

FLOOR AREA CONCESSION INCENTIVES AS PLANNING INSTRUMENTS TO PROMOTE GREEN BUILDING: A CRITICAL REVIEW OF INTERNATIONAL PRACTICES

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Abstract

Gross Floor Area (GFA) concession scheme, as a planning incentive, is developed from the notion of "make developers pay" in UK in 1990. It rewards developers additional GFA in exchange for public amenities so that government could save that amount of money. This paper carries out a review of GFA concession scheme in Hong Kong and Singapore to synergize the key features and success factors of its implementation. Reasons for its effectiveness were discussed from the perspective of political, economical, and business issues. Based on case studies, the key features of "Floor Area Concession Schemes" are discussed, including 1) very effective in places with high land value; 2) influencing built environment positively and negatively; 3) ensuring the buildings get certified by green building (GB) rating system. This paper identifies key success factors, comprising 1) common goal but different interests shared by developers and governments; 2) a bonus cap; 3) regular review and revision of the scheme; 4) links between planning objectives and GB technology and design practice, which will be discussed. These help formulate a general approach or model of "Floor Area Concession Schemes" for promoting green building.

1 Introduction

GFA (Gross floor area) concession incentive scheme is to reward developers additional GFA for providing public amenities. It has been widely applied to government programs, such as affordable housing program in US, Australia and UK (Fox et al, 1995; Gurran et al, 2008), and renewable energy of buildings in New Zealand, Japan, France and US (Paetz and Pinto-Delas, 2007). The GFA concession incentive scheme is about the idea to leverage on private investment for providing public amenities (Tang and Tang, 1999). In recent years, the idea has been applied to green building (GB) promotion in several countries and regions, such as US, Singapore and Hong Kong. There are some different terminologies like GFA concession and density bonus in these countries and regions, but sharing the same meaning. In Hong Kong, GFA concession means the floor area of certain building features are allowed to be discounted from the total GFA of the development, with the prerequisite of BEAM Plus certification and energy efficiency data, and fulfilling Sustainable Building Design Guidelines (SBDG) (Council for Sustainable Development, 2010). In Singapore, Green Mark (GM) GFA incentive Scheme is to reward developers additional GFA for constructing GM Platinum and Goldplus buildings. Density bonus and FAR (floor area ratio) bonus are used in North America. In US, any developments guaranteeing LEED (Leadership in Energy and Environmental Design) could increase allowable density by increasing permitted building height or floor area ratio. Overall, all these concepts serve the purpose of promoting GB by rewarding extra GFA in a site.

Even if the application of GFA bonus to green building is very new, it has achieved success to some extent. For example, in Hong Kong, after the GFA concession incentive scheme was launched, developers actively joined the incentive scheme and the numbers of registered GBs increased almost one third within one year (Liu and Lau, 2013). In US, density bonus is one of the most popular incentive schemes among developers (Miller et al, 2008). Paetz and Pinto-Delas (2007) and Chan et al (2009) conducted international case studies and claimed that planning incentives work best as part of a suite of incentives, including subsidies, grants, and development contribution discounts, fast permitting process and education programs.

This paper aims to explain why apply GFA bonus on green building promotion, and explore its key features and success factors. First, the reasons for its effectiveness is analysed from the perspective of political, economical, and business issues, which justifies the advantages of GFA bonus as the incentive scheme. Next, case studies of Hong Kong and Singapore are conducted to figure out the achievements and side effects of this scheme. Three key features and four success factors are identified, which indicate that how to apply the GFA incentive scheme is more cost-effective. Findings could be generalized to other regions and countries.

2. Reasons for its effectiveness

2.1 political issues

GFA incentive scheme is a planning incentive essentially, in the form of GFA bonus, to promote green building (Paetz and Pinto-Delas, 2007). For developers, they are motivated by more profits through selling additional GFA. From governments' perspective, this scheme generates environmental benefits for the public by positive externality of green building. In this sense, developers and governments share common goals but different interests. Thus, the essential bargaining resource for governments achieving their own interest is their willingness to use public authority to assist business and their ability to create political support for specific programs (Kantor and Savitch, 1993). If the incentive is insufficient, developers will not be engaged in the transaction, while if it is too much, additional social costs will be imposed (Feiock et al, 2008). This leads to another role of GFA incentive schemes, a tool to balance public interests and market efficiency. Regarding GB promotion, it means to reduce additional GFA's influence on physical environment and promote GB efficiently. Additionally, GFA concession incentive scheme is politically appealing for there are no requirements for financial subsidies or grants from the governments and it doesn't matter whether governments have strong financial power or not.

2.2 Economical issues

Typically, no matter in residential, commercial or industrial sector, developers of GB projects, are seldom the end-users, but pay all the initial costs and risks with few benefits of energy savings (Paetz and Pinto-Delas, 2007, Qian et al, 2015). They only benefit if green buildings enjoy higher price or become more marketable than traditional buildings (Paetz and Pinto-Delas, 2007). Therefore, it is essential to implement incentives, like GFA concession that could benefit developers directly, especially at the stage that market doesn't generate a premium on green buildings. With this incentive scheme, developers are able to make profits from sale of additional lots. Therefore, they consistently participate. For example, in Ashland US where buildable lands are expensive and relative scarce, density bonus is very successful and has been used in most of subdivisions (Sauer and Siddiqi, 2009).

2.3 Business issues

GFA bonus is essentially a business between government and developers. Private developers are expected to take the responsibility of providing servicing facilities and public infrastructure (Tang and Tang, 1999). For example, US cities usually acquire public benefits from private developers (Sagalyn, 1997). The Governments compensate them through planning incentives, like density bonus. This strategy has been applied in providing low and moderate cost housing, constraining urban sprawl, and promoting green building (Fox et al, 1975; Ottensmann, 1977; Abair, 2008). On one hand, government

save the cost of provision of public servicing amenities. On the other hand, developers have possibility to gain more benefits from the development. For example, in Hong Kong, GFA concession incentive scheme motivated developers to construct green buildings that improve energy and water efficiency. With the increasing of GB market share, more and more electricity and water would be saved in the future. That means government could save the cost of infrastructure extension.

3. State of the art

3.1 Hong Kong

3.1.1 Criteria to grant GFA concession

There are three types, including disregarded GFA, exempted GFA and GFA bonus. Developers could sell more GFA from this scheme. However, it is not mandatory instrument to force developers build green building.

To facilitate the development of green and innovative building, Lands Department, Building Department and Planning Department issued two Joint Practice Notes (JPNs) in 2001 and 2002. JPNs illustrate what features could be exempted or disregarded from maximum GFA. They cover twelve green and innovative features (Council for Sustainable Development, 2009). In 2010, the Building Department reviewed the incentive scheme and assess its effectiveness. After that, they issued Sustainable Building Design Guidelines that became the pre-requisite of GFA concessions (Building Department, 2012). This guideline requires 3 key building design elements, including building separation or permeability, building setback, and site coverage of greenery. In the same year, BEAM Plus (building environmental assessment methods) together with energy efficiency data became another prerequisites for granting GFA concessions (Hong Kong Green Building Council, 2015a). These documents are formulated to balance environmental performance and comfort requirements of buildings.

3.1.2 Achievement of incentive scheme and side effects

3.1.2.1 More certified BEAM Plus projects

The BEAM Plus is a voluntary scheme, tailored for sub-tropical and high-density urban development (Ng, 2013). From 1996 to 2010, the BEAM experienced a slow movement (Figure 2) that only 210 projects acquired certificates within 14 years. This situation changed dramatically when Hong Kong government claimed that the BEAM Plus certification was the prerequisite of GFA concession in 2011. To April 2015, the registered projects have increased to 641 already (Hong Kong Green Building, 2015b). Hong Kong is a high-density city that has very limited land provision each year (Li, 2006). That means the scale of new development is fixed every year. Therefore, the gross floor area concession is very attractive to developers. That's why after the GFA concession incentive scheme implemented, more BEAM Plus projects were registered.

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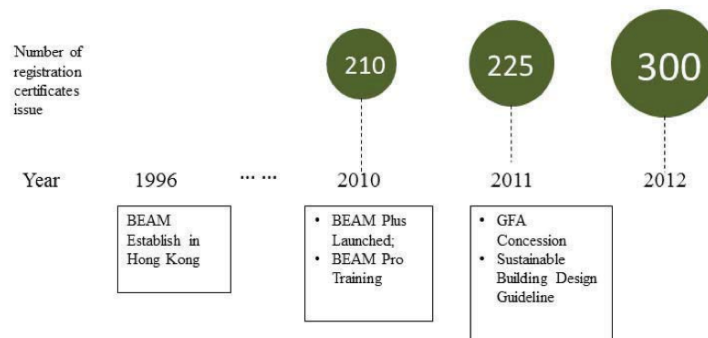


Figure 2 Number of BEAM Plus Projects in Hong Kong (Source: Liu and Lau, 2013)

3.1.2.2 How GFA concessions affect built environment

(1) Environmental benefits from incentive scheme

Joint Practice Notes (JNP) is the package of incentives to green building design. Their goal is to maximize use of renewable energy resources and green building material, to minimize the use of non-renewable energy and to reduce the construction waste (Leung, 2002). This guide also illustrates the green features that could be exempted from the GFA calculation. In this way, fixed green features suitable for Hong Kong built environment are promised. JNP encourages developers to provide public open space, such as communal sky or podium garden, and to satisfy the residents' needs. Providing these gardens in high-density place could enhance building amenity, allow more daylight and better ventilation, improve visual effect, and provide a green area for recreational activities. These features benefit occupants numerous and include better personal and communal space, balconies, etc. (Tam et al, 2013). Also, maintaining these facilities adds values to the buildings that bring long-term economic benefits.

(2) Side effects of incentive scheme

The additional GFA increased building height and bulk that have negative impacts on the built environment. Development Bureau (2010) conducted a survey to review 97 projects constructed in 2001 since GFA concession policy implemented. The findings show that GFA concessions for the residential buildings contributed to additional 40% GFA in high-density areas, 67% in medium-density zones, and 57% in low-density zone. Regarding the non-domestic developments, GFA concession added 37% of building bulk (Development Bureau, 2011).

In high-density city like Hong Kong, increased building height or bulk may bring negative influence to built environment (Council for sustainable development, 2009), such as visual impact and air ventilation. Figure 3 illustrates the canyon effect that reduces the effectiveness of air ventilation and strengthens the concentration of pollutant at a pedestrian level. The vehicles on the street emitted pollutants that are transported towards leeward side, while the windward side is exposed to the background pollution.

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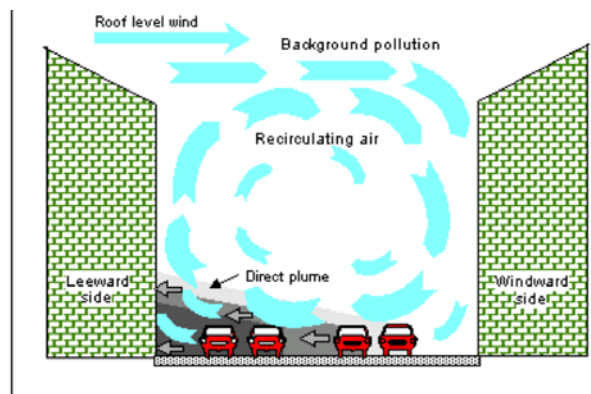


Figure 3 Canyon effect (Source: Berkowicz, 2000)

Apart from the negative impacts on the built environment, there was inflated building issues due to developers' speculation. To encourage developers to provide more liveable environment, GFA concession incentive scheme regulates that green and amenity features like balconies, wide corridor, and sky gardens, called inflated areas, are not accounted for total allowable GFA. Thus developers don't have to pay government for inflated areas but they could receive payment from consumers. This leads to the phenomenon that some features such as non-structural prefabricated external walls and projecting windows (known as "bay windows") become developers' tools to make inflated profits. For example, in Figure 4, the area of external wall could be exempted. Hence developers increased the thickness of wall to 300mm that is too much for a sub-tropical climate city like Hong Kong. Same phenomenon also appeared in Singapore. Singapore Urban Redevelopment Authority pointed out that 500mm projecting windows (the extent of projection in Figure 5) have greatly contributed to building bulk, influenced building design, and generally discouraged energy efficiency (Hong Kong Institute of Architect, 2012). Therefore, the incentive scheme should be designed carefully to avoid the speculation.

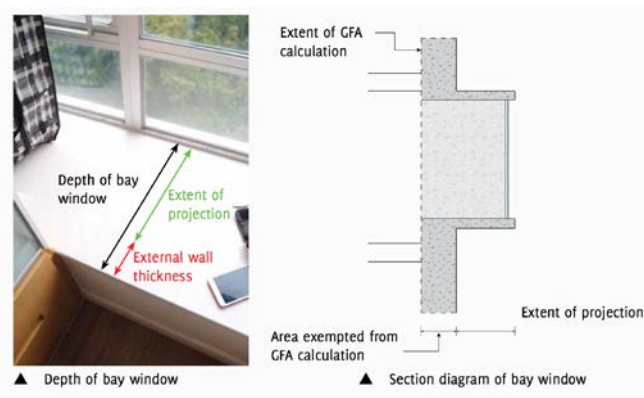


Figure 4 Bay window of inflated building (Source: Hong Kong Institute of Architecture, 2012)

3.1.3 To review the incentive scheme

Considering the defects of this incentive scheme, Hong Kong government reviewed it and conducted public engagements attended by 4000 participants from various sectors (i.e. professional institutes, developers, general public) in 2010 (Development Bureau, 2011). After over 65 in-depth public engagements, government decided to tighten the policy, including doing away with concessions for certain features, lowering the level of concessions for car parks, utility platforms, balconies, and residents' recreational facilities, etc. (GovHK, 2014). Tightening policy aims to seek a proper balance between the comfort requirements of buildings and environmental performance (Tam et al, 2013). According to Development Bureau (2011), tightened policy has a positive effect on the control of building height and bulk, and a significant reduction of GFA concession could be reached, compared

with previous policy. It proves that to review the scheme and gather feedback from the stakeholders in time is necessary and essential.

3.2 Singapore

3.2.1 Criteria to grant GFA concession

In 2005, Building Construction Authority (BCA) in Singapore issued the Green Mark (GM) Scheme to facilitate sustainable development of built environment. This scheme encourages developers to adopt integrated design approach, incorporate passive design and various green building technologies (BCA, 2009). In 2009, BCA and the Urban Redevelopment Authority (URA) jointly released a set of the Green Mark GFA incentives. Developers or building owners could acquire the additional GFA allowed beyond Master Plan if buildings achieve higher-tier GM ratings of Platinum and Goldplus. Achieving the GM Platinum level could claim for up to 2% GFA bonus (subject to a cap of 5,000 sqm.), while reaching the GM Goldplus could claim for up to 1% GFA bonus (subject to a cap of 2,5000 sqm) (BCA, 2009). The Gold and Certified level of projects assessed by GM, cannot get GFA bonus.

3.2.2 Achievement of incentive scheme and side effects

Singapore started green building at later time compared with other developed countries, but experienced large growth of green building from 2006 to 2012 (Figure5). When Green Mark was launched in 2005, only a few projects registered. In the following years, government implemented a lot of policies to promote GB, such as the 1st Green Building Master Plan in 2006, the Green Mark Incentive Scheme in 2006, the Green Mark GFA Incentive Scheme in 2009, etc. By 2012, the registered Green Mark building has reached to 1274. Figure 5 shows the dramatic increase clearly. In terms of the GM GFA Incentive Scheme, after it's implemented in 2009, the number of the GM Platinum and Goldplus projects had increased from 82 to 125 within 3 years (BCA, 2014). When its effective period ended in 2014, government extended for another 5 years.

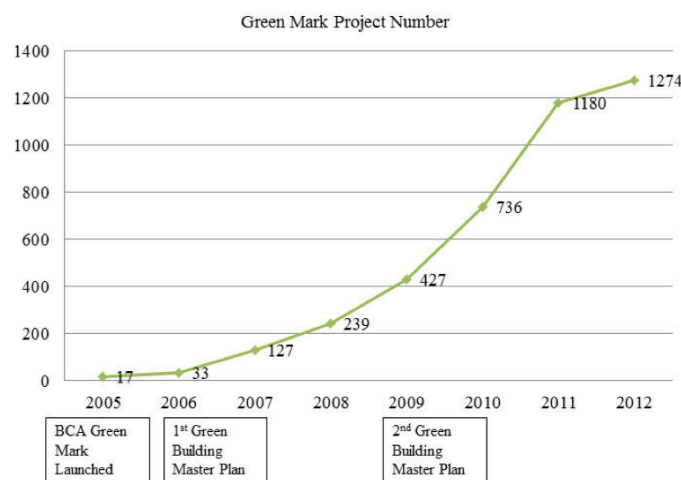


Figure 5 Number of Green Mark Projects in Singapore (Source: Liu and Lau, 2013)

3.2.2.1 How GFA concession scheme influence built environment

(1) Environmental benefits from incentive scheme

The GM GFA incentive scheme provides some prerequisite requirements for the building design criteria according to the features of built environment. For example, if developers would like to acquire the GM Platinum rating of residential building that indicates GFA bonus, it's required to use ventilation simulation modelling and analysis to identify the most effective building design and layout. The

simulation consequence and recommendations derived are to be implemented to guarantee quality natural ventilation (BCA, 2013). The Green Mark Platinum requires that minimum 70% selected typical dwelling units have good natural ventilation. Common areas, such as lift lobbies, corridors, and staircases, are to be designed for natural ventilation (BCA, 2013). In this way, the environmental benefits of GB could be guaranteed.

(2) Side effects of incentive scheme

As bonus GFA are allowed over the Master Plan (MP) gross plot ratio (GPR) for a site, they increase the development bulk and intensity beyond what was regulated for (BCA, 2015). The bay window and planter boxes are typical products of this scheme that influences building bulk and intensity significantly. At the beginning, the bay window was exempted from the GFA calculations because it was regarded as raised window ledges and not floor slab (BCA, 2008). However, providing bay window is usually intended to increase saleable strata space. What's more, in order to overcome standard façade appearance of bay window, some architects provide cladding to decorate bay windows that leads to immense building bulk and influences design consequence of developments (BCA, 2008). In 2008, URA reviewed the incentive scheme, collected feedback from industry, and announced the changes of the GFA guidelines for bay windows and planter boxes.

4 Key features and success factors

4.1 Key features

According to the above analysis, there are three key features of GFA concession incentive scheme.

(1) Very effective in High land price area

Hong Kong and Singapore enjoy high land price and housing rent. More saleable GFA means more profits for developers. In high-rent place, density bonus could be easily used to encourage developers (Küçükmetoğlu and Büyükgöz, 2013). In Hong Kong where housing price and building density are higher, GFA is closely related to profitability of a project, concerned very much by developers (Liu, 2013). Unlike China Mainland, Hong Kong has limited land provision each year (Qian, 2010). Land sales could not exceed 50ha each year (Li, 2006). Therefore, the total gross floor area concession is very attractive to developers.

(2) Influencing built environment positively and negatively

Both of Hong Kong and Singapore link the GFA concession incentive scheme to the building design to guide developers to construct green buildings. Thus implementing this incentive scheme could benefit their unique built environment, such as more daylight. On the other hand, the additional GFA would increase building bulk and height, which influence visual effects and air ventilation of surroundings. Therefore, government should be careful to decide how much GFA bonus could be granted.

(3) To ensure building get certified by green building rating system

Both Hong Kong and Singapore require green building label to reward GFA bonus. For example, in Hong Kong, BEAM Plus certification is the prerequisite of GFA concession, and in Singapore, only Green Mark Goldplus certification or above could get bonus. These requirements largely promote GB development.

4.2 Success factors

(1) Developers and government have common goals but different interests

To promote green building, governments should build strong relationship with developers (Qian et al, 2013). The GFA incentive scheme makes governments and developers share common goals but different interests. Developers get compensation from GFA bonus for they are usually not end-users and cannot enjoy the benefits of energy efficiency but have to pay all the initial costs and risks, while

governments could save the money to reduce the energy consumption and deal with environmental protection issues by promoting GB.

(2) To set a cap of bonus

Both of Singapore and Hong Kong have set a cap of GFA bonus to reduce the impacts of increased building bulk and height on built environment, as well as developers' speculation. By setting a cap, inflated buildings are prevented and building bulk and height get controlled. After all, the key point to build the relationship between developers and government is to motivate developers with GFA concession and to minimize its negative impacts on the built environment in the meanwhile.

(3) To review the scheme and assess the effectiveness

As the GFA concession incentive scheme for green building is very new in the world, governments usually lack of experience, especially lack of information about the incentive scheme design. Therefore, they need to review the scheme and collect feedback from industry regularly. In Singapore, they reviewed the incentive scheme after 2 years of implementation to adjust some details, such as streamlining GM GFA application process and revising the definition of some terminology. In Hong Kong, governments also gathered some feedbacks from the market and industry to assess the effectiveness and improve the scheme. For example, they conducted survey and public engagements to collect information about inflated buildings and feedbacks from stakeholders including professionals, developers, and general public, and revised the GFA concession incentive scheme. Figure 6 illustrated the history of the GFA concession in Hong Kong.

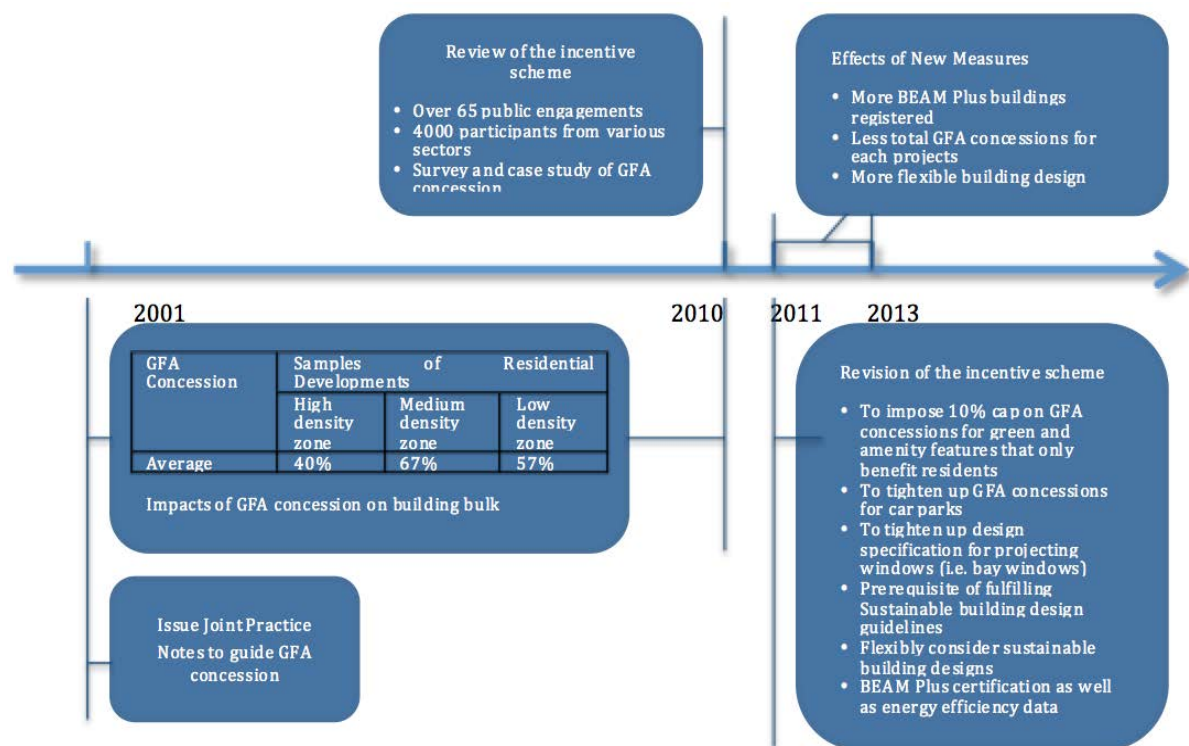


Figure 6 the history of GFA concession incentive scheme in Hong Kong (Constructed by author)

(4) To link GFA scheme with various planning objectives GB technology and design practice

The Planning objectives, certain GB technology, and the green design practice could be realized by setting the requirements of getting GFA concession. For example, in Singapore, bonus GFA incentives help realize various planning objectives for the city, such as balcony scheme encouraging tropical architecture, and lighting incentives scheme enhancing city image (URA, 2011). In Hong Kong, the

innovative green design could get additional points of BEAM Plus, and the GFA of green features are allowed to be exempted.

5 Conclusion

GFA incentive scheme, which is developed from the notion of "make developer pay" in UK in 1990, is widely used in the world and applied in many programs to reward developers in exchange for provision of public amenities. This paper lays emphasis on its application on green building promotion and analyse the reasons from political, economic, and business perspective. In terms of political issues, the GFA incentive scheme makes government and developers share common goals but different interests. Governments could be proactive to promote GB. And the extent of promotion depends on their willingness to use public authority to assist business and their ability to create political support for the program. Additionally, governments do not have to spend money such as providing grants or subsidies. Therefore, it does not matter whether the government has strong financial power or not. Regarding economic issues, as developers are usually not the end-users and cannot enjoy the benefits of energy efficiency, but they have to pay all the initial costs and risks, GFA bonus could benefit developers directly. From business perspective, developers acquire additional GFA from government by the provision of amenities, while governments save the money of public service provision.

Even if the GFA incentive scheme has long history, it is still new to apply it to the GB promotion. Hong Kong and Singapore as leading regions have achieved success to some extent. This paper conducts case studies of the two places to analyse the key features and success factors to help formulate a general approach or model of GFA incentive scheme for GB promotion. Key features include 1) very effective in places with high land value; 2) influencing built environment positively and negatively; 3) ensuring the buildings get certified by GB rating system. Success factors include 1) common goal but different interests shared by developers and governments; 2) a bonus cap; 3) regular review and revision of the scheme; 4) links between planning objectives and GB technology and design practice.

6 Acknowledgements

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"Fan, K., Qian, Q.K., Chan, E.H.W., 2015, Floor Area Concession Incentives as Planning Instruments to Promote Green Building: A critical review of International practices, Smart and Sustainable Built Environments (SASBE) conference 9-11 Dec, 2015, Pretoria, South Africa"

⁴⁶URA, 2011, DEVELOPMENT CONTROL PARAMETERS FOR RESIDENTIAL DEVELOPMENT, Urban Redevelopment Authority, Singapore, <http://www.ura.gov.sg/circulars/text/dchbr/generalconsideration-dchbr.pdf>