The aging problem of buildings in Hong Kong has drawn wide attention within the construction and real estate industry, while current rehabilitation work focuses more on repairing the physical function of the building and lacks a concern of sustainability and long-term focus. Understanding the limited budget of government and the owners, it seems that green buildings cost a large sum of money at initial stage, while these cost may be recoverable in the long-term since these energy-saving green features can help cut down future expenditures. This case presented a quantitative analysis on the energy performance and return on investment.

## Background

### What is Tong Lau?

Tong Lau is a residential building located in Yau Ma Tei in Hong Kong, designed in 1977 and occupied in 1979. It is a 10-story residential building, owned by Hong Kong Housing Authority, and is located in Yau Ma Tei, Kowloon. The building was built in the late 1970s, and its structural design and construction materials have been found to be outdated. The building has been experiencing severe problems due to aging structure and improper maintenance, leading to structural deterioration and insufficient quality of life.

### Why Tong Lau needs rehabilitation?

- High energy consumption: The building’s energy consumption is significantly higher than the current standards, leading to high operating costs.
- Poor indoor environmental conditions: The indoor environment is not well controlled, leading to discomfort for residents.
- Low building energy efficiency: The building’s energy efficiency is far below the current standards, leading to high energy waste.
- Structural issues: The building’s structural integrity is threatened, leading to safety concerns.
- Environmental impact: The building’s environmental impact is high, leading to sustainability concerns.

### Why sustainability is important in Tong Lau’s rehabilitation?

- Environmental benefits: Sustainable rehabilitation can help reduce the environmental impact of the building.
- Economic benefits: Sustainable rehabilitation can help reduce the cost of energy consumption.
- Social benefits: Sustainable rehabilitation can help improve the quality of life for residents.
- Technological benefits: Sustainable rehabilitation can help improve the performance of the building.

### Building Rehabilitation

Building rehabilitation involves improving the building’s performance and sustainability. This involves upgrading the building’s materials, systems, and technologies to improve its energy efficiency, indoor environmental conditions, and structural integrity. The rehabilitation aims to achieve a balance between the building’s original characteristics and the required sustainability.

### Building Rehabilitation Technologies

- BEMS (Building Energy Management System) + Internet of Things (IoT)
- Green Building Studio
- Revit and Green Building Studio
- Ventilation and wind access to integrate the high-tech tools, simulating how wind would flow around and through a building.

### Research Methodologies

- Choose Tong Lau as a research target.
- Implement above technologies to Tong Lau’s rehabilitation work, aiming to integrate the high-tech tools, simulating how wind would flow around and through a building.
- Examine lighting & cooling performance before and after rehabilitation.
- Evaluate energy performance before and after rehabilitation.
- Define rehabilitation scenario locally.
- To examine the feasibility, both energy saving performance and economic return is analyzed and results show that such rehabilitation has the potential to promote and apply to different communities in HK. Thus, the whole research closely underpins the originality and practicability, which gives real-life example of individual building and attempts to transform old Tong Lau community into sustainable built environment.