

A COMPARATIVE ANALYSIS OF DEEP RETROFIT AND LOW-CARBON STRATEGIES FOR EXISTING BUILDINGS IN HONG KONG: FEASIBILITY AND ECONOMIC VIABILITY

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Background

Buildings contribute 30–40% of global energy use and are a major source of carbon emissions.

In Hong Kong, buildings consume over 60% of electricity, primarily from high-rise structures.

Achieving carbon neutrality by 2050 requires retrofitting buildings to improve energy efficiency and reduce emissions.

Key retrofitting approaches:

Deep retrofits: Structural/system upgrades (e.g., HVAC replacements, renewable energy integration).

Low-carbon strategies: Operational improvements (e.g., energy management systems, energy regeneration technologies).

This study evaluates these approaches for feasibility and economic viability in Hong Kong’s unique urban environment.

Objectives

Compare energy savings, carbon reduction potential, and economic viability of deep retrofitting and low-carbon strategies.

Identify retrofitting technologies suitable for Hong Kong’s space-constrained urban environment.

Address challenges such as:

- Space limitations.
- High upfront costs.
- Stakeholder resistance.

Recommend retrofitting strategies aligned with Hong Kong’s 2050 carbon neutrality goals.

Methodology

1. Mixed-methods approach:

- Quantitative analysis: Global case studies and technical reports.
- Qualitative insights: Academic literature and expert commentary.

2. Key metrics:

- Energy savings.
- Carbon reduction potential.
- Economic viability.

3. Technologies analyzed:

- Advanced HVAC systems.
- Regenerative braking systems.
- Hybrid elevator systems.

4. Performance indicators:

- Payback periods.
- Net present value (NPV).
- Return on investment (ROI).

5. Focus on Hong Kong’s urban challenges: High-rise density and space constraints.

Findings & Conclusion

Deep retrofits:

- Energy savings: 20–70%.
- Carbon reduction: High.
- Payback period: 15–20 years.
- Challenges: High upfront costs and intrusive installations.

Low-carbon strategies:

- Energy savings: 30–40%.
- Carbon reduction: Moderate.
- Payback period: 6.7–10 years.
- Advantages: Lower costs and faster implementation.

Technologies suitable for Hong Kong:

- Machine room-less elevators.
- Hybrid systems.
- Advanced HVAC units.

Challenges in Hong Kong:

- Space constraints.
- High costs.
- Need for government incentives.

Emphasis on balancing short-term affordability with long-term sustainability to meet carbon neutrality targets.

Recommendation

Adopt a combination of deep retrofits for long-term sustainability and low-carbon strategies for short-term gains.

Provide government subsidies and financial support to encourage retrofitting in older buildings.

Implement localized solutions to address Hong Kong’s unique urban challenges.

To achieve Hong Kong’s 2050 carbon neutrality goal, balancing affordability, sustainability, and stakeholder collaboration is essential.