

**INTERNATIONAL MEETING OF SMALL ISLAND STATES ON  
THE HUMAN DIMENSION OF GLOBAL CLIMATE CHANGE**

**MALDIVES, 13-14 NOVEMBER 2007**

**SINGAPORE'S STATEMENT**

Your Excellencies, Ladies and Gentlemen,

I would like to express my delegation's appreciation to the Government of the Republic of Maldives for convening and organizing this International Meeting of Small Island States on the Human Dimension of Global Climate Change, as well as for the excellent hospitality extended to our delegates.

**Preamble**

2 Climate change is the most serious environmental challenge the world is facing today. Not only can climate change lead to natural disasters such as droughts, floods, and rising sea levels affecting the region, but also to regional competition over resources such as energy, food, and water. There is also the human dimension to climate change, as it involves all of humanity. This is why this meeting we are attending over these next two days is relevant.

3 As all nations contribute to global warming in one way or another, and as most nations would suffer the ill effects and impacts of climate change, a global solution is needed to tackle this challenge. Singapore therefore supports the UNFCCC and the Kyoto Protocol processes to find a global solution to climate change.

4 Singapore recognises that all countries should contribute to resolve the issue of climate change to address it effectively, and should work towards a long-term global target collectively as a global community through the UNFCCC.

**Mitigation**

5 Ultimately, mitigating greenhouse gas emissions requires reducing the amount of carbon in air. Singapore believes that there are three broad areas that we must proceed on:

- Increase carbon sinks – take carbon out of the air through forests.
- Shift to cleaner fuels – with lower carbon intensity.
- Reduce energy intensity – use less energy in our economic activities.

### Increasing Carbon Sinks

6 We have to use the forests as buffers against climate change. We should pursue reforestation programmes, as well as minimise loss of forest area through deforestation. But this requires the attention of the international community. We need to get the market mechanisms right, so that there is value at the local level of preserving forests in a governed, responsible manner with concrete deliverables.

### Clean Energy

7 Green power (e.g. wind, solar, biofuels etc) can be an alternative to fossil fuels. But for many of these technologies we need research and development before they can be scaled up to a level that can meet our growth and development needs cost-effectively. In Singapore, we have allocated S\$170 mil (~US\$110 mil) for research in solar and fuel cell technologies.

8 However, we should also be cognisant of the trade-offs and risks involved in clean energy e.g. if biofuels are produced unsustainably, can lead to deforestation, environmental damage and destruction of carbon sinks.

### Energy Efficiency

9 Singapore had started the greening of Singapore before "green" was fashionable and adopted a comprehensive approach in the design and development of our city-state in a way that is efficient, carbon-friendly and liveable.

10 Singapore is working to improve our energy efficiency as a practical, sustainable response on addressing our greenhouse gas emissions. We recognise that this not only lowers our carbon emissions but also reduces energy imports and improves our cost competitiveness. As of 2006, our carbon intensity (carbon emissions per dollar of GDP) has improved by 26% over 1990 levels.

11 Governments have a role to play by addressing market barriers in energy efficiency, e.g. lack of information, or high upfront costs. We have put in place new building codes and energy labelling regulations to help increase energy efficiency in a way that will also make us more productive. The Singapore government is taking the lead to drive energy efficiency improvement, by making its own buildings energy efficient.

12 The government has recently announced an Energy Efficiency Masterplan that covers a spectrum of areas including legislation, incentives, awareness raising and competency building, to further drive our efforts in energy efficiency, especially in the major energy-consuming sectors in Singapore namely power generation, industry, transport, buildings and households.

### **Vulnerability and Adaptation**

### Singapore's Vulnerability to Climate Change

13 As a relatively low-lying, densely populated island in the tropics, Singapore is vulnerable to climate change. Much of the island is less than 15m above sea level, with a generally flat coast. Housed within its 193km coastline is a population of about 4.5 million, making Singapore one of the most densely populated countries in the world. Singapore is also situated in a region in which many communicable diseases such as dengue are endemic.

14 The potential impacts of climate change on Singapore include:

- (a) Coastal land loss
- (b) Increased flooding
- (c) Water resource impacts
- (d) Public health impact from resurgence of diseases
- (e) Heat stress
- (f) Increased energy demand
- (g) Impacts on biodiversity

These potential impacts are not due solely to climate change, but can be aggravated by adverse global climate change.

### Existing Adaptation Measures

15 Singapore is aware of its vulnerabilities to climate change and has already put in place various measures that help in adapting to the potential impacts of climate change.

#### Coastal Land Loss

16 A sea level rise of up to 59 cm could result in some coastal erosion and land loss in Singapore, particularly as Singapore has a relatively flat coastline. About 70% to 80% of Singapore's coastal areas have hard wall or stone embankments and the rest are either natural areas such as beaches, mangroves. The Government will look at adapting to the sea level rise through the protection of our foreshore and coastal areas as the need arises. Existing revetments may have to be strengthened and reinforced while natural areas may have to be protected using different coastal defense systems.

#### Flooding

17 A higher sea level would also make it more difficult for rainwater to drain into the sea and this could aggravate inland flooding during storm surges and rainstorms. In order to minimise the impact of rising sea levels, the government requires new reclamation projects to be built to a level 125 cm above the highest recorded tide level, above the IPCC AR4's highest projected sea level rise.

18 The development of drainage infrastructure in Singapore over the last 30 years has reduced flood-prone areas from 3200 ha in the 1970s to 124 ha today. We will reduce it to less than 66 ha by 2011 through the development and improvement of drainage infrastructure in Singapore (e.g. widening and deepening of drains and canals), as well as other flood alleviation projects.

(e.g. raising grounds in conjunction with new developments, installing pumped drainage systems).

### Water Resource Impacts

19 A rise in sea level could also result in seawater flowing into some coastal reservoirs, a process known as saltwater intrusion. Additional steel plates on the tidal gates of coastal reservoirs may need to be installed in the future to address this issue.

20 Rising global temperatures could affect absolute levels of rainfall and its seasonal distribution, thus resulting in changes in levels in the reservoirs. Increased unpredictability in rainfall could also cause difficulties in capacity planning for our water resources. The introduction of reclaimed water and desalination, which are not rainfall dependent, has increased the resilience of our water supply, although at the cost of higher energy use.

### Higher Energy Demand and Heat Stress

21 Warmer temperatures due to both climate change as well as the urban heat island effect<sup>1</sup> would lead to greater use of air-conditioning and increase Singapore's energy demand. Moreover, higher annual temperatures could result in more frequent and more severe episodes of warm weather, leading to increased occurrences of heat stress and discomfort, particularly among the elderly, the sick and those without access to air-conditioning.

22 Measures that can lower ambient temperature include increasing the amount of greenery in the city (e.g. city parks, rooftop gardens, vertical greening in buildings) and modifying building layouts and designs (e.g. using building materials with better thermal properties, lighter-coloured building surfaces, designing building interiors and exterior building layouts for better ventilation and to maximise the wind tunnel effect).

23 The government is also encouraging greenery along our streetscape islandwide, such as providing parks and green space, as well as planting strips along the road reserve and developments. In addition, rooftop and vertical greenery in our buildings have been promoted through the planning guidelines.

### Public Health Impact from Resurgence of Diseases

24 Singapore is situated in a region in which many vector-borne diseases are endemic, in particular dengue fever. Dengue patterns are affected by many factors, of which climate is one of them. The government is studying the link between climatic factors such as temperature, humidity, and rainfall. Preliminary results indicate that the number of dengue cases and the yearly

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<sup>1</sup> The urban heat island effect refers to the phenomenon whereby urban areas are warmer than rural areas, largely due to the replacement of natural land cover with pavement, buildings and other infrastructure.

incidence of dengue in Singapore are significantly correlated with the annual temperature.

25 To address dengue, the government has put in place a comprehensive mosquito surveillance, control and enforcement system, which includes pre-emptive steps ahead of the annual dengue peak period to suppress the mosquito population, dengue-related research and a review of building designs.

#### Impacts on Island and Marine Biodiversity

26 A rise in sea level could also lead to loss of mangroves, which could further aggravate coastal erosion rates. Increased erosion could impact recreational areas at the coasts. A rise in seawater temperature as a result of global warming could also have a negative impact on marine life e.g. coral bleaching.

#### Further Measures to Adapt to Climate Change

27 Climate change is a long-term phenomenon and its impacts will be felt for decades. Existing adaptation measures are in place and the Government has commissioned a study to better understand the long-term impacts of climate change on Singapore. With a better understanding of these impacts, government agencies will review the sufficiency of Singapore's existing adaptation measures, identify new measures as necessary and establish national systems to actively monitor and manage these impacts.

#### **Concluding remarks**

28 As a small, low-lying city-state, Singapore is vulnerable to the effects of climate change, including warming temperatures and rising sea levels. We lack natural resources and are dependent on imported fossil fuels for our energy needs. In terms of alternative energies, solar energy offers some potential but the cost of generating electricity from solar is currently too high to be economically sustainable.

29 Despite these limitations, Singapore remains committed to addressing climate change in an environmentally sustainable manner. Our national climate change target as stated in the Singapore Green Plan 2012 is to reduce our carbon intensity (CO<sub>2</sub> per dollar of GDP) to 25% below 1990 levels by 2012. In 2006, our carbon intensity was at 26% below 1990 levels.

Thank you.

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