DESIGNING OUR CITY

Planning for a sustainable Singapore
Cities as we know them today are already dramatically changing. Our living environments are reshaping the way we live. This new ‘urban age’ presents a unique opportunity for us to remake and reinvent our cities. How well we plan and design our living environments will matter.

**Designing our city** looks at how Singapore is planned for long-term sustainability, encouraging us to think about how we can shape it and new ideas that can transform our future.
INTRODUCTION

While it took London a hundred years to become the world’s first megacity*, it is now taking just decades for new megacities to emerge. The scale and speed of urbanisation* is unprecedented.

In 40 years’ time, three-quarters of the world’s population will be city dwellers. This has a profound impact on the ecological balance of our planet and human conditions.

Note:

This map shows the population of urban agglomerations with 10 million people or more in 2011 and their projected urban population by 2025. You can also see how much their urban population has grown since 1970. While cities such as Tokyo appear to have the largest urban population by 2025, in actual fact, cities such as Lagos, Delhi and Shanghai are expected to register a higher urban population growth than others. This is evident by the thicker blue rings indicated on the map. Singapore is not in this list as its urban population is under 10 million.


* megacity — a metropolitan area with a total population in excess of 10 million people.

* urbanisation — increase in the proportion of people living in towns and cities.
While our challenges today are vastly different from the 1960s, our priority remains the same: catering for economic growth and a good quality of life, maintaining a clean and green environment, and making the best use of our resources. What has constantly guided our approach to sustainable development is far-sighted, holistic, and comprehensive planning, which enables us to take into account future development needs through an integrated planning process. Our objectives are:

**Economic**
Sustain a robust and vibrant economy

**Social**
Provide a good quality of living and a sense of well-being for all

**Environmental**
Develop in an environmentally responsible manner

**Land and sea**
Optimise our limited land and sea space

Public consultation is an integral part of land use planning. The public and stakeholders are consulted throughout the planning process during the Concept Plan and Master Plan reviews, on area-specific plans (such as the ongoing public consultation efforts for the Rail Corridor), and development control guidelines. We also proactively realise our vision, in collaboration with the public and private sectors, and the community.
As one of the few city-states in the world, our conditions are unique. Like all cities, we have to cater for housing, business, social, and recreational needs. But as Singapore is not just a city but also a sovereign state, we also have to accommodate activities that are typically located outside a city like seaports and airports, water catchment areas, utilities such as waste treatment plants and power stations, as well as military training areas and bases.

To achieve sustainable development, we need to preserve options for the next generation. Often, we need to make difficult decisions that may require trade-offs in the short term but will reap benefits in the longer term. We also have to carefully manage diverse and competing land use demands and priorities. It is not about keeping every tree and shrub in Singapore untouched or about building as many petro-chemical plants as we can. It is about considering all land use demands comprehensively so that potential trade-offs between uses can be evaluated holistically for continued economic growth and the provision of good quality living environments.

The challenge of balancing land use needs within Singapore has never been an easy one. In making land use decisions, planners often have to think about meeting current and future needs. Here are five decisions made by planners 40 years ago that have a significant impact on our lives today.

**1971 NOW**

Marina Bay realised

Marina Bay as a seamless extension of the Central Business District, was first mooted in the 1970s. From just an empty land, it has become an iconic destination.

**DID YOU KNOW?**

Land around Marina Bay was retracted throughout the 1970s, 1980s and 1990s. The first detailed land use plan was exhibited in 1992. Planners have worked on this project from the 1970s until today.

**1971**

Airport relocated

The international airport was relocated to the east as decided in the 1971 Concept Plan, allowing for several expansions. It is one of the busiest in the world.

**DID YOU KNOW?**

The idea of reclaiming land at Changi was inspired by then Prime Minister Lee Kuan Yew’s visit to Boston’s Logan Airport, where planes took off and landed over water, reducing aircraft noise.

**1970s NOW**

Jurong Island

Jurong Island has a dedicated “plug and play” infrastructure to help companies save on capital costs and build synergy through product integration. The island has a rock cavern at a depth of 130 m, Southeast Asia’s first underground liquid hydrocarbon storage facility.

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**1991 NOW**

Bustling hubs

The idea for commercial and regional centres was introduced in the 1991 Concept Plan. Tampines Regional and Novena Fringe Centres have since become bustling hubs. More are underway.

**DID YOU KNOW?**

The centres were mooted by planners as a way to better manage peak-hour congestion traffic in and out of the city and to bring jobs closer to homes.

**1991**

Greening paid off

Even in the 1960s when planners grappled with slums and overcrowding, greening was made a priority. Today, Singapore stands out as a City in a Garden.

**DID YOU KNOW?**

Since 1971, a Tree Planting Day has been held every year without fail, where Members of Parliament, community leaders, and others plant saplings throughout the island.

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A sustainable city is also one that offers a good quality of life for all. A key aspect of this is in ensuring that housing is available and affordable. Land is set aside for a variety of housing types to meet different needs and aspirations. This ranges from affordable and quality high-rise public housing, where over 80 per cent of the population lives, to private housing that includes landed properties and high-rises.

Even though our living environments are likely to become denser, quality living environments will continue to be planned for. There will be more ground level open spaces and parks, and community spaces at intermediate levels to facilitate community bonding. Good design and landscaping can also offer visual relief.

It is not just about providing good housing but it is also about creating a total good quality living environment around where we live. The planning of residential towns takes into account not only the physical layout and architecture of housing blocks but also how schools, shops, medical facilities, parks, places of worship, and offices are within easy access. Towns are also well-served by public transport and road networks. These housing estates have since transformed Singapore’s landscape. Many of the older estates have been rejuvenated to meet the needs of residents.

Coming up, Jurong Lake, East Coast, and Hougang will be given makeovers under the Housing Development Board’s Remaking Our Heartlands programme.

Our population is also ageing. By 2050, about one in four of our population will be aged 65 and above, up from one in ten today. Caring for and supporting the needs of the elderly will become even more important. Adequate housing, healthcare, community, and leisure facilities will be provided in tandem with the growing population to meet the needs and aspirations of both the young and the old.
DESIGNING OUR CITY

Public transport is a more effective and also environmentally-friendly way to travel as compared to cars. The rail network and bus services have been continuously enhanced to make public transport a more convenient way to travel. This is complemented by measures to control car ownership and usage. By 2020, the rail network will double to 278 km with the addition of new lines announced in the 2008 Land Transport Master Plan — Thomson Line, Eastern Region Line, Tuas Extension, and North-South Line extension.

SUSTAINING GROWTH. DECENTRALISATION. GOING PUBLIC

To reduce peak-hour congestion from traffic flowing in and out of the city-centre, regional and fringe centres outside of the city centre were introduced in the 1991 Concept Plan to bring jobs closer to home. Tampines Regional Centre and Novena Fringe Centre have since become bustling hubs, offering a mix of offices, retail, entertainment, and commercial facilities. Over the next 15 years, three new hubs are planned to support further growth in the commercial, retail, and entertainment sectors. The largest of these to be developed is Jurong Lake District in the West. The other two are Kallang Riverside at the fringe of the city centre and Paya Lebar Central in the East. Each of these hubs will have a different economic focus and unique identity, while Marina Bay and the city centre will continue to be the key business and financial district.

going public

Given our limited resources, we will need to continue to sustain our economic growth to provide good jobs, maintain high living standards, and remain attractive to visitors and investors. With increasing global competition and the rise of regional economies, maintaining our economic competitiveness will be even more important to attract growth opportunities to create more higher-value jobs.

Setting aside sufficient land and infrastructure for both the manufacturing and services sectors, and creating new employment clusters and growth corridors will continue to be important in maintaining our competitiveness. At the same time, we also safeguard sufficient land for critical infrastructure such as ports and airports to strengthen our linkages to the rest of the world.

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To complete the total quality living environment, creative strategies have been adopted to leverage on Singapore’s key assets to enhance our leisure environment. One of them is the deliberate introduction of greenery everywhere. The result is Singapore as a City in a Garden, from streetscape and skyscrapers greenery to parks within 400 m of most homes. Park connectors, a novel idea using drainage space, have linked up parks to offer bigger and more extensive green spaces. 360 km of park connectors will be built by 2020 and a 150 km round-island route is in the pipeline. Promenades, boardwalks, and bridges have also been built over the years to link up green spaces and activity nodes and provide access to waterfronts and coastlines. These efforts create new, exciting recreational options that make this city more appealing and never dull.
Sustainable development is much more than building infrastructure or preserving the environment. It is about putting the community at the heart of development. It is also about building rooted and cohesive communities, as well as preserving our local character and sense of identity through the preservation of our built and natural heritage. Through Singapore’s Conservation Programme, more than 7,000 buildings and structures have been conserved to date. We have also protected four Nature Reserves to safeguard tropical rainforests and coastal mangroves and kept another 18 Nature Areas for as long as possible.

The balance between heritage and development has never been a straightforward issue of retain or destroy. Often, planners have found creative ways of ensuring that buildings continue to be viable and relevant. Sometimes, retaining our heritage is not just about conserving key buildings alone but is about protecting and enhancing neighbourhoods with unique identities. Better pavements, tree planting and other works have been carried out to areas like Balestier, Siglap, Holland Village and others so that these continue to thrive.

In our small island home of 714 sq km, over 7,000 heritage buildings and structures in more than 100 areas have been gazetted for conservation. About 6,500 of these are shophouses. The first shophouses to be conserved and restored in Singapore were in Tanjong Pagar in 1987.

In Singapore, we are guided by the 3R principle when it comes to conservation buildings:

- MAXIMUM Retention
- SENSITIVE Restoration
- CAREFUL Repair

Conservation buildings are selected based on:
- architectural significance and rarity
- cultural, social, religious and historical significance
- contribution to the environment and identity
- economic impact

In Singapore’s Conservation Programme began in the early 1980s as an integral part of city planning. It was the first large-scale urban conservation programme in Southeast Asia that protects urban streets and areas.

Shophouse styles according to the chronology of Singapore’s physical development:
- Early Shophouse style 1840–1900
- First Transitional Shophouse style
- Late Shophouse style 1900–1940
- Second Transitional Shophouse style
- Art Deco Shophouse style 1930–1960
- Modern Shophouse style 1950–1960
Singapore has in place innovative environmental policies and technologies to manage its precious water, waste and energy resources. Through a long-term water supply strategy termed the Four National Taps, Singapore has built up a robust and sustainable supply of water for its people. Rainwater is collected through a comprehensive network of drains and canals before it is channelled to 17 reservoirs for storage. To achieve water sustainability, we carry out large-scale used water recycling to produce NEWater, Singapore’s own brand of high-grade reclaimed water, and seawater desalination. Today, NEWater can meet 30 per cent of Singapore’s water needs, and the plan is to triple the current NEWater capacity so that NEWater can meet 50 per cent of future demand by 2060. We also intend to ramp up the desalination capacity so that desalinated water can meet 30 per cent of our water demand in the long term.

As a low-lying, densely populated island in the tropics, Singapore is vulnerable to the impact of climate change. We must be prepared for the possible effects with mitigation and adaptation efforts. The Sustainable Singapore Blueprint released by the Inter-Ministerial Committee in April 2009 has set out strategies to reduce our energy intensity, improve our water conservation and recycling participation rate. In December 2009, Singapore pledged in the context of the United Nations Framework Convention on Climate Change negotiations to reduce our greenhouse gas emissions by 16 per cent below Business-as-Usual scenario in 2020 when a global agreement is achieved. Apart from these mitigation efforts, we have also put in place measures like strengthening our coastal protection, enhancing our drainage systems, increasing the resilience of our water supply, and protecting our natural biodiversity.

TOWARDS A MORE LIVEABLE CITY

More than ever, cities need to grow in an environmentally sustainable manner and Singapore has set out our goals for 2030. These key targets will help guide the city towards a more lively and liveable city for us and our children.

A MORE SUSTAINABLE LIFESTYLE

- **35%**
  Improvement in energy efficiency by 2030

- **59%**
  Improve recycling rate from 59% in 2011 to 70% by 2030

- **100 km of waterways**
  for recreational activities by 2030

- **153 litres to 140 litres**
  per capita per day by 2030

A PLEASANT URBAN ENVIRONMENT

- **Provide 0.8 ha of green park space**
  for every 1,000 persons by 2030

- **Open up 900 ha of reservoirs**

- **70%**
  of journeys to be made by public transport during morning peak hours by 2020

- **80%**
  of our existing buildings to achieve at least Green Mark Certification (minimum level of energy efficiency) rating by 2030

- **70%**
  of Sulphur Dioxide levels at 15µg/m³ by 2030 and maintain the same levels up to 2030

Improve air quality by reducing the Particulate Matter 2.5 levels to 12µg/m³ (surface smoke concentration standard) and cap Sulphur Dioxide levels at 15µg/m³ by 2030 and maintain the same levels up to 2030.

living lab

For cities to address complex urbanisation and environmental challenges of the future, there is a need to constantly seek out viable new ideas, technologies, and smarter solutions. Singapore sees itself as a living laboratory. In recent years, many companies and research institutes, in partnership with government agencies have developed new technologies and have been testing out new urban solutions in Singapore that can be commercialised and replicated elsewhere.

Sustainable water solutions
With all the major estuaries dammed up to create reservoirs for drinking water, the next step is to tap into the remaining streams and rivulets near the shoreline. The national water agency, PUB has pioneered the Variable Salinity Plant, a new technology that enables minor catchments to be tapped. This will increase the overall water catchment areas in Singapore to about 90 per cent, adding to our supply of drinking water.

Largest solar test-bed
Solar technology has been given an extra boost with the Housing Development Board’s largest ever five-year test-bed scheme in 30 public housing precincts by 2015. The scheme will help enhance the industry’s capabilities and test the feasibility of implementing solar technology on a wider scale when it becomes more cost-effective. To date, $18 million has been invested on 4MWp of Solar PV system for 80 public housing blocks in 13 towns.

Smarter power grids
A way forward for energy consumption is to explore smarter ways of managing energy demand and usage. This is what the Energy Market Authority’s current Intelligent Energy System (IES) pilot test-bed seeks to do. Launched in 2009, the IES is a platform being built to prepare Singapore for the future by allowing for a greater adoption of renewable energy sources, offering consumers more choices in energy consumption and catering for other new technologies like electric vehicle charging.

Intelligent transport systems
Having succeeded in implementing the world’s first electronic road toll collection system as a means of managing traffic congestion, the Land Transport Authority’s Singapore Urban Transport Solution initiative from 2008 has been researching and testing out new solutions in better traffic management on the roads, delivering real-time traffic information to road users and meeting the diverse needs of people with an integrated user experience.

Climatic mapping
To help create cooler and more comfortable environments for people to enjoy, URA is leading an ongoing climatic mapping island-wide study that examines the impact of buildings, greenery, and urban spaces on micro-climatic conditions like air flow and temperatures. The study aims to produce maps showing where the hot and cooler spots are across Singapore and highlight planning and urban design strategies that can leverage on climatic conditions to create better living environments.
There are also larger-scale “living labs” in areas like Punggol, Marina Bay, Jurong Lake District, and the CleanTech Park that are designed to be environmentally-friendly and are testing out a wide range of urban solutions.

Jurong Lake District

Jurong Lake District is the largest of three new growth areas being developed. Covering 360 ha of land, it is envisioned to provide at least 500,000 sqm of office space, 250,000 sqm of retail, F&B, and entertainment space, 2,800 hotel rooms and a number of edutainment attractions. It has two district precincts — Jurong Gateway (commercial) and Lakeside (leisure). Companies and researchers are invited to work with government agencies to test-bed urban solutions in a real-life environment. Some possible ideas that can be tested are smarter ways to manage waste, reduce energy and water consumption, and improve urban mobility and connectivity.

Marina Bay

Marina Bay is Singapore’s most ambitious urban transformation project. It is envisioned as a vibrant 24/7 environmentally-friendly mixed use precinct where people live, work, and play in. More than just giving Singapore a stunning city skyline, Marina Bay has been designed with sustainability in mind, adopting environmentally-sustainable strategies and technologies in its development:

- Marina Bay serves as a freshwater reservoir that will add to local water supply by ten per cent
- A mix of uses planned at Marina Bay offers residents and office workers greater access to amenities, cutting down on possible long distance travelling
- A common services tunnel has been built. It is a novel way of locating all utility services like electrical and telecommunication cables and water pipes in the same underground network, allowing for easier maintenance and upgrading with minimal disruptive and pollutive road excavations
- The waterfront promenade has been designed as a well-shaded environment with lush tree planting for pedestrians. It also includes other elements like water features, to cool the ambient air temperature, making it a pleasant walking experience

For both Marina Bay and Jurong Lake District, the use of public transport, walking, and cycling are encouraged. Both have a planned comprehensive network of walkways, promenades, and cycling paths. A landscape replacement policy is introduced to ensure the greenery lost from the site area taken up by buildings will be replaced. All new developments will be required to provide landscaped areas on the upper levels of developments in the form of sky terraces, landscaped terraces and roof gardens. In addition, all new developments at Marina Bay will be required to achieve a minimum Green Mark Platinum or Gold[^2] standard by the Building and Construction Authority, while new commercial buildings in Jurong Gateway will be mandated to achieve a minimum Green Mark standard of Gold[^3]. This will help reduce energy usage of new developments by 25 to 30 per cent.

Punggol Eco-Town

Punggol Town is Singapore’s first waterfront eco-town. It is planned with a holistic framework that takes into account social, economic, and environmental considerations. Punggol is designed to have smaller, more intimate estates with a central common green. This enables better access to green spaces and makes it easier to link-up estates, encouraging more cycling and walking. It is well-supported by transit systems and car sharing systems are planned to reduce individual usage of cars.

CleanTech Park

CleanTech Park is set to be the choice location for green-minded business owners. Developed by JTC Corporation, the 50 ha development will push the boundaries of sustainability, serving as a large-scale integrated “living laboratory” for test-bedding and demonstration of systems-level clean technology solutions. It will serve as an epicentre for research, innovation, and commercialisation in clean technology. The park is envisioned to house a working population of 20,000 when it is fully built by 2030.
When it comes to sustainability, what can we as individuals do? Many of us may be overwhelmed with rising to the challenge or simply don’t care. But it is about starting small and doing what we can. Beyond saving water and electricity, here are some ideas:

What does a sustainable Singapore look like in 2030? What else must we do to get there?
‘Sustainability’ encompasses not only the commonly-held notion of environmental sustainability, but needs to embrace social and cultural sustainability as well. A socially sustainable Singapore is one which is socially inclusive, with strong bonds in the community, healthy social interaction, protection of the vulnerable, and respect for social diversity. While social interaction evolves organically, it can also benefit from institutions and programmes that support the development of healthy communal bonds and the building of trust relations.

Such institutions and programmes need to focus on bridging rich and poor, young and old, citizen and foreigner, as well as those of different races and religions. They should also help bring men and women together! Relatively, a culturally sustainable Singapore is one which has its own cultural voice and idiom, with unique cultural expressions that underscore a local sense of identity and indeed, nationhood, particularly in the face of globalising and potentially homogenising forces. Again, cultural institutions and programmes that stimulate and give space to creative expression are critical for the successful fulfillment of this endeavor.

Singapore 2030 is no Utopia but nevertheless, I envision it to be a place where ordinary people show civic pride, are much more conscious of the environmental consequences of their personal choices, where institutions and corporations adopt sustainable practices not just because it is economically or politically correct to do so, but because it is the responsible thing to do. To get there, government will need to further develop a carefully calibrated set of positive and negative incentives to align behaviour with consequences. Above all, it needs to show the way in embedding sustainability throughout its practices and policies.

Dr Amy Khor, Minister of State, Ministry of Health and Mayor, South West District

Professor Lily Kong, Vice-President (University and Global Relations), National University of Singapore
Cities are increasingly seen as central to the fight against climate change. Singapore, as a compact and efficient garden city, can offer a holistic approach to optimising resource consumption, reduce waste and pollution, integrate smart city infrastructure and promote a shared community to make our city greener, smarter and more inclusive.

**Population growth, rising prosperity and rapid urbanisation** will put increasing pressure on energy supplies over the next 40 years worldwide. Transport and industrial growth in particular are key issues for Singapore’s energy sector. The cities that succeed in meeting these challenges will be effective in promoting public and private sector collaboration, providing the clarity and stability in policies that encourage investment in change to meet economic, energy and environmental challenges.

**Environmentally sustainable urban planning on an integrated basis** will continue to be important for Singapore. Industry in Singapore will become more energy and carbon efficient, and customers will be more environmentally conscious. New energy solutions for customers and new business and pricing models will be developed.

*Lee Tzu Yang, Chairman, Shell Companies in Singapore*

Smart offices and homes, instead of being consumers of energy, can be transformed into producers of energy. Buildings, instead of depleting the green, can add to the green footprint. Increasingly, the extensive use of information, communication and sensory technology will enhance real-time resource optimisation that can enable citizens to make informed choices, ultimately benefiting the city and improving quality of life.

*Liam Wee Sin, President (Property), UOL Group Limited*

What I hope in 2030 is that **Singapore embraces sustainability as a way of life.** Not just the way we plan our city and design our parks and buildings but how we go about living our daily lives. It would be ideal if there is a significant reduction in the number of motor vehicles on the road. People will use underground mass people movers; above ground, right of way will be given to people walking and using bicycles and seaways.

With the diminishing need for roads due to less vehicles, we could have more green, more trees and more parks. Our city will be more compact, buildings will be taller with breathing spaces, landscaping and greenery. More land can be set aside to increase our nature reserves, parks and greenery. Singapore can truly be a city in a forest.

*People and nature will co-exist and Singapore will be a gracious society that cares about the city and the environment.*

Recycling will be second nature to Singapore. Every single person has a role to play in sustainable Singapore.

To realise my ideal 2030, I feel we do need a firm partnership between the government and the people. We need to educate our people and get the masses to see sustainability’s strong points. We also need the authorities to carry out a complete and in-depth review of existing government policies vis a vis sustainability. We need to take advantage of Singapore being in a ‘close-loop’ situation — an island — which **makes our little red dot different from other countries.**

*Wong Mun Summ, Founding Director, WOHA*
2030 will be upon us before we know it and any progress we make towards becoming more sustainable will be built on foundations we put together in the next few years. I can’t anticipate technical advances very well, but I imagine Singapore will have access to state-of-the-art renewable energy, waste minimisation, recycling, green transport, green buildings, and other technological innovations.

The sustainable Singapore I envision will see alignment between widespread implementation in cutting edge renewable or sustainable technology, progressive policies that encourage their use, and buy-in from the private sector. Most importantly, sustainability will become a part of the Singapore lifestyle, as much a part of our identity as our love for hawker food. We won’t be as reliant on automobiles for commuting (cars certainly will not have any special cachet, and gas guzzlers will definitely be considered tacky), recycling will be easy and will be second nature to everyone. Sustainability will extend to all aspects of our consumer and lifestyle choices, with the result that Singapore will drive environmentally-enlightened initiatives and the implementation of environmental best practices far beyond our shores.

In a sustainable Singapore in 2030, we will be upon excessively cooled buildings and an over-reliance on air-conditioning. We will embrace our tropical heritage, and most Singaporeans will find greatest joy in outdoor recreational activities rather than seeking out air-con at every opportunity. Many families will be into urban gardening, and everyone will have an opportunity to eat fresh, delicious, home-grown vegetables. Nature will be a major part of the Singapore psyche, and urban nature will be seamlessly integrated into our wild spaces. We’ll have more biodiversity in 2030 than we have today.

Singapore will be a leader in all aspects of sustainability — technological development, green investments, policy, nature conservation, education, and lifestyle — and will become an international centre for training and disseminating innovations in sustainability throughout the world. In 2030, municipal leaders from many countries will be coming to Singapore to learn how adopting an environmental ethos can help every sector of society. Living in harmony with the environment will become a focal point for community and national pride, and in 2030, Singapore will be among those leading the way, helping to bring together all humanity under a common cause for the benefit of all.

Dr Shawn Lum, President, Nature Society Singapore
To make Singapore a great city to live, work and play in.