

GGBP Case Study Series

Sustainable City Singapore

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Singapore has established a series of long-term goals and 10-year plans to reconcile rapid economic development and environmental sustainability. It has pursued its vision of being a clean, green city using targeted policy portfolios and strong spatial planning.

Context

Singapore is one of the world's leading commercial hubs, with the fourth-biggest financial center and one of the five busiest ports. Singapore has made the rapid transition from a developing to a developed country in five decades by prioritizing the twin goals of developing a competitive economy and pursuing environmental sustainability. Both are important in order to attract investors and enhance quality of life. Singapore is resource-constrained, and imports most of its food, water, and natural resources. As an island city-state, it has its own share of existing environmental challenges, particularly with air quality levels, in part because of regional transboundary haze.

The first Singapore Green Plan was released in 1992 by the then Ministry of the Environment, followed in 2002 by a new 10-year national plan, developing a national approach of integrated planning and close attention to detail. In 2009, the Ministry of the Environment and Water Resources and the Ministry of National Development (MND) released the Sustainable Singapore Blueprint (SSB), which outlined five-year plans to make Singapore a liveable and lively city-state, and key strategies for Singapore's sustainable development in the long term.

Singapore is also pursuing green growth actively. The National Climate Change Strategy 2012 places emphasis on green growth opportunities. Singapore is developing a Cleantech hub, and is harnessing opportunities in clean and green

energy (e.g. solar), waste and water technologies, urban management, green information and communications technology, and clean mobility, among others.

For Singapore to continue to grow and prosper, it must continue to upgrade the ambition and innovation of its approach to sustainability.

Approach

In 2008 Singapore set up an Inter-Ministerial Committee on Sustainable Development (IMCSD), co-chaired by the Minister for National Development and the Minister for the Environment and Water Resources. The Sustainable Singapore Blueprint which was introduced in the following year sets out sustainable development goals to 2030. The SSB outlines strategies to achieve twin objectives of economic growth and a good living environment. It includes ambitious targets for energy efficiency; water consumption; local air quality; use of public transportation; green and blue spaces, including park space and water catchment areas; and green buildings. USD1 billion was committed by the government over five years from 2009 to support initiatives under the SSB. The SSB is currently under review and the next SSB document will be released by the end of 2014.

Singapore's land use plans for the next 40-50 years are outlined in a concept plan, which is reviewed every decade. This long-term plan is then translated into a master plan, which guides development over the next 10-15 years. Singapore is currently also preparing an underground master plan to build transportation links, shops, and other facilities under the existing surface developments so as to ensure room for growth in the future. Singapore's long-term transportation plans are

outlined in the Land Transport Master Plan 2013. The plans outline measures to increase connectivity, improve transport services, and create a more inclusive and liveable community.

Singapore has a broad mix of regulations and standards, pricing systems, technology demonstration projects, consumer awareness programs, information management, and other policies across environmental issues, including air quality, climate change, energy efficiency, water, waste, nature conservation, and public health.

The policy portfolios generally consist of a range of instruments and measures that target a number of goals, including:

- Air quality – regulatory measures for stationary and mobile sources of pollutants; co-regulation of pollutants by government, industry, and consumers;
- Transport – electronic road pricing (a form of congestion charging in central city areas), cycling networks and pathways, vehicle quota system (i.e. the auctioning of certificates of entitlement for vehicle ownership), and a dense and integrated public transport system consisting of the mass rapid transit system and bus network;
- Climate change – demonstration projects on renewable energy (e.g. testing of various solar technologies in public housing precincts), research and development (R&D) investments and establishment of research institutes dedicated to energy research, climate studies and research, risk assessment, and adaptation planning;
- Energy efficiency – promotion of energy efficiency, setting minimum standards, 80 percent of buildings in Singapore to achieve Green Mark certification by 2030;
- Water – sourcing water from local catchments; recycling and desalination of

water; improvement of water efficiency through water efficient homes program; mandatory submission of water efficiency management plans for large water users; application of international water standards; provision of education for those living in water catchment areas; and long run marginal pricing to encourage water conservation, reflecting the scarcity value of water;

- Waste – incineration; encouragement of participation in recycling; promotion of innovative technologies to recycle and reduce waste; infrastructure support for recycling; and voluntary Singapore Packaging Agreement;
- Nature conservation reforestation and outreach program for students; nature recreational master plan; and 10 percent of land area committed as green space, of which half is gazetted nature reserves;
- Provision of green and blue spaces – enhancement of Singapore’s physical environment through the provision of greenery and green spaces as well as cleaning and opening up water bodies for recreational activities;
- Public health – improvement of the cleanliness and hygiene of public places; control of vector-borne diseases; prohibition of smoking in public places; public education; monitoring and improving indoor air quality; and researching healthy indoor environment.

Singapore’s emphasis on sustainability includes efforts to address climate change, and a whole-of-government approach is taken. The Inter-Ministerial Committee on Climate Change is chaired by Singapore’s Deputy Prime Minister. The Committee is supported by the National Climate Change Secretariat, which was established in 2010, as a dedicated set-up under the Prime Minister’s Office to ensure effective

coordination of Singapore’s domestic and international policies, plans and initiatives on climate change.

Singapore has many initiatives and programs to address climate change, which are reflected in its National Climate Change Strategy 2012 document, including:

- Carbon Emissions-based Vehicle Scheme to encourage the adoption of low-emission vehicles;
- Fuel Economy Labelling Scheme to enable customers to make more informed decisions on their vehicle purchase;
- Mandatory Energy Labelling Scheme for household appliances, namely air conditioners and refrigerators in 2008, clothes dryers in 2009, and televisions in 2014;
- Minimum Energy Performance Standards (MEPS) for refrigerators and air conditioners in 2011, and clothes dryers in 2014;
- Tighter MEPS for household air conditioners and refrigerators (2013);
- The Energy Conservation Act, which requires energy-intensive companies in the industry and transport sectors to appoint energy managers, monitor and report their energy use and greenhouse gas emissions, and submit energy efficiency improvement plans;
- Reform in fuel mix to make the shift away from fuel oil to natural gas for power generation (about 90 percent of electricity is generated from natural gas);
- R&D in innovation of energy technologies, such as at the Energy Innovation Programme Office, the Energy National Innovation Challenge, the Solar Energy Research Institute of Singapore, and the Energy Research Institute at the Nanyang Technological University;

- Green Building Master Plan, which comprises regulatory requirements for minimum environmental sustainability standards in buildings, the development of green rating tools, incentive schemes, research programs, capability development road maps and outreach efforts, and climate change studies to understand potential effects and impacts on the physical environment of Singapore.

Singapore has also provided test bed and demonstration platforms to support companies and research institutes to validate new technologies in a real-world setting (e.g., Cleantech Park for green companies, Punggol Eco-Town to test residential solutions, electric vehicle test bed, etc.). The first zero energy building in South-East Asia retrofitted from an existing building is one such example.

Singapore also has several incentive schemes and programs to promote energy efficiency:

- Design for Efficiency Scheme (DfE);
- Energy Efficiency Improvement Assistance Scheme (EASe);
- Grant for Energy Efficiency Technologies (GREET) scheme and Investment Allowance for Energy Efficiency Projects;
- Energy Efficiency Financing program;
- Encouragement of new co-generation plants in energy intensive sectors;
- Green Mark Incentive Scheme for Existing Buildings;
- Green Mark Gross Floor Area Incentive Scheme;
- Green Mark Incentive Scheme – Design Prototype;
- MND Research Fund for the Built Environment;
- Building Retrofit Energy Efficiency Financing (BREEF) scheme;
- SME Energy Efficiency Initiative;
- Consumer and small business education programs;

- Energy Efficiency National Partnership (EENP);
- Public Sector Taking the Lead in Environmental Sustainability (PSTLES).

Outcomes

The 2005 review of the 1992 Green Plan found that targets on air and water quality, waste, recycling, and conservation had been met. The evidence suggests that the portfolio of policies and practices in place have made Singapore substantially greener than when it was first established. For example, the Singapore River was so severely polluted in the early 1900s that a major clean-up program was required; this started in 1977. The river is so clean now that it forms part of the Marina Reservoir providing domestic water supplies to the city (MEWR, 2013).

Other major achievements have been the mass public transit system, which encourages commuters to take public transport instead of turning to private cars.

This is reflected by a 63 percent public transport peak period mode share, which increased from 59 percent in 2008 to 63 percent in 2012. There is a target to increase this to 75 percent public transport mode share by 2030. This reduces congestion on roads, improves air quality, and maximizes land use by minimizing the need for roads. Energy efficiency, carbon intensity, and waste management are also improving, substantially improving the quality of life in Singapore (BCA, 2009).

These positive impacts are recognized by international ratings. For example, the Economist Intelligence Unit's Asian Green City Index Study in 2011 ranked Singapore as Asia's greenest metropolis, particularly for its

ambitious environmental targets and its efficient approach to achieving them.

Lessons

Success factors

One feature that has enabled Singapore's success is the use of a *comprehensive mix of regulations, financial incentives, demonstration programs, capacity building, and consumer education and awareness*. Singapore's economic policies are designed to promote sustained and inclusive economic growth, driven by productivity and innovation, to create good-quality jobs and support higher standards of living for Singaporeans. Flexible labor market policies and a sound business infrastructure allow Singapore to capture global opportunities in new growth areas. Social policy is based on the principle of self-reliance, with significant investments in education and training, which also facilitate employment relevance. Home ownership is also a priority, with support given to enable Singaporeans to afford public housing. Family plays an important role as a layer of support, with government assistance targeted at those who face greatest difficulty. Fiscal and tax policies are designed to ensure sound public finances, provide a conducive and stable economic environment for businesses, enhance economic competitiveness, and support economic growth. At the same time, the government ensures that the fiscal system as a whole is progressive, with more support going towards the needy and more contributed by the higher-income earners. In addition, Singapore has been effective in applying a *rigorous approach to developing tailored solutions for each environmental goal*. Finally, Singapore's clean and green image has been a critical marketing tool in *attracting international investment*.

Limitations

- Singapore lacks a hinterland – its small land area has to support the spectrum of activities in a country – beyond transport, housing, offices, shops and industries, land is also required for reservoirs and water catchment areas, as well as security needs.
- Singapore is a small, alternative-energy disadvantaged city-state. Given its small size and dense urban landscape, there are challenges in using alternative energy sources such as solar energy on a wide scale. These limitations also mean that Singapore has to become highly efficient in its land, energy and water use.

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Disclaimer

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