

04

## ENERGY RETROFIT OF EXISTING BUILDINGS -GODREJ BHAWAN: MUMBAI

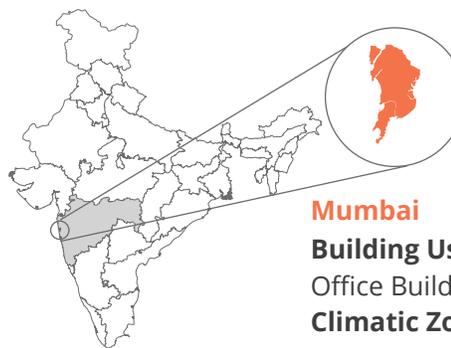


### Project Highlights

- This case study highlights Godrej Bhavan, an iconic office building in South Mumbai, focusing on the strong business case for energy-efficiency upgrades or retrofits
- The Godrej Bhavan retrofit shows that greener, energy-saving retrofits are practical and profitable in India's rapidly transforming building market and provides replicable practices for cost and energy savings
- Just two years after the upgrade, Godrej Bhavan is already reaping cost and energy savings (12.5%) and is on track to recover the costs of installing energy-efficiency measures through lower electricity bills

### Background

Godrej Bhavan, built by Godrej & Boyce in 1972, is a six-storey building that houses the company's chief management. After decades of high electricity consumption, Godrej & Boyce upgraded Godrej Bhavan in 2010 to include inclusive energy efficiency and sustainability features, such as efficient cooling and lighting systems. Because of the upgrade, Godrej Bhavan has now evolved to an energy efficient building that is achieving significant financial and indoor environmental quality benefits for its owner and occupants.



**Mumbai**  
**Building Use**  
 Office Building  
**Climatic Zone**  
 Hot and Humid  
*(Not to scale)*

### Project Objectives

- I. Demonstrated the low-hanging energy and cost-saving opportunities by upgrading HVAC, lighting, and building management systems through energy retrofits
- II. Managed to reduce electricity use, improves building systems, enhances occupant comfort, and increases environmental awareness through energy retrofits

### Project Approach

- Installed Building Energy Management System (BMS) dashboard display with digital energy meters that continuously monitor energy use, check and rectify energy-use discrepancies
- Upgraded the incoming and outgoing electrical systems for high-voltage electricity to a ring main unit system to provide an uninterrupted power supply
- Upgraded the chiller compressor-condenser unit from a 35-year-old HVAC system has been replaced with a new HVAC system with a screw chiller water-cooled condenser, electronic expansion valve, and a high coefficient of performance (COP) of 5.5 from a previous COP of 2.2.
- Installed dedicated Air Handling Units (AHUs) for each floor with VFDs and chiller water-modulating valves
- Installed double-glazed clear windows and shading devices to reduce heat gain through the windows while still providing light
- Conventional lighting fixtures are replaced with highly efficient lighting fixtures

- Developed the building's original green roof, which had a soil depth of nine inches, by removing the covering of the "tandoor" roof clay tiles. The Godrej team measured a reduction in the roof temperature by 10°C using thermal imaging.
- Planted trees around the building to maintain a cool microclimate and reduce the heat island effect.

## Achievements



- First building in Mumbai and the sixth building in India to receive the LEED Gold certification from the United States Green Building Council under the Existing Buildings Operations and Maintenance category
- Energy-Efficiency Leader Award by Ingersoll Rand in recognition of demonstrated initiatives for energy optimization in the air-conditioning system



Godrej Bhawan

## Long term impacts

- The energy retrofits will help to maximize energy savings and minimize the operational cost of the buildings

Highly efficient lighting fixtures and double-glazed windows



## Challenges

- The retrofit required implementing new energy-efficiency technologies in an aging office building with ongoing operations
- The building's architectural design, façade, glazing, lighting, and HVAC system were already in use, limiting the opportunity to redesign these components

## Solutions

- The retrofit focused on specific equipment and energy management upgrades instead of redesigning the building