

Bombay House: The Sustainability and Energy Efficiency Journey in a Heritage Building

By Rakesh Bhatia
Senior Vice President
Ecofirst Services Ltd., Mumbai

Introduction

Bombay House, the TATA group headquarters recently became the first IGBC Existing Building to achieve a Gold rating in March 2014 as well as bag the coveted BEE 4 Star Rated Building in the office category during September 2014.

Built in 1924, the 110,000 sft Bombay House is a Heritage Building Grade II A, as enlisted by the Heritage Committee of Brihanmumbai Municipal Corporation (BMC). It is interesting to understand the approach adopted by Bombay House on its journey to Sustainability and Energy Efficiency, which is worth emulating in other office buildings. If a heritage building built in 1924 can achieve it, any other office building can also achieve it.



Photo 1: IGBC certificate

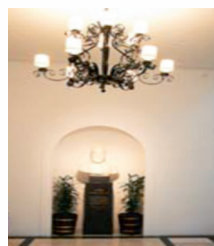


Photo 2: Inside the grand entrance of Bombay House

Standing Tall

The Tata Group headquarters in Mumbai, Bombay House, is replete with history

- The plot, in South Mumbai, was bought in 1904
- George Wittet, the architect who designed the Prince of Wales Museum, built Bombay House
- The building was completed in 1924
- The Chairman's office, occupied by the likes of J.R.D. Tata and Ratan Tata, and now by Cyrus Mistry, is on the fourth floor
- The Associated Building Co. owns the building and is responsible for its upkeep

Energy Efficiency Program

At the heart of the initiative lies an Audit Program, which is the starting point for any Energy Efficiency Program. A series

About the Author

Rakesh Bhatia is Senior VP at Ecofirst Services Ltd., a TATA group company. He is BE Mechanical, MBA, USGBC LEED AP (BD+C) and GRIHA Evaluator. His areas of experience are sustainable infrastructure design, MEP planning, Green buildings facilitation, high performance building design, retrofit and continuous building commissioning. He is a member of ASHRAE.

continued on page 34

continued from page 32

of ASHRAE level I, level II and level III audits were conducted by various agencies during 2009-10, initiated by Tata Quality Management Services. This fixed the baseline performance of the building.

The Energy Performance Index (EPI) was in the range 175-180 kWh/m², which became the baseline, based on which an investment grade retrofit program was devised to be implemented in phases. Today, Bombay House is at an EPI range of 112-124 kWh/m², almost 33% more efficient than the baseline, and has been awarded BEE 4 Star rating. In 2015-17 it is expected that following a continuous commissioning approach the building will operate between 98-100 kWh/m², which is almost 45% lower than the baseline.

The complete EPI reduction journey over the years, showing the year wise retrofits carried out, has been depicted in Figure 1.

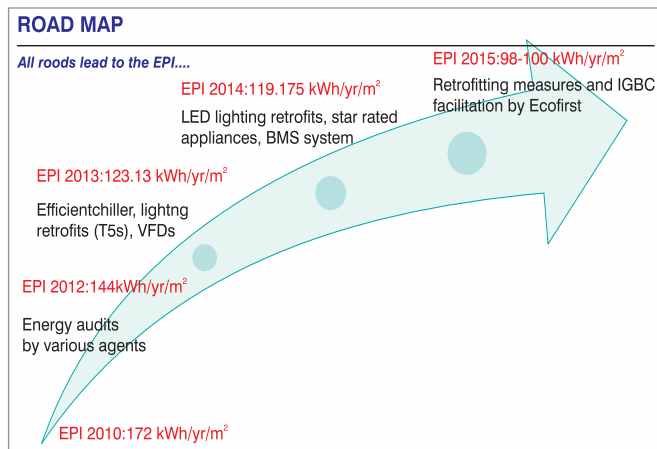


Figure 1: EPI reduction journey at Bombay House

Existing Buildings Operations and Maintenance Program

The IGBC Existing Building (EB) rating system addresses green features under the following categories with rating levels *Certified, Silver, Gold and Platinum*:

- Site and Facility Management
- Water Efficiency
- Energy Efficiency
- Health and Comfort
- Innovation

The objective of the rating system is to address national issues such as:

- Energy efficiency
- Conservation of natural resources
- Handling of consumer waste
- Water efficiency
- Reduction in fossil fuel use
- Occupant health and wellbeing

The anticipated long term benefits of the program are:

- Reduction in power demand by commercial buildings
- Reduction in greenhouse gas (GHG) emissions
- Reduction in potable water consumption
- Increase of green cover in existing premises, thereby reducing heat island effect

- Recharge of aquifers with storm water
 - Enhanced indoor air quality leading to productivity gains
- Bombay House achieved 78 points (out of a possible 100 points) after meeting the Mandatory Criteria, which qualified it for a Gold rating.

The major steps taken as part of the IGBC Rating Program are listed below.

For Energy Efficiency

- LED lights installed all over with their guarantee period renegotiated for five years
- Sensors placed in public areas of the building to cut off power when the space is not in use
- Clean energy bought from a renewable source for low carbon footprint
- Rs.90 lakh saved per year on the building's power consumption

For Water Efficiency

- Valves that control water flow installed in restrooms
- Low-flow fixtures, which again save a good deal of water, installed
- Rainwater harvesting tank built

For Health and Hygiene

- Improved waste management, using segregated bins for dry, wet and medical waste
- Duct built to draw in more fresh air and improve air quality in the building
- Began monitoring and controlling carbon dioxide levels in the building
- Installed an ozone system to clean the air conditioning ducts removing fungus and moss build up

For Site Management

- Increased focus on managing e-waste
- Traded landscaping requirement for green buildings – since there was no space for it around Bombay House – by pointing out that several gardens in Mumbai were maintained by Tata trusts

As part of ongoing efforts, the building is targeting the following:

- A Platinum recertification under IGBC EB Program.
- A 5 Star Rated office building under the BEE Program.



Photo 3: Off-site grid connected solar PV system

- At least 1,00,000 kWh units of electricity generation through a grid connected solar PV array installed at three off-site locations spread across Mumbai and Pune.

continued on page 36

continued from page 34



Photo 4: Energy efficient chiller installed at Bombay House

- Replacement of the current stand-by chiller with a high COP chiller having high Integrated Part Load Value (IPLV) to further reduce ikw/TR, bringing down energy consumption by another 1,00,000 kWh.
- As a passive measure to bring down the air conditioning load, a high technology low-E solar film of SHGC 0.30 will be installed on the external glasses which are currently single glazed.
- All AHU motors will be replaced by EFF 1 series high efficiency motors.
- 100% waterless urinals to achieve more than 50% water savings.

Tangible and Intangible Benefits of the Program

1. Energy usage is reduced by 5,17,500 kWh/year. Considering unit price at Rs.15/kWh, this translates to utility cost saving of Rs.77,62,500 per year compared to 2010.
2. Water saving is approximately 50% of the IGBC baseline. The resultant cost saving comes to around Rs.1000 per day, or Rs.3,65,000 per year.
A simple payback period is just 3.75 years.
3. Improved indoor air quality and employee productivity have been achieved by providing fresh air intake in the HVAC system and implementing the recommendations of the employee



Photo 5: Staircase lift for differently-abled – the first of its kind in India

satisfaction survey.

4. Public image and branding have been enhanced through IGBC facilitation.
5. Corporate sustainability, social awareness and global environmental benefits have accrued through the green message.

Conclusion

Handling an Existing Building project has its own set of challenges, which can be overcome through careful planning and execution. The successful implementation at Bombay House highlights some learning for such cases:

- Top management buy-in and support is a pre-requisite for success.
- Integrated teams of building energy experts, facilitation team, building facility owners and a set of retrofit contractors working for the common cause of energy efficiency and sustainability.
- Openness and flexibility in adoption of newer technologies that will help optimize the engineering operations.
- Strong employee engagement programs and surveys, which help the building facility owners obtain feedback on the improvement program for the building.
- Overall a lot of patience and persistence is required as the results are measurable only after implementation of energy efficiency measures. ❁