



*Project Title:*

Cost-Benefit-Analysis (CBA) for Implementing Green Buildings (GB) Promotion Incentives: with Transaction Cost (TCs) Considerations

*Principal Investigator:*

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*Project ID:*

CICR/10/13

*Research Institution:*

The Hong Kong Polytechnic University

*Subject Area:*

Environment and Sustainability

## Objective

- ♦ To compare the international best-practice incentive schemes for promoting green buildings;
- ♦ To review the benefits and costs to the all stakeholders upon implementation of the “granting GFA concessions” incentive;
- ♦ To establish measurements for the costs and benefits that would be brought to all stakeholders by implementing the “granting GFA concessions” incentive in Hong Kong;
- ♦ To develop a CBA framework to evaluate the key benefit creators and cost drivers of the “granting GFA concessions” incentive scheme; and
- ♦ To recommend key issues for modifying the existing incentive scheme to smooth out the overall TCs in the society, and to attract more equitable market penetration for GB.

## Background

The barrier to the GB market is higher than its conventional counterpart. For green buildings, many actual costs such as extra design / construction costs and new material expenditure etc. can easily be appraised. The problems come from the hidden costs (transaction costs) involved and the particular kinds of "unintended consequences", as by-products, or repercussions after embarking on a course of action. If the asymmetric information about quality standards or requirements exists, the opportunistic behaviour of market players may lead to the production of conventional buildings.

Cost-benefit analysis (CBA), is an analytic procedure, to evaluate the desirability of the scheme/project, by weighing the resulting benefits against the corresponding costs, in order to see whether the benefits outweigh the costs. CBA quantifies the potential returns and expenses of a policy/regulation and balances the pros and cons to arrive at a decision. The major CBA indicators include present value, net present value and benefit cost ratio. One of the aspects to be evaluated by CBA in this research is hidden costs and benefits, which have not yet been reflected in most cost-benefit analysis. When hidden costs, in terms of transaction costs (TCs), are too large, they inhibit exchange, production, and economic growth.

## Methodology

The research comprises seven key stages: Literature review, analytical framework, expert interviews, analytical hierarchy process (AHP), hypothetical model, computational fluid dynamics (CFD) simulation and focus group meeting.



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## Results and Findings

The research results show that Hong Kong has relatively lower threshold requirement to apply for the GFA concession, as compared with Arlington of US and Singapore where the GFA Concession scheme is more mature. In Singapore, the calculation restricts the GFA bonus in high land-value areas that usually have high density, in order to reduce negative impacts of increased density on the surroundings. However, in Hong Kong, the GFA concession does not consider land value. Since the land is owned by government, and developers have to bid for the land, the benefits of GFA concession go back to land cost in the end.

The results of analytical hierarchy process (AHP) analysis show that construction cost is still private sectors' major concern and that the actual costs are more important than hidden costs. Participants of the GFA Concession scheme value energy savings and enhanced value of GB most. Regarding the environmental benefits resulted from the Sustainable Building Design Guidelines (SBDG), it turns out that building separation and setback are effective in removing air pollutants and reducing pedestrians' health risks. The amount of benefits gains vary with the building configurations. Building setback could provide monetary benefit gains twice as much as building separations. It is recommended to keep the incentive scheme because it is proved effective and government incentive is still needed at this stage. However, the incentive scheme needs to consider transaction costs to make the scheme fairer to stakeholders, especially for consultants who need to absorb unpaid transaction costs. In addition, it is time to adjust the scheme to promote higher level of GB, and the detailed methods of adjusting the incentive scheme need more in-depth study with wider consultation of the industry.

## Recommendations

- ◆ Building setbacks could still provide better monetary benefit gains than building separations but the effectiveness is about 1.5 times only.
- ◆ Transaction costs should be priced to meet the new phenomenon of GB.
- ◆ The GFA concession incentive scheme is useful and can be extended to other sectors, like building conservation, low-carbon city, etc.
- ◆ The 10% GFA concession could be kept, as it is attractive to the private sectors and benefits society at large through a better environment and increased land revenue.
- ◆ Professional institutes should review the BEAM Plus and PNAP APP 152 with government to make them more user-friendly and to reduce their transaction costs.

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