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Green Investment in Asian Cities: Cases of Shanghai, Jakarta and Yokohama

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SUMMARY

- Investing in low carbon infrastructure, particularly for energy supply, buildings and transportation, is crucial for reducing greenhouse gas (GHG) emission trajectories. Such investment could start from rapidly growing cities such as Shanghai, Jakarta and Yokohama.
- Green building development, which is a key task under China's sustainable development strategy, can be further promoted, for example, by optimising subsidy structure and simplifying the award process of green building labels.
- In Jakarta, the demand for energy consumption mostly comes from the industrial, transportation, residential and commercial sectors, while energy supply still predominantly comes from natural gas and coal. Policy decision should be made and prioritised according to the mitigation potentials of these sectors, both in terms of energy supply and demand.
- Risks and returns from renewable energy investment in Yokohama.

Box 1. Summary.

Photo: Shanghai skyline at night viewed from the bund. By Geee Kay/Flickr (CC BY-NC-ND 2.0)

In China, the building sector is one of the biggest sectors that consumes large amounts of energy. Green buildings produce a variety of external benefits in their life cycles, including energy and water savings, pollution reduction, indoor and outdoor environmental improvement, among others. However, developers are reluctant to provide all these external benefits due to the consideration of incremental costs, making the green building sector a less attractive market.

Shanghai is the first city in China to have implemented the Green Standards, and the first "green building label" was awarded to a building in Shanghai in 2008. Between 2008 and 2013, a total of 94 green building labels were issued.

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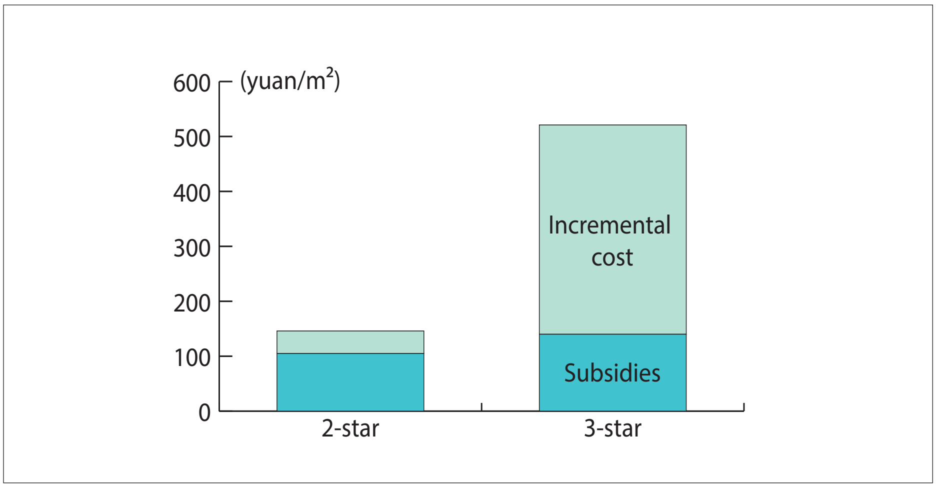


Figure 1. Subsidies and incremental costs of green buildings in Shanghai.

In Shanghai, more environmental and economic benefits can be achieved during the operation stage of green buildings, but this fact is overlooked.

In Shanghai, the total subsidies for two- and three-star green buildings amount to 105 yuan/m^2 and 140 yuan/m^2 respectively, thanks to a uniform subsidy of 60 yuan/m^2 provided by the municipal government in accordance with a policy titled "Supporting the Building Energy-saving Projects in Shanghai", in addition to state subsidies of 45 yuan/m^2 for two-star green buildings and 80 yuan/m^2 for three-star green buildings.

This study found that real incremental costs of green buildings in Shanghai are 41 yuan/m^2 and 381 yuan/m^2, respectively for two- and three-star green buildings and, therefore, the total subsidies are sufficient to cover the incremental cost of two-star green buildings, but insufficient for three-star ones. A comparison between subsidies and incremental costs for Shanghai is presented in Figure 1.

POLICY IMPLICATIONS

- The study found a similar pattern at both national and local levels with regard to the adequacy of subsidies for two- and three-star green buildings, i.e., it is costly to build three-star green buildings but profitable to build two-star ones.
- The study further found that the number of "green building design labels" awarded is much higher than that of "operation labels", which is mainly attributable to the fact that, under Green Standards, the process of obtaining an operation label is more complicated and costlier compared with obtaining a design label. More environmental and economic benefits can be achieved during the operation stage of green buildings, but this fact is overlooked.

POLICY RECOMMENDATIONS

- The situation could be changed by simplifying the process and reducing the cost of awarding green building operation labels.
- The subsidy for three-star green buildings could be increased to narrow the gap of incremental cost.
- The market mechanism could be used to encourage the development of green buildings.

Box 2. Policy implications and recommendations from the Shanghai case study.

Yokohama: Lessons Learned for Investing in Renewable Energy

Photo: Residential solar PV installation at Yokohama, Japan. By Bernd/ Flickr (CC BY-SA 2.0)

Compared with investing in conventional energy sources, investment in renewable energy presents multiple risks and challenges in economic, social, political and geological realms. A reformed electricity market, innovative financing schemes and further low carbon policies are crucial for mitigating the risks and increasing the attractiveness of renewable energy investment, which will help address these challenges and promote renewable energy supply. In Japan, a Feed-in Tariff (FIT) system was introduced in 2012 after the Fukushima nuclear plant incident to accelerate the use of renewable energy. Following the introduction of FIT, the installed capacity of solar PV increased to 11.857 GW in two years from July 2012 to July 2014.

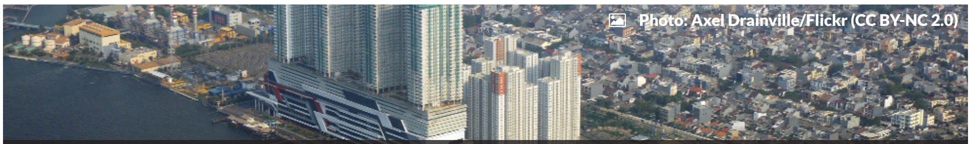
This study found that risks exist in the current FIT system in Japan. Price of renewable technology is still expensive in Japan to replace the conventional energy system. Problems of the current FIT system emerged in 2014 with the rapid increase of installed capacity of solar PV. Enhancement of grid system is needed to increase future renewable energy operations. These include the widening gap between maximum electricity demand and the increasing installed capacity of renewable energy at the regional level. Taking Kyushu Electric Power Company as an example: Although the maximum electricity demand of the company was 16.71 GW, the approved installed capacity of renewable energy reached 17.55 GW in March 2014, well above the company's maximum demand. This is also linked with the supply balance of renewable energy and nuclear power, and related cost performance issues.

Policies such as Japanese FIT system can mitigate price risks; however, at the same time, changes in policy and regulations also increase the risks and uncertainties for renewable energy investment.

POLICY IMPLICATIONS AND RECOMMENDATIONS

- The risks and returns from renewable energy investment are highly dependent on the rate of the FIT, the price of solar modules and the period of solar PV usage. For households, it is found that the gain from investment will increase, while for the commercial sector, the effect of different tax policies will depend on the companies' financial situation.
- These challenging issues are rooted in the growing discussion on the future electricity balance and energy trade-off of fossil fuel, nuclear and renewable energy and on their prioritisation. In addition, renewable energy generation faces issues of the existing grid system. In order to solve this problem, a need to establish infrastructure such as output control systems, storage batteries and power grid enhancement, rather than limit the installation of renewable energy systems.
- What can be learned from the Japanese FIT system is that policies such as FIT can mitigate price risks; however, at the same time, changes in policy and regulations also increase the risks and uncertainties for renewable energy investment and, as a result, affect the returns generated from renewable energy operations.

Box 3. Policy implications and recommendations from the Yokohama case study.



Jakarta: Green Energy Options for Mitigation

A modelling study was conducted to identify options of GHG mitigation action for the energy sector of the Special Capital City District (DKI) of Jakarta to achieve "Low Carbon City in 2030". Figure 2 shows a summary of the results of an Extended Snapshot Tool (ExSS) modelling simulation, showing snapshots of energy supply and demand for the base year (2005) and target year (2030) under two scenarios: business as usual (BaU) and mitigation (CM). The snapshot of final energy demand in DKI Jakarta shows that under the BaU scenario the final energy demand during the period 2005–2030 is estimated to increase by a factor of 4.1 from 6.67 Mtoe (5.5% of total energy consumption of Indonesia) to 27.54 Mtoe, while the primary energy supply during 2005–2030 will increase from 11.29 Mtoe to 49.2 Mtoe. Under the CM scenario in the same period, the demand is estimated to increase by 3.5 times from 6.67 Mtoe to 23.33 Mtoe while the primary energy supply mix will increase from 11.3 Mtoe to 41.53 Mtoe.

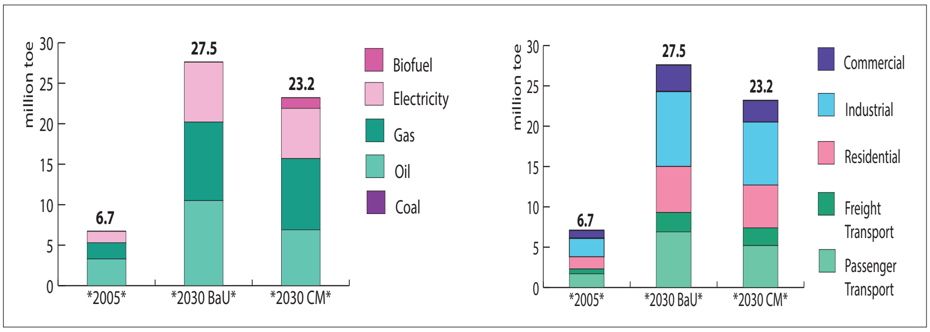


Figure 2. Snapshots of energy supply and demand in Jakarta for the base year (2005) and target year (2030) under business as usual (BaU) and mitigation (CM) scenarios.

POLICY IMPLICATIONS AND RECOMMENDATIONS

- The study explored mitigation actions for Jakarta to reduce emissions in each demand sector and to introduce structural changes in energy supply. Policy decision should be made and prioritised based on sectors with potential for emission reduction, which, in the case of Jakarta, mainly include the industrial, transportation, residential and commercial sectors.
- In terms of demand, focus should be given to the deployment of low carbon technology (such as energy efficiency in industry) and the promotion of green lifestyles by shifting into public transportation, which could significantly reduce emissions. In terms of supply, gas is still the predominant source of energy and the city heavily depends on coal, in particular for railroad freight transportation and power generation.
- Results of this study show that the energy demand of Jakarta will increase significantly, particularly due to increasing activity in the industrial and transportation sectors. Efforts to achieve the mitigation scenario could be realised by a radical shift from coal to gas.

Box 4. Policy implications and recommendations from the Jakarta case study.

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