COST-EFFECTIVENESS OF GREEN WALLS FOR COMMERCIAL RETROFITTING

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Green walls/ bio-walls/ living walls refer to vegetation that grows directly onto a building’s façade, or supported on a separate structural framework connected to the façade.

Apart from aesthetics, green walls are known to have multiple environmental benefits, including those on the building and its surroundings. To list a few:

a.) Lowering energy consumption, and thus the energy cost of a building.
b.) Improvement of air quality- both, indoor and outdoor.
c.) Reduction in urban heat island effect.
d.) Reduction in noise pollution.
e.) Supporting Bio-diversity.
Rampant growth of commercial real estate in India with growing attention to sustainability concepts.

But much needs to be done for the pre-existing commercial stocks.

As stated in the Energy Assessment Guide for Commercial Buildings by USAID ECO-III project for India, building owners facing rising energy costs are seeking ways to reduce costs.

Employing energy efficient practices and retrofits can be a simple and effective way to achieve operating cost reductions.

Hence, this research explores the possibility of applying one of the green retrofitting concepts, by evaluating the costs and benefits of green walls in an operational commercial project.
AIM

To Evaluate the Cost-effectiveness of Green Walls for Commercial Retrofitting
OBJECTIVES

1.) To study the effects of green wall systems on the Thermal Performance of the Façade.

2.) To quantify the energy consumption and savings in comparison to other conventional systems.

3.) To calculate the construction and maintenance cost of the green wall system.

4.) To implement green wall in the selected commercial application, and evaluate the cost-effectiveness against conventional façade systems.
**METHODOLOGY**

1. **Studying the base case retrofitting requirements**
   - Identifying specifications of Green Walls
     - Calculating the energy consumption in green wall case by simulation in Design Builder.
     - Calculating the construction and maintenance cost of green wall case.
   - Identifying specifications of conventional retrofitting practices
     - Calculating the energy consumption in each case by simulation in Design Builder.
     - Calculating the construction and maintenance cost of each case.

2. **Analysis of all the selected systems comparing their construction & maintenance cost and the respective energy saving.**

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**FINDINGS**

- Glass 1
- Glass 2
- ACP+Glass 1
- Green Walls

- Capital Cost (Million INR)
- Annual Energy Saving (%)

The graph compares the capital cost and annual energy saving for different architectural options.
FINDINGS

- **Annual energy saving** (Million INR)
- **Annual maintenance cost** (Million INR)

**Green Wall**

- Annual energy saving: 1.2
- Annual maintenance cost: 3.2
The selected green wall system is not the most cost-effective façade system due to its high capital and maintenance cost.

But in green wall case, maximum reduction in the cooling load, accounting to almost 22% saving on annual electricity bills as compared to the base case.

However, in comparison with glass 2 case, the cost-effectiveness of green walls is greater.