

NATIONAL ASSESSMENT REPORT

IN PREPARATION FOR THE HIGH LEVEL MEETING
FOR THE FIVE YEAR REVIEW OF THE MAURITIUS
STRATEGY IMPLEMENTATION IN 2010

SINGAPORE

**Prepared by Singapore's Ministry of the Environment
and Water Resources
in partnership with other Ministries and Agencies
(<http://www.mewr.gov.sg>)**

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EXECUTIVE SUMMARY

Introduction

Singapore has been fortunate in its development aspirations. Nevertheless, Singapore does share with its AOSIS partners many parallel concerns. These include the need to: (1) restructure our economy to tackle mounting globalization; (2) manage our scarce land area prudently to deal with rising urban development and water catchment demands; (3) manage our limited water resources strategically to ensure sufficient supply in the future; (4) diversify our sources of energy and develop renewable energy capabilities; (5) and finally, institute measures to tackle new threats such as the menace of transnational terrorism and the spread of new contagious diseases.

Such concerns and constraints faced by Singapore had been highlighted in Singapore's National Assessment Report for BPOA+10 which are now updated in this report. Our Report will also indicate that after having performed well and achieved a "clean and green" living environment, Singapore's current aim is to progress from merely maintaining quality environmental performance in the short term to achieving environmental sustainability in the long term. We hope to accomplish this through the Singapore Sustainable Blueprint (SSB), which stresses ongoing innovation in managing Singapore's limited resources, and vibrant partnerships and co-operations across what we refer to as the 3P sectors (The Private, Public and People Sectors).

Socio-Economic Context

Singapore's geographic location is such that it is spared from natural disasters such as earthquakes and typhoons. The incidence of crime is also relatively low and has had minimal socio-economic impact. However, being a small island city-state, Singapore faces challenges posed by globalization, land scarcity and limited water resources. Singapore's response to such challenges is to anticipate and ameliorate such problems in advance before they overwhelm the country. Good governance and community participation in addressing major problems is key to Singapore's continued success in managing issues such as globalization and limited water resources.

National Framework for Sustainable Development

Singapore is committed to a domestic plan of action to ensure that development does not come at the expense of our quality of life and to play our part in addressing global environmental challenges. We developed the Sustainable Singapore Blueprint (SSB) as our national blueprint for sustainable development till 2030. It summarises Singapore's approach to addressing the challenges of population growth, resource constraints and climate change. The SSB sets out a series of goals to be achieved by 2030, in the areas of resource efficiency, physical environment, capability development and community engagement. The Inter-Ministerial Committee on Sustainable Development (IMCSD), overseeing the implementation of the blueprint,

reviews it regularly to discuss any new developments and ensure that the targets remain relevant and up to date.

Progress / Problems in BPOA and MSI Implementation

Being a small island city-state, Singapore could be highly vulnerable to changes in sea level, water supply problems, uncontrolled urbanization, over reliance on fossil fuel energy, communicable diseases and the threat of transnational terrorism. To safeguard our citizens and ensure long-term environmental sustainability, Singapore has put in place several strategies and mechanisms. These include measures to cope with the possible effects of sea-level rise, a comprehensive framework for disaster management, and policies to promote energy and water efficiency, waste minimization and nature conservation. In addition, Singapore has also launched a number of capacity-building and training programmes for the purpose of sharing Singapore's experience and expertise with other small island and developing countries.

Trade and Investment for Sustainable Development

Singapore continually seeks to strengthen our trade links by supporting multilateral and regional initiatives, and forming free trade agreements with key trading partners.

Millennium Development Goals

Recent social and economic statistics indicate that Singapore's ongoing measures to improve poverty, child mortality, control of communicable diseases, education, environmental sustainability and gender equality, have been highly successful. Singapore will continue to ensure that its citizens enjoy a high standard of living.

Emerging Concerns and Special Needs

Like many Small Island Developing States (SIDS), Singapore continues to confront a range of socio-economic challenges (such as responding to global economic conditions, urbanization and the potential threat posed by pandemics), as well as environment challenges (such as scarcity of land, limited water resources, and the need to adapt to the effects of climate change). Singapore also continues to rely on fossil fuels for electricity generation given our severe constraints in switching to alternative sources of energy. The persistent threat of transnational terrorism is also a major concern for Singapore. As Singapore prepares to face such challenges, it looks forward to sharing its experience and cooperating with other SIDS and the wider international community through the Singapore Cooperation Programme (SCP) and other platforms.

INTRODUCTION

In April 1994, the first UN Global Conference on the Sustainable Development of Small Island Developing States (SIDS) convened in Bridgetown, Barbados. The Conference adopted the Barbados Programme of Action (BPOA), which set forth actions and measures to be taken at national, regional and international levels in support of the sustainable development of SIDS. However, the SIDS continued to encounter many problems and constraints owing to their special geographical circumstances.

In December 2002, the 57th Session of the UN General Assembly called for an International Meeting in 2004 for the 10 year review of the BPOA (BPOA+10). BPOA+10 convened in Mauritius from 10 to 14 January 2005. As part of the preparatory process for BPOA+10, the UN and the Alliance of Small Island States (AOSIS) had requested all SIDS to provide information on their respective national circumstances on BPOA implementation by using a template provided by the UN SIDS Unit. These national assessment reports were collated into regional assessments for the Pacific, Caribbean and AIMS (Atlantic, Indian Ocean, Mediterranean and South China Sea) regional AOSIS groups respectively. The three regional assessments were consolidated into a unified interregional SIDS position for BPOA+10.

The process will now be repeated in 2010. The UN is planning to convene a 5-year (mid-term) High Level Review of the Mauritius Strategy for the Implementation of the Barbados Plan of Action for the Sustainable Development of Small Island States (or in short "MSI+5") in New York in September 2010 during the 65th UN General Assembly to review the progress made in the last five years in implementing the MSI.

Singapore has been fortunate in its development aspirations. Nevertheless, Singapore does share with its AOSIS partners many parallel concerns. These include the need to: (1) restructure our economy to tackle mounting globalization; (2) manage our scarce land area prudently to deal with rising urban development and water catchment demands; (3) manage our limited water resources strategically to ensure sufficient supply in the future; (4) diversify our sources of energy and develop renewable energy capabilities; (5) and finally, institute measures to tackle new threats such as the menace of transnational terrorism and the spread of new contagious diseases.

Such concerns and constraints faced by Singapore had been highlighted in Singapore's National Assessment Report for BPOA+10 and updated in its Report for MSI+5. Our Report will also indicate that after having performed well and achieved a "clean and green" living environment, Singapore's current aim is to progress from merely maintaining quality environmental performance in the short term to achieving environmental sustainability in the long term. We hope to accomplish this through the Singapore Sustainable Blueprint, which stresses ongoing innovation in managing Singapore's limited resources, and vibrant partnerships and co-operations across what we refer to as the 3P sectors (The Private, Public and People Sectors).

We hope that Singapore's National Assessment Report for MSI+5 will serve as a useful and informative supplement to AOSIS' overall assessment of the unique vulnerabilities and challenges faced by all small island countries.

1. SOCIO ECONOMIC CONTEXT

Singapore, being outside the Pacific Rim of Fire, is spared from natural disasters such as earthquakes and typhoons. The incidence of crime is also relatively low and has had minimal socio-economic impact. However, being a small island city-state, Singapore faces challenges posed by globalization, land scarcity and limited water resources. Singapore's response to such challenges is to anticipate and ameliorate such problems in advance before they overwhelm the country. Good governance and community participation in addressing major problems will be the key to Singapore's continued success in managing issues such as globalization and limited water resources.

1.1 KEY CHARACTERISTICS

1.1.1 Location

Singapore comprises the main island of Singapore and some 63 smaller offshore islands. Singapore is situated in Southeast Asia, at the intersection of the Straits of Malacca and the South China Sea, approximately 137 kilometers north of the Equator between latitudes 1°09'N and 1°29'N and longitudes 103°36'E and 104°25'E. Singapore's neighbour to the north is Malaysia and its neighbour to the south, east and west is Indonesia. Singapore's location places it in the midst of one of the world's busiest sea and air transit points.

1.1.2 Physical Statistics

Land area (Total): 710.2 sq km
Coastline length of Main Island: 182.4 km
Distance east to west of Main Island: 47 km
Distance north to south of Main Island: 23 km

1.1.3 Population Statistics (2009)

Total population (including foreigners): 4,987,600
Percentage increase over 2008: 3.1
Resident population: 3,733,900
Percentage increase over 2008: 2.5%
Population distribution by age:

- Resident population below 15 years: 667,900
- Resident population between 15 and 64 years: 2,735,900
- Resident population 65 years and over: 330,100

Population distribution by ethnic categories:

- Chinese: 2,770,300
- Malay: 500,100

- Indian: 343,500
- Others: 120,000

Density (persons per sq km, 2008): 6,814

Sex ratio (males per 1,000 females): 976

1.1.4 Climate

Temperature (Mean daily): 27.9°C

Relative humidity (Mean daily) at 2.00 pm: 72%

Rainfall (Mean annual): 2,325 mm

Sunshine hours (Mean daily): 5.2 hours

Singapore experiences two distinct monsoon seasons:

- the wetter Northeast Monsoon from November to January, and
- the drier Southwest Monsoon from May to September.

1.1.5 Economy (2009)

GNI at current market prices (SGD million): 258,657.7

Per capita indigenous GNI at current market prices (SGD): 46,693

GDP at current market prices (SGD million): 257,640.4

GDP at 2000 market prices (SGD million): 231,775.5

Total External Trade (SGD million): 747,417.4

Imports (SGD million): 356,299.2

Exports (SGD million): 391,118.2

Official foreign reserves (SGD billion): 264.0

Balance of payments (overall balance) (SGD million): 16,456.2

Visitor arrivals (persons): 9,681,300

Tourism receipts (SGD million): 12,400

Additional statistics on Singapore can be obtained from this internet website:

- *Statistics Singapore:* <http://www.singstat.gov.sg>

1.2 KEY CHALLENGES AND RESPONSES

1.2.1 Globalisation

Singapore believes that the key to its future economic growth is to embrace and adapt to globalisation rather than to resist it. With a new economic paradigm after the onset of the global economic recession in late 2008, the Economic Strategies Committee (ESC) was formed in May 2009 to develop long-term strategies for Singapore in the next ten years.

The ESC's goal is to see Singapore become an innovative economy with high-skilled people, where skills, innovation and productivity are the basis for growth. Growth has to be inclusive, allowing for broad-based increases in incomes for our citizens. Singapore must also be a distinctive global city,

more open and diverse than most, the best place to grow and reach out to a rising Asia, and offering a home that provides an outstanding quality of life.

The recommendations of the ESC can be summarised in three broad priorities:

- Boost skills in every job: Singapore must aim for higher productivity in order to sustain higher wages and inclusive growth. Companies must continue to innovate, improve its efficiency and create better jobs. Workers must upskill themselves at all levels. Singapore must also avoid increasing its dependence on foreign workers.
- Deepen corporate capabilities to seize opportunities in Asia: Singapore must grow a diverse and resilient ecosystem of companies. Going forward, commercialisation, of R&D would be a key source of competitiveness. Singapore must also develop market-based facility to spur bank financing of internalisation.
- Make Singapore a distinctive global city and endearing home. Singapore must deepen expertise across the board and keep attracting top foreign talent. It has to build the software and the infrastructure to allow Singaporeans to have the highest quality of life in Asia.

The ESC has put forward its report and key recommendations on 1 February 2010.

For more information on the ESC's recommendations and Singapore's other policies to address globalisation, please refer to the following internet websites:

- Ministry of Trade and Industry: <http://www.mti.gov.sg>
- Economic Development Board: <http://www.sedb.com>
- International Enterprise Singapore: <http://www.iesingapore.com>
- Economic Strategies Committee: <http://www.esc.gov.sg>

1.2.2 Urban Development

Singapore is an island city-state. With an area of approximately 700 sq km, the foremost challenge for Singapore is the scarcity of land. There is competing demand for land from housing, commercial, industrial, agricultural, recreational and water catchment.

Singapore's Urban Redevelopment Authority (URA), the national land use authority, handles every aspect of land use from strategic long-term planning to day-to-day development control. The URA has a comprehensive land use planning system to address land use needs. It draws up the Concept Plan (which is the strategic land use plan that guides Singapore's physical development in the long term) up to 40 to 50 years ahead. The Concept Plan lays out the broad land uses like housing, industries, infrastructure and parks to meet the needs of a larger population in the longer term. By taking a long-term perspective, our plans ensure that developments are carried out in a

sustainable manner. The latest Concept Plan Review was completed in 2001. The broad strategies and long-term direction set out in the Concept Plan are then translated into the more detailed Master Plan. The Master Plan shows the permissible land use and density of developments in Singapore, and guides development in the medium term, over the next 10-15 years. The latest Master Plan was gazetted in December 2008. The URA is in the process of reviewing the Concept Plan, and will be completing the review in 2011.

For more information on Singapore's measures to address urbanization, please refer to these internet websites:

- *Ministry of National Development:* <http://www.mnd.gov.sg>
- *Urban Redevelopment Authority:* <http://www.ura.gov.sg>

1.2.3 Disaster Management

Singapore, being geographically located outside the Pacific Rim of Fire, is spared from natural disasters such as earthquakes, typhoons and volcanic eruptions. The challenges for Singapore's emergency services, however, are in the form of preventing and mitigating potential man-made disasters in a highly urbanized environment.

Singapore's infrastructures include one of the world's busiest airports, the busiest seaport and an extensive network of underground roadways. Land scarcity and high population density has made it necessary to house and locate populations and businesses in high-rise buildings. Mishaps thus have a greater potential to inflict mass casualties and extensive destruction to properties. There is also the threat of disasters that could potentially occur in the chemical and petrochemical industries located at the brink of the city-state. A major accident could have offsite impact on population centres. Recently, the threat of terrorism has added a new dimension to emergency preparedness and response.

The Ministry of Home Affairs (MHA) is the principal authority responsible for civil defence emergency preparation and disaster management in Singapore. Under its command is the Singapore Civil Defence Force (SCDF), which is responsible for planning, coordinating and implementing an assortment of programmes and activities. The SCDF is the leading authority that will coordinate the pre-planning activities and command and control for all mitigating operations for the period of an incident. Over 20 other Ministries and Statutory Boards are also involved in supporting roles.

For additional information on Singapore's emergency preparation and disaster management initiatives, please refer to these internet websites:

- *Ministry of Home Affairs:* <http://www.mha.gov.sg>
- *Singapore Civil Defence Force:* <http://www.scdf.gov.sg>

1.2.4 Natural Resource Depletion

The concept of natural resource depletion, conventionally used in the context of forestry, mining and other comparable activities, is not applicable to Singapore since it is a highly urbanized city-state. Of significance to Singapore, however, are our parks, our roadside greenery, and our Nature Reserves. In spite of Singapore's land shortage, the Government's policy is to maintain these in a healthy state. In 1996, a revitalized Singapore National Parks Board (NParks) was established to create and maintain a pervasive garden environment over the whole island. Today, NParks manages about 3,580 ha of parks, park connectors and open spaces in Singapore, and about 2,830 ha is under NParks management.

For further information on Singapore's management of its parks, nature reserves and other greenery, please refer to the following website:

- National Parks Board: <http://www.nparks.gov.sg>

1.2.5 National Security and Crime

In the new security environment, Singapore could face a diverse range of new and non-traditional threats. To tackle these challenges, Singapore will have to strengthen all five components of its Total Defence strategy. This includes: Military Defence, Civil Defence, Economic Defence, Social Defence and Psychological Defence. The Singapore Armed Forces will continue to maintain its conventional capabilities to ensure that the military component of Total Defence remains strong. At the same time, it will work closely with other government organizations to develop an effective defence against new security challenges, especially the non-traditional threats that may arise. In the area of counter-terrorism, Singapore has put in place various initiatives to guard against domestic terrorist acts since the events of September 11, 2001. In addition, we strongly support the international campaign against terrorism, and we have signed on to several international conventions against terrorism.

With regard to crime, Singapore remains one of the safest places in the world. In a worldwide survey in November 2002 conducted by Mercer Human Resource Consultancy, Singapore was jointly ranked the second safest city in the world with Helsinki, Zurich, Geneva and Bern. In November 2003, Singapore's National Crime Prevention Council received the annual award for the best State anti-crime programme from the International Society of Crime Prevention Practitioners. Our National Crime Prevention Council was singled out for its leadership in promoting police-community partnerships.

For more information on Singapore's Total Defence strategy and other national security policies, please refer to these internet websites:

- Ministry of Defence: <http://www.mindef.gov.sg>
- Total Defence: <http://www.totaldefence.org.sg>

For more information on Singapore's ongoing initiatives to prevent crime, please refer to these websites:

- *National Crime Prevention Council: <http://www.ncpc.gov.sg>*
- *Singapore Police Force: <http://www.spf.gov.sg>*
- *Ministry of Home Affairs: <http://www.mha.gov.sg>*

1.2.6 Unemployment

With globalisation, technological changes and economic restructuring, new job opportunities will be created while new skills will also be required of the workforce. The Singapore Workforce Development Agency provides a comprehensive set of services to assist jobseekers, such as training, counselling, career advice and job matching. During the economic downturn in 2008-09, Singapore launched the Skills Programme for Upgrading and Resilience (SPUR) to enable companies to cut costs and save jobs, while also reskilling and upskilling workers. As of September 2009, the overall unemployment rate (seasonally adjusted) in Singapore was 3.4 per cent.

For more information on Singapore's measures to create a globally competitive workforce, please refer to these internet websites:

- *Singapore Workforce Development Agency: <http://www.wda.gov.sg/>*
- *Ministry of Manpower: <http://www.mom.gov.sg>*

1.2.7 HIV/AIDS, Malaria and Other Diseases

The World Health Organization has declared Singapore as malaria free since 1982. However, the control of other diseases such as dengue and chikungunya poses a challenge for Singapore. Firstly, the dense populated and highly urban environment is conducive for disease transmission. Secondly, as a business/tourism hub in an endemic region, Singapore is vulnerable to the introduction of infections through travel and trade. Singapore is also receptive to outbreaks because of the presence of vectors for these diseases.

Singapore adopts an integrated approach to mosquito control, with pre-emptive source reduction as the key thrust. This is supported by public education, active laboratory-based virus and mosquito surveillance and deterrent penalties against mosquito breeding. Public education and community outreach programmes play a large part in our disease prevention efforts because community participation by keeping their living environment free of mosquitoes is the key to preventing disease transmission. One such initiative is the Dengue Prevention Volunteer Groups, comprising residents who were trained by the National Environment Agency to educate their neighbours on dengue prevention and carry out inspection for mosquito breeding in their neighbourhood.

For additional information on Singapore's personal and public health strategies, please refer to the following internet websites:

- *National Environment Agency: <http://www.nea.gov.sg>*
- *Ministry of Health: <http://www.moh.gov.sg>*

- Health Promotion Board: <http://www.hpb.gov.sg>

1.2.8 Water and Sanitation

Singapore, being a small island State, has to manage its limited water resources prudently to meet increasing demand and to support its economic and social development. PUB is the water authority managing Singapore's water supply and sanitation needs.

PUB's strategy for expanding Singapore's water supply is based on an "addition and multiplication" approach. Addition refers to securing new water sources, which can be through expansion of water catchments for collection of more rainwater or desalination of seawater. Multiplication refers to the effect of reclaiming used water (waste water), taking advantage of advances in membrane technologies. With an extensive network of sewers island-wide, Singapore is able to collect and treat used water using advanced membrane processes to produce high-grade reclaimed water called NEWater. This closes the water loop, enabling PUB to manage, in an integrated manner, our reservoirs, waterworks, rivers, drains, sewerage system and water reclamation plants (waste water treatment plants).

At the same time, Singapore has always emphasized water conservation and has in place an overall water demand management programme to address demand growth. This includes proper management of the transmission and distribution network to minimize losses, and implementation of water conservation measures. Singapore's per capita domestic water consumption has been brought down from 165 litres per day in 2003 to the current 155 litres. This will help to stretch our limited water resources to the fullest.

For more information on Singapore's water and sanitation strategies, please connect to the following internet websites:

- PUB: <http://www.pub.gov.sg>
- NEWater: <http://www.pub.gov.sg/NEWater>

2. NATIONAL FRAMEWORK FOR SUSTAINABLE DEVELOPMENT

Singapore developed the Sustainable Singapore Blueprint (SSB) as our national blueprint for sustainable development till 2030. It summarises Singapore's approach to addressing the challenges of population growth, resource constraints and climate change. The SSB sets out a series of goals to be achieved by 2030, in the areas of resource efficiency, physical environment, capability development and community engagement. The Inter-Ministerial Committee on Sustainable Development (IMCSD), overseeing the implementation of the blueprint, reviews it regularly to discuss any new developments and ensure that the targets remain relevant and up to date.

2.1 SUSTAINABLE SINGAPORE BLUEPRINT

Looking ahead, Singapore faces three main challenges. Firstly, Singapore's population grew from 4 to 4.84 million in less than a decade, and will continue to grow further in the future. This will place heavier demands on resources. Secondly, other cities around the world will also continue to grow, exacerbating competition for scarce global resources and threatening the security of our basic needs such as energy, food and water. Thirdly, worldwide development has resulted in climate change, negatively affecting environmental conditions such as temperature and rainfall.

To formulate a long-term plan to address these three challenges, the Inter-Ministerial Committee on Sustainable Development (IMCSD) was set up in January 2008. The IMCSD is co-chaired by the Minister for the Environment and Water Resources and the Minister for National Development, with Ministers from the Ministry of Trade and Industry, Ministry of Transport and the Ministry of Finance as members. As sustainable choices can be made at the individual, organisational and national level, the IMCSD recognised that sustainable development efforts would only be successful through partnership with the private and people sector. The IMCSD thus engaged in extensive consultations with both these sectors to ensure the comprehensiveness and inclusiveness of the report. A dedicated portal in the website for the general public to share their views on sustainable development in Singapore was created, in addition to consultations held via focus group discussions, public forums and dialogue sessions.

Following a year long consultation with public, private and people sector stakeholders, the IMCSD released the Sustainable Singapore Blueprint (SSB) report. The SSB focuses on four strategic thrusts, namely:

(1) Improving Resource Efficiency

Singapore has to import most of our resources and does not have viable sources of renewable energy. As such, some of our key

measures in this area include enhancing energy and water efficiency, pricing energy appropriately and minimising waste.

(2) Enhancing our Urban Environment

Singapore has high urban density and needs a clean and green environment to ensure a good quality of life for our people. Some of our key measures in this area include improving air and water quality, in addition to enhancing green and blue spaces.

(3) Developing our Capabilities

Singapore’s pursuit of economic growth in tandem with environmental sustainability over the years has made us well-placed to serve as a living laboratory for environmental sustainability research. Some of our key measures in this area include investing in research and development and facilitating the international sharing of knowledge.

(4) Engaging our Community

Singapore’s efforts to build a sustainable economy and environment rely on the support of the community. Some of our key measures in this area include promoting community efforts and industrial efficiency.

The SSB sets out 11 key targets across these 4 strategic areas, to be achieved by 2030. The targets are aligned with achieving our vision of a Sustainable Singapore of the future. A summary of these targets is provided in the table below.

While energy efficiency was a key focus of the SSB, following its launch, the lead-up to the UNFCCC talks demonstrated the international salience of reducing carbon emissions as a tool to combat climate change. As such, in December 2009, Singapore publicly announced our voluntary commitment to a 16% CO2 reduction target below 2020 BAU levels, contingent on a global agreement being reached and on other countries also adopting significant targets and implementing their commitments.

Main Targets of the Sustainable Singapore Blueprint

S/N	Strategic Thrust	Target
1	Improving Resource Efficiency	Energy – Greater Efficiency and Diversification <ul style="list-style-type: none"> Reduce our energy intensity (per dollar GDP) by 20% from 2005 levels by 2020, and by 35% from 2005 levels by 2030
2		Waste – Towards Zero Landfill <ul style="list-style-type: none"> Improve our recycling rate from 57% in 2008 to 65% in 2020 and 70% in 2030
3		Water – Towards Self-sufficiency and Greater Efficiency <ul style="list-style-type: none"> Reduce total per capita daily domestic water consumption from 156 litres to 147 litres by 2020 and 140 litres by 2030

4	Enhancing our Urban Environment	Better Air Quality <ul style="list-style-type: none"> • Reduce the annual mean for ambient fine particulate matter (PM2.5) from 16 ug/m3 in 2008 to 12 ug by 2020 and maintain it at this level till 2030 • Cap ambient sulphur dioxide (SO2) levels at 15 ug/m3 by 2020 and maintain it at this level till 2030
5		Clean, Green and Blue Physical Environment <ul style="list-style-type: none"> • Increase the green park space by 900ha to 4,200ha by 2020 and reach a park provision of 0.8ha per 1,000 population by 2030 • Increase the length of our park connectors (linear parks) from 100km in 2007 to 360km by 2020 • Introduce 30ha of skyrise greenery by 2020 and 50ha of skyrise greenery by 2030 • Open 820ha of reservoirs and 90km of waterways for recreational activities by 2020 and have 900ha of reservoirs and 100km of waterways open for recreational activities by 2030
6	Developing our Capabilities	<ul style="list-style-type: none"> • Build Singapore into an outstanding knowledge hub in the latest technology and services that will help cities grow in a more environmentally friendly way
7	Engaging our Community	<ul style="list-style-type: none"> • Build a community in Singapore where everyone adopts a more environmentally responsible lifestyle. Environmental responsibility will be part of our people and business culture

For details of the main targets in the Sustainable Singapore Blueprint, please refer to the following table. To view and download an electronic version of the complete Sustainable Singapore Blueprint, please visit:

<http://www.sustainablesingapore.gov.sg/>

For more information on Singapore's overall environmental sustainability policies and programmes, please refer to the following websites:

- Ministry of the Environment and Water Resources: <http://www.mewr.gov.sg>
- National Environment Agency: <http://www.nea.gov.sg>
- Public Utilities Board: <http://www.pub.gov.sg>

3. PROGRESS AND PROBLEMS FACED IN THE IMPLEMENTATION OF THE BPOA AND MSI

Being a small island city-state, Singapore could be highly vulnerable to changes in sea level, water supply problems, uncontrolled urbanization, over reliance on fossil fuel energy, communicable diseases and the threat of transnational terrorism. To safeguard our citizens and ensure long-term environmental sustainability, Singapore has put in place several strategies and mechanisms. These include measures to cope with the possible effects of sea-level rise, a comprehensive framework for disaster management, and policies to promote energy and water efficiency, waste minimization and nature conservation. In addition, Singapore has also launched a number of capacity-building and training programmes for the purpose of sharing Singapore's experience and expertise with other small island and developing countries.

3.1 SECTORAL AREAS

3.1.1 Climate Change and Sea-Level Rise

Singapore ratified the UN Framework Convention on Climate Change on 29 May 1997. On 12 April 2006, Singapore acceded to the Kyoto Protocol. Singapore is also actively participating in the on-going discussions on the post-2012 framework for climate change. These actions demonstrate Singapore's ongoing support for international efforts to address the issue of climate change.

As a small, low-lying, and densely populated city-state located in the tropics, Singapore is vulnerable to the effects and impacts of climate change. Singapore also has a relatively high uniform temperature and abundant rainfall, and is situated in a region where communicable diseases such as dengue are endemic.

The potential impact of climate change on Singapore include increased flooding, coastal land loss, water resource scarcity, heat stress, increased energy demand, public health impact from resurgence of diseases, and impacts on biodiversity. These potential impacts are not due solely to climate change, but can be aggravated by adverse global climate change.

To better understand the long-term effects of climate change, the National Environment Agency has worked with relevant agencies to commission a 2-year study on Singapore's vulnerabilities to climate change. As of end 2009, the first phase of the study covering rainfall patterns, temperature, sea level rises etc is near completion and is undergoing an international peer review process. The second phase of the study has been commissioned to look into the secondary effects of climate change, such as how climate change would affect public health and biodiversity. This study is planned for completion in 2011. Singapore's researchers are also participating in the meetings of the

Inter-governmental Panel on Climate Change (IPCC) and will update the models used in tandem with the evolving scientific findings.

Sea-Level Rise

Since 1991, the PUB has required new reclamation projects to be built at a level 125 cm above the highest recorded tide level. This helps to address the sea level rise projected in the IPCC's Fourth Assessment Report (AR4), which could increase by up to 0.59 m by 2100.

Flooding

PUB has been improving the drainage infrastructure in Singapore over the past 30 years, and has reduced flood prone areas from 3200 ha in the 1970s to about 66 ha today. PUB targets to further reduce this figure to about 56 ha by 2011.

Coastal Land Loss

Currently, about 70% to 80% of Singapore's coastal areas have hard wall or stone embankments, which help protect against coastal erosion. The remaining areas are natural areas such as beaches and mangroves. Singapore is looking at the need to protect the foreshore and coastal areas through measures such as strengthening existing revetments.

Water Resource Scarcity

Given that Singapore's coastal reservoirs have dams that are higher than the projected sea level increase in the AR4 and that the height of these dams can be raised if needed, Singapore's water supply is unlikely to be affected by seawater intrusion. Singapore has also enhanced the resilience of its water supply through the introduction of NEWater and desalination, which are not rainfall dependent and serve to diversify the water supply for Singapore.

Heat Stress

Climate change and the urban heat island effect can result in warmer temperatures. This can be mitigated by increasing the amount of greenery in the city, which helps to lower the ambient temperature of the surroundings. Singapore is introducing more greenery by providing parks and green open spaces, as well as planting greenery along roads and around developments. Rooftop and vertical greenery on buildings are also being promoted through planning guidelines and incentives.

Higher Energy Demand

Energy efficiency has been identified as Singapore's key strategy towards addressing climate change. Singapore is alternative-energy disadvantaged and must rely on imported fossil fuels to meet its energy needs. Singapore's limited land space and lack of natural endowments means that Singapore has little recourse to alternative energies like renewables to meet its energy needs.

To drive greater energy efficiency in all sectors of Singapore's economy, an Energy Efficiency Programme Office (E²PO) has been established. The E²PO would promote the adoption of energy efficient technologies and practices, build capability to drive and sustain energy efficiency efforts, raise public

awareness to stimulate energy efficient behaviour, and support research and development efforts to enhance Singapore's capabilities in energy efficient technologies.

Public Health Impact from Resurgence of Diseases

Singapore is located in a region where vector-borne diseases, particularly dengue, are endemic. The National Environment Agency has put in place a comprehensive mosquito surveillance, control, and enforcement system to address the threat of such diseases.

Impacts on Biodiversity

The National Parks Board (NParks) is monitoring the long-term tree diversity, tree growth, and survival in marked study plots. A coral nursery has also been established off Pulau Semakau to enable Singapore to proactively enhance existing marine habitats by maximising the survival of naturally occurring coral. NParks is also developing pre-emptive management strategies to counter mangrove erosion at coastal areas.

Land Use and Infrastructural Planning

Singapore has a deliberate policy in place to raise low-lying areas in conjunction with redevelopment proposals. In addition, the Ministry of National Development leads an inter-agency taskforce to review existing infrastructural adaptation measures, as part of the overall government's approach to address climate change.

3.1.2 Natural and Environmental Disasters

Singapore's Ministry of Home Affairs is the principal policy and directing authority responsible for civil emergency preparedness and disaster management. Under its command is the Singapore Civil Defence Force (SCDF), which is responsible for planning, coordinating and implementing emergency preparedness programmes and activities. The SCDF is the leading authority that will coordinate the pre-planning activities, and command and control all mitigating operations during an incident. Over 20 other Ministries and Statutory Boards are also involved in performing supporting roles under Singapore's unified framework of Operation Civil Emergency.

Legal Framework

The principal laws supporting Singapore's emergency preparedness and disaster management activities are:

- The Civil Defence Act (Cap.42) – This Act provides the legal framework for, amongst other things, the declaration of a state of civil defence emergency and the mobilization and deployment of operationally ready national service rescuers.
- Fire Safety Act (Cap.109A) – This Act provides the legal framework to necessitate fire safety requirements on commercial and industrial premises, as well as the involvement of the management/owners of such premises in emergency preparedness against fires.

- Civil Defence Shelter Act (Cap.42A) – This Act provides the legal framework for buildings to be provided with civil defence shelters for use by persons needing to take refuge therein during a state of emergency.

Incident Management System

The Singapore Civil Defence Force has developed its capabilities on the need to react to a number of major incidents at the same time. To ensure expedient medical aid for and conveyance of casualties owing to civil defence emergencies, SCDF also operates a fleet of 36 emergency ambulances.

The major scenarios that have been identified include the following:

- Oil refinery fires and major industrial accident and explosions
- Mass Rapid Transit incidents, involving underground and overhead trains and cable-ways
- Maritime incidents in the port area
- Chemical related incidents involving hazardous materials
- Air Crash Incidents, both in populated and airport areas
- High-rise building fire incidents
- Building collapse incidents

Special Capability

The Disaster Assistance and Rescue Team (DART) is a specially trained SCDF unit that can undertake high-risk fire fighting and rescue operations. This includes deep penetration, rescue in confined space, collapsed buildings and height rescue, and life detection for wide area searches. DART is also the main component in the SCDF overseas contingent and is capable of rapid dispatch for urban search and rescue missions within the region.

Hazardous Material Incident Teams (HITs) are also strategically located in four Singapore fire stations. HITs are trained and equipped to handle hazardous material (HAZMAT) incidents throughout Singapore.

Public Warning and Protection

Another significant role of the SCDF is to provide early warning and adequate protection to the population in times of national emergency. The SCDF has in place a Public Warning System (PWS) with an island-wide network of more than 280 outdoor sirens mounted strategically on high-rise buildings. The PWS will be utilized in the event of disaster to alert the affected communities to tune in to local broadcasting stations for important messages and actions to be taken.

The current Civil Defence shelter programme is one that focuses on the provision of household shelters in new residential developments as the primary means of providing protection for the population emergency. In addition, dedicated public shelters will be incorporated at population hubs along transit routes, such as in underground Mass Rapid Transit (MRT) shelters, whenever the opportunity arises.

International Collaboration and Overseas Rescue

Singapore has an exchange programme with a number of countries from the Asia-Pacific region and Europe. The various emergency authorities in Singapore, especially the Ministry of Home Affairs, the Singapore Civil Defence Force and the Singapore Police Force meet their respective foreign counterparts from time to time to exchange views and experiences on emergency preparedness.

Singapore's SCDF assisted the Philippines in the Baguio Earthquake rescue operation in 1990 and assisted Malaysia in the rescue operation following the collapse of the Highland Towers in 1993. In 1999, the SCDF Overseas Rescue Contingent assisted Taiwan in the Taiwan 921 Earthquake rescue effort. In January 2008, SCDF successfully attained the International Search and Rescue Advisory Group (INSARAG) External Classification of its Overseas Rescue (Operation Lionheart) Contingent as a Heavy Urban Search and Rescue (USAR) Team. Since then, the Operation Lionheart Contingent has been deployed to the earthquakes in Sichuan, China (2008) and Padang, Indonesia (2009). SCDF also has eight disaster management experts, together with four doctors from the Singapore Armed Forces (SAF), who are registered as members of the UN Disaster Assessment and Coordination (UNDAC) team.

The Singapore Armed Forces (SAF) has also contributed to humanitarian assistance and disaster relief (HADR) operations in the region. The SAF's contribution following the Dec 2004 Boxing Day tsunami disaster was the single largest SAF deployment for HADR operations. More than 1,200 personnel as well as Landing Ship Tanks (LSTs), helicopters and heavy equipment were deployed to various locations in Indonesia to assist in the HADR efforts. Over the last two years, the SAF had also deployed personnel and equipment for HADR operations in China (Sichuan earthquake, 2008), Myanmar (Cyclone Nargis, 2008), Taiwan (Typhoon Morakot, 2009) and most recently, Indonesia (Padang earthquake, 2009).

For additional information on the Singapore's emergency preparedness and the capabilities of the Singapore Civil Defence Force, please refer to the following internet websites:

- Singapore Civil Defence Force: <http://www.scdf.gov.sg>

3.1.3 Coastal and Marine Resources

Singapore became a party to the United Nations Convention on the Law of the Sea on 17 November 1994 and the Convention on Biological Diversity on 21 December 1995. Measures are in place for developing and implementing integrated coastal zone management plans, including integrating such plans within national development plans. Monitoring programmes for coastal and marine resources have been set-up by several agencies to document and apply this information to decision-making.

Singapore's Agri-Food & Veterinary Authority (AVA) supervises the development of aquaculture, including coastal and open-water aquaculture. As a member of the Southeast Asian Fisheries Development Centre (SEAFDEC), Singapore also hosts the region's Marine Fisheries Research Department (MFRD), which conducts research and training on post-harvest fisheries operations.

For more information on the AVA and MFRD, please refer to these websites:

- MFRD: <http://www.seafdec.org/mfrd/index.html>
- Agri-Food and Veterinary Authority: <http://www.ava.gov.sg>

3.1.4 Land Resources and Terrestrial Biodiversity

Land Use Planning

Singapore's comprehensive land use planning framework described in Section 1.2.2 ensures that land resources are comprehensively planned and utilized in a sustainable manner. In addition, the release of land belonging to the State at various tenures, e.g. 30 to 60 years for industrial use, 99 years for residential and commercial uses, and shorter terms ranging from 5 to 30 years for other sites, provides the flexibility to recycle land for other uses when the tenures are up. As this applies to most of the land in Singapore, this policy will help us meet future needs and facilitate sustainable land use.

Singapore has employed innovative ways of maximising land use to help reduce the constraints of land scarcity. One of our strategies was to incorporate compatible uses in our green spaces. Parks, for instance, were opened up for other compatible uses from horticulture planting to venues for staging outdoor concerts. Moreover, efforts were also taken to ensure that our parks, gardens, roadside greenery and a network of green links formed an integral part of the greening of Singapore. The Park Connectors Network is a long-term project that aims to link up major parks in continuity via an integrated series of green connectors, including jogging and bicycle tracks, and it is an innovative strategy of creating more green spaces with limited land. In certain areas, these park connectors also function as a green corridor for wildlife. To date, this Park Connector Network project has made much progress. Over the next 10-15 years, our existing park connector network will be tripled to 360 km progressively. A round-island route has also been planned, which consists of linking up park connectors, pathways, crossings, coastal promenades, trails and other connections to bring people closer to the coastline and greenery, providing greater recreational options closer to homes.

Some of the key strategies adopted in the Concept Plan 2001 and Master Plan 2008 to help achieve greater sustainable development and minimise negative impact on the environment include:

- Safeguarding Land for Growth
Land is safeguarded for long term economic needs, including strategic industries like pharmaceuticals, electronics, biomedical sciences, and new growth sectors such as aerospace and medical travel. Land is also

set aside for future expansion of the ports, airport and other large infrastructure.

- Providing a Quality Living Environment
A wide variety of housing choices and types are provided to house Singapore's growing population comfortably. Housing estates are also planned as total living environments, with comprehensive amenities to meet residents' needs.
- Maintaining Environmental Quality
Stringent pollution controls are in place to protect water and air quality. Essential but pollutive infrastructure is located away from residential areas, while innovative initiatives like the Deep Tunnel Sewerage System also help to optimise land use while meeting infrastructure needs.
- Integrating Transport with Land use Planning
As Singapore is land-scarce, public transportation is the key emphasis as the more effective and efficient mode of transport. To provide greater convenience and accessibility to public transportation, higher-density housing and commercial developments are planned around and integrated with rail transit.
- Reducing the Need to Commute
Besides building more housing close to and in the city centre, a wider choice of business locations are developed near areas where people live. New employment areas are planned at the fringe of new towns. This helps close the distance between jobs and homes, and thus reduces workers' need to commute and eases traffic congestion.
- Protecting Singapore's Natural Heritage
Nine per cent of Singapore's land area is devoted to green space and nature reserves. Where possible, nature areas are incorporated into parks so that they can be retained and made accessible for public enjoyment. By prioritising developments in urban areas, nature areas can be kept undeveloped for as long as possible for future generations to enjoy.

In the formulation of the Concept Plan and Master Plan, the general public is consulted through exhibitions, dialogues, internet and focus/subject groups. The finalized land use plans and the planning proposals and strategies therein are made available for public viewing and also posted on the Internet for easy reference.

Terrestrial Biodiversity

Despite Singapore's highly urban setting, it nonetheless has a wide range of terrestrial ecosystems including mangroves, coastal, open undisturbed habitats such as grassland and freshwater habitats such as lakes and streams. These and their component species are conserved within a network of two national parks and four nature areas. Approximately 4.5% of

Singapore's land area is legally protected within the nature reserves, and another 4.5% within the national parks. The National Parks Board further manages network of streetscapes and park connectors. At least 2,053 species of higher plants are considered to be native, 360 species of birds have been recorded as resident and there are a vast but uncounted number of insects and invertebrates. Singapore is the type locality for many species of plants and animals. Singapore's few endemic species include freshwater crabs and prawns within the nature reserves.

For further information on Singapore's land resources and terrestrial biodiversity management, please refer to the following internet websites:

- *Urban Redevelopment Authority:* <http://www.ura.gov.sg>
- *Singapore Land Authority:* <http://www.sla.gov.sg>
- *National Parks Board:* <http://www.nparks.gov.sg>

3.1.5 Energy

Energy Policy

Energy plays an indispensable role in Singapore's economy, and will remain critical to our continued economic growth and development. Singapore is a small country state wholly reliant on fossil fuels to meet our energy requirements. The overarching aim of Singapore's energy policy is to address the global energy challenges and to capitalise on the opportunities to sustain our long term economic growth.

The National Energy Policy Report (NEPR), published in 2007, articulates Singapore's energy policy framework that has the following policy objectives:

- To promote competitive markets
- To diversify energy supplies
- To improve energy efficiency
- To build energy industry and invest in R&D
- To step up international cooperation
- To develop whole-of-government approach

Promote Competitive Markets

To promote competitive markets, the Government has liberalised Singapore's electricity and gas markets and is looking into full contestability in the electricity retail market. The Government is also encouraging innovation among private sector players to achieve greater energy security.

Diversify Energy Supplies

To diversify Singapore's energy supplies in order to protect against supply threats, the Government aims to create an open and flexible framework for energy diversification to take place. While Singapore may be alternative energy disadvantaged due to our small size, the Government will continue to support research into alternative energy sources such as solar power, which have greater potential for Singapore.

Energy Efficiency

To improve energy efficiency in Singapore, the Government has established the inter-agency Energy Efficiency Program Office (E2PO) led by the National Environment Agency (NEA). The Government aims to improve energy efficiency by 35% from 2005 levels by 2030. Some of Singapore's key initiatives to promote energy efficiency and the use of clean and renewable energy sources are listed below:

- Power Generation
Between 2000 and 2006, overall power generation efficiency improved from 38 per cent to 44 per cent due to the switch to oil-fired steam plants to combined cycle gas turbines. The E2PO will also continue to promote cogeneration and trigeneration through, for example, the integration of such facilities in future industrial developments.
- Consumers and Households
The Government will continue to encourage consumers to purchase energy efficient appliances and to adopt energy saving habits. New initiatives include mandatory energy labeling for all household refrigerators and air-conditioners sold in Singapore, and encouraging households to reduce standby power consumption.
- Industry
The Energy Efficiency Improvement Assistance Scheme co-funds up to 50 per cent of the cost of energy appraisals for buildings and industrial facilities. Under the Investment Allowance Scheme, capital expenditure that results in more efficient energy utilisation can be granted a capital allowance that allows a deduction against chargeable income. Programmes will be developed to help companies incorporate efficiency considerations early, in the conceptual design phase of a new facility, as well as to adopt good energy management systems.
- Buildings
Building control regulations have helped to reduce the energy required for cooling, while the Green Mark and EnergySmart schemes have been introduced to incentivise developers to build energy efficient buildings. From 2008 onwards, all new buildings and existing buildings that undergo major retrofitting works with gross floor area (GFA) above 2,000m² must meet the Green Mark Certified standard. The Government has also launched the Green Mark Incentive Scheme to encourage building developers to achieve higher Green Mark ratings. Efforts would also be directed to improve the energy efficiency of housing estates by introducing energy saving devices.
- Energy Efficient and Clean Transportation
To further increase the energy efficiency of Singapore's land transport system, the Government is focusing on encouraging greater use of public transport, with a goal of achieving a 70:30 ratio between public and private transport journeys by 2020. The use of more fuel efficient vehicles, and reducing congestion on our roads would also be

promoted. Policies under consideration include mandating fuel economy labeling, and there are also efforts to increase public awareness of fuel efficient driving habits.

Energy R&D

The research institutes, universities and the private sectors in Singapore are engaging in various energy-related R&D activities. Moving forward, energy R&D efforts would be intensified in areas where Singapore has expertise or competitive advantage. One key new initiative is the Singapore Initiative in New Energy Technologies (SINERGY) Centre which will provide technical infrastructure, such as a microgrid and command and control facility, to facilitate research on clean and sustainable energy solutions. The centre will also develop in-house expertise in systems integration, testing and evaluation of energy technologies.

On building capabilities for renewable energy, solar energy is the most promising source for Singapore. There have been continuous efforts to invest early in solar technology test-bedding projects to prepare for large scale use of solar energy. Singapore's national institute for applied solar energy research, Solar Energy Research Institute of Singapore (SERIS), is a research institute sponsored by both the Economic Development Board (EDB) and the National University of Singapore. Its mission is to conduct research and development for a sustainable energy supply based on solar resources.

Develop whole-of-government approach

The growing complexity and strategic importance of energy policy demands a Whole-of-Government approach. The Energy Policy Group (EPG) was formed in 2006 and draws together the different strands of energy policy, culminating in the 2007 NEPR. Several organisational changes have also taken place such as the expansion of the Energy Market Authority (EMA), the creation of the Clean Energy Programme Office (CEPO) and the Energy Efficiency Programme Office (E2PO). The Energy Studies Institute (ESI) has also been set up at the National University of Singapore (NUS) to promote and develop policy-oriented research on the economics, environmental and international relations aspects of energy, as well as contribute to energy dialogue and collaboration within the region.

For additional information on Singapore's energy supply and energy efficiency policies, please refer to the following internet websites:

- Ministry of Trade & Industry: <http://www.mti.gov.sg>
- Energy Market Authority: <http://www.ema.gov.sg>
- National Environment Agency: <http://www.nea.gov.sg>

3.1.6 Management of Waste, Water and Sanitation Services

Environmental Land Use Planning

Environmental problems can be prevented through proper land use planning and the imposition of appropriate controls. The National Environment Agency (NEA), therefore, adopts an integrated approach in the planning controls of

new developments. This is to ensure that environmental considerations and factors are incorporated at the land use planning, development control and building control stages, so as to minimize pollution and to mitigate pollution impact on surrounding land use. The Urban Redevelopment Authority (URA), which is the land use authority in Singapore, consults NEA on land use planning issues. The Housing & Development Board (HDB), other public developers and private sector developers also consult NEA on the allocation of industrial premises.

Water Pollution Control

The following have been adopted by Singapore to control water pollution:

- Providing sewerage infrastructure and solid waste management system to prevent pollution at source;
- Requiring industries to pre-treat their trade effluent before discharge into the sewerage system; and
- Prohibiting industries which use or store large quantities of chemicals to be sited within water catchments.

Such measures have ensured that the water quality of inland and coastal waters in Singapore has remained good.

Toxic Waste Control

Singapore is a small country with limited land. As the land is intensely used for housing, industries, water catchments and recreation, it is important that toxic wastes are safely managed at all times to protect the population and the environment.

The key elements in Singapore's strategy to control toxic wastes and ensure their safe treatment and disposal are as follows:

- a. avoid generation of intractable wastes;
- b. encourage waste minimisation;
- c. encourage waste reuse, recovery and recycling;
- d. regulate collection, treatment and disposal;
- e. monitor and audit collection, treatment and disposal; and
- f. promote and support educational and training programmes.

The collection, recycling, treatment and disposal of toxic industrial wastes are controlled under the Environmental Public Health Act (EPHA) and the Environmental Public Health (Toxic Industrial Wastes) Regulations (TIWR).

The Environmental Public Health (Toxic Industrial Waste) Regulations require all toxic industrial wastes collectors to be licensed. Approval is also required to transport toxic industrial wastes that exceed the quantities specified in the Regulations. The major types of toxic industrial wastes include spent oil, waste solvents, spent etchant and chemical wastes. NEA encourages the reuse and recovery of waste chemicals as it would reduce the amount of wastes that require treatment and disposal. Biohazardous wastes from hospitals and polyclinics are segregated and stored in colour-coded plastic

bags. The wastes are then put in special containers and collected by licensed companies for disposal in special high temperature incinerators.

Singapore acceded to the Basel Convention on 2 January 1996. The Hazardous Waste (Control of Export, Import and Transit) Act and its Regulations were enacted and came into operation on 16 March 1998. The Act and its Regulations enable Singapore to fulfil the obligations under the Basel Convention. Under the Act and its Regulations, any person who wishes to export, import or transit any hazardous waste listed under the Basel Convention will have to apply for a permit from NEA. NEA adopts the Prior Informed Consent (PIC) procedure of the Basel Convention in granting any permit for the export, import or transit of hazardous wastes.

Solid Waste Management

Singapore's unique constraint of a densely populated, highly urbanized city with limited land area makes proper waste management an imperative.

Our solid waste management strategy consists of three key thrusts, namely:

- a. Waste minimisation at source;
- b. Reuse and recycle to reduce waste disposed of at incineration plants and landfill; and
- c. Volume reduction of waste disposed of through incineration.

A) Waste Minimisation

To minimise waste at source, NEA signed the voluntary Singapore Packaging Agreement with 5 industry associations (representing more than 500 companies), 19 individual companies, 2 NGOs, the Waste Management and Recycling Association of Singapore and 4 public waste collectors in June 2007. The agreement encourages food and beverage companies to reduce the amount of packaging used in their products. The Agreement resulted in a reduction of 2,500 tons of packaging waste in the first two years of implementation, equivalent to about S\$4.4 million in savings for the participating companies. From October 2009 onwards, the Agreement was extended to cover all types of product packaging, including detergents, toiletries, personal care products and household products.

B) Recycling

Recycling helps to reduce the need for additional incineration plants and to extend the lifespan of Singapore's only landfill – Semakau Landfill. High recycling rates have been achieved for a number of waste streams such as construction and demolition waste, metals and used slag. A number of waste streams such as food and plastic waste offer potential for further increase in recycling rate. Singapore's overall recycling rate increased from 40% in 2000 to 56% in 2008. The target in the Sustainable Development Blueprint target is to increase the recycling rate to 65% by 2020 and 70% by 2030.

C) Waste Collection and Disposal

All solid waste in Singapore is collected daily through a comprehensive refuse collection system. With limited land for landfills, Singapore's policy is to

incinerate all incinerable waste that is not recovered, reused or recycled. Incineration reduces waste volume by up to 90%. About 91% of waste collected is incinerated. The remaining 9% that cannot be incinerated is disposed of at Semakau Landfill, along with the ash generated from incineration. The electricity generated using the waste heat recovered from the incineration plants accounts for 2-3% of Singapore's total electricity supply. Scrap metal is also recovered.

Sanitation

PUB has a programme in place to provide a comprehensive sewerage system to keep pace with industrial, housing and commercial developments. 100 per cent of the population in Singapore has access to modern sanitation. Used water is collected via an extensive sewerage system and treated at water reclamation plants. Used water is treated as a resource as well. Treated used water is further purified using advanced technology to produce high grade reclaimed water, known as NEWater, which helps contribute to Singapore's water supply. With an eye on the future, the Deep Tunnel Sewerage System (DTSS), consisting of a network of deep tunnels that channels used water to a centralised water reclamation plant for treatment, was conceived as a cost-effective and sustainable solution to meet Singapore's used water needs in the 21st century.

Freshwater

PUB, Singapore's national water authority, is committed to the skillful management of Singapore's water resources from four different sources known as the Four National Taps (water from local catchment areas, imported water, reclaimed water known as NEWater and desalinated water). By integrating the system and maximising the efficiency of each of the four taps, Singapore has ensured a robust, diversified and sustainable water supply capable of catering to the country's continued growth. Today, 100 per cent of the population in Singapore has access to piped drinking water supply.

For more information on the management of waste, drinking water supply and sanitation services in Singapore, please refer to the following websites:

- National Environment Agency: <http://www.nea.gov.sg>
- Public Utilities Board: <http://www.pub.gov.sg>.

3.1.7 Tourism

The Singapore Tourism Board (STB) aims to strengthen Singapore's position as a premier business and leisure destination, by continually revitalizing traditional segments such as attractions and shopping, while expanding food and beverage, cruise, events and MICE (Meetings, Incentives, Conventions and Exhibitions) segments. The Board is also promoting Singapore's quality healthcare and education sectors to the world. STB is in the midst of charting a tourism master plan for Singapore - Tourism Compass 2020. The plan will take into account global mega-trends and ensure sustainable growth in Singapore's tourism industry for the next decade.

The next five years are exciting ones for Singapore's tourism landscape, with the addition of a few major attractions. The following are some examples of upcoming developments and the efforts to remain environmentally sustainable:

- Resorts World Sentosa (RWS) - Opened in early 2010, RWS was awarded the 'Green Mark for Districts' award by Singapore's Building and Construction Authority for integrating sustainable building concepts into the master design of its development. When fully completed, RWS will feature six hotels, retail, dining and entertainment areas, a Maritime Xperiential Museum, a Marine Life Park as well as Universal Studios Singapore.
- One initiative is the use of Ethylene Tetrafluoroethylene (ETFE) canopies for the outdoor shelters at Universal Studios Singapore. This feature will control the amount of sunlight entering outdoor areas and will reduce the amount of energy required for cooling those areas. When used in conjunction with solar-powered eco-cooling systems on a continual basis, those areas can be kept at a comfortable 25 degrees Celsius and will be 40% cheaper to operate compared with conventional air-conditioners.
- Gardens by the Bay - This ambitious project is a 101-hectare world-class leisure destination that will set the standard for new generation park and garden development management. Phase 1 of the The Gardens, known as Gardens in Marina South occupy 54 hectare and boast 2 conservatories that will simulate cool-dry and cool-moist climates and house plant varieties from temperate and Mediterranean climates for educational purposes. The conservation narrative will be strongly emphasized in the Gardens' various features. An innovative water collection system using 18 manmade towers called 'Supertrees' will channel rainwater to the conservatories to cool them from Singapore's tropical heat. This ensures the conservatories' energy usage is greatly reduced.
- Nature based Attractions - These attractions such as the upcoming River Safari (2012), the existing Singapore Zoo, Night Safari, Jurong Birdpark and many park and nature reserves continue to be a key component of Singapore's tourism offerings. They serve as an education platform for visitors on the importance of environmental conservation.

For more information on Singapore's tourism policies and programmes, please connect to the following websites:

- Visit Singapore: <http://www.visitsingapore.com/>
- Singapore Tourism Board: <http://app.stb.com.sg/asp/index.asp>

3.1.8 Transportation

Key Challenges and Constraints

Transport is a critical function that supports economic and social progress. In order to sustain growth both in the short and long-term, it is necessary to plan ahead in a pragmatic, integrated, cost-effective yet flexible manner to ensure that we are able to meet two important objectives: to lower the environmental footprint and to enable more efficient travel.

Based on population planning parameters, projected tourist arrivals and economic growth, it is projected that travel demand within Singapore could increase from 11 million journeys a day currently to about 14.3 million journeys a day in 2020. This is a 30% increase in the number of journeys per day. Hence a good transportation system is a vital requirement to support these developments.

Presently, roads already take up 12% of Singapore's total land area (710.2 sq km in 2008), compared to 15% for housing. The scope to expand the road network is limited if Singapore is to maintain a liveable environment.

In Singapore's efforts to build a sustainable transport system that is environmentally friendly, economically viable and efficient, the Government reviews its policies and strategies regularly to ensure that they support environmental goals in the long run. Improving the energy efficiency of the transport sector is achieved through the following key strategies:

- Sustainable land use planning;
- Promoting the use of public transportation and making it a choice mode for commuting;
- Managing road usage;
- Improving fuel economy;
- Promoting green vehicles and Improving Vehicular Emissions; and
- Achieving cleaner forms of commute

Sustainable Land Use Planning

The planning for an environmentally sustainable transport system starts at the land use planning stage. Both land use and transport planning are carried out simultaneously to ensure that the development of Singapore's land is adequately supported by transport infrastructure. Commercial centres are aimed to be decentralised to ensure that employment opportunities are located close to residential centres. This helps to reduce the demand for travel in and out of the city centre during peak hours and hence would consequentially minimise traffic congestion.

The design and alignment of road and rail infrastructures are planned to minimise adverse impact on environmentally sensitive areas and to preserve the natural environment wherever possible.

Promoting the Use of Public Transport

Public transport is the most efficient and sustainable form of motorised transport. Singapore targets to achieve a public transport modal split of 70 per cent in the morning peak period by 2020, up from the current 59 per cent. The merits of promoting public transport can be seen from a comparison of the relative energy use by various modes of transport. It is estimated that a car carrying only the driver uses nine times the energy used by a bus and twelve times that used by a train per passenger kilometre transported.

Singapore aims to make public transport a choice mode to attract even the car owners to consider using it for their daily commute. The reliability, frequencies and speed of bus services will be improved to reduce waiting and travelling times. The Rapid Transit System (RTS) will continue to be expanded with the aim of doubling Singapore's rail network from 138 km in 2008, to 278 km by 2020. The integration of the public transport network will be improved, to make transfers as seamless as possible, and to provide integrated travel information to facilitate commuters to plan their journey.

The structure of the public transport industry is being reviewed with the intention of increasing contestability for the market, so that public transport operators are compelled to continuously improve on their service standards and efficiency. Singapore's Land Transport Authority (LTA), which currently plans the road and rail systems, is taking over the planning of the bus network, so that the whole transport system can be planned holistically. More bus priority measures, such as bus lanes, will be put in place, in addition to making it mandatory for other vehicles to give way to buses exiting bus stops. These measures will make travel on buses faster, and more reliable.

Managing road usage

- Congestion Pricing

Through effective management of road usage, LTA seeks to reduce congestion and improve the efficiency of Singapore's transportation system. Singapore's strategies of promoting the use of public transport as a viable alternative to the car and innovative policies to restrain car ownership and usage (such as the Vehicle Quota System (VQS) and Electronic Road Pricing (ERP) helps to minimise congestion on the roads and hence minimises fuel wasted and pollution caused by vehicles caught in gridlock.

Congestion pricing was first introduced in Singapore in 1975 to control congestion within the city centre. Known as the Area Licensing Scheme (ALS), Motorists entering the city had to purchase and display a label. Although it was successful at discouraging some drivers from driving into the city, it was not user-friendly and labour intensive to enforce, and hence difficult to extend to other places or time periods when congestion had built up.

In September 1998, Electronic Road Pricing (ERP) was implemented as an innovative, efficient and cost-effective solution to managing travel

demand to ensure that traffic on our roads remains smooth-flowing. Each vehicle carries an electronic In-Vehicle Unit (IU). The driver inserts a pre-paid stored-value card with sufficient balance into the IU at the start of the journey. Each time the vehicle passes under an ERP gantry when it is operational, a pre-determined charge is deducted from the stored-value card.

ERP aims to keep traffic speeds on a road within an optimal speed range. This is the speed where the road is carrying its maximum capacity, and where traffic can still flow smoothly. ERP is implemented on roads where travel demand has built up to a point that the traffic speeds on the road fall below this optimal speed range, and traffic conditions degenerate quickly into start-stop conditions. It aims to discourage sufficient motorists from using the road so that traffic conditions can return to optimal. ERP is a more targeted way of managing traffic congestion as it charges motorists only when and where they contribute to congestion.

The Singapore ERP system remains one of the first of its kind in the world to be implemented and operated on such a scale. Ensuring a congestion-free road network facilitates the efficient movement of people and goods, and supports our growth. From the environmental viewpoint, keeping traffic flowing smoothly minimises the time and fuel wasted and pollution caused when vehicles are caught in gridlock.

- Vehicle Quota System (VQS)
Singapore's vehicle population is regulated through the VQS, which was introduced in 1990. The VQS pegs the long-term vehicle population growth at a sustainable rate. Under the VQS, potential buyers need to bid for a Certificate of Entitlement (COE) which entitles them to own a vehicle for a fixed number of years. The Government can thus control the growth rate of the vehicle population by limiting the annual supply of certificates. This measure has effectively capped the annual growth rate of the vehicle population at 3% per year compared to an average of 6.8% per year over the previous 3 years prior to the implementation of the VQS. With road growth expected to slow down going forward, the vehicle population growth rate has been lowered to 1.5% per year from 2009.
- Intelligent Transport Systems (ITS)
In addition to this, Singapore leverages on technology to maximise the capacity of the road network, through systems such as the Green Link Determining System (GLIDE) and the Expressway Monitoring and Advisory System (EMAS). GLIDE effectively increases traffic throughput at our junctions by monitoring real-time traffic flow, while EMAS ensures that incidents on expressways are cleared quickly, thereby minimising congestion.

- Improving Fuel Economy

The Fuel Economy Labelling Scheme (FELS) has been launched in 2003 as a voluntary programme with the aim of providing buyers of passenger cars with fuel economy information at the point of sale. As at the end of 2007, less than 20% of all vehicle models in the market were participating in FELS. The effectiveness of FELS was limited, as consumers were only able to compare between limited vehicle models that are participating in the FELS.

To improve the effectiveness of FELS, Singapore has introduced mandatory fuel economy labelling for passenger cars and light goods vehicles from 1 April 2009. All automobile retailers are now required to display the fuel economy labels of passenger car and light goods vehicles models at the showroom.

Promoting Green Vehicles and Improving Vehicular Emissions

- Green Vehicle Rebate

To encourage the purchase of green vehicles, a Green Vehicle Rebate (GVR) has been in place since 2001. CNG vehicles also enjoy special tax exemption until 31 December 2009. The GVR was further enhanced in December 2005, whereby green vehicles can enjoy an Additional Registration Fee (ARF) rebate of 40% of the Open Market Value (OMV) of the car, up from 20% previously. Since the enhancement of the rebate, which is valid until end 2011, the number of green vehicles has increased substantially from about 140 in 2005 to more than 5,400 by the end of 2008. Singapore will continue to encourage more motorists to switch to green vehicles which are cleaner and more fuel-efficient.

- Improving Vehicular Emissions

In order to improve air quality, Singapore has set a target to reduce the fine particulate matter pollutant (PM_{2.5}) level from 16µg/m³ in 2008 to 12µg/m³ by 2020. This will be achieved by tightening emission regulations over time. Singapore has adopted the Euro IV emission standards for diesel vehicles and these vehicles emit about 70% less PM_{2.5} compared to their Euro II counterparts.

With effect from 1 October 2006, all new diesel vehicles are required to comply with the Euro IV emission standards. All taxis are expected to achieve Euro IV emission standards by 2014, and with public bus operators expected to follow suit for all their buses by 2020. The Government will also consider tighter emission standards, such as the Euro V emission standard for new diesel vehicles, when it is cost effective to do so.

Singapore is also looking at new technologies to improve the environmental performance of vehicles. For instance, Diesel Particulate Filters (DPFs) that are fitted to diesel vehicles can potentially reduce up

to 85% of the vehicles' PM emissions. The LTA will be conducting trials on the use of the DPF on a range of diesel-driven vehicles and assess its feasibility and cost effectiveness in reducing PM2.5 emissions. Proposals for diesel-hybrid bus trials are also being evaluated. To this end, a vehicle emission test laboratory has been established to support trials on DPF installation and diesel hybrid buses.

Achieving Cleaner Forms of Commuting

Cleaner forms of commuting such as cycling and walking are encouraged. LTA is spending more than S\$41 million to provide cycling facilities in selected residential towns. These facilities include cycling paths on sidetables which provide an alternative route for cyclists commuting between home and transport hubs such as bus interchanges and Mass Rapid Transit stations. In addition, more bicycle parking facilities will be provided near transport hubs to help cyclists transfer to the public transport system for longer distance travel. LTA will work with local community stakeholders when implementing the facilities. The Government has also worked with public transport operators to allow foldable bicycles on buses and trains during off-peak hours. To cater to pedestrians, more covered linkways and pedestrian overhead bridges around MRT stations and bus interchanges will be introduced.

Recent Trends and Emerging Issues

Singapore's population, like that in many other developed cities around the world, is ageing. In addition, with rising affluence, the needs and expectations of its people have increased. Managing road usage and striking a balance between meeting higher expectations and aspirations to own cars while keeping traffic on the roads free-flowing has become a challenge to us. These changing demographics will compel Singapore to re-examine our current policies to better cater to the needs of future generations. In the midst of achieving economic growth and meeting diverse needs, Singapore will also continue to strive to protect our environment by supporting sustainable transport developments.

For additional information on Singapore's transportation policies, please refer to the following internet websites:

- Ministry of Transport: <http://www.mot.gov.sg>
- Land Transport Authority: <http://www.lta.gov.sg>

3.1.9 Communication

Singapore has a high degree of regional and international telecommunications connectivity with other countries. Domestic infocomm usage is high, with the country's mobile phone penetration rate standing at 137.4% in 2009. As at end 2009, the household broadband penetration rate rose to 142.2%, from 99.9% the year before. The number of 3G mobile subscribers also increased from almost 2.5 million subscribers in 2008 to almost 3.2 million subscribers in 2009.

In several global infocomm industry rankings, Singapore has been placed at or near the top spot. In 2009 for instance, Singapore was ranked 2nd on its Technological Infrastructure Sub-Index in the IMD World Competitiveness Yearbook and 1st on the Government Readiness Sub-Index in the World Economic Forum Global IT Report.

Singapore's efforts to develop a highly networked environment are part of its overall "Intelligent Nation 2015" (iN2015) masterplan. A key to realising the iN2015 vision is putting in place a robust infocomm infrastructure that will meet the future needs of Singapore's economic and social development. In that regard, ongoing telecommunication infrastructure projects such as the Next Generation National Broadband Network (NGNBN) and Wireless@SG are instrumental in paving the way for the vision of seamless and ubiquitous broadband communications island-wide.

Whilst acknowledging the value-add of ICT as a key enabler for economic growth, Singapore also recognises its social potential in enriching the lives of all Singaporeans in the way they live, work and play. Hence, one of the key outcomes of iN2015 is the empowerment of Singaporeans with access to and literacy in infocomm usage.

The Infocomm Development Authority (IDA) is Singapore's national authority for the development of info-communications. Part of its role is to encourage the application of communication technologies in areas critical to sustainable development. These include sectors such as:

- a. Education: Singapore intends to strategically deploy ICT in education to provide a learner-centric and collaborative learning environment that equips our youth to face the challenges of a digital, knowledge-based world. Singapore has implemented ICT-enabled programmes such as:
 - i. NEU PC Plus Programme, a PC deployment plan, benefiting students from low-income families;
 - ii. EdVantage Programme, a flagship programme with the Ministry of Education to leverage on ICT to facilitate teaching and learning beyond the classroom; and
 - iii. FutureSchools@Singapore, for the development of model schools that integrate innovation and ICT pervasively and seamlessly into curriculum learning.
- b. Healthcare: Singapore's healthcare providers have leveraged on the innovative use of ICT to improve healthcare quality, reduce costs, as well as to meet some of today's challenges such as Singapore's ageing population. The IDA has an Integrated Clinic Management Systems (CMS) programme, which encourages General Practice (GP) clinics to adopt and leverage on infocomm technologies to facilitate operations and clinical improvements in their patient care. Through this programme, General Practitioners have the capability to easily plug into the national healthcare network and achieve the Ministry of Health's "One Singaporean, One Electronic Medical Record" vision.

Both IDA and Singapore's Media Development Authority (MDA) also collaborate in the Interactive Digital Media (IDM) sector, another key growth cluster for Singapore. The IDM Research & Development Programme was set up to leverage on Singapore's unique multi-cultural, multi-lingual identity with our strong foundation in information and communications infrastructure to create innovative niches within this vast and fast changing sector. One of the key initiatives of the R&D programme is "IDM in Education". This focus area in the IDM sector aims to harness the innovativeness of IDM to facilitate engaged learning for students in both the school and higher education sectors and develop educational models and tools to equip students with the right skills and competencies to be ready for an IDM-pervasive environment.

As the champion of the media industry in Singapore, the MDA spearheads initiatives that promote industry growth in film, broadcast, publishing, music, games, animation and IDM. The MDA also oversees a Public Service Broadcast (PSB) programming and funds programmes that promote social objectives as well as serve the interests of TV viewers. Between 2007 and 2009, these have included programmes promoting the message of environmental sustainability, which were screened on major local TV channels: e.g. *Saving Gaia* (featuring environmental champions in the local community), *The Green List* (dispensing tips on eco-friendly living) and *Saving Water Wally* (imparting good water conservation habits to children.)

For additional information on Singapore's communications policies, please refer to the following internet websites:

- Ministry of Information, Communications and the Arts: <http://www.mica.gov.sg>
- Media Development Authority: <http://www.mda.gov.sg>
- Infomm Development Authority: <http://www.ida.gov.sg>

3.2 CROSS-SECTORAL AREAS

3.2.1 Financing and Investment

Singapore has a wide range of prudent financial policies, incentives and strategic financing tools to promote inward investments and to encourage a strong and healthy economy. For more information, please refer to the following websites:

- Economic Development Board: <http://www.sedb.com>
- Ministry of Trade and Industry: <http://www.mti.gov.sg>

3.2.2 Sustainable Development Capacity Building and Education

Singapore Environment Institute

The Singapore Environment Institute (SEI) is the training division under the National Environment Agency (NEA), a statutory board under the Ministry of the Environment and Water Resources. Launched in 2003, SEI has been

championing the environment capacity building efforts through the development and conduct of training programmes and facilitation of knowledge-sharing platforms. Besides providing environmental courses to enhance the competence of NEA staff and those working in the environment industry, SEI also conducts various capacity-building programmes to government officials from other countries. The array of environmental training subjects offered by the Institute includes Climate Change, Energy Efficiency, Environmental Protection, Pollution Management, Solid Waste Management and Environmental Health Management. Since its inauguration, SEI has trained more than 30,000 government leaders and officials, business decision-makers and the industry, as well as members of the public and non-governmental organisations. To promote and engage further knowledge transfer efforts, the SEI is keen to explore partnership opportunities with other countries and international organizations.

Please refer to the website for more details on SEI's mission and environmental capacity building programmes:

- *Singapore Environment Institute:* <http://www.nea.gov.sg/cms/sei/abt.html>

International Capacity Building and Cooperation

At the United Nations General Assembly 22nd Special Session in 1999, Singapore launched the Singapore Small Island Developing States Technical Cooperation Programme (SIDSTEC). The initial five-year programme was part of Singapore's contribution to sustainable development of SIDS. SIDSTEC courses covered training fields such as urban development and environmental management, which were closely aligned to the 1994 Barbados Programme of Action.

In 2005, Singapore announced the indefinite extension of SIDSTEC at the Mauritius International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Training fields have since expanded to cover diverse and relevant fields such as public administration, education, customs modernisation and climate change. As of December 2009, the SCP has trained over 6200 officials from SIDS member states. Details of SIDSTEC courses are available at the following website:

- *Singapore Cooperation Programme:* <http://www.scp.gov.sg>

Sustainable Development in Schools

The National Environment Agency (NEA) has adopted a multi-prong approach towards encouraging Sustainable Development in Schools through the schools' curriculum, as well as extra-curricular programmes.

On the curricular front, sustainable development concepts are distributed through the curriculum in various subjects and at the different levels, in subjects such as civic and moral education, health education, geography. Students learn about their role and interaction on the environment, pollution prevention, environmental health and management and appreciation of the natural environment. In Geography for example, students learn the concept of sustainable development while studying the causes and effects of

environmental degradation and the various approaches to managing resources. They also learn to evaluate the effectiveness of environmental strategies related to the issue of sustainable growth in the context of different environmental systems.

The curriculum is supplemented by NEA's Environment Champions (Schools) Programme where selected students receive training by NEA to build their capacity to spearhead environmental activities. These Environment Champions work closely with Environment Education Advisors in their respective schools to encourage their peers and the community to take ownership of the environment.

NEA works with the Ministry of Education to recognise outstanding schools in the area of environmental education as Centres of Excellence in Environmental Education. There are currently two schools that have achieved this distinction, both of which have a structured and differentiated environment education programmes for their students. In these programmes students learn about a myriad of issues relating to sustainable development through classroom learning and project work.

NEA also supports schools in their environment education efforts by working with partners to set up centralised resource areas on specific topics such as climate change. In 2008, the NEA developed and launched together with Science Centre Singapore and the Shell Group of Companies a Climate Change Exhibition. The exhibition educates school children and the public on climate change issues relating to sustainable development.

3.2.3 Regional Cooperation

Singapore's environment-related co-operation within the regional Association of Southeast Asian Nations (ASEAN) can be traced back to the 1977 ASEAN Sub-Regional Environment Programme, which set the framework for such regional co-operation. This cooperative effort was further enhanced when ASEAN charted its Vision 2020 in 1997, which envisioned, among other things, a clean and green ASEAN with fully established mechanisms for sustainable development.

To achieve this vision, Singapore has been partnering our ASEAN neighbours to promote environmental sustainability guided by the ASEAN Socio-Cultural Community (ASCC) Blueprint which was adopted by the ASEAN Leaders at the 14th ASEAN Summit on 1 March 2009 in Cha-am/Hua Hin, Thailand.

ASEAN member States signed the ASEAN Agreement on Transboundary Haze Pollution on 10 June 2002. The Haze Agreement seeks to institutionalize and enhance existing arrangements under the Regional Haze Action Plans and serve as a legal framework to better facilitate regional and international co-operation in addressing this problem. Singapore is among the first six countries to ratify the Haze Agreement, which came into force on 25 November 2003.

In addition, Singapore's Meteorological Services Department (MSD) – a division of the National Environment Agency – currently hosts the ASEAN Specialized Meteorological Centre which forewarns the region of an outbreak of land/forest fires, provides an assessment of weather conditions, and monitors the spread of hotspots and occurrences of transboundary smoke haze affecting the ASEAN region.

Indonesia and Singapore had jointly developed a Master Plan to prevent and mitigate land and forest fires in the province of Jambi, Sumatra. Since Nov 07, under the support of the Indonesian State Ministry of Environment and the leadership of the Governor of Jambi province, Singapore completed 7 action programmes under the Master Plan and has implemented 2 new programmes related to peatlands management and the enhancement of aquaculture expertise.

3.2.4 Research and Development

Memoranda of Understanding (MOU) with Universities

In June 1991, then Ministry of the Environment signed separate Memoranda of Understanding with the Nanyang Technology University (NTU) and the National University of Singapore (NUS) on joint applied R&D co-operation programmes. On 1 July 2002, the two MOUs were transferred to the National Environment Agency (NEA). Joint projects under the MOU are in the areas of applied R&D pertaining to engineering and the physical and general environment in Singapore. The projects are of practical importance to NEA and of academic interest to the universities. If a research area is of interest to NEA and the university, the interested staff will form a team for the joint project. Costs and incomes accruing from the programme, if any, are shared between the NEA and the two universities. In addition to the universities, the NEA collaborates with other tertiary institutions to carry out joint research projects.

Innovation for Environmental Sustainability (IES) Fund

The IES Fund was set up by the Ministry of the Environment in October 2001 to encourage and assist Singapore-registered companies to undertake innovative environmental projects that could help to meet the objective of environmental sustainability. NEA now administers the IES Fund. It provides assistance through grants to cover a percentage of the qualifying cost of the project, up to a maximum of S\$2 million for each project.

4. TRADE AND INVESTMENT FOR SUSTAINABLE DEVELOPMENT

Singapore continually seeks to strengthen our trade links by supporting multilateral and regional initiatives, and forming free trade agreements with key trading partners.

As a small and open economy highly dependent on trade, Singapore has a strong interest in ensuring that global trade is based on a strong rule-based multilateral trading system where goods and services can flow freely with minimum impediment. Engagement with the World Trade Organisation (WTO) therefore remains a top priority, and Singapore also supports regional initiatives towards further liberalisation such as Asia-Pacific Economic Co-operation (APEC) forum, the Association of Southeast Asian Nations (ASEAN) and the Asia-Europe Meeting (ASEM), which are all complementary to the WTO process.

In the same liberalising vein, Singapore believes that free trade agreements (FTAs) function as building blocks to the multilateral process. Since the signing of its first FTA under the ASEAN Free Trade Area (AFTA) in 1993, Singapore's network of FTAs has to date expanded to cover 16 regional and bilateral FTAs with 24 trading partners. These FTAs have been instrumental in helping Singapore-based businesses strengthen cross-border trade by eliminating or reducing import tariff rates, providing preferential access to services sectors, easing investment rules, improving intellectual property regulations, and opening government procurement opportunities.

Additional information on Singapore's FTAs can be obtained from the following internet website:

- <http://www.fta.gov.sg>

5. MILLENNIUM DEVELOPMENT GOALS

Recent social and economic statistics indicate that Singapore's ongoing measures to improve poverty, child mortality, control of communicable diseases, education, environmental sustainability and gender equality, have been highly successful. Singapore will continue to ensure that its citizens enjoy a high standard of living.

5.1 POVERTY ERADICATION

Social issues in Singapore come under the ambit of the Ministry of Community Development, Youth and Sports (MCYS). Singapore's approach to poverty eradication is to have a social safety net that is comprehensive and sustainable over the long term. The government's measures are calibrated and targeted so that help goes to those who need them most. Singapore's social safety net is underpinned by several key principles. Firstly, it is work-focused. MCYS encourages individuals to work and be self-supporting. The government supports this through education and continuing education, employment assistance, skills training and upgrading. Secondly, MCYS emphasises family as the first line of support. Singapore believes that the bedrock of society is the family, and family members should render mutual support where possible. Thirdly, Singapore believes that the community must be involved in helping the low-income and needy in society. MCYS developed a 'Many Helping Hands' approach which involves the private and people sectors in providing services and help to the less fortunate. This is based on our belief that the community has the knowledge and resources to help this group effectively and efficiently.

For those without the ability to work or do not have family support, there will be the government's help in the form of the final social safety net – ComCare – to ensure that their basic needs are met. ComCare, short for the Community Care Endowment Fund, serves as a springboard for the needy to become self-reliant through addressing their social and financial needs while rendering employment assistance, training and other help. Financial assistance and other forms of social support are delivered through 5 regional Community Development Councils, which are local administrative centres of government.

The key ComCare programmes under the 3 ComCare Pillars of Self Reliance, GROW and EnAble are:

- (i) ComCare Self Reliance: To promote self-reliant individuals and families.
 - Work Support: Helps low-income families become self-reliant through work, by tying financial assistance to compliance with an action plan containing steps a family must take to find employment / move towards self-reliance. The programme provides monthly cash allowances as well as assistance for utilities, rent, and service and conservancy charges.

- ComCare Transitions: Provides medium-term assistance to people who are temporarily unable to work (e.g. due to medical illness), are financially needy and have little or no family support.
- (ii) ComCare GROW: Helps low-income children realize their potential and break out of the cycle of poverty.
- Kindergarten Financial Assistance Scheme (KiFAS): Provides fee assistance for needy children attending kindergarten to ensure no needy child is deprived of a preschool education.
 - Centre-based Financial Assistance Scheme for Childcare (CFAC): Provides fee assistance for needy children attending childcare centres to allow their parents to go out to work and to give the children access to developmental opportunities in childcare centres.
 - Student Care Fee Assistance Scheme (SCFA): Provides fee assistance to low-income school-going children with affordable before and after school care, while their parents are at work.
 - Healthy Start Programme (HSP): Helps low-income families, with newborn babies or children aged 6 years old and below, enhance their parenting skills and parent-child interactions so as to strengthen the family as a unit and provide opportunities for their children to receive early childhood education/development programmes.
- (iii) ComCare EnAble: Helps the non-work capable integrate into the community through formal and informal networks.
- Public Assistance Scheme (PA): Provides living expenses for basic needs for non-work capable Singaporeans with little or no family support.

For more information, please refer to the following internet website:

- *Ministry of Community Development, Youth and Sports:*
<http://www.mcys.gov.sg>

5.2 EDUCATION AND REDUCTION OF CHILD MORTALITY

5.2.1 Education

Singapore's literacy rate for 2008 was 96.0 per cent. The percentage of residents with secondary or higher qualifications was 89.6 per cent. Singapore has enacted legislation for Compulsory Primary School Education in National Schools. This is aimed at giving children a common core of knowledge that will provide a strong foundation for further education, and a common educational experience, which will help to build national identity and cohesion. It will ensure that those children who would otherwise miss out on the full benefits of an education in national schools will have an opportunity to do so.

5.2.2 Reduction of Child Mortality

Children in Singapore enjoy accessible, high quality and equitable health care. In 2008, the infant mortality rate was 2.1 per 1,000 live births, compared to 26.3 per 1,000 live births in 1965. In 2009, UNICEF's "State of the World's Children Report" ranked our infant mortality rate as the lowest in the world.

The under-5 mortality rate in Singapore was 2.8 per 1,000 resident live-births in 2008. This represents a 67 per cent reduction of under-5 mortality rate since 1990 (when the rate was 8.6 per 1,000 resident live-births). The commonest causes of death among children under 5 years of age are congenital anomalies, perinatal complications of prematurity, pneumonia, heart diseases, cancers and accidental falls.

The Singapore Childhood Immunization Programme and improved environmental control have played key roles in reducing the mortality from childhood infections. The Childhood Immunization Schedule includes immunization against tetanus, tuberculosis, diphtheria, pertussis, polio, hepatitis B, measles, mumps and rubella and pneumococcal disease. Improved antenatal and perinatal care – e.g. antenatal ultrasounds, genetic counseling and births supervised by trained health care workers – have also contributed to the reduction of the under-5 mortality rate.

Injuries are an important cause of under-5 mortality – and are a leading cause of death among the 5 to 18 year olds. Several organizations are involved in helping to reduce the incidence of injuries. These include the National Safety Council (NSC) which is involved in public education, the Singapore Civil Defence Force (SCDF) which teaches safety drills and the Consumer Association of Singapore (CASE) which is tasked with ensuring the safety of electrical appliances and children's toys.

For additional information on Singapore's education and child healthcare policies and programmes, please refer to the following internet websites:

- Ministry of Education: <http://www.moe.gov.sg>
- Ministry of Health: <http://www.moh.gov.sg>

5.3 GENDER EQUALITY AND EMPOWERMENT OF WOMEN

Singapore is a small island city-state with our people as the only resource. It therefore makes sense for Singapore to develop the potential of all individuals, both women and men, for the advancement of the nation. We base our system on meritocracy, and everyone, regardless of gender, enjoys full and equal opportunities. Equality is safeguarded under Article 12 (1) of the Singapore Constitution, which reads, "All persons are equal before the law and entitled to the equal protection of the law".

The Singapore Government is committed to providing all Singaporeans with equal access to quality education, which will help to develop and empower them fully to choose their own careers and shape their future. Singapore has

achieved a high literacy rate for women. The literacy rate of resident females aged 15 years and over was 94.2% in 2008, up from 89% in 2000.

Female students make up more than half the full-time student intake at the local universities today. In addition, women are well-represented in traditionally male-dominated subjects. The intake of females to the following courses in 2007 reflect this:

- (a) at the universities, women made up 80% of the health sciences course, 69.1% of the architecture & building course and 66.2% of the natural, physical and mathematical science course;
- (b) at the polytechnics, women made up 78.3% of the health sciences course, 69.2% of the legal studies course and 62% of the science and related technologies course; and
- (c) at the ITE, women made up 60.4% of the applied and health sciences course and 39.1% of the info-communications technology course.

To achieve the twin objectives of giving our children a core set of knowledge and skills, and providing a common educational experience, the Government has made six-year primary school education in national schools compulsory. This took effect with the cohort entering Primary One in 2003. In making primary school education compulsory, Singapore has in effect implemented Goal 2 of the UN Millennium Development Goals, i.e. to achieve universal primary education for boys and girls.

Women in Politics & Decision-Making Positions

Female representation in the Singapore Parliament has been increasing. Based on data compiled by the Inter-Parliamentary Union (IPU), as at 31 October 2009, Singapore is ranked 42 out of 187 countries in terms of the percentage of women in the Lower or Single House. Singapore's 24.5% of women in Parliament currently exceeds IPU's world average of 18.6 percent (both Houses combined)¹. The International Institute for Management Development (IMD) World Competitiveness Yearbook 2009 ranked Singapore 18 out of 57 countries in terms of the percentage of women in Parliament, ahead of UK, USA and Hong Kong.

In April 2009, the first female Minister in Singapore was appointed with her appointment to the Prime Minister's Office (PMO). She also serves concurrently as Second Minister for Finance and Transport.

Women have a choice whether to enter politics. Although more women are increasingly holding their own in the economic sphere, many still shy away from politics due to the desire for privacy. While we have made progress, there is still more that we can learn from other countries on how to encourage more women to participate in politics. The Government is optimistic that as Singaporean women become more educated, more will consider entering politics. Such a change takes time, and Singapore remains committed to this long-term effort.

¹ <http://www.ipu.org/wmn-e/world.htm>

For more information on Singapore policies and programmes to promote gender equality and empower women, please refer to the following internet websites:

- Ministry of Community Development, Youth and Sports: <http://www.mcys.gov.sg>
- Singapore Council of Women's Organisations: <http://www.scwo.org.sg>

5.4 HIV/AIDS, MALARIA AND OTHER DISEASES

5.4.1 HIV/AIDS

As indicated in Section 1.2.7, the prevalence of HIV/AIDS is relatively low in Singapore compared to other diseases. The control and prevention of HIV/AIDS comes under the central control of the Ministry of Health (MOH), with the involvement of other relevant government agencies and community organizations. The National AIDS Control programme comprises the following:

- Public education and education of high risk groups
- Protection of the national blood supply through routine screening of blood and blood products
- Encouraging HIV testing
- Management of HIV-infected individuals and their contacts
- Monitoring and surveillance
- Legislation

The MOH is assisted by an inter-sectoral National HIV/AIDS Policy Committee, which provides overall policy guidance on strategies to prevent and control HIV/AIDS and to provide adequate treatment, care and support to individuals and communities infected and affected by HIV/AIDS.

5.4.2 Dengue Fever, Malaria and Other Diseases

The National Environment Agency (NEA) is responsible for the prevention and control of vector-borne diseases in Singapore.

Dengue Fever / Dengue Hemorrhagic Fever (DF/DHF)

In Singapore, the *Aedes aegypti* and *Aedes albopictus* mosquitoes transmit DF/DHF. Close surveillance is kept on the *Aedes* mosquito population, particularly in the dengue-sensitive areas. Source reduction, or the removal of breeding sources is the primary means to control the vector population; insecticides are used only in areas with outbreaks to bring down the mosquito population. Where possible, building structures are re-designed to prevent water stagnation that could give rise to mosquito breeding. Multi-disciplinary research is carried out. These include the use of Geographical Information System (GIS) to track the vector distribution, employment of molecular tools to monitor the dengue virus serotypes, use of biochemical tools to monitor

insecticide resistance. NEA also coordinates the mosquito control efforts of public sector agencies through the Inter-Agency Dengue Taskforce.

Malaria

Singapore has been declared malaria-free since 1982. However, NEA still maintains an *Anopheles* vector surveillance program to prevent the re-introduction of malaria. These include the regular maintenance of anti-malaria drains, carrying out oiling and residual insecticide spraying at malaria-receptive areas and monitoring the salinity of coastal water bodies to prevent *Anopheles* from breeding. In addition, entomological and epidemiological investigation is also carried out for any reported clustering of malaria cases.

Other vector-borne diseases

A control and surveillance programme is also in place for other vectors such as rodents, flies and cockroaches to prevent outbreak of diseases associated with these vectors.

For more information on Singapore's public health policies and initiatives, please refer to the following internet websites:

- Ministry of Health: <http://www.moh.gov.sg>
- National Environment Agency: <http://www.nea.gov.sg>

5.5 ENVIRONMENTAL SUSTAINABILITY

As previously noted in section 2.1, Singapore has developed the Sustainable Singapore Blueprint to help the country develop sustainably over the next 10-20 years. The Sustainable Singapore Blueprint was launched in April 2009 with a vision to "make Singapore a lively and liveable city state, one that Singaporeans love and are proud to call home". The Blueprint focuses on four strategic thrusts, namely: (1) Improving Resource Efficiency, (2) Enhancing our Urban Environment, (3) Developing our Capabilities, and (4) Engaging our Community.

To view and download an electronic version of the complete Sustainable Singapore Blueprint, please visit <http://www.sustainablesingapore.gov.sg/>

5.6 PARTNERSHIPS FOR SUSTAINABLE DEVELOPMENT

Singapore recognizes that co-operation and partnerships across the 3P (people, private and public) sectors is crucial to meet sustainability challenges and to build an environmentally sustainable and enduring Singapore for generations to come. The Ministries in the Inter-Ministerial Committee on Sustainable Development will be engaging the 3P sectors to get their support in achieving the targets and outcomes set out in the Sustainable Singapore Blueprint.

For more information on Singapore's national, regional and global partnerships for sustainable development, please refer to the following websites:

- Sustainable Singapore Blueprint: <http://www.sustainablesingapore.gov.sg/>
- Singapore Cooperation Programme: <http://www.mfa.gov.sg/scp/>
- Singapore Environment Institute: <http://www.nea.gov.sg/cms/sei/index.html>
- PUB Conservation & Education: <http://www.pub.gov.sg/conservation.htm>

6. EMERGING CONCERNS AND SPECIAL NEEDS

Like many Small Island Developing States (SIDS), Singapore continues to confront a range of socio-economic challenges (such as responding to global economic conditions, urbanization and the potential threat posed by pandemics), as well as environment challenges (such as scarcity of land, limited water resources, and the need to adapt to the effects of climate change). Singapore also continues to rely on fossil fuels for electricity generation given our severe constraints in switching to alternative sources of energy. However, since 2001, we have shifted from fuel oil to natural gas - the cleanest form of fossil fuel - which currently accounts for 80% of our electricity needs. In addition, the persistent threat of transnational terrorism is a major concern for Singapore, which is a regional centre for trade and finance, and an international hub for air and sea transport. As Singapore prepares to face such challenges, it looks forward to sharing its experience and cooperating with other SIDS and the wider international community through the Singapore Cooperation Programme and other platforms.