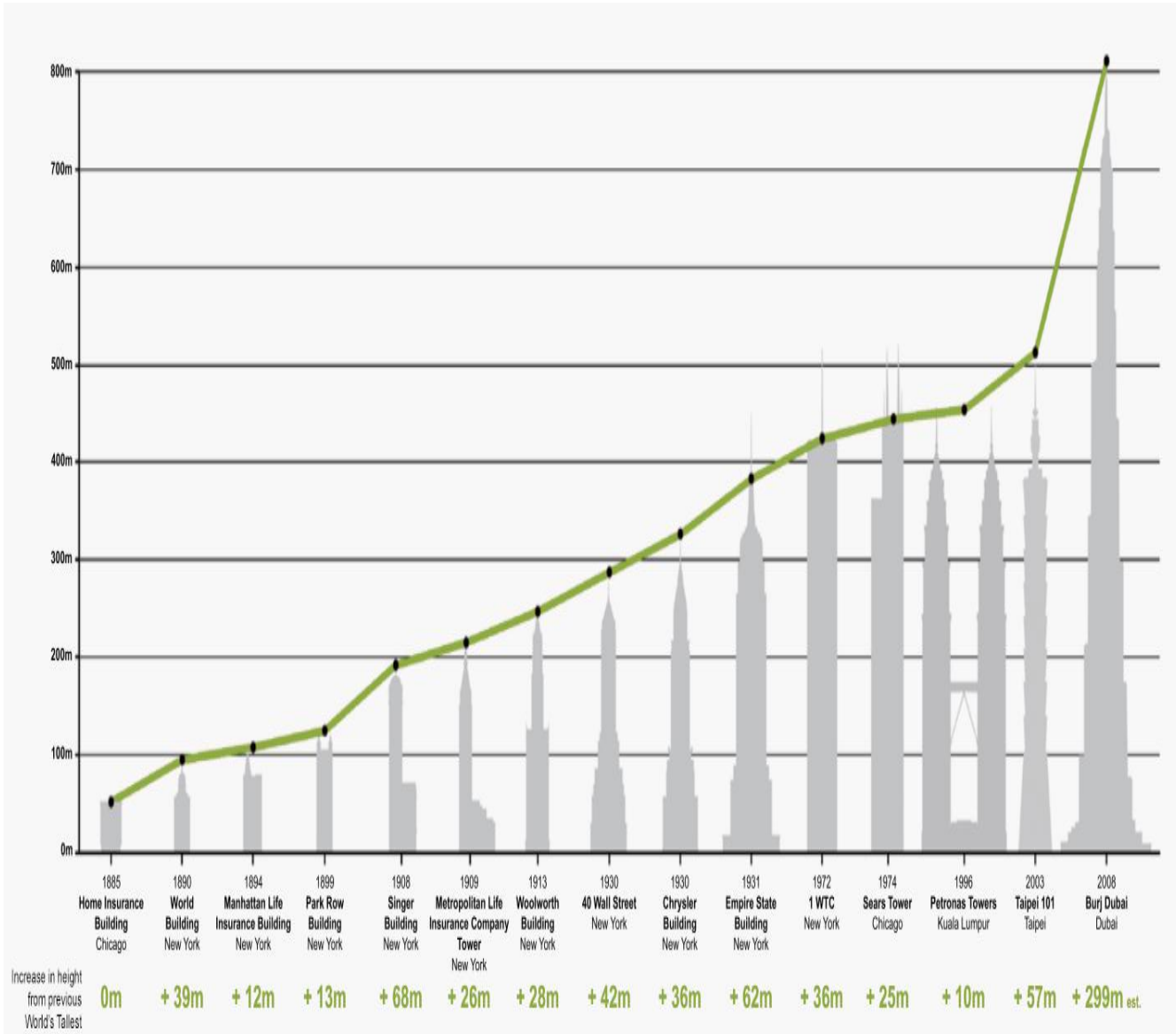


## Cold-Repair

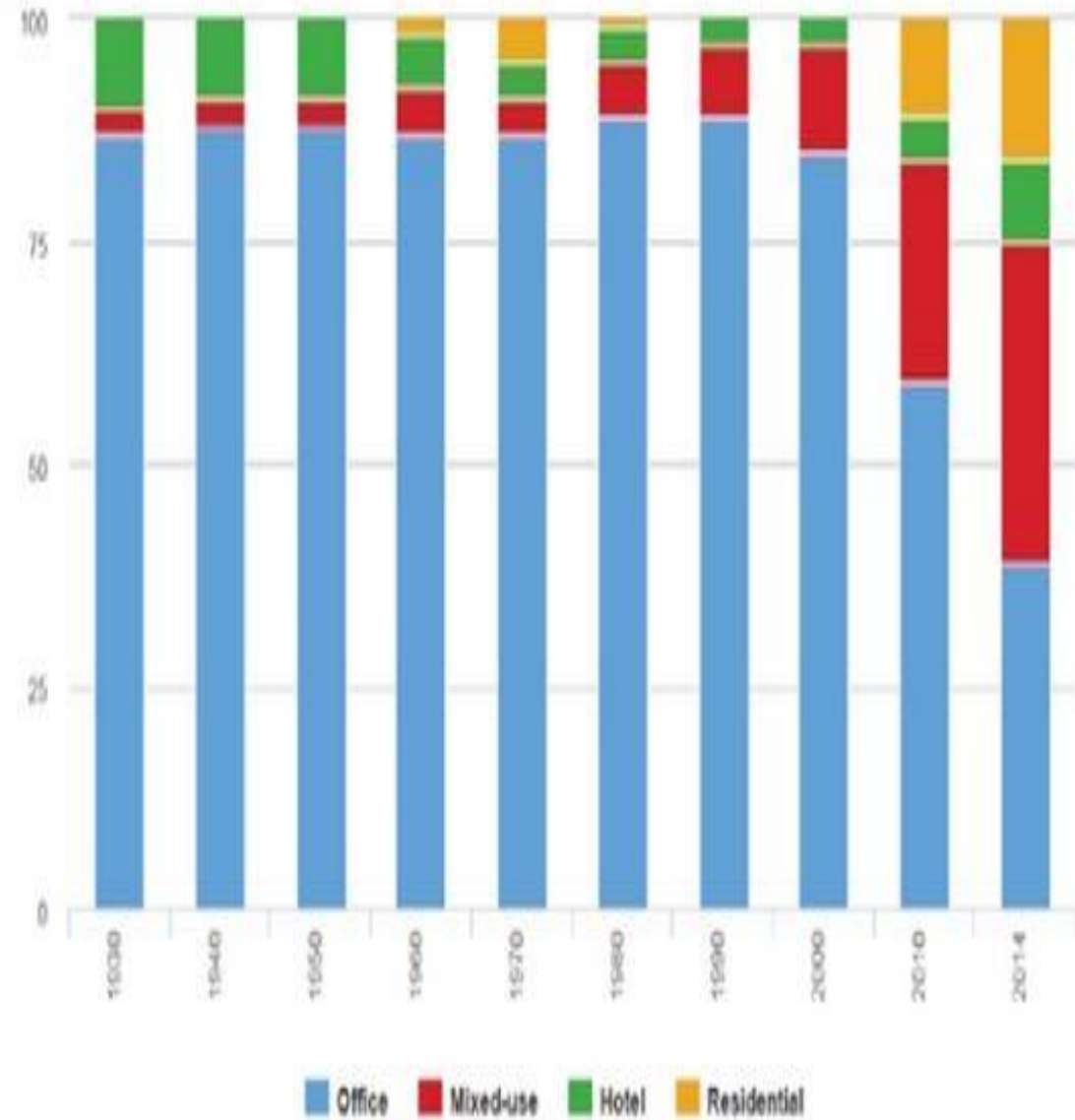


Residential Buildings

# Form follows Function



Source: Council of Tall Buildings and Urban Habitat





# Development progression



SMART  
Homes



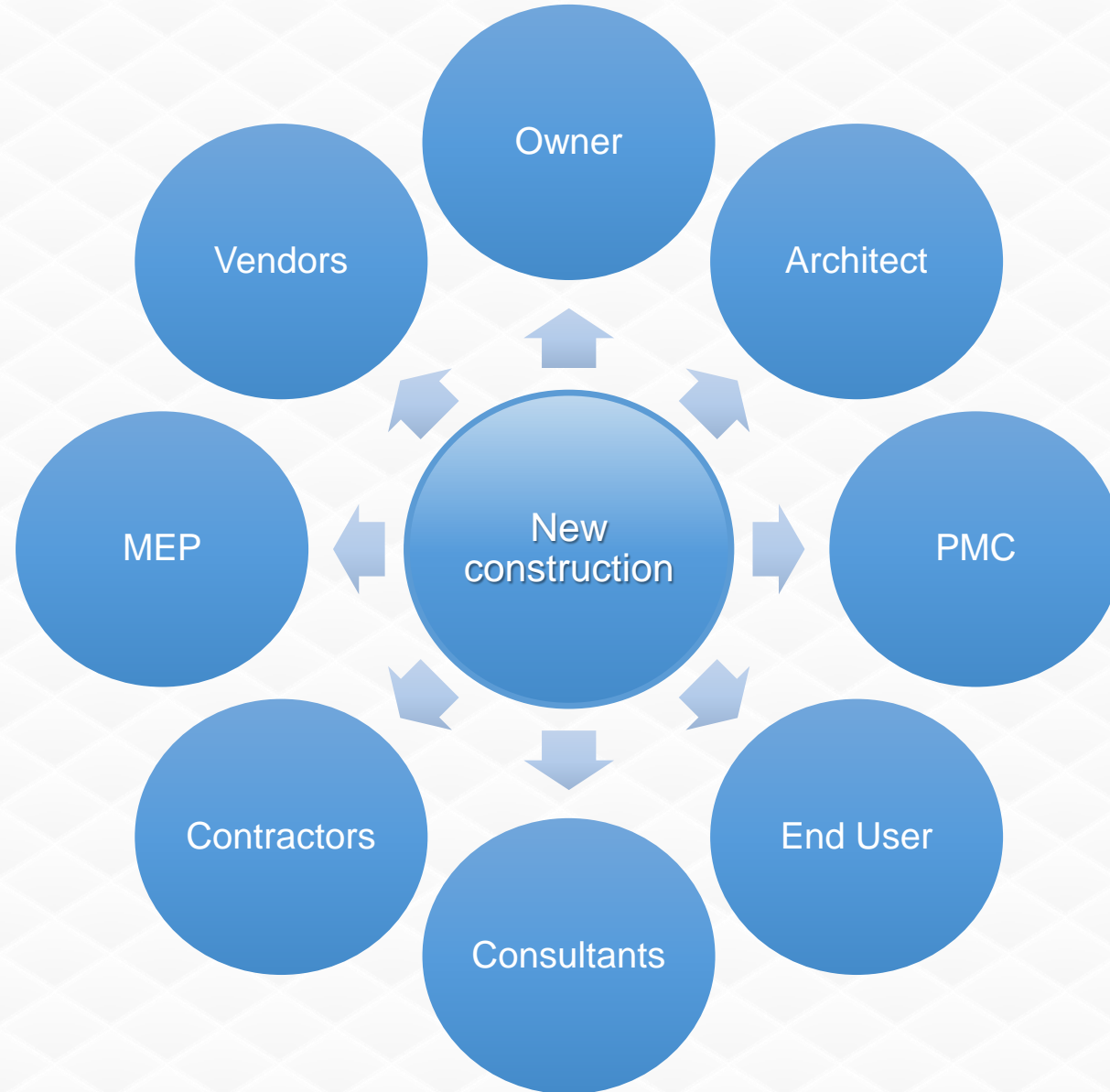
SMART  
Workspace



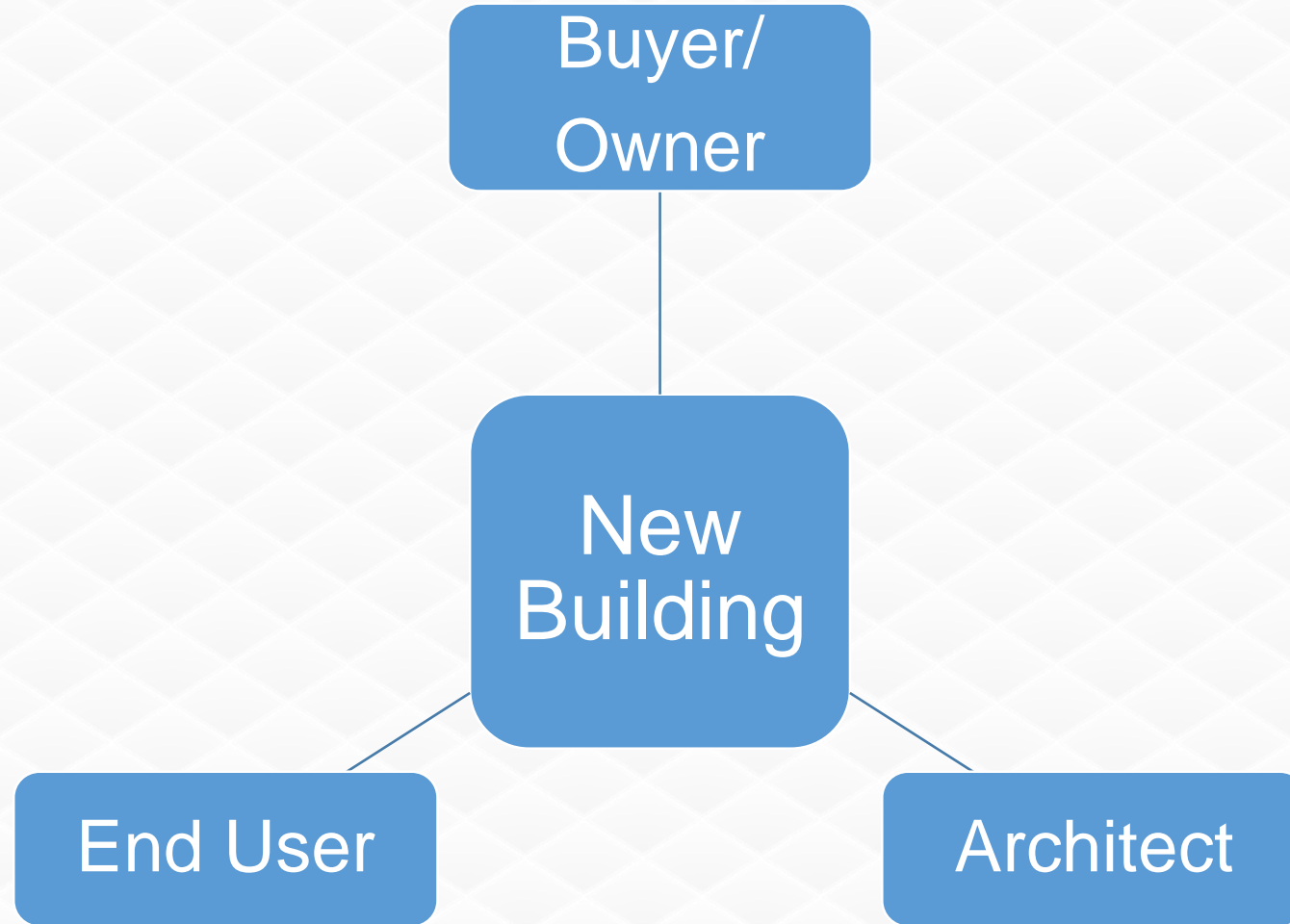
SMART  
City



# Stakeholders involved



# Key Stakeholders



**Do they really want to use the glass..??**



# Choice Vs Option

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**What will you choose.?**

# Happiness Index- Step 1

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**Buyer**



**Architect**



**End User**



# Issues Related to **Conventional Green buildings**

**Sustainable:**

**E.P.I = 140 kWh/m<sup>2</sup>-yr**

- The mind set of people focuses towards gaining a status symbol rather than gaining economical and environmental benefits.
- Additional cost of Construction and Installation.
- Additional cost for maintenance.



**And affordable:**

**E.P.I = 140 kWh/m<sup>2</sup>-yr**

# Strategic & Tactics

Innovative Products

Innovative techniques

Innovative technologies





# Changing Façade Trends

Commercial

Residential

Institutional

Amenities



30%

25%

30%

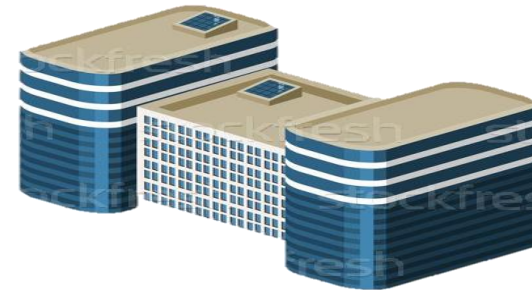
35%

75%

40%

70%

60%



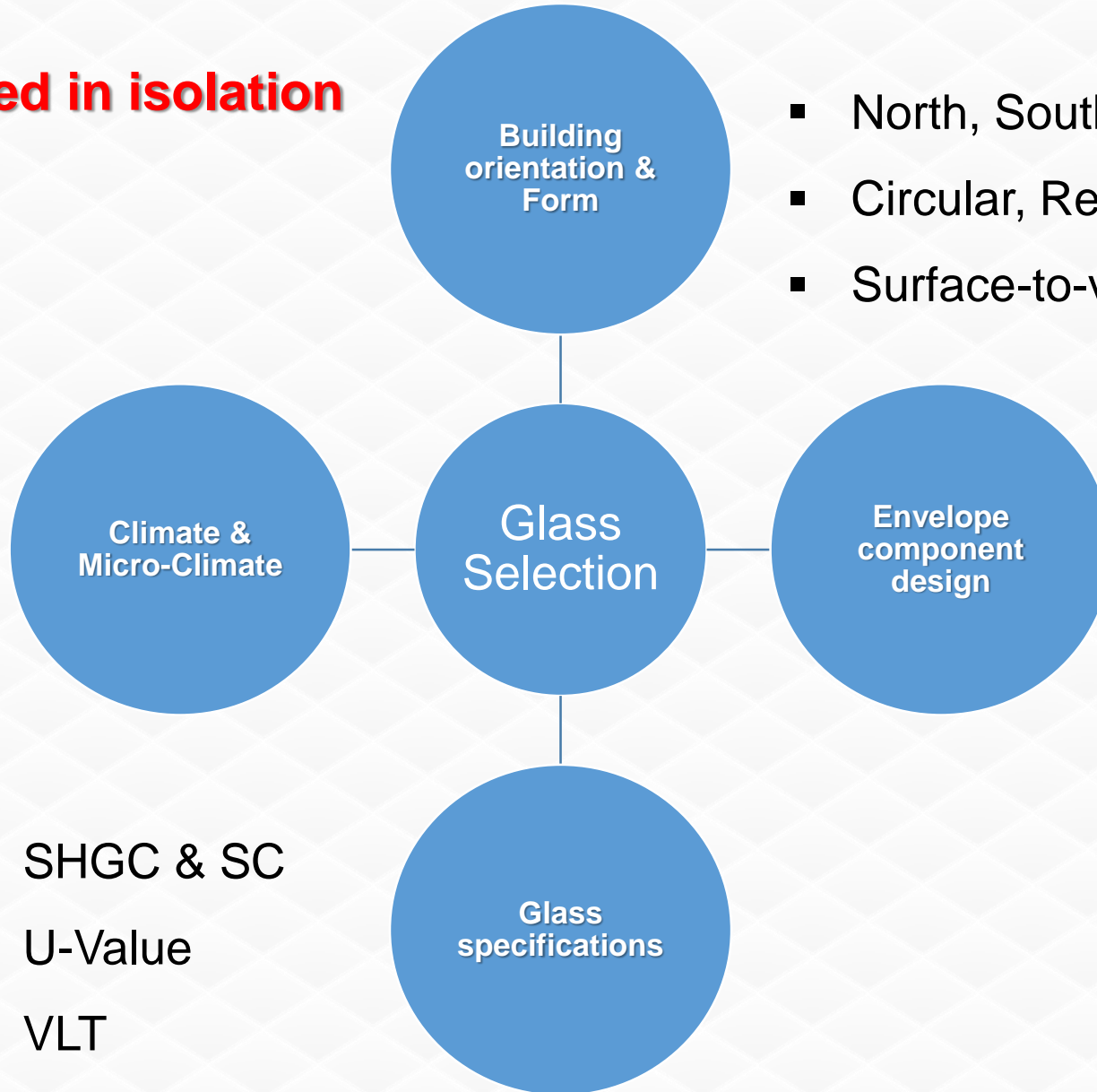
With changing Architectural trends the WWR is continuously increasing .  
And this is why glazed facades become a major source of solar heat gain.

# Needless to say...



## Glass can not be looked in isolation

- Temperature & humidity,
- Solar radiation,
- Wind speed/direction
- Landform, vegetation, water bodies,
- Open spaces, etc.



- SHGC & SC
- U-Value
- VLT

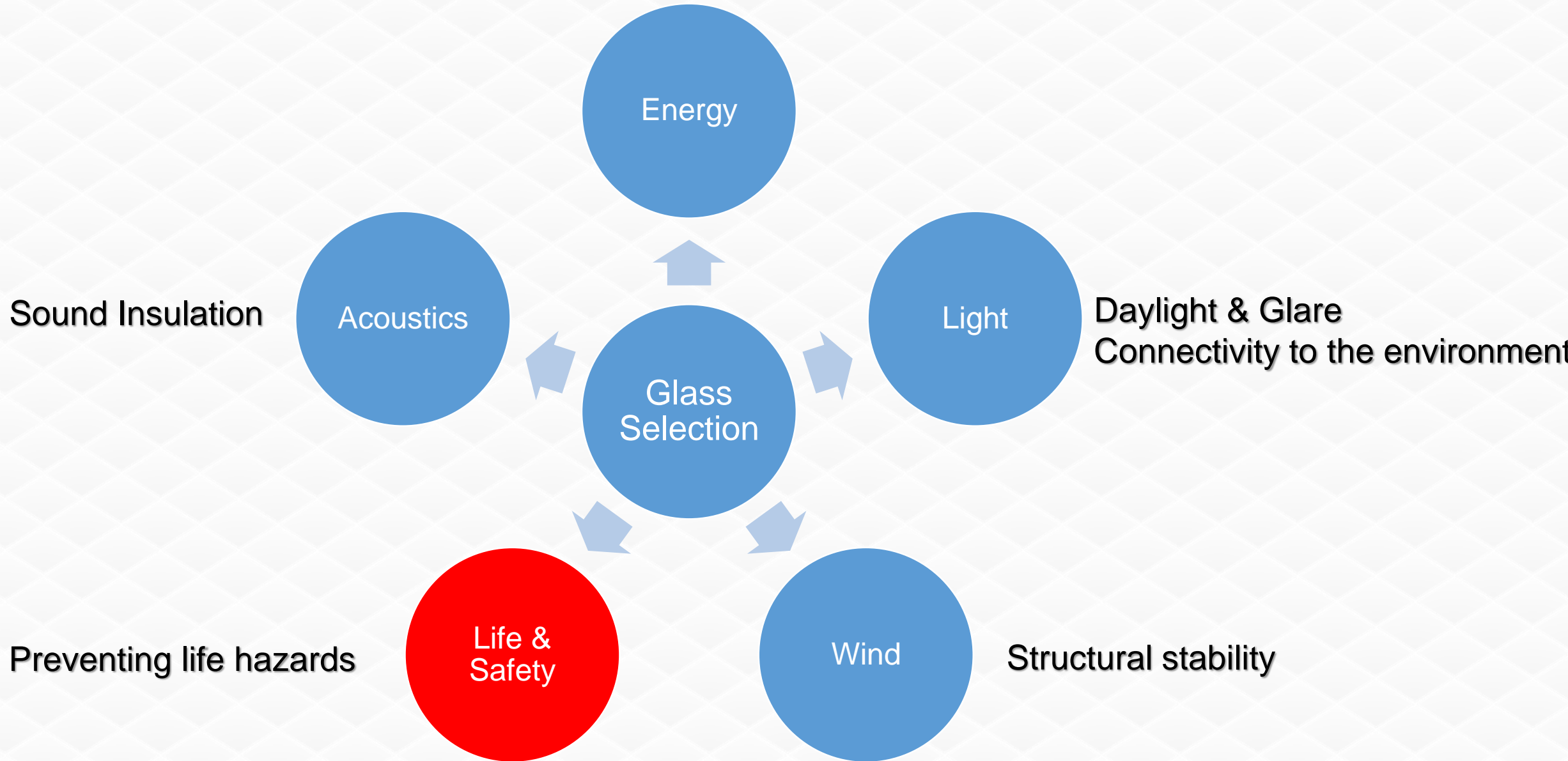
- North, South, East & West
- Circular, Rectangular, Square
- Surface-to-volume ratio

- Shading devices,
- Fenestration size,
- Placement of windows



# 361<sup>0</sup> Approach- Selection Approach

Reduced heat load

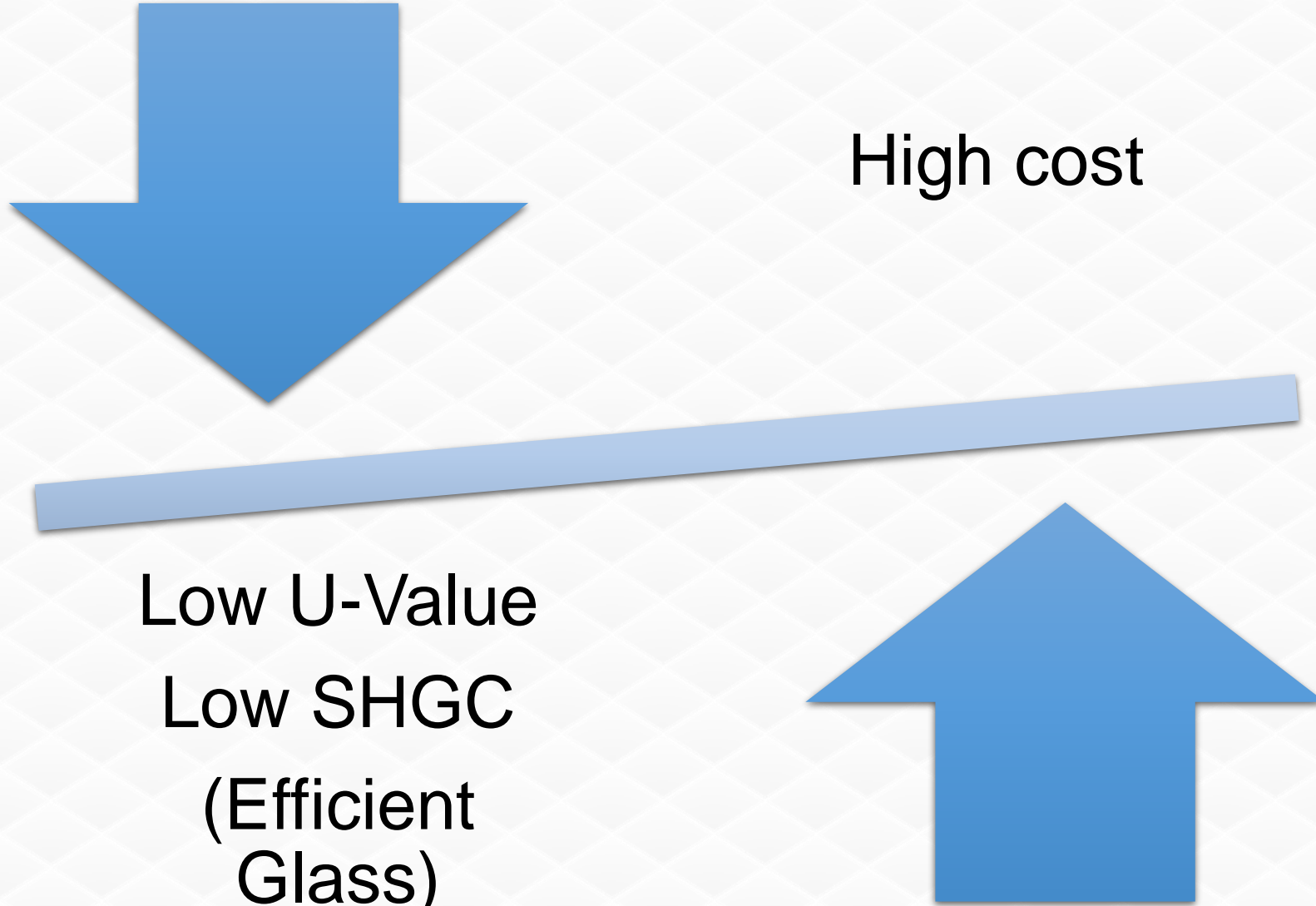


# Relation: Glass and Cost

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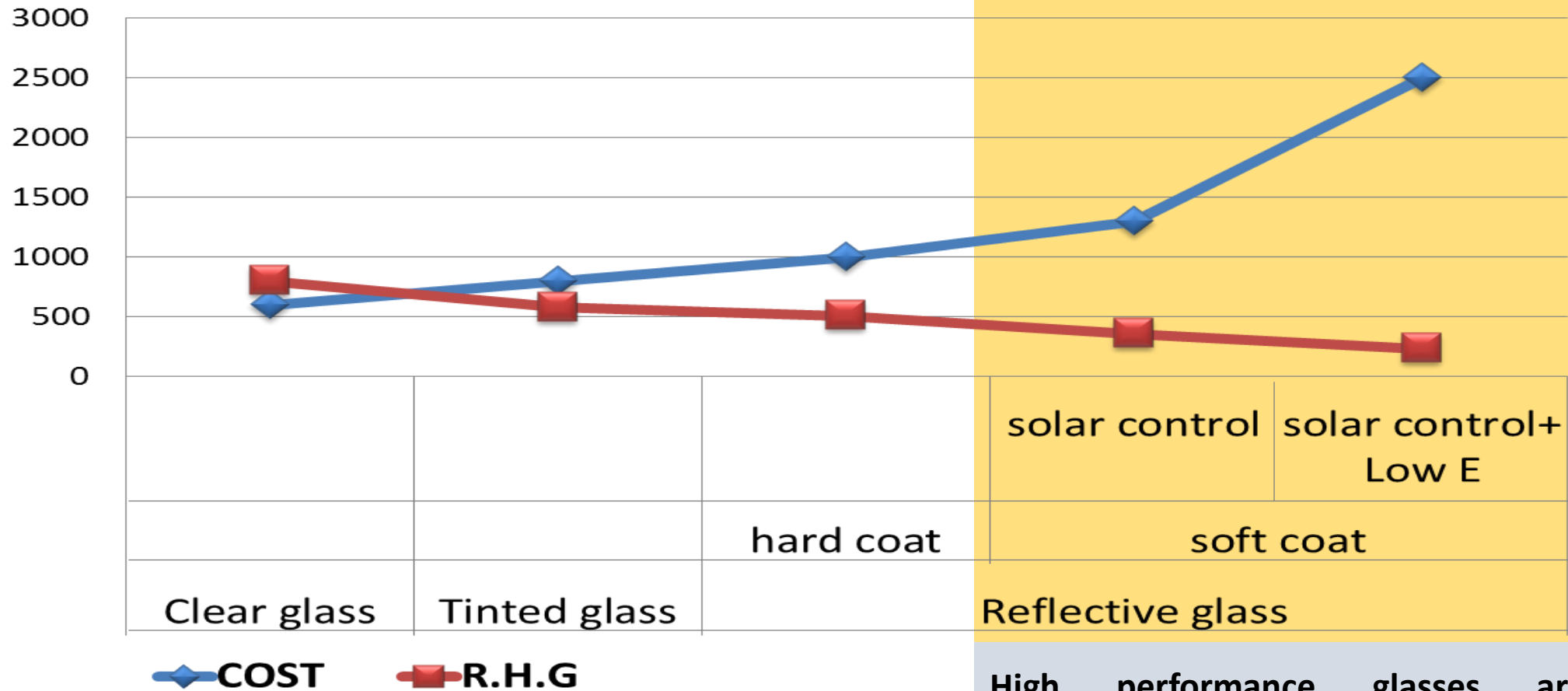
High cost

Low U-Value  
Low SHGC  
(Efficient  
Glass)



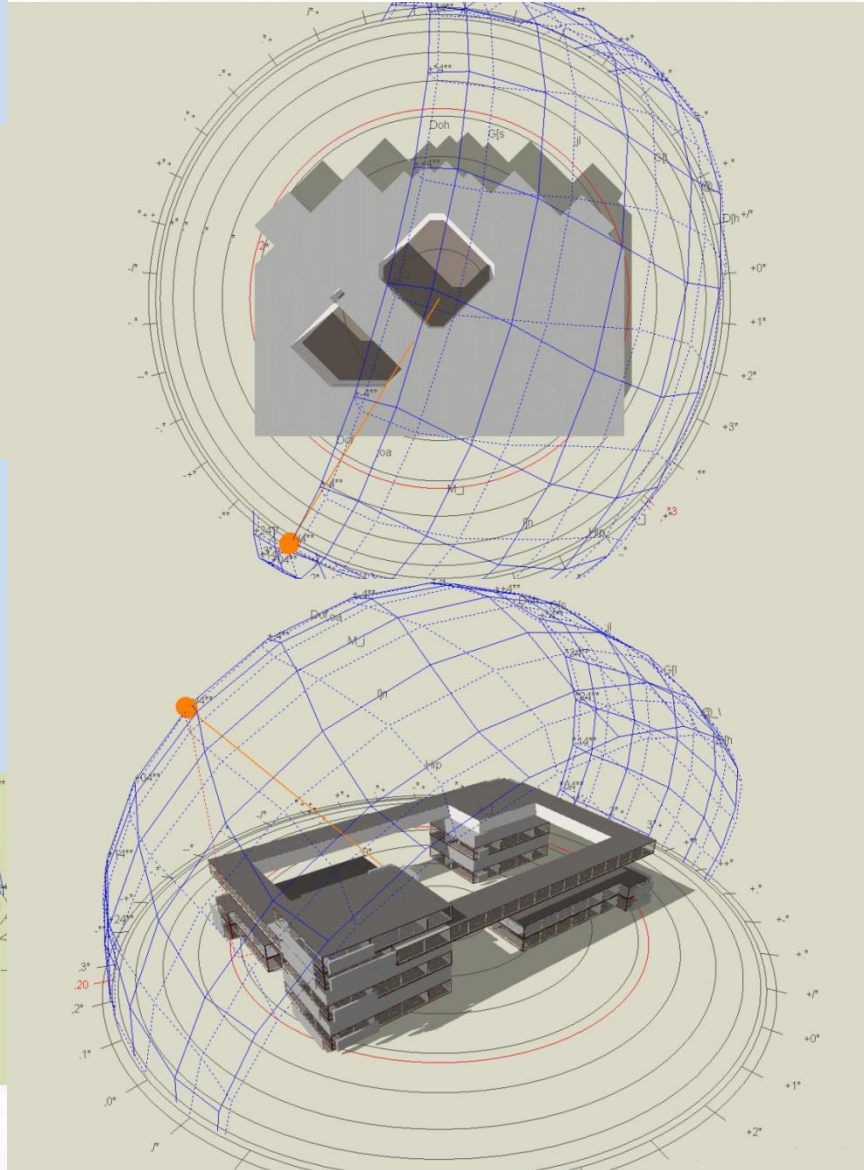
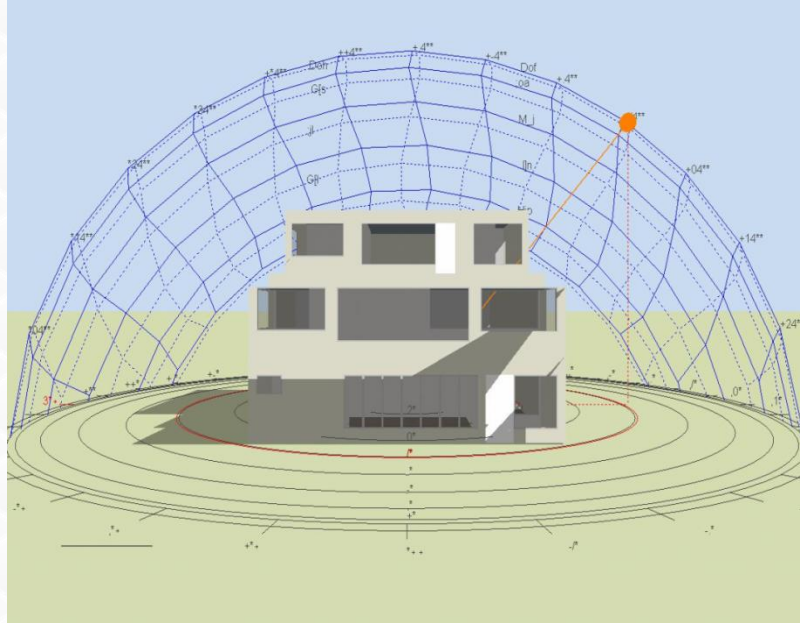
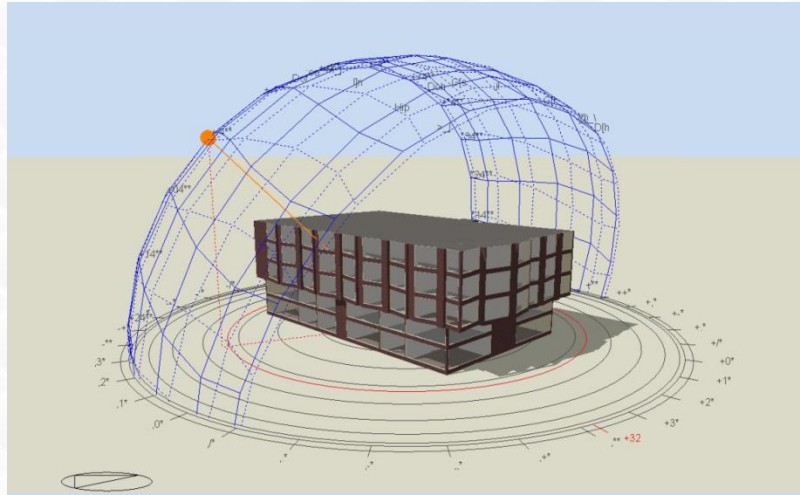


# Glazing Cost and Performance



High performance glasses are innovative products which are **expensive but cost beneficial** as the amount of heat gain is less and hence more energy saving.

# SMART solutions





# Innovative Techniques

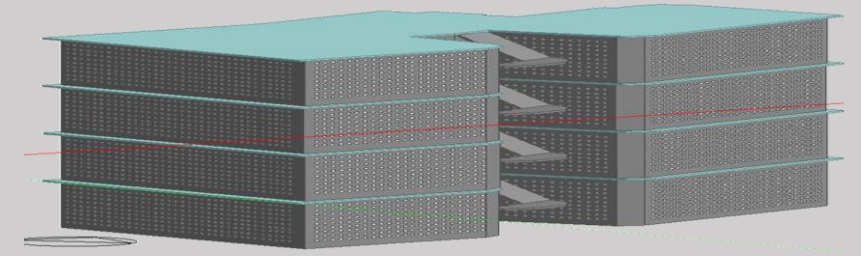
**Technology and Techniques go hand in hand.**

Developing new products and technologies alone cannot solve all the issues, their installation techniques and applications are equally important.

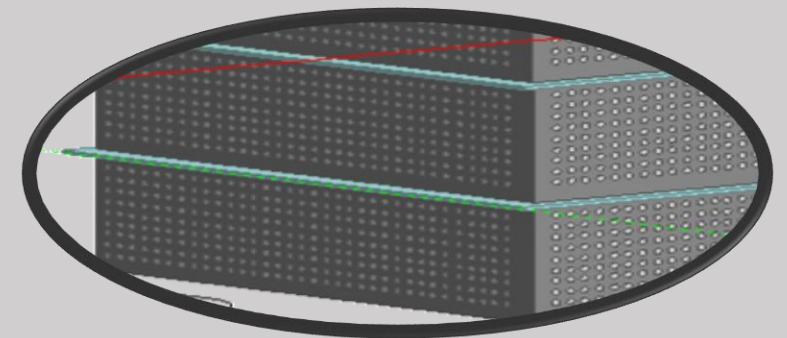
## Case 1

### Double Skin Façade School, Mumbai

Type	Total Electricity Consumption	Electricity Cost	Savings
	( Mwh)	Annual (in lakhs)	Annual (in thousands)
<b>Non - ventilated cavity</b>			
Base case - 12mm AIS Clear	871	52	
12mm Solar Control	884	53	-78.88
12 mm Solar Control	876	52	-27.80
Solar Control	876	52	-27.80
Solar Control low e	876	52	-27.80
<b>Ventilated cavity</b>			
12mm Solar control	718	43	921.07
Solar Control	718	43	921.07
Solar control low e	718	43	921.07



Double skin facade – Combination of perforated aluminum sheet & glazing

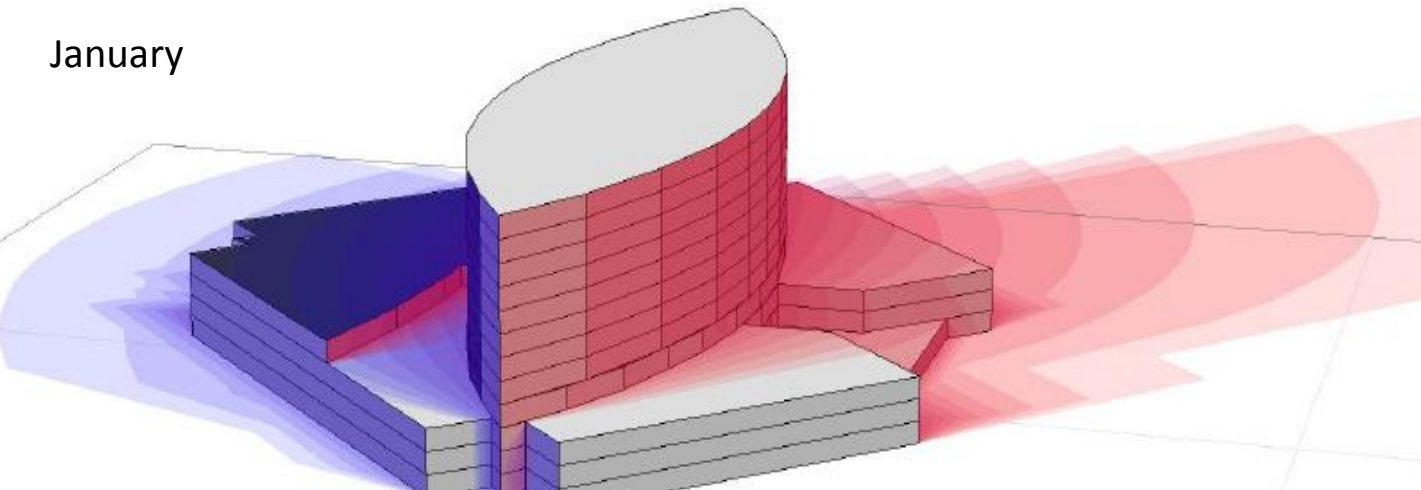


The non-solar heat gets trapped between the perforated aluminium façade and inside skin when using a low-E glass.

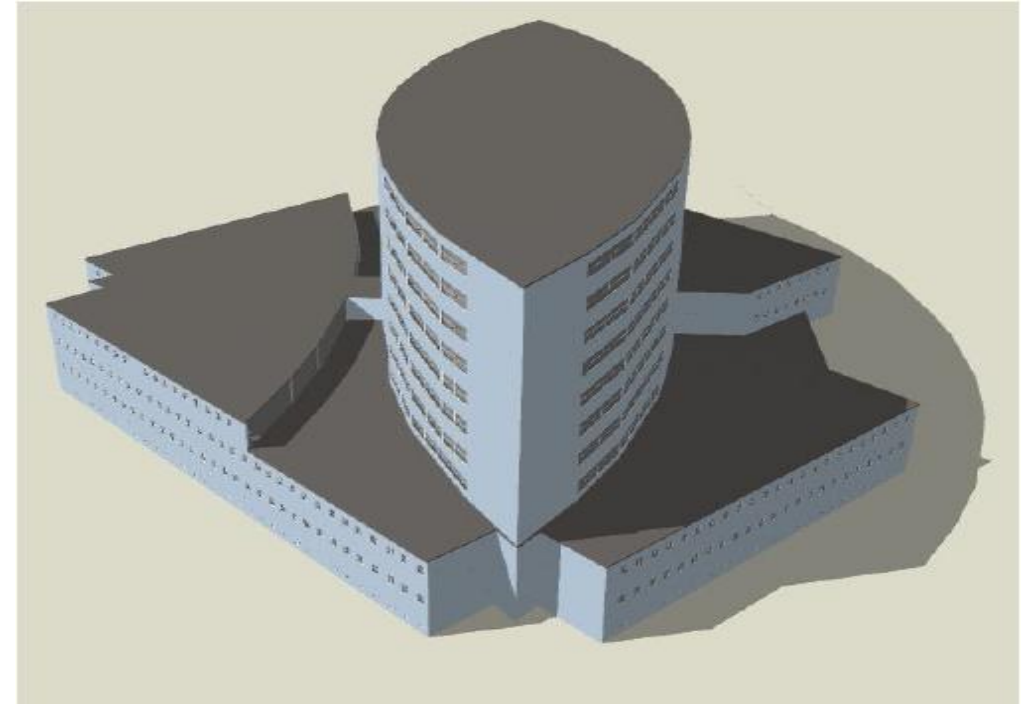
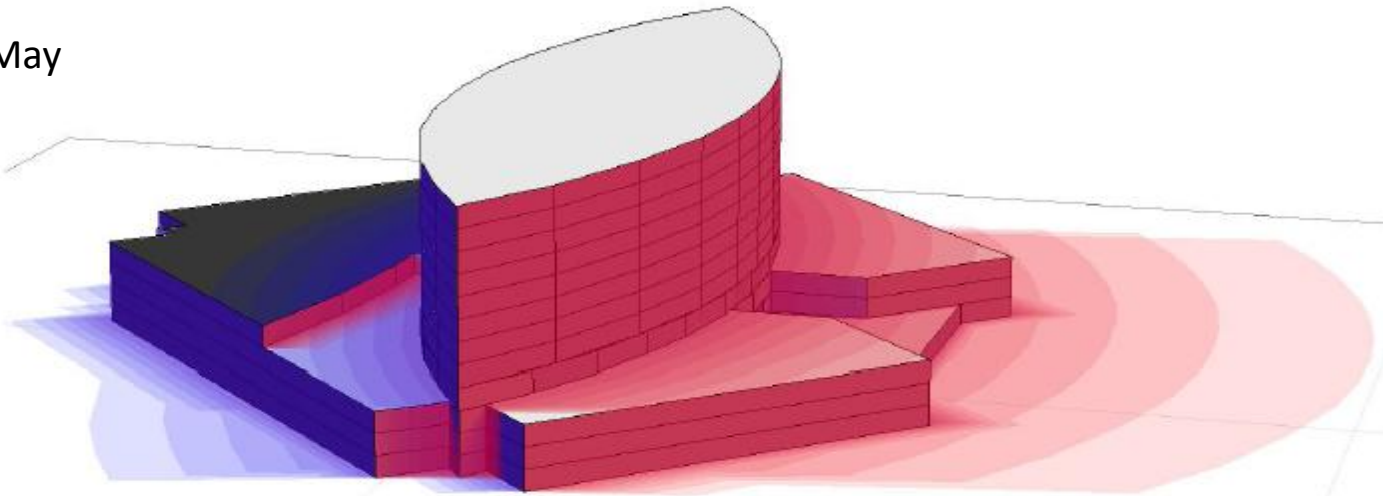
Non-solar heat gain is the reason for increase in heat gains.

## Case 2: Optimum Orientation Commercial, Navi Mumbai

January



May

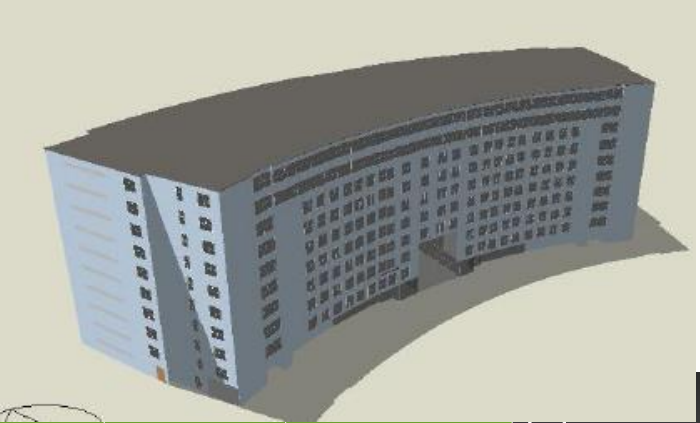


Glazing on East & South Façade showed that **Clear Glass performed as good as the so called “high – performance glasses”** and the choice came down to aesthetics



# Case 4 :Climate Analysis Office , Bangalore

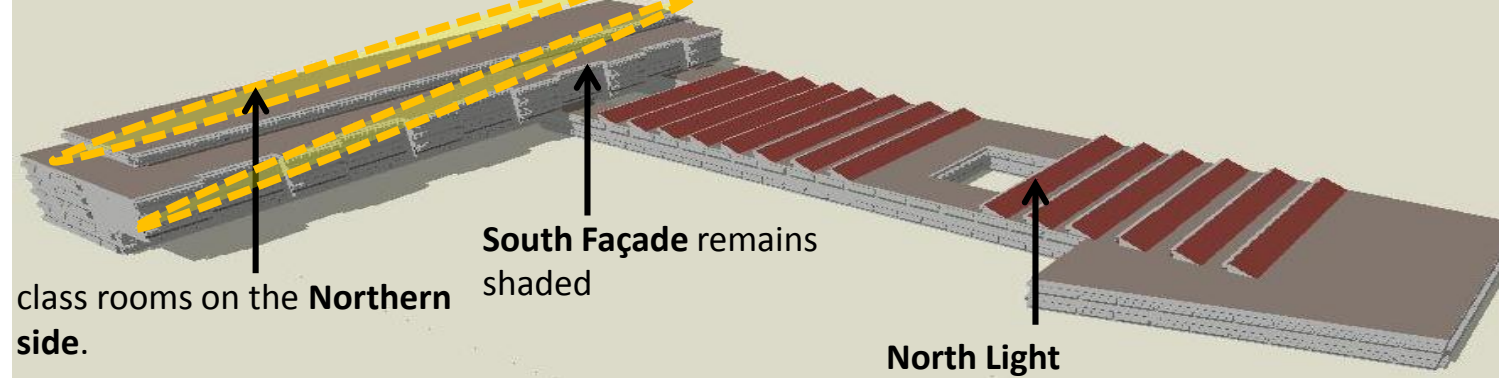
Climatic condition of the location is important to select type of glazing as different weather conditions have different impact on glass.



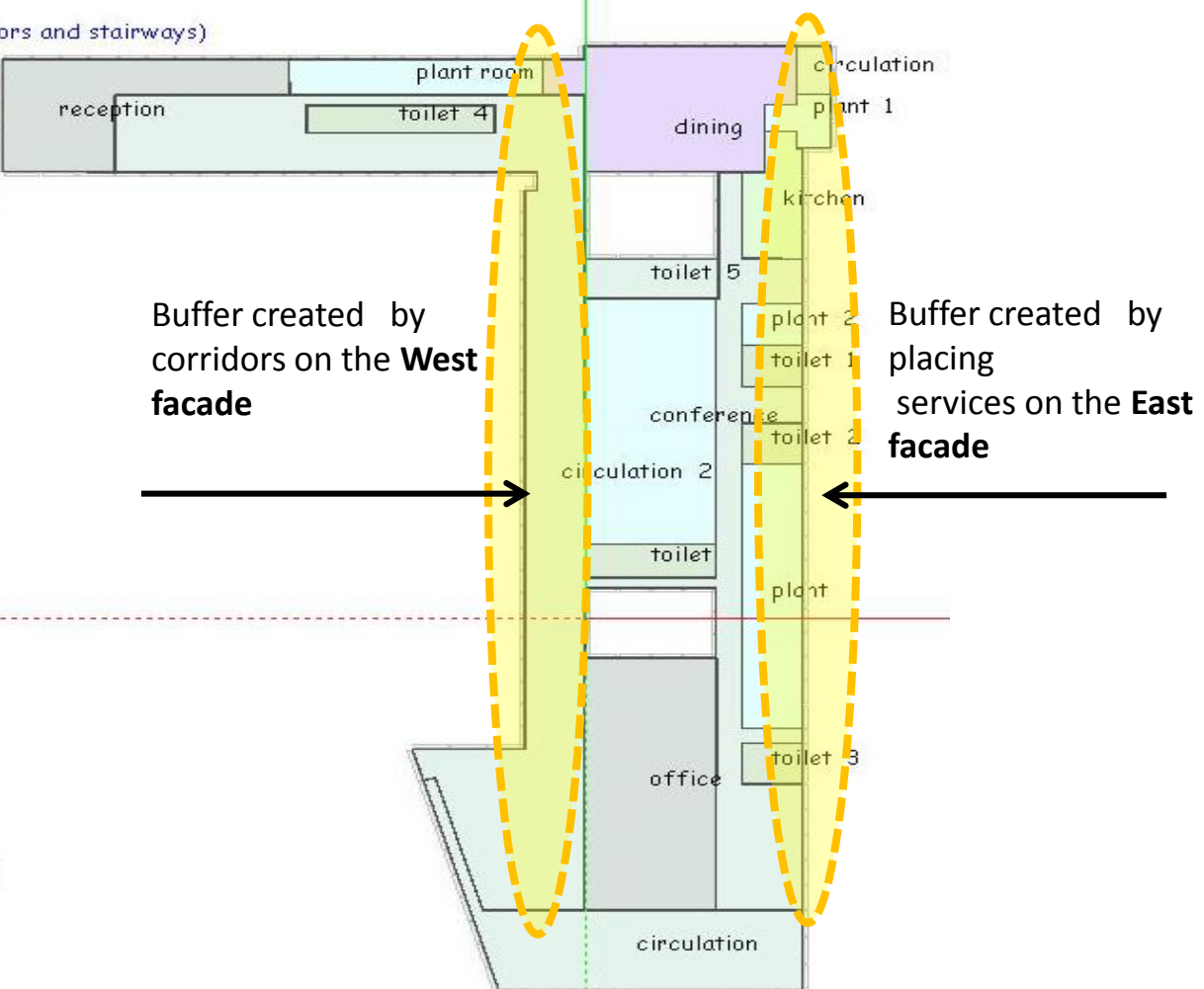
Calculations	Total (KWh)	Cost of Electricity	Savings (Kwh)/ Yr	Savings (Rs.) / Yr	Cost of Glass	Cooling design (Kwh)	Cooling Load In TR	Units	Cost (Cr.)	Saving	Extra Paid for Glass
base case clear Glass SGU	7032860	4.21			2750000	3052	862	300tr*3	2.13		
Enhance Pine SGU	7244067	4.34	-211206	-1267237	5500000	2960	836	300tr*3	2.13	0.00	2750000
Enhance Reef SGU	7034942	4.22	-2082	-12491	5500000	2905	820	300tr*3	2.13	0.00	2750000
Proposed Glass	7099559	4.05	-66699	-400191	5750000	2800	790	300tr*2 + 200tr*1	1.90	0.23	3000000
Proposed Glass with lighting controls	7320208	4.39	-287347	-1724085	5750000	2876	812	300tr*2 + 200tr*1	2.01	0.118	3000000
Proposed Glass without lighting controls	7640898	4.58	-608038	-3648227	4250000	2885	814	300tr*2 + 200tr*1	2.01	0.118	1500000

Glass with SF of 37 & U-Val – 5.7 was as efficient as a glass with SF of 25 & U-Val – 3.7. The building design & the local weather conditions meant that you can relax the glass values and still be energy efficient.

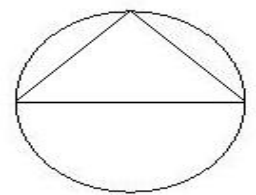
# Case 5: Optimum Design Learning center , Mumbai



- Circulation area (corridors and stairways)
- Light plant room
- Food preparation area
- Toilet
- Eating/drinking area
- Workshop - small scale



- DESIGN FEATURES :**
- Learning centre is optimally designed with louvers on all the glazed facades.
  - North light on the roof for capturing daylight.
  - The East and West radiations are blocked by creating buffer spaces of service areas and corridors





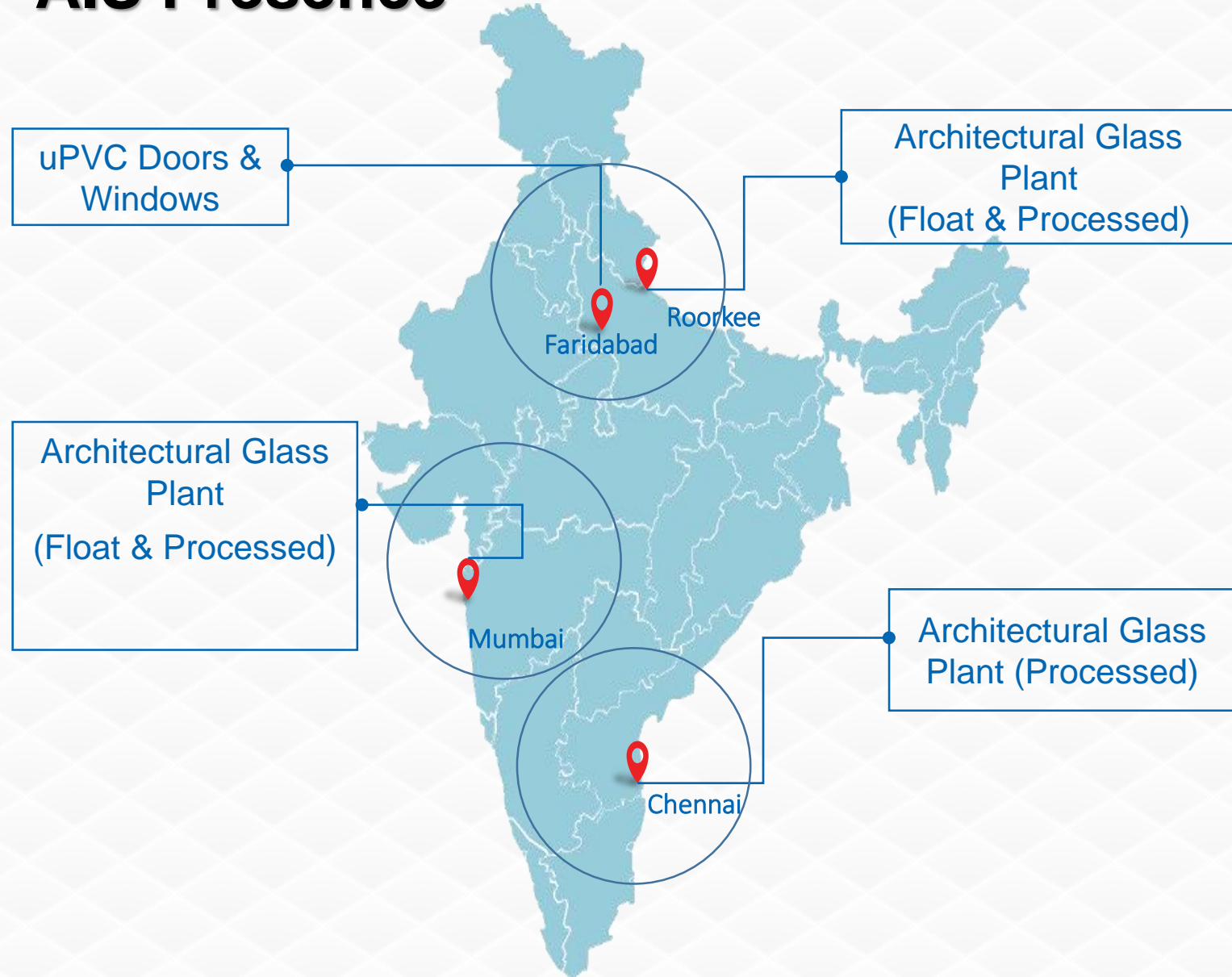
# Environmental Debate



**Grave to Cradle**



# AIS Presence



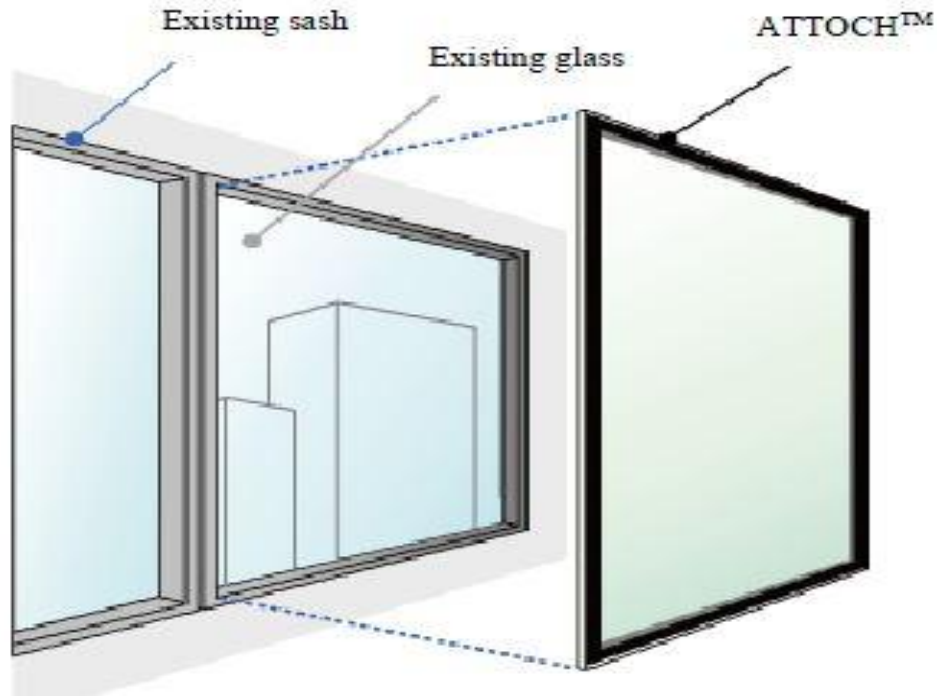
**AIS Processing Units covering most of the Geography..**



# New Technology- AIS Renew

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## Façade Retrofitting for better energy performance:



Before installation



After installation

- Installation takes only 30 to 60 minutes per window.
- The existing glass continues to be used, and so does not require disposal.



# Happiness Index- Step 2

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**Buyer**



**Architect**



**End User**

# Economical aspect

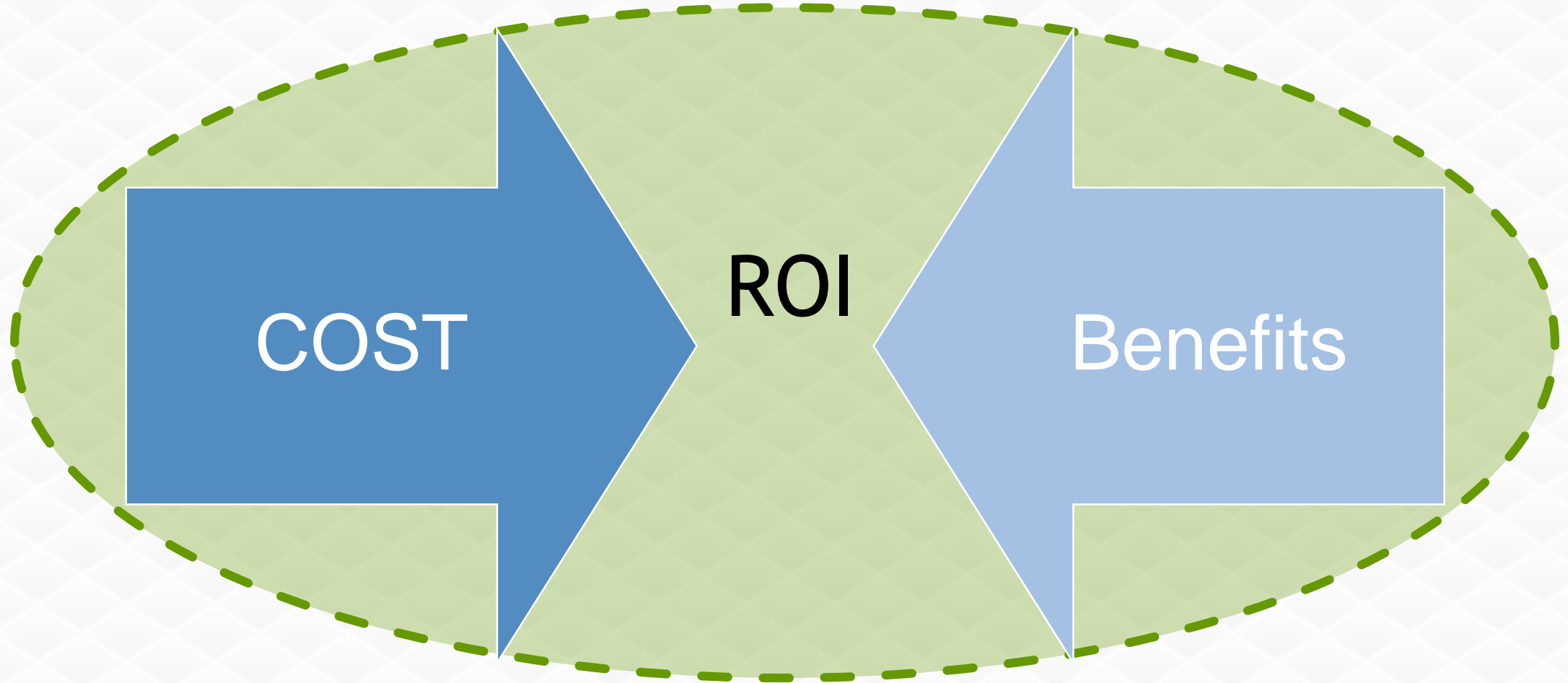
Capex

- Selection of glass as per project requirement

Opex

- Savings in monthly energy bills (lighting, HVAC etc.)

# Ways to look at COST factor





# Happiness Index- Step 3

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**Buyer**



**Architect**

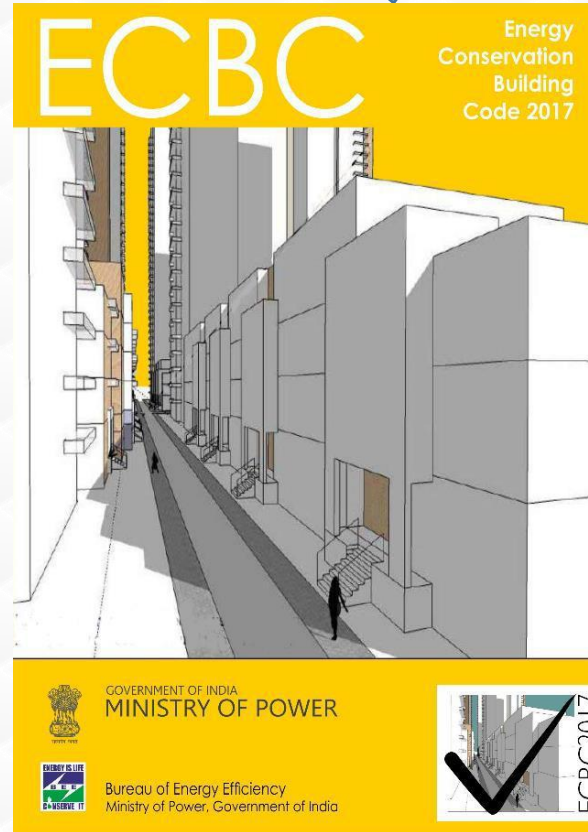


**End User**

# Way forward



Reference standards for mandatory requirement and prescriptive requirements of building envelope, HVAC, lighting levels, Service hot water in building rating system.



Reference standards for lighting levels, HVAC, thermal comfort conditions, natural ventilation and any other building materials and system design criteria



**Choose Wisely  
&  
See More....**





# Thank You

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