A CASE STUDY ON

# ENERGY EFFICIENCY AND ALTERNATE ENERGY SYSTEMS IN GREEN BUILDINGS


PRESENTED BY– TEAM INNOVATORS

- TANMAYA MOHAPATRA
- SUBHAM PRADHAN
- ANMOL NAYAK


# OVERVIEW OF THE CASE STUDY

IndianOil owns and operates large number of corporate offices pan India. The energy demand for heating, cooling, lighting, etc, are currently optimized through independent energy saving initiatives. Although a comprehensive and integrated energy solution is a challenge. Alternate energy systems like Bio-digester, Solar electricity, Solar water heater etc are available for individual buildings (commercial).

# DELIVERABLES

Participants to develop business case for retrofitting current IndianOil buildings to optimize energy efficiency, water convservation, sustainable building materials, indoor air quality, etc. Indian Oil is looking for having product, system or innovative idea for generation and utilization of alternate energy for its commercial buildings. This solution should impact general efficiency and shall further improve employee well-being.

ANALYTICS & CONSULTING CLUB

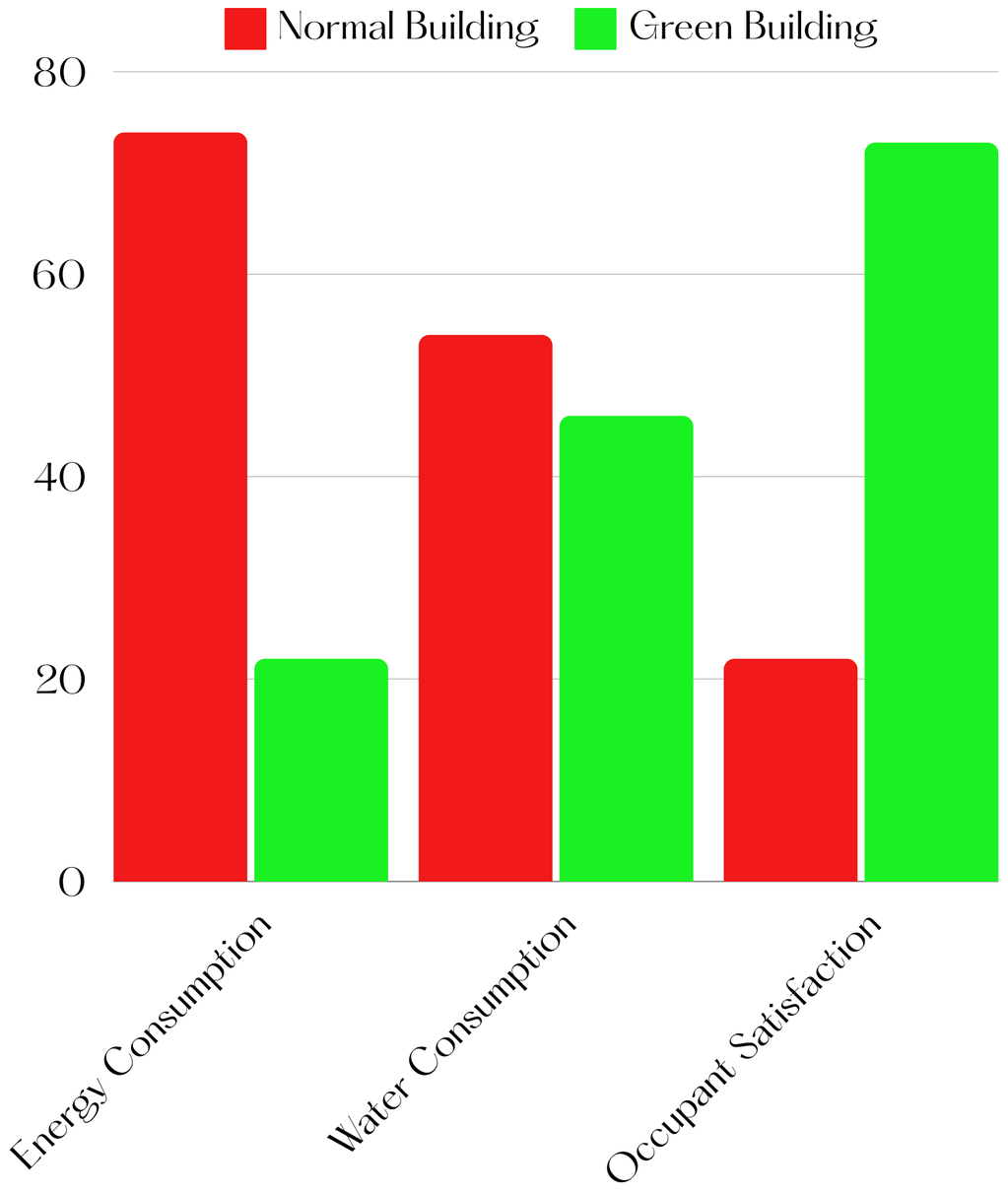
Decode • Analyse • Thrive

# WHAT IS A GREEN BUILDING ?

**Green building is the practice of increasing the efficiency of buildings and their use of energy, water and materials, and reducing the building's impacts on human health and the environment.**

# WHY GREEN BUILDINGS?

- Reduction of natural resource consumption
- Reduction of operating costs
- Health, comfort and safety for all residents
- Energy optimization and reduction of energy consumption
- Increased productivity of the occupants
- Better indoor air quality (IAQ has a tremendous impact on human health)



# EFFICIENT WAYS FOR ACHIEVING GREEN BUILDINGS

01

MATERIAL EFFICIE-NCY

02

WATER EFFICIE-NCY

03

INDOOR AIR QUALITY

04

ENERGY EFFICIE-NCY

"Waste isn't waste until we waste it."

# MATERIALS EFFICIENCY


## 01. SUSTAINNABLE CONCRETE

- MIXTURE OF CRUSHED GLASS, WOOD CHIPS AND SLAG(A BYPRODUCT OF STEEL MANUFACTURING.)
- REDUCES THE EMISSION OF CARBON DIOXIDE.
- MORE BENDABLE AND CRACK RESISTANT WHEN COMPARED TO TRADITIONAL CEMENT CONCRETE.

## 02. WOOL BRICKS

- OBTAINED BY ADDING WOOL TO A NATURAL POLYMER TO THE CLAY OF THE BRICK.
- 37% MORE STRENGTH THAN BURNT BRICKS

## 03. LEAD FREE PAINTS

- ALL THE INTERIOR PAINTS SHOULD HAVE LOW VOC LEVELS AND MUST BE LEAD FREE.

## 04. BAMBOO

- IT'S FLEXIBILITY ALLOWS IT TO BEND AND CURVE WITHOUT BREAKING, MAKING IT VERSATILE MATERIAL FOR CONSTRUCTION OF ARCHES AND CURVED ROOFS.

## 05. PVC FLOORING

- PVC is highly resistant to many chemicals.
- Thus, PVC flooring is a great flooring option even in the healthcare sector, laboratories, and research centres.
- Luxury vinyl tile is much more budget-friendly than ceramic tile

"NO BLUE, NO GREEN"

# WATER CONSERVATION

"REDUCE RECYCLE REUSE"

The Green Building Water Management (GBWM) component **focuses on water efficiency and conservation in buildings.**

## LOW-FLOW FAUCETS AND TOILETS

- Low-flow faucets are equipped with aerators or flow restrictors that limit the flow rate of water while maintaining adequate pressure for typical usage.
- Low-flow toilets utilize innovative flushing mechanisms, such as dual-flush systems or pressure-assisted flushing.
- Significant water savings minute can be achieved without compromising user experience.

## GREYWATER RECYCLING SYSTEMS

- Greywater refers to wastewater generated from non-toilet fixtures such as sinks, showers, and laundry machines.
- Greywater recycling systems collect, treat, and reuse this water for non-potable purposes, such as toilet flushing, irrigation, and landscape watering.
- Greywater recycling systems can significantly reduce reliance on freshwater sources for non-potable water applications, thereby conserving valuable water resources and reducing the strain on municipal water supplies.

## BEHAVIORAL AND CULTURAL SHIFTS

- Launching employee engagement programs and awareness campaigns within IndianOil's commercial buildings to promote water conservation behaviors and best practices, such as reporting leaks promptly, using water-efficient fixtures responsibly, and participating in water-saving initiatives.
- Recognizing and rewarding individuals or teams that demonstrate outstanding commitment to water stewardship and sustainability.

# INDOOR AIR QUALITY IMPROVEMENT

**Every breath matters. Clean air, Clean mind.**

## USING LOW VOC PAINTS AND MATERIALS

VOCs are organic chemicals that can easily vaporize into the air at room temperature, posing potential health risks when inhaled

## HUMIDITY CONTROL

Use of humidifiers and dehumidifiers to maintain the internal moisture levels.

## AIR PURIFICATION TECHNOLOGIES

- UV-C light purifiers utilize ultraviolet light in the C spectrum (UV-C) to disinfect air by deactivating microorganisms such as bacteria, viruses, and mold spores.
- Photocatalytic Oxidation (PCO): It is an advanced air purification technology that uses a combination of ultraviolet (UV) light and a catalyst, typically titanium dioxide (TiO2), to create reactive hydroxyl radicals and super-oxide ions

## VENTILATION ENHANCEMENTS

Use of- Mechanical Ventilation, Natural Ventilation, Exhaust Systems

## HVAC SYSTEM UPGRADES AND MAINTENANCE

Upgrading and maintaining HVAC systems(Heating, Ventilation and Air Conditioning)not only ensures optimal performance, healthy indoor environment  but also improves energy efficiency, reduces operational costs, and prolongs the lifespan of the equipment.

# ENERGY EFFICIENCY

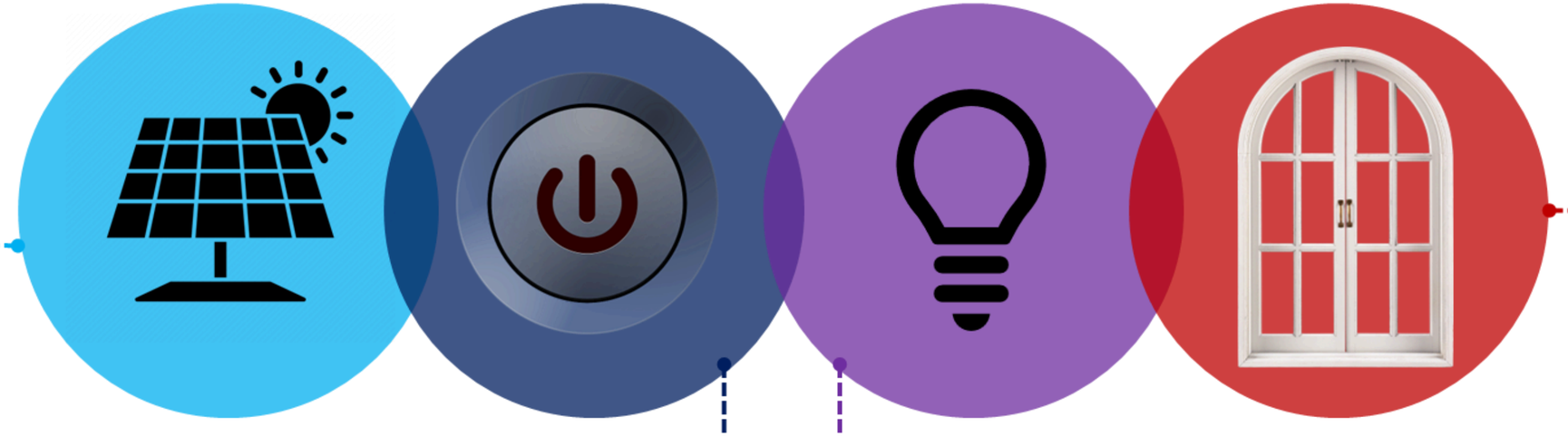
"The less you burn, the more you earn"

## RENEWABLE ENERGY INTEGRATION

- Solar Panels
- Wind Turbines

## LIGHTING SOLUTIONS

- Replace traditional lighting with energy-efficient LED lights.
- Install sensors and automated lighting controls to ensure lights are only used when necessary.



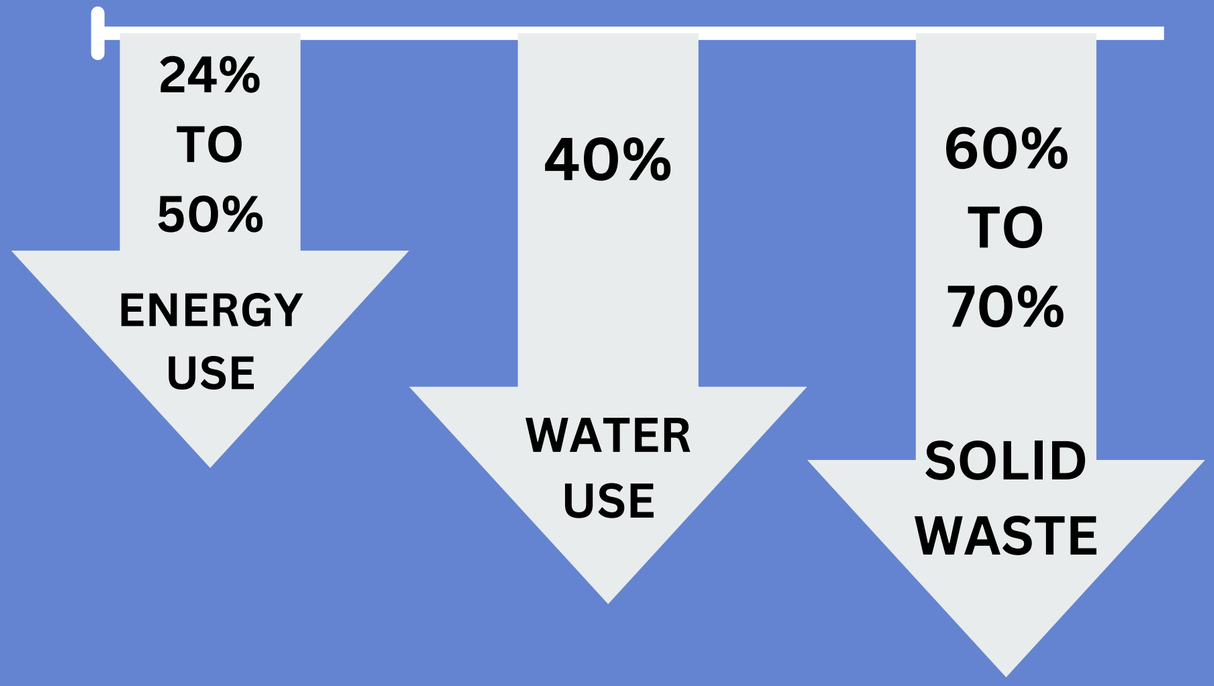
## BUILDING AUTOMATION SYSTEMS

- Building Management System-It is a computer-based control system installed in buildings to monitor and manage the building's mechanical and electrical equipment
- Smart Controls-These are advanced systems that use technology to monitor, manage, and optimize the use of energy in commercial buildings.

## ENERGY-EFFICIENT EQUIPMENT AND APLLIANCES

- Upgrade Equipment: By systematically upgrading equipment to energy-efficient models, Indian Oil can achieve significant energy savings, reduce operational costs, and contribute to sustainability goals.
- Energy Star Appliances: Using appliances that have high energy efficiency ratings.

# GREEN BUILDINGS POTENTIALLY REDUCE




**Green buildings ensure that waste is minimized, maximise resuse and recycling at every stage during the construction and operation of the building.**

# BENEFITS OF GREEN BUILDINGS

## SOCIAL BENEFITS

- Improve quality of life
- Better work performance
- Improve health and comfort

## ECONOMIC BENEFITS

- Reduces operating cost
- Create market for green product and services
- Enhances asset value and profit

## ENVIRONMENTAL BENEFITS

- Reduce wastage of water
- Conserve natural resources
- protect biodiversity and ecosystem

# THANK YOU