

You are All Highly Welcome to this presentation on Green Building Envelope



By

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The Perceptible Impacts of Building Envelope on Other Green Building Features: “A Review”

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By

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PRESENTATION OUT LINE

□ INTRODUCTION

- Background to the study
- Research Problem
- Research Aim

□ THE RESEARCH METHODOLOGY

□ REVIEW OF LITERATURE

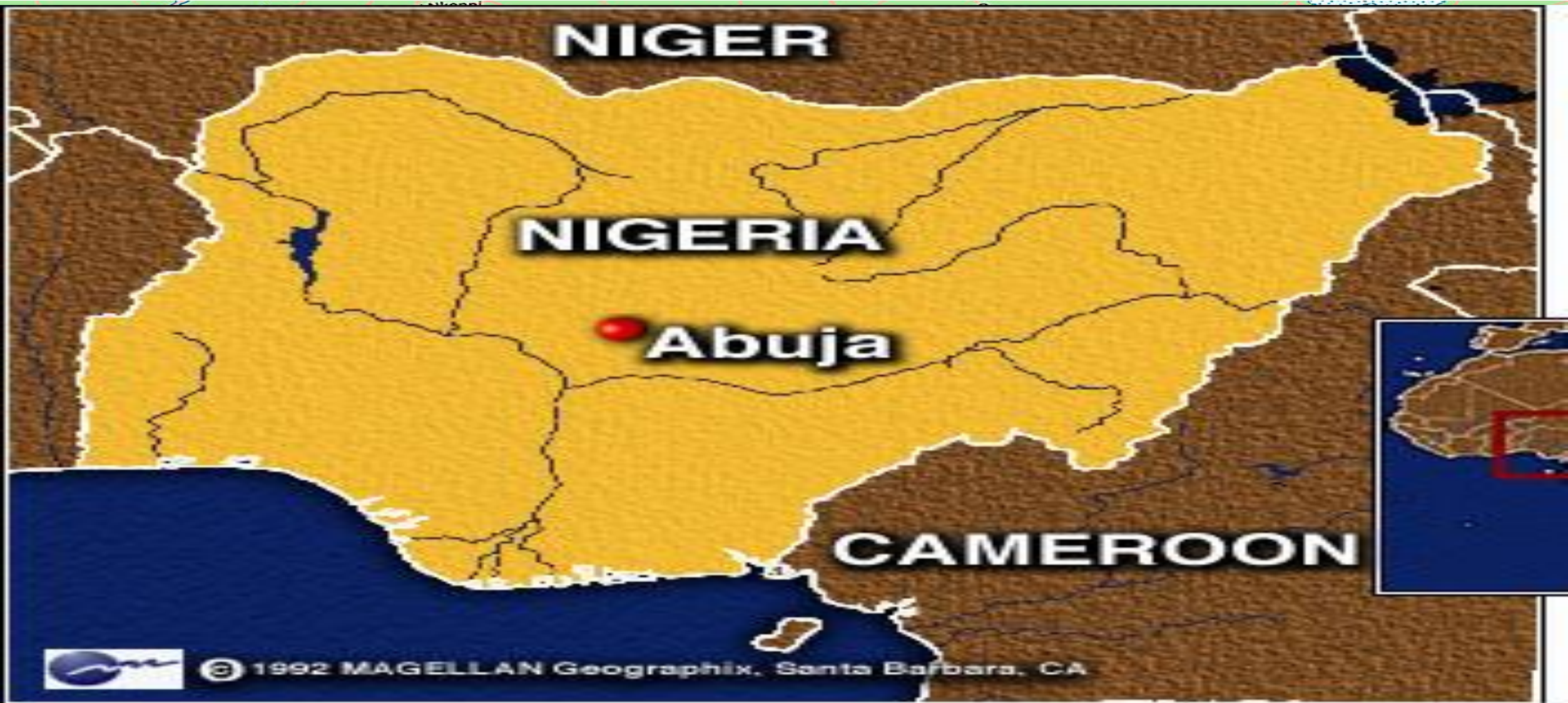
- Building Envelope
- Building Envelope and Other GB features
 - 1. *Energy Efficiency systems,*
 - 2. *Water Efficiency systems,*
 - 3. *Day Lighting systems,*
 - 4. *Indoor Environmental Quality (IEQ) systems*

□ ANALYSES, SUMMARY AND CONCLUSION

□ RECOMMENDATION

INTRODUCTION -

Background to the study



INTRODUCTION - Background to the study

Since the emergence of Sustainable / Eco / High performance / Green Buildings, there were so many attempts to clearly define it, with each Industry and discipline defining it from its own perspective.

Green Building (GB) refers to a structure that:

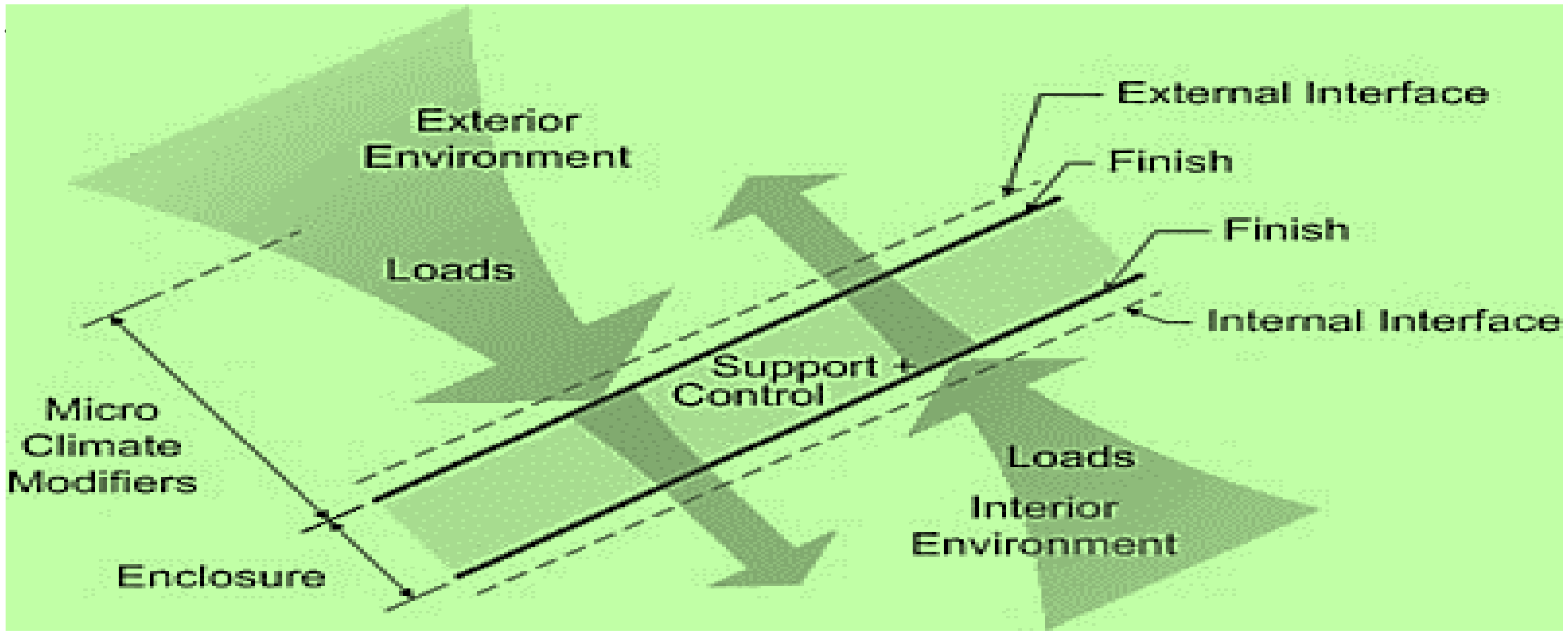
- Uses all processes that are environmentally responsible and resource-efficient
- Sensitive to the environment, resource and energy consumption, impact on people, financial impact and the world at large.
- Embraces Environmental friendly practices from building design to the landscaping choices.
- Are designed, constructed and operated to provide optimum performance of the building with positive impact to the occupants.

INTRODUCTION - Background to the study

Green Building (GB) refers to structure that:

- Green building is an effort to amplify the positive and mitigate the negative of these effects throughout the entire life cycle of a building.
- This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort

INTRODUCTION - Background to the study



This System is called **BUILDING ENVELOPE** system

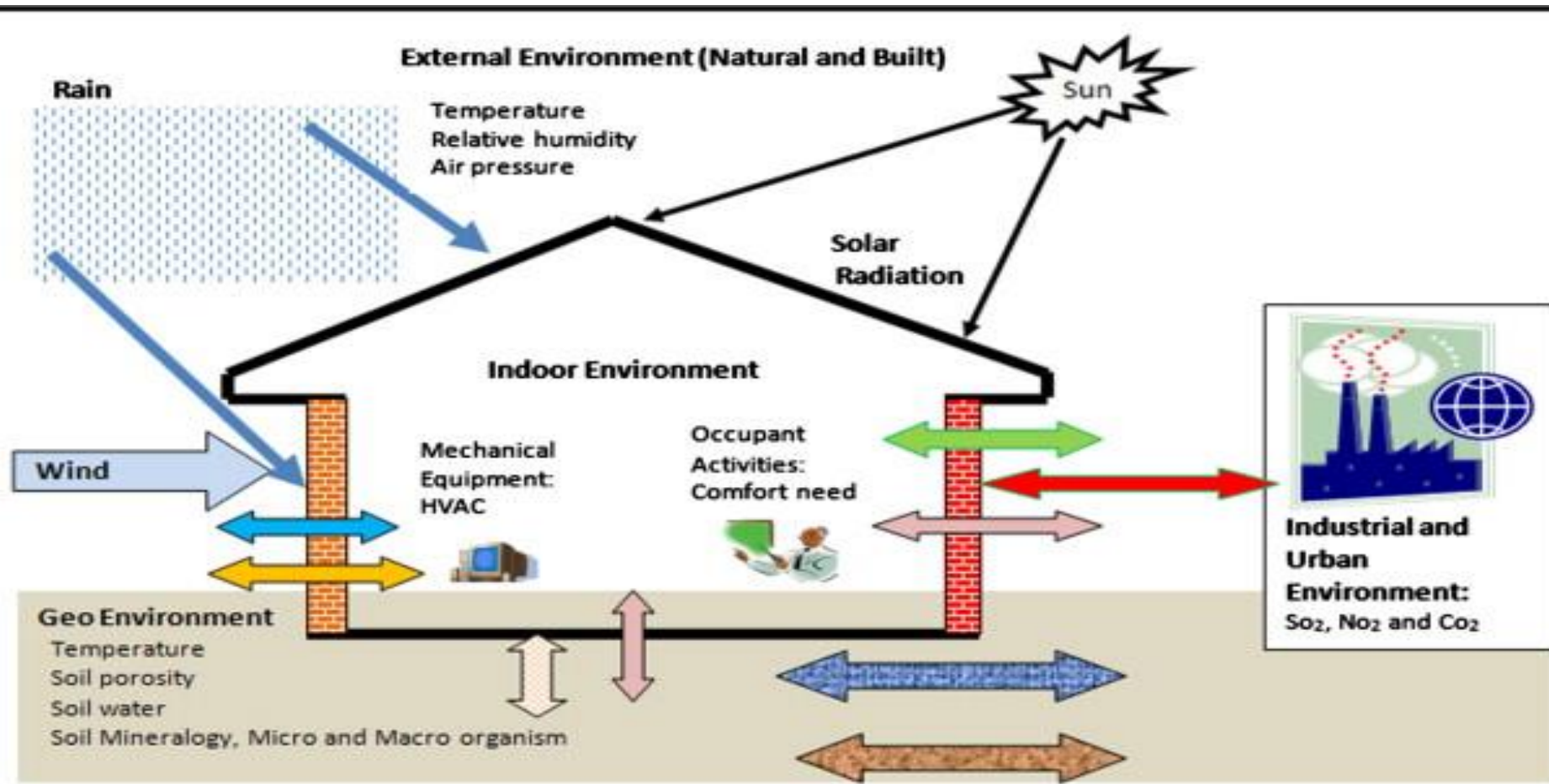
INTRODUCTION -

Background to the study

- The BE is all of the elements of the outer shell that maintain a dry, heated, or cooled indoor environment and facilitate its climate control.
- Building envelope design is a specialized area of architectural and engineering practice that draws from all areas of building science and indoor climate control.
- The functions of the BE can be separated into:
 - Support (to resist and transfer structural loads),
 - Control (the flow of matter and energy of all types),
 - Finish (meeting human desires on the inside and outside).

INTRODUCTION -

Background to the study



- Yellow arrow: Vapour pressure difference
- Green arrow: Air pressure difference
- Pink arrow: Temperature difference
- Red arrow: Industrial pollution impact
- Blue arrow: Air leakage
- Light pink arrow: Soil Porosity
- Dark blue arrow: Soil Water
- Brown arrow: Soil Mineralogy, Micro and Macro organism

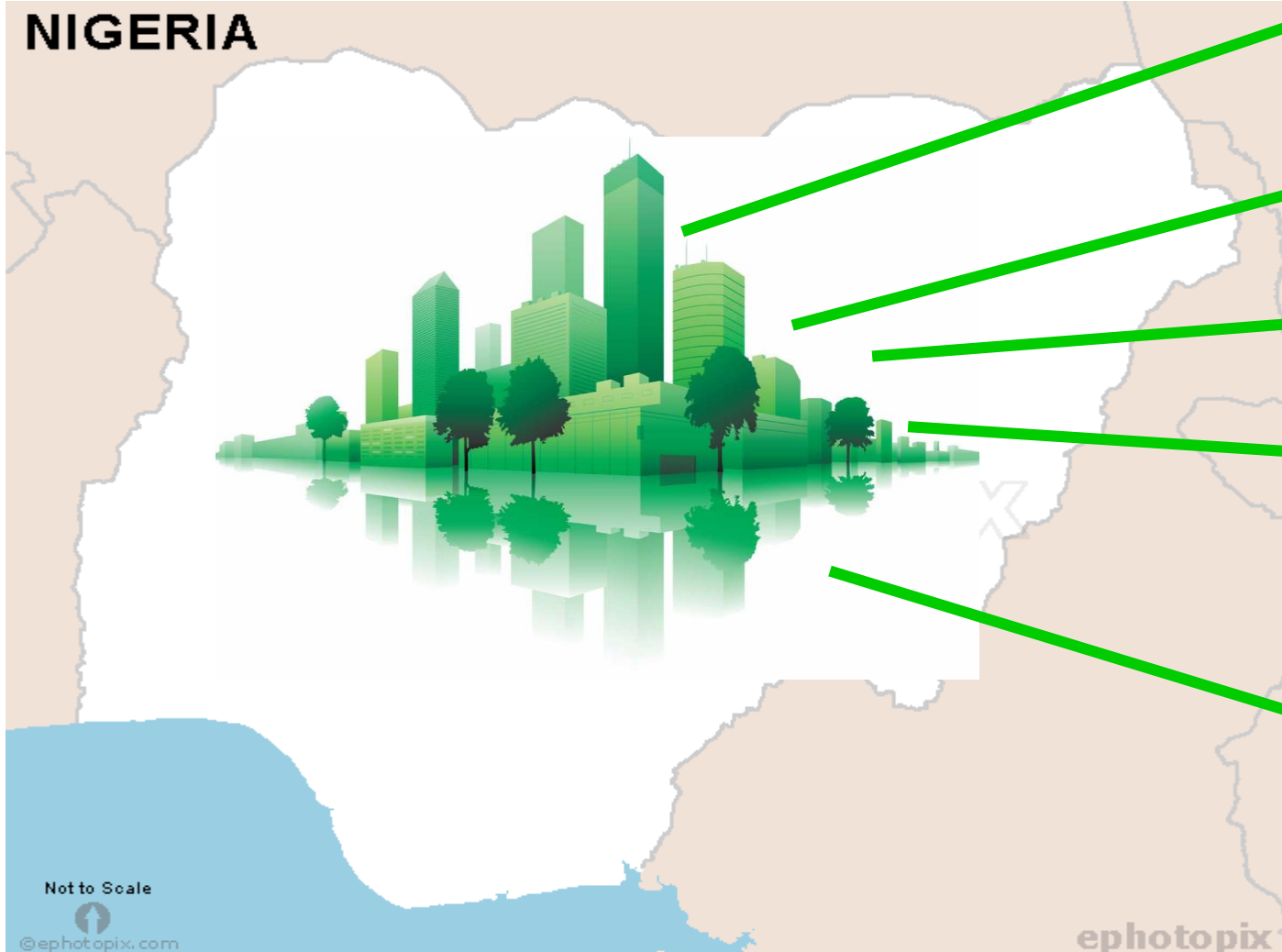
1. Support (to resist and Transfer structural loads),
2. Control (the flow of matter and energy of all types),
3. Finish (meeting human desires on the inside and outside).

INTRODUCTION - Research Problem

- Developers'/ Clients' Attitudes due to lack of comprehensive data about Green Building,
- Cost of Incorporating green features into renovation or proposed projects,
- Potential environmental impacts produced by the use of certain building materials,
- Impact represented by the combination of some building materials when used in a certain constructive assembly.

INTRODUCTION - Research Problem

GB, especially The Envelope considers



Building type,

Project location,

Local climate,

Site conditions, and

The familiarity of the project team with sustainable design.

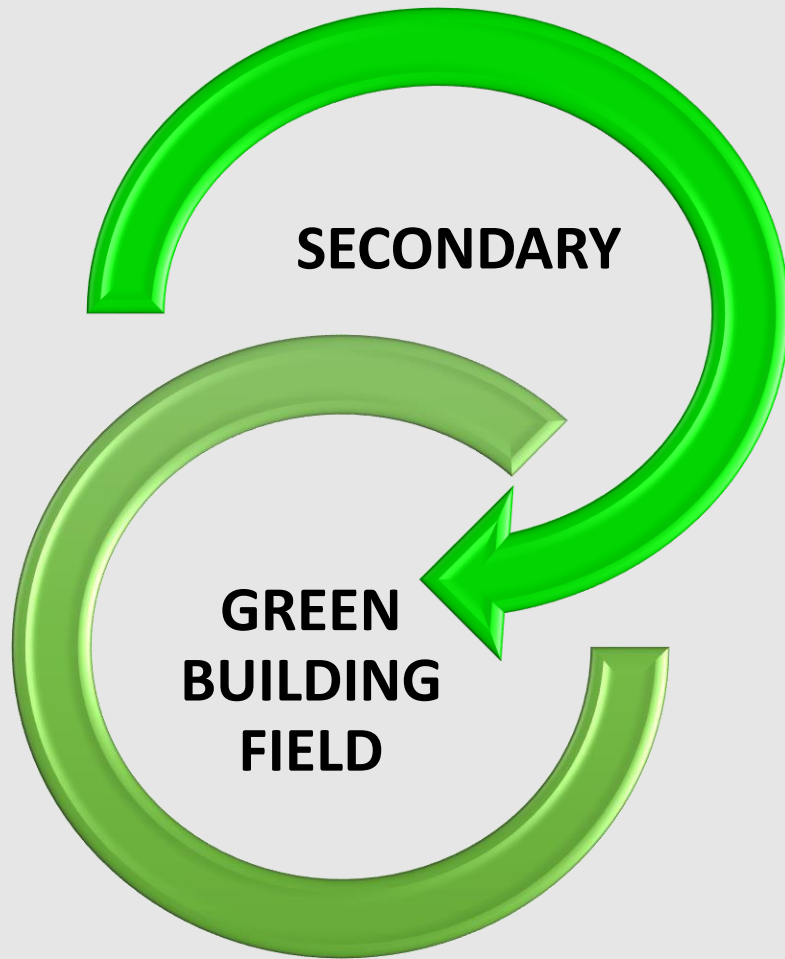
INTRODUCTION - Research Aim

The aim of this paper is to:



on other GB features within the Nigerian and global context with the view of improving the existing literature.

RESEARCH METHODOLOGY



- *Secondary sources* of data such as journals, conference / seminar / workshop papers, text books, newspapers, magazines and internet sources etc. were used to review literatures the green building field which identify and narrow few environmentally sustainable passive and active elements of GB within the Nigerian and Global context.

LITERATURE REVIEW

- GB is an integrated building system that encompasses all the efficiency systems (into a single system) for the purpose of sustainability.
- Such elements include Energy Efficiency systems, Water Efficiency systems, Day Lighting systems, Indoor Environmental Quality (IEQ) systems and Building envelope systems etc. through the use of sustainable building materials.

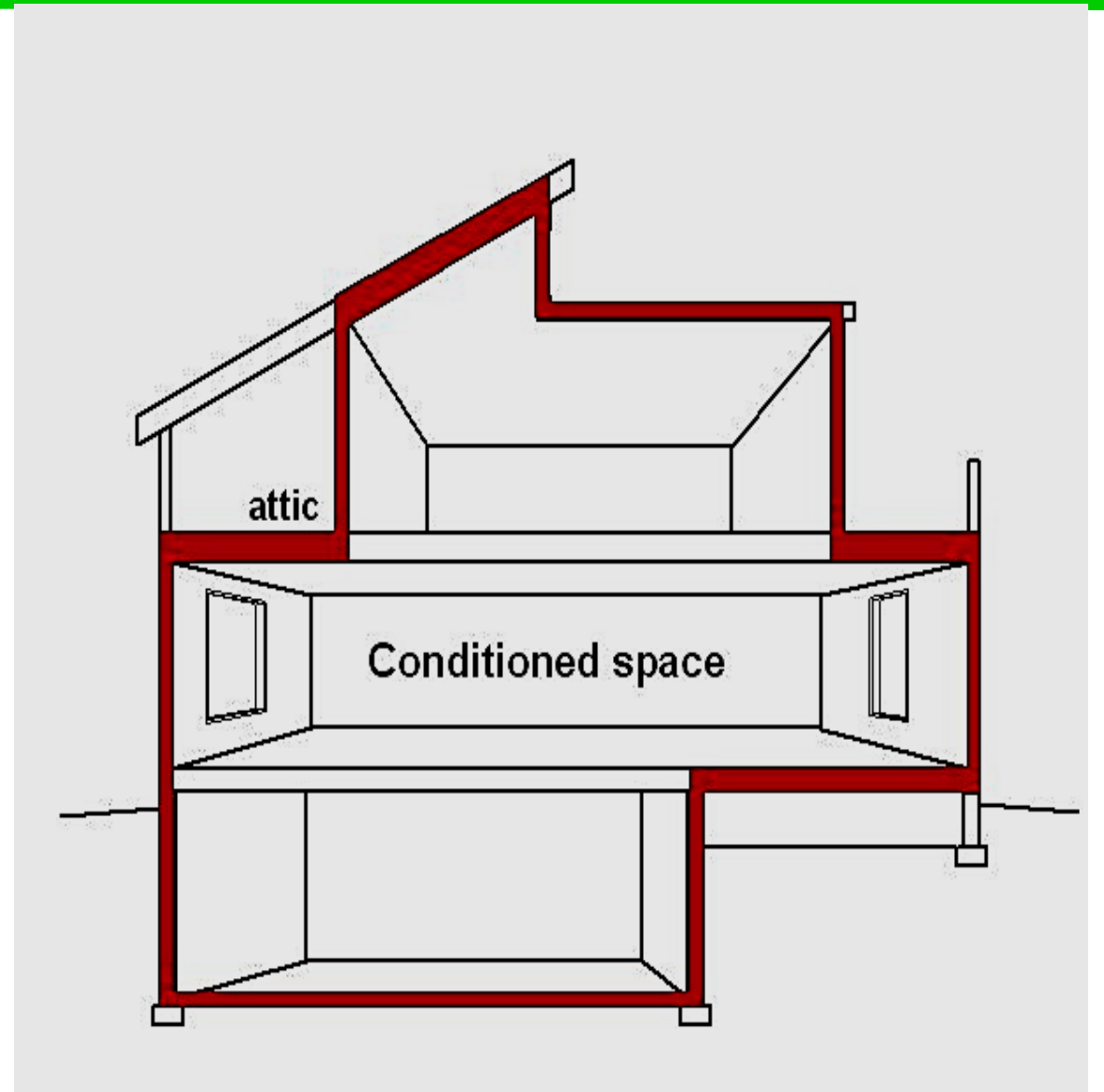


LITERATURE REVIEW

The building envelope, also called

- building enclosure,
- shell or fabric, is
- the boundary or physical separator

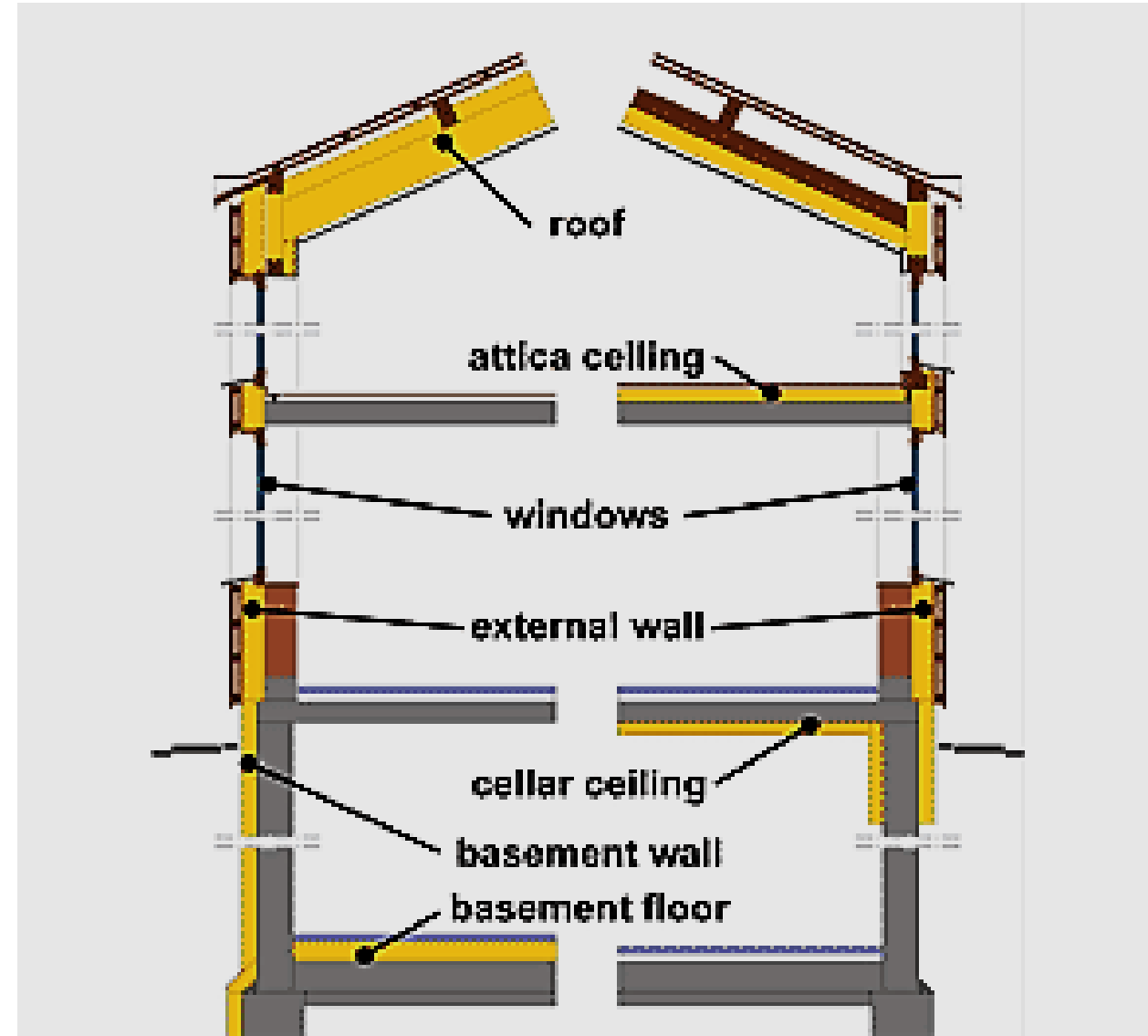
between un-conditioned or conditioned interior of a building and the outdoor environment.



LITERATURE REVIEW

Building envelope, consisting of:

- External walls,
 - Roofs,
 - Ceilings,
 - Floors,
 - Doors, and
 - Windows
- Guarantee the quality of the environment inside the building, since the exchange between the inner and outer environment takes place through it.
- It is also the point where illumination, ventilation or heat flows



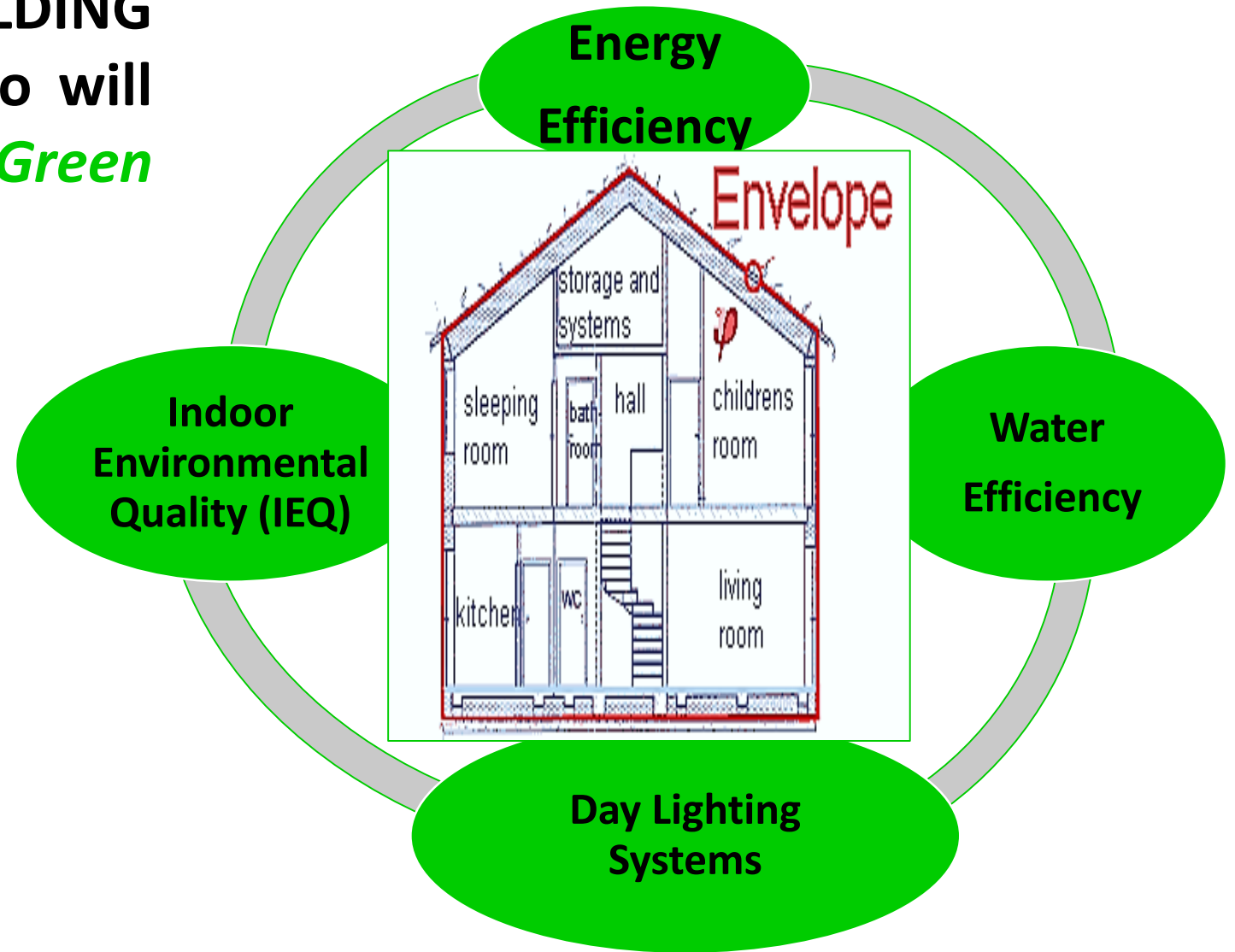
LITERATURE REVIEW

- The use of materials and construction technique in building envelope widely differs between developed countries like China, Europe, USA, and developing countries especially those within the tropics like Nigeria.
- In almost all parts of the world, buildings used to be constructed using local materials to maximize comfort considering local climate.
- In warm-humid areas larger openings were provided in the buildings for natural ventilation for cooling etc.

LITERATURE REVIEW

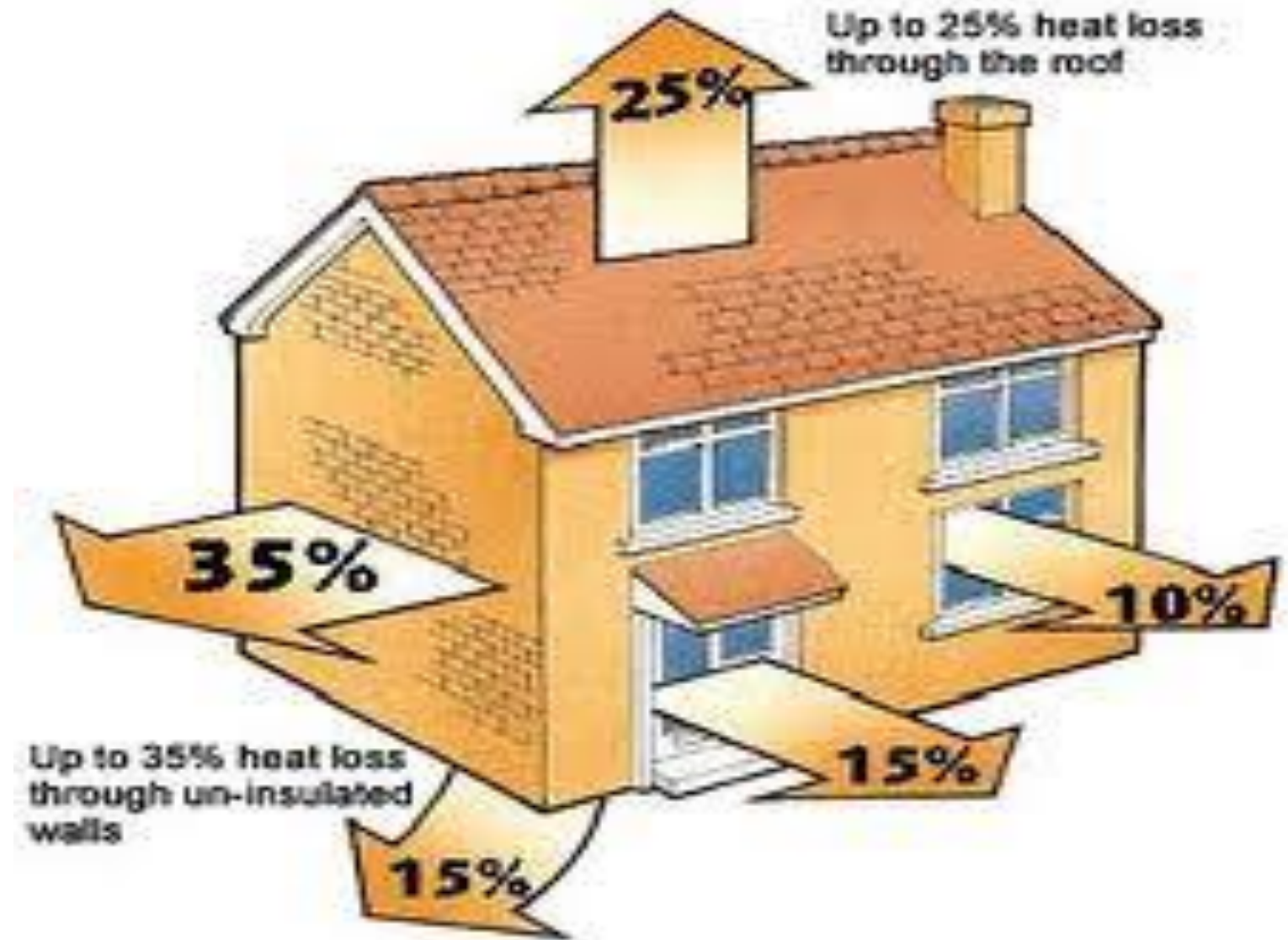
The perceptible impacts of **BUILDING ENVELOPE (BE)** in this work also will be limited to *The following **Green building elements and features:***

- Energy Efficiency systems
- Water Efficiency systems
- Day Lighting systems
- Indoor Environmental Quality (IEQ) systems.



BUILDING ENVELOPE VS ENERGY EFFICIENCY SYSTEMS

- ❑ Cooling & heating losses from interior of the building
- ❑ Inclement weather entering/ penetrating the building such as Harmattan etc.

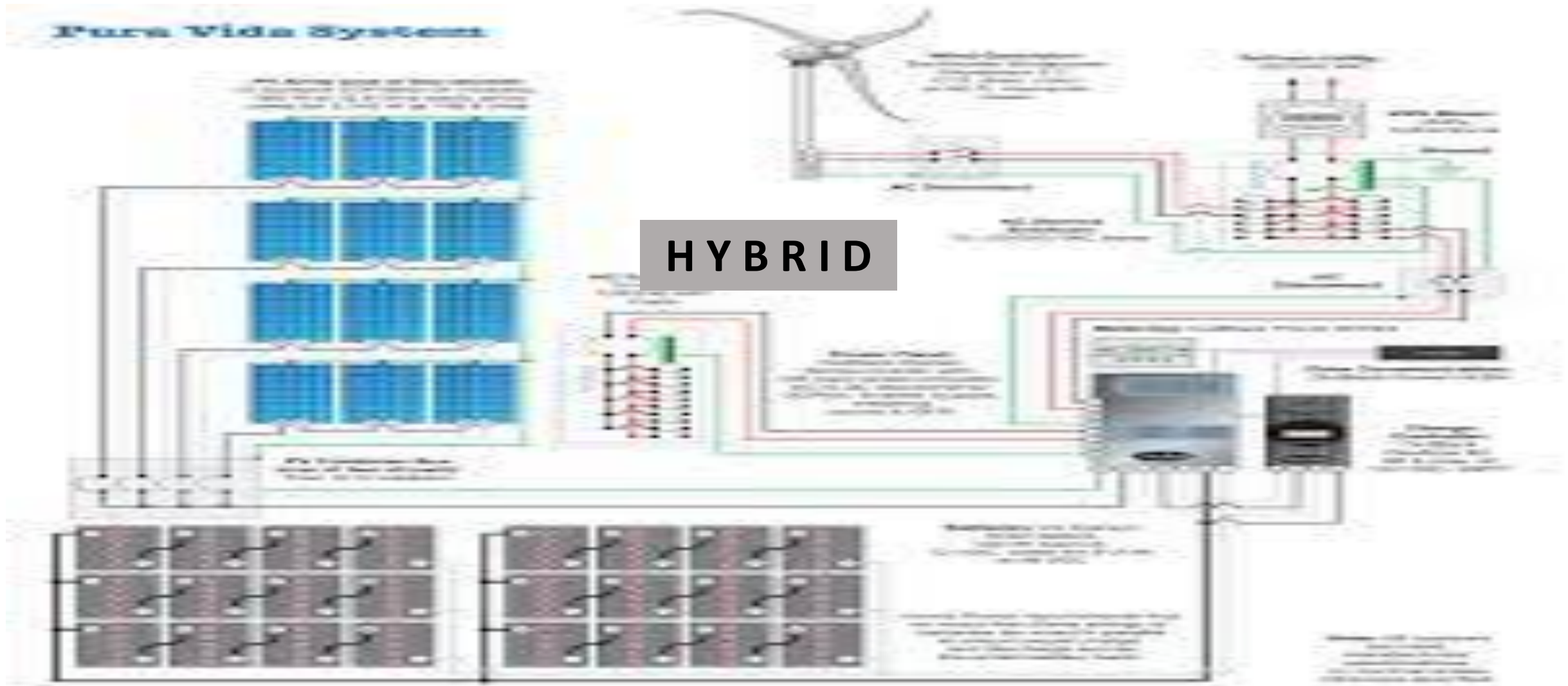


BUILDING ENVELOPE VS ENERGY EFFICIENCY SYSTEMS

- Nowadays building envelopes are designed and constructed according to energy saving measures, by Considering:
- Significant Reduction of Heat flow through opaque external walls and Roof etc.
- The relationships between the impacts of materials used and
- The energy consumption linked to the building assemblies employed in the building envelope.

BUILDING ENVELOPE VS ENERGY EFFICIENCY SYSTEMS

Solar panels Wind turbines DC Inverters Solar-water-heaters



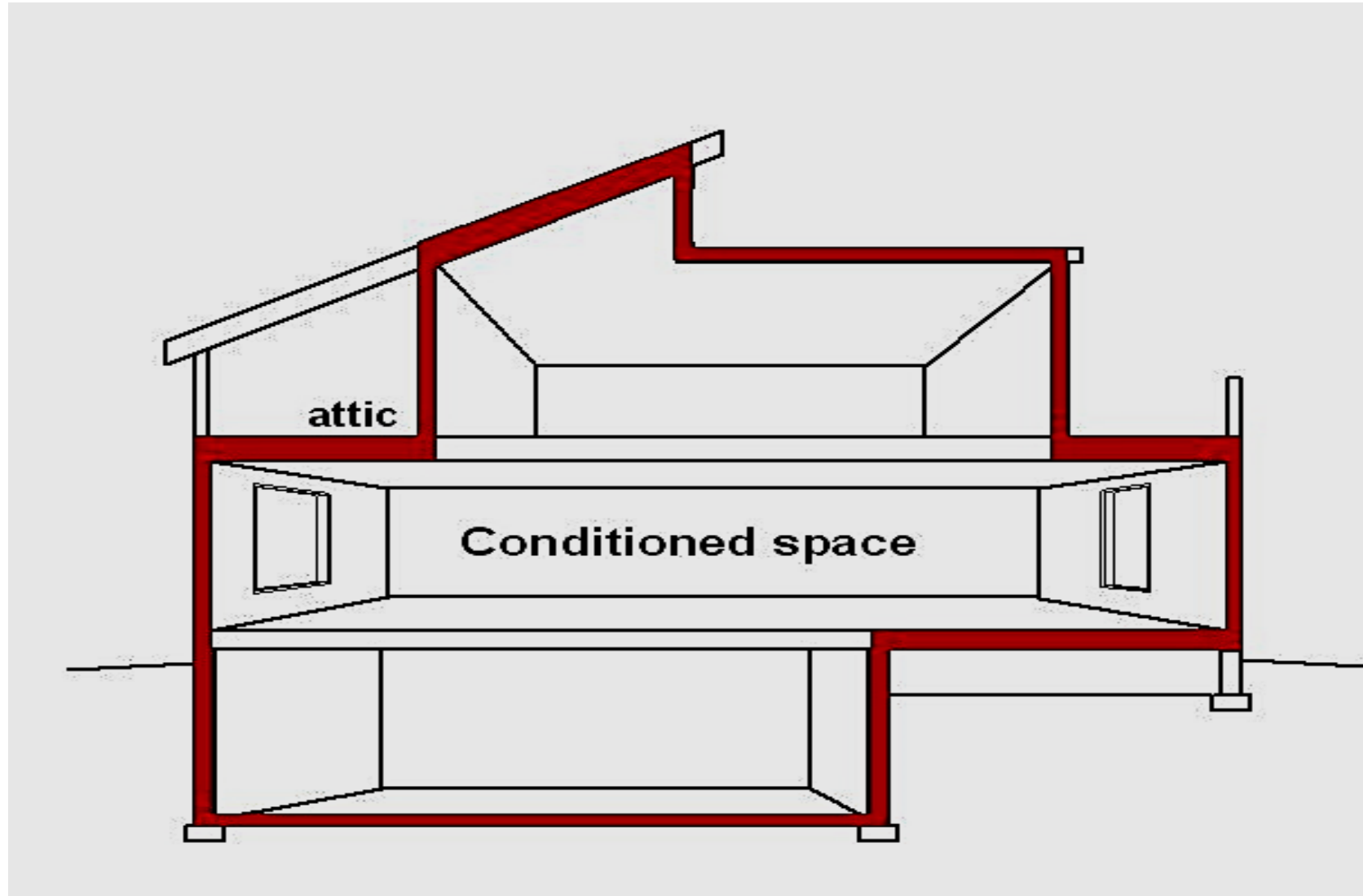
BUILDING ENVELOPE VS ENERGY EFFICIENCY SYSTEMS

□ Allow active and Passive Renewable energy fittings;

□ *Also Minimizes:*

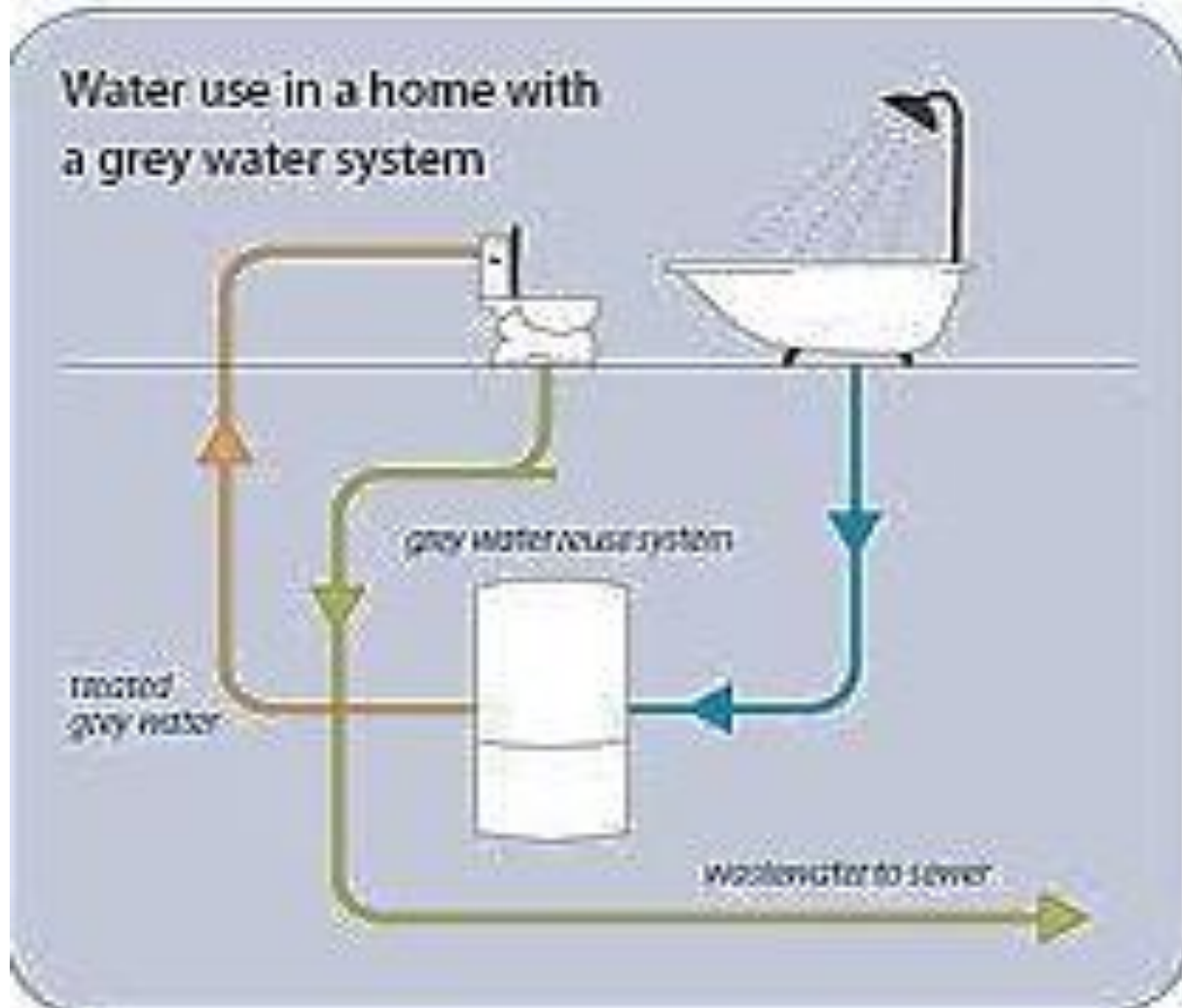
□ *Cooling & heating losses from interior of the building*

□ *Incident weather entering/ penetrating the building such as Harmattan etc.*



BUILDING ENVELOPE VS WATER EFFICIENCY SYSTEMS

Grey & Black Water Systems



Water Conserving Appliances and Technologies



BUILDING ENVELOPE VS WATER EFFICIENCY SYSTEMS

Rainwater Harvest



BUILDING ENVELOPE VS DAY LIGHTING SYSTEMS

- ❑ Day lighting is achieved through the use of Clerestories (Side, Top and Skylights)



BUILDING ENVELOPE VS DAY LIGHTING SYSTEMS

❑ SPECTRAL GLAZING e.g. PHOTO CHROMIC GLAZING



BUILDING ENVELOPE VS DAY LIGHTING SYSTEMS

□ THERMO CHROMIC GLAZING



BUILDING ENVELOPE VS DAY LIGHTING SYSTEMS

□ ELECTRO CHROMIC GLAZING



BUILDING ENVELOPE VS DAY LIGHTING SYSTEMS

☐ USE OF LCD IN GLAZING



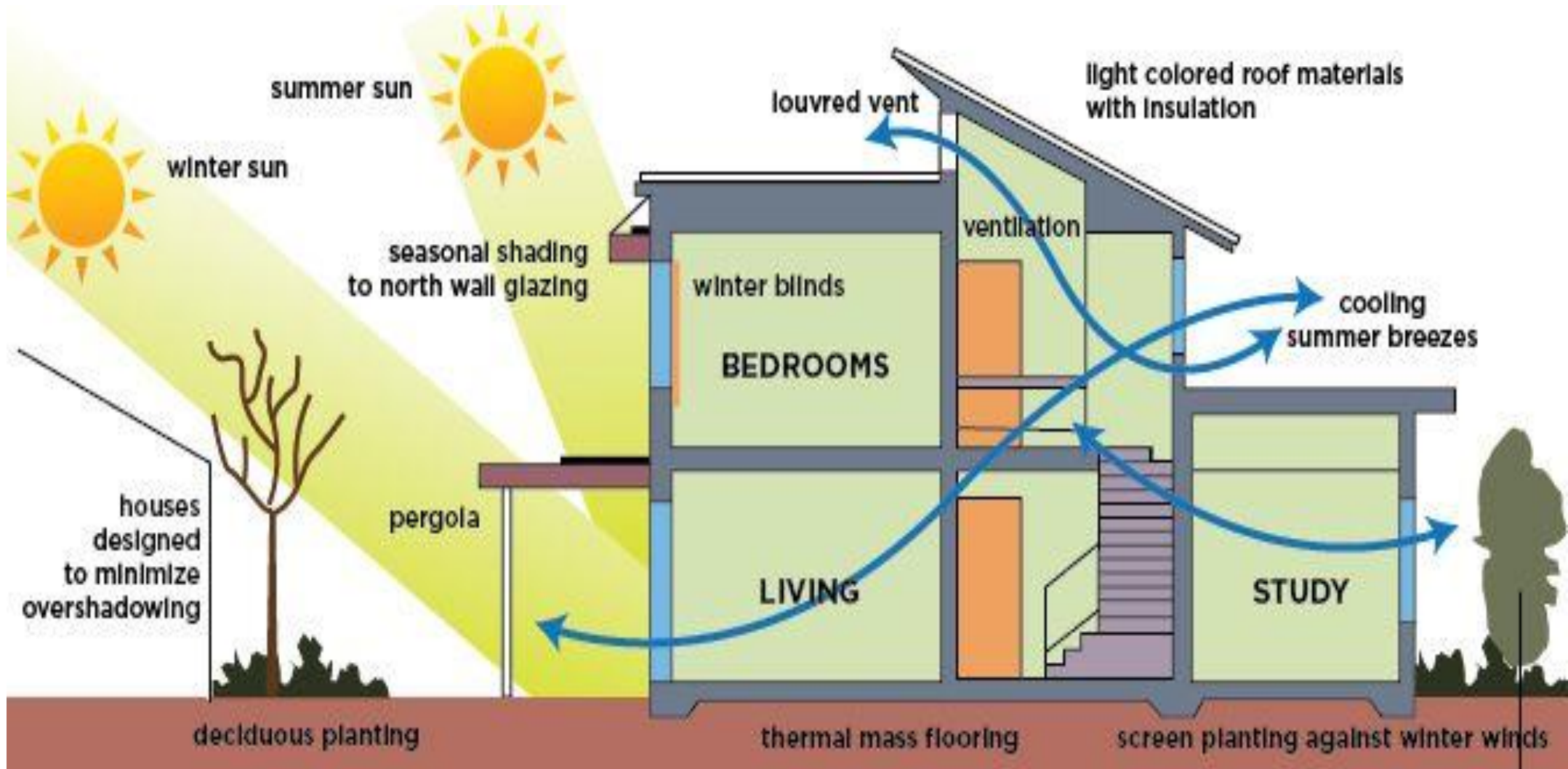
BUILDING ENVELOPE VS DAY LIGHTING SYSTEMS

SOLAR TUBES



BUILDING ENVELOPE VS Indoor Environmental Quality (IEQ)

- People spend up to 90% of their time indoors.



BUILDING ENVELOPE VS Indoor Environmental Quality (IEQ)

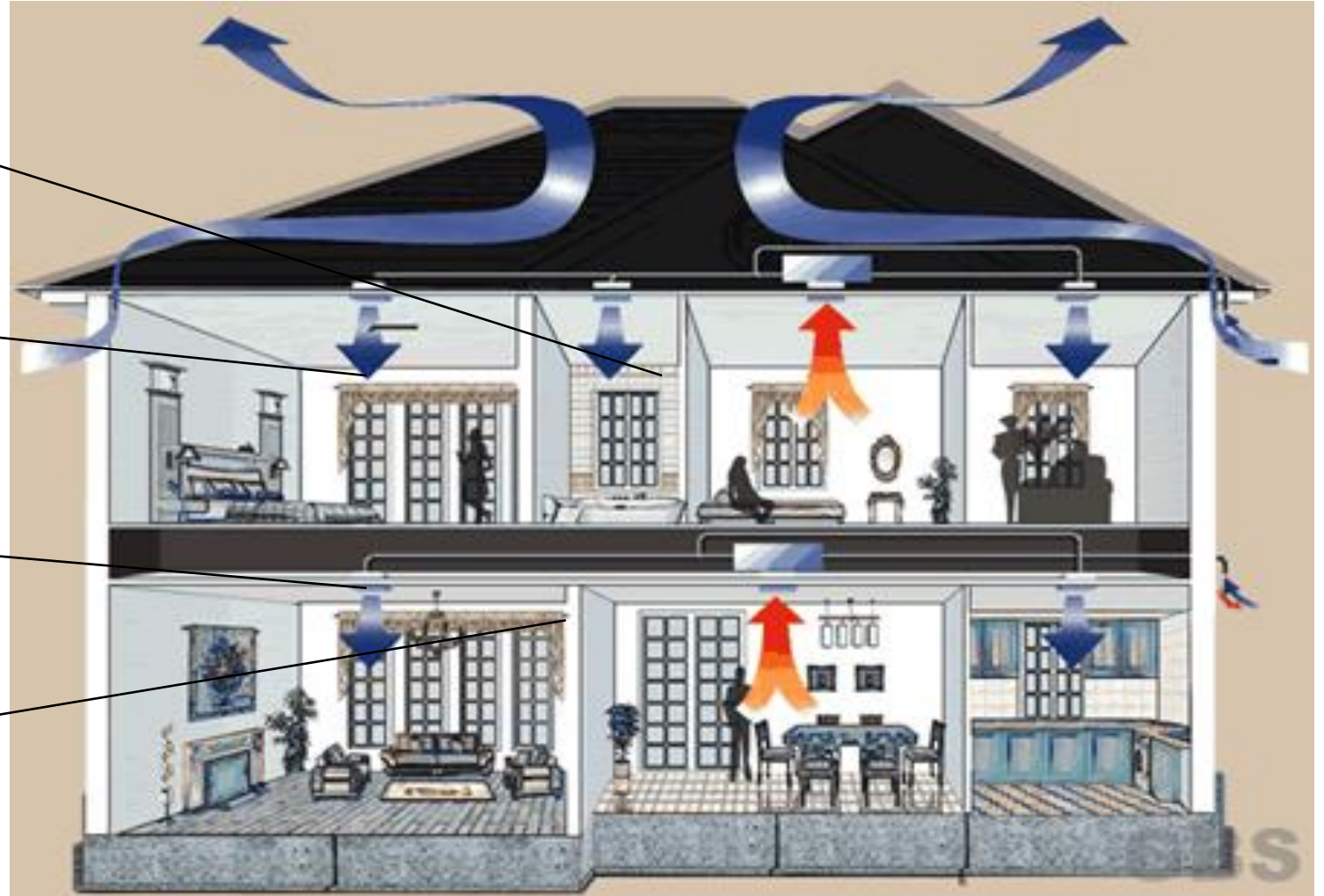
□ People spend up to 90% of their time indoors.

Indoor Air Quality

Lighting (N&A)

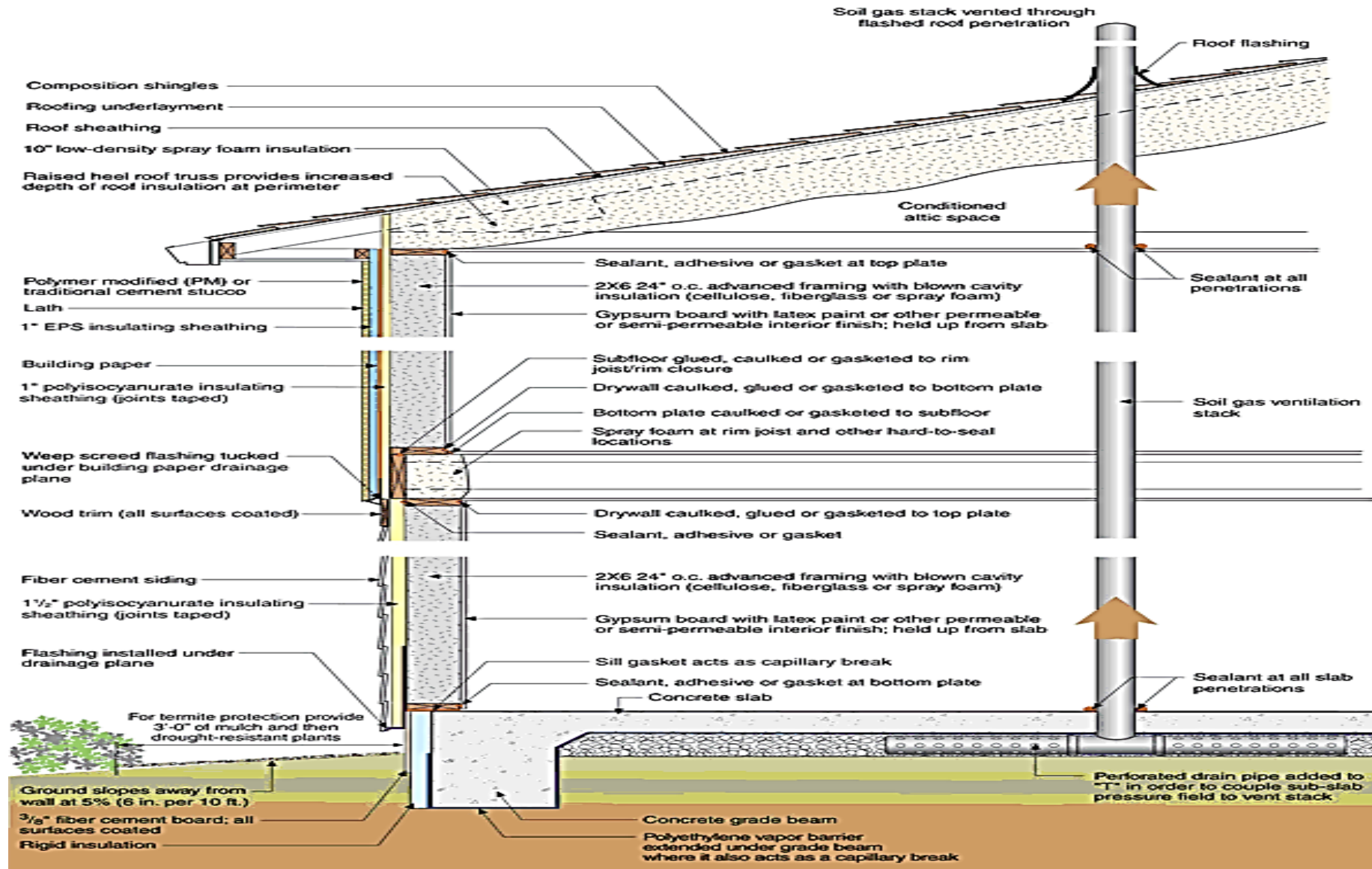
Thermal Comfort

Acoustics



Cumulatively they increase Comfort and productivity.

ANALYSES, SUMMARY AND CONCLUSION



ANALYSES, SUMMARY AND CONCLUSION

- ❑ Energy Efficiency System: The BE help in retaining the conditioning inside the GB while also preventing the outside weather condition coming inside. It also allows integrating and fixing of Renewable sources of Energy within its system. e.g. Solar Panels etc.
- ❑ Water Efficiency system: The BE can incorporate additional Piping works for Grey and black water systems, so also the any additional tank and pipe works required for effective utilization of rainwater.

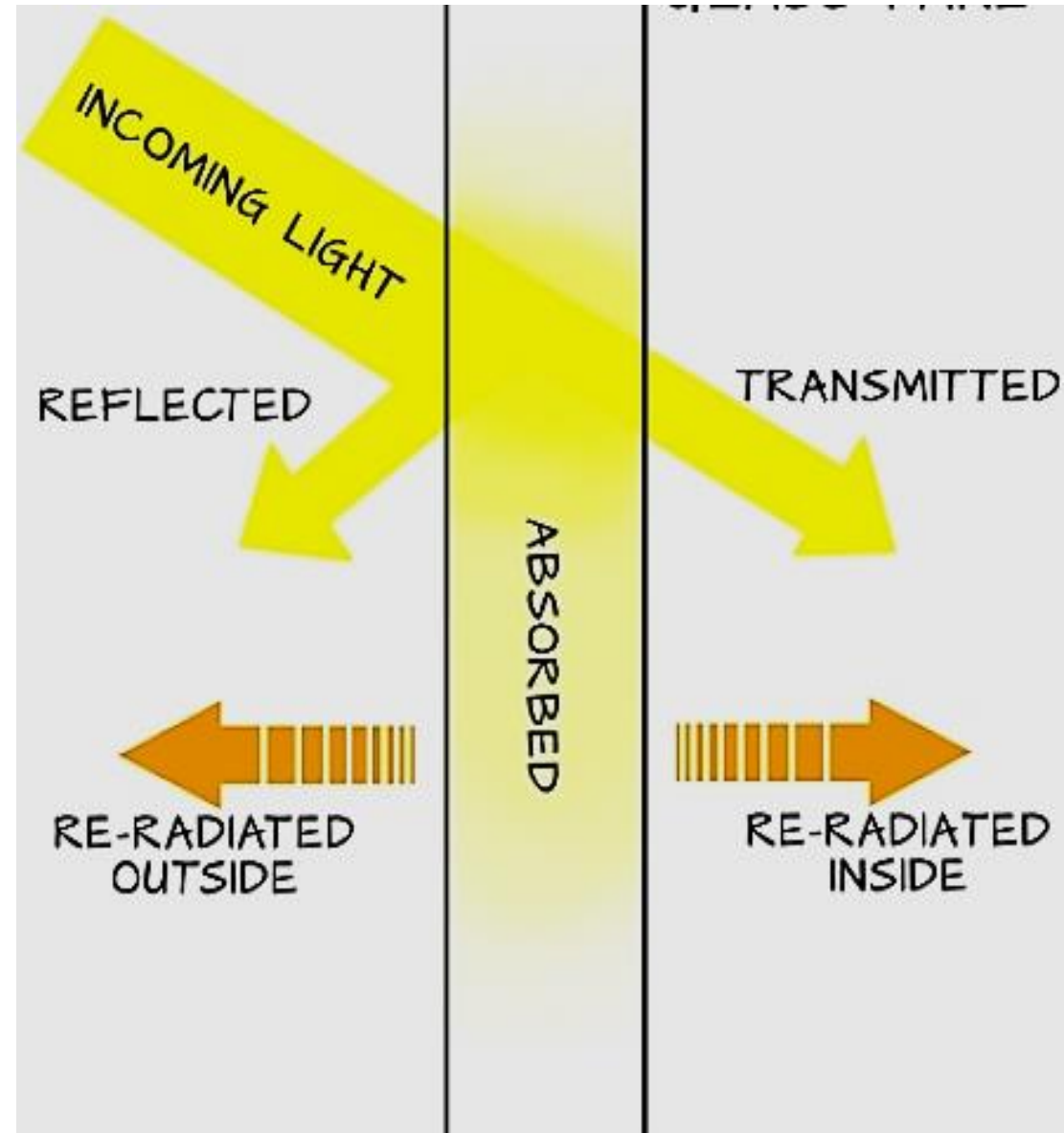
ANALYSES, SUMMARY AND CONCLUSION

- Day lighting: The Type and positioning of Clerestories, Solar tubes and glazing choices within the BE system highlights the High impact of BE on the Day lighting system and strategies.
- Indoor Environmental Quality (IEQ): This encompasses indoor air quality, Thermal Comfort (Heating, Cooling & Ventilation etc.), Lighting (both Electric Lighting & Day lighting), Acoustics etc. Without an Adequate BE system all the four subcomponents of IEQ will not be achieved. The Control function of BE improves the indoor air quality, thermal comfort, Lighting (especially day lighting) and acoustics within a building.

ANALYSES, SUMMARY AND CONCLUSION

At this Juncture, it is worthy to note that adequate BE system impact other GB features due to:

- The use of materials and construction technique in building envelope,
- It is also the point where illumination, ventilation or heat flows
- Enclosing and separating the un-conditioned or conditioned interior of a building and the outdoor environment.



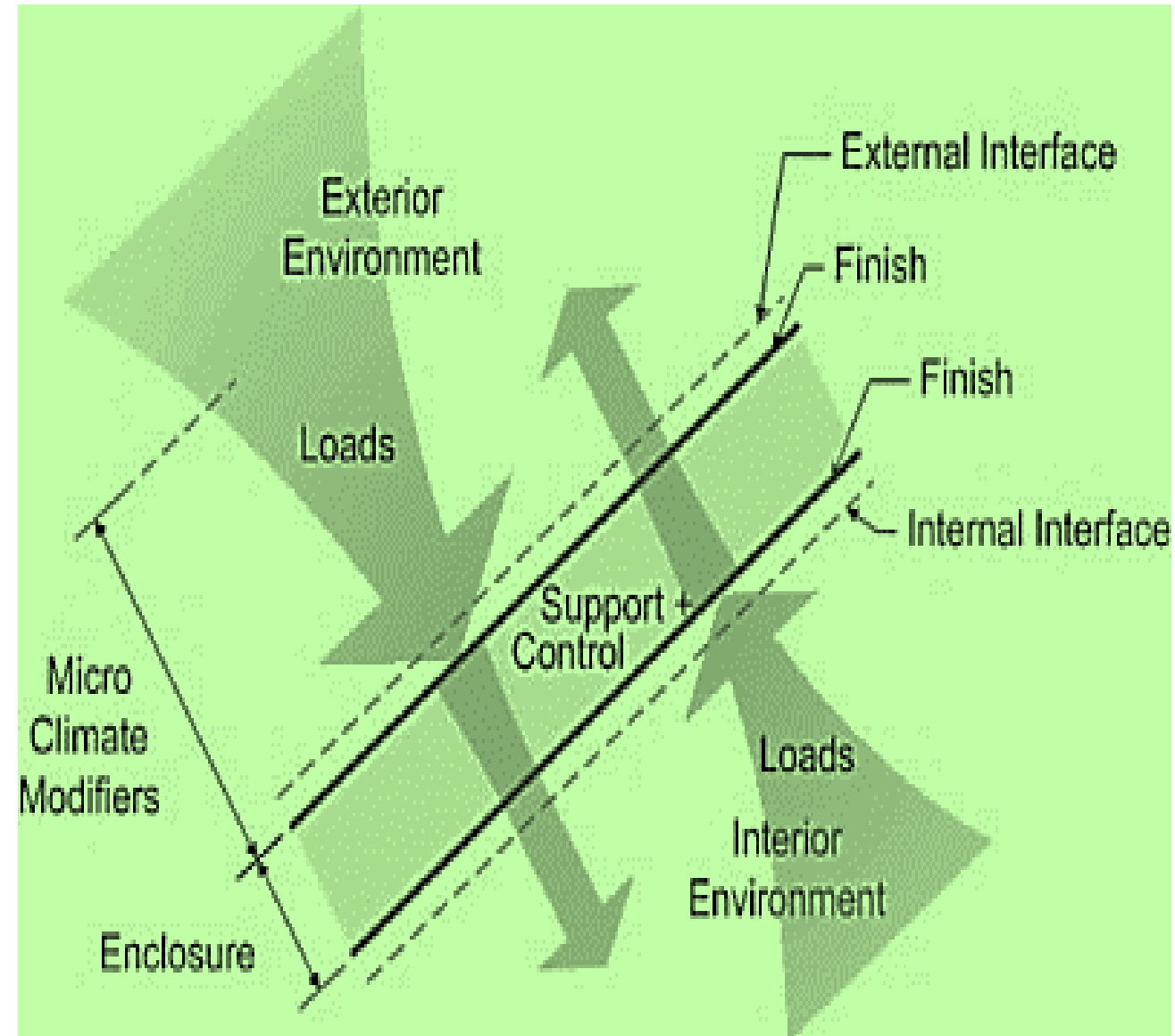
BUILDING ENVELOPE

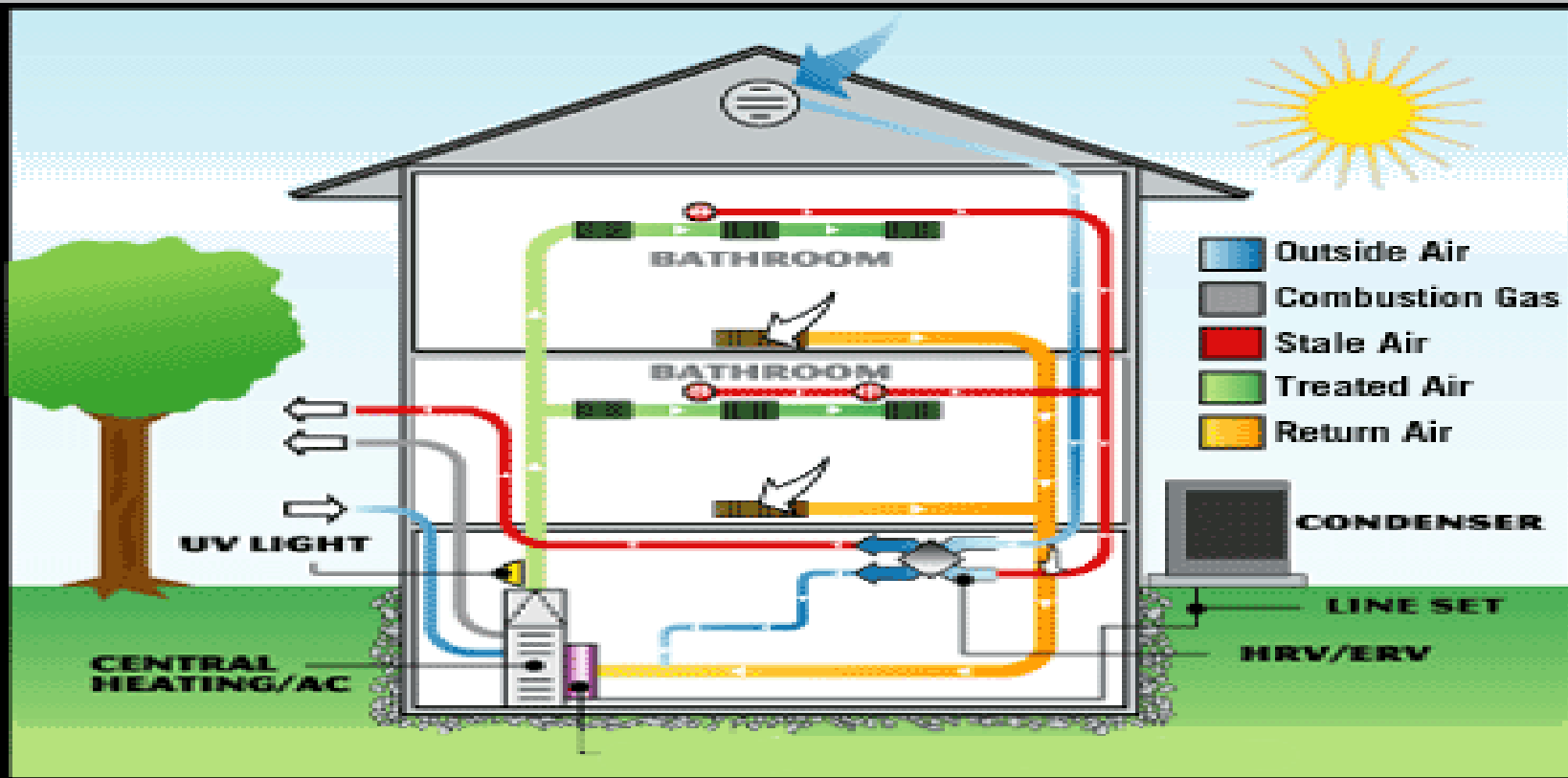
The envelope must balance

requirements for:

- ❑ Ventilation
- ❑ Daylight
- ❑ Thermal and moisture protection

appropriate to the climatic conditions of the site.





NAGODE, MIYETTI

谢谢

THANK YOU

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BUILDING ENVELOPE IS THE MAJOR ELEMENT IN GREEN CONSTRUCTION



BUILT ENVIRONMENT

GREEN GLOWS & GROWS