

Singapore's Water Story: A journey towards water sustainability

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Ladies and Gentlemen

1 A very good evening to all. I am honoured to be here at the inaugural Cairo Water Week.

2 The theme for our plenary session today, "Water Management for Sustainable Development", is pertinent. According to a 2017 report by the World Health Organisation and UNICEF, some 844 million people worldwide still lack basic drinking water service, while some 2.3 billion people lack basic sanitation. Access to Clean Water and Sanitation is one of the UN Sustainable Development Goals. And rightly so, for they are at the core of sustainable development, underpinning poverty reduction, economic growth and environmental sustainability.

3 Water has and will always be an existential issue for Singapore. The World Resources Institute ranked Singapore as one of the most water-stressed countries in the world. Our small land mass does not allow us to collect and store much rainwater. Despite these constraints, we have progressed from a country lacking in water, to our current state where every citizen has access to clean drinking water at the turn of a tap. Singapore's journey towards water sustainability, our Singapore Water Story, however, has not been easy.

4 Our progress was made possible by long-term planning and a political leadership determined to improve people's lives. We pursued innovation to improve water management, and continually engaged and educated our citizens on our water situation and the need for conservation. The latter has ingrained in Singaporeans a heightened national consciousness of our water challenge.

5 There are five key elements in Singapore's water sustainability approach.

THE FIRST ELEMENT – OUR FOUR NATIONAL TAPS

Our First Two Taps

6 The first element is our Four National Taps strategy to ensure a diversified water supply. At independence in 1965, Singapore had only two sources of water – our first Tap, water from local catchments; and our second Tap, imported water from Malaysia.

7 Over the years, we have created new reservoirs, cleaned and dammed up our rivers to capture rain and maximise yield. Our storm water and wastewater streams and systems are kept separate so that storm water can be channelled to our reservoirs through a comprehensive drainage network before it is treated to potable standards. Today, two-thirds of Singapore is water catchment, making us one of the few countries in the world to harvest urban storm water on a large scale for consumption.

8 One project that was emblematic of our efforts is the clean-up of the Singapore River in 1977. The River was literally an open sewer back then. The clean-up took ten years and involved the relocation of thousands of Singaporeans from farms, factories and street-food stalls that were polluting the river catchment. The successful clean-up eventually paved the way for the development of the Marina Barrage and Marina Reservoir in the heart of our city, some 30 years later.

9 However, Singapore's water demand grew exponentially over the years, and will continue to grow. Compounded by the vagaries of weather, as early as the 1970s, we started looking into weather-resilient water sources to ensure the sustainability of our water supply.

NEWater

10 Singapore first examined water recycling in the 1970s. However, the membranes then were costly, unreliable and could not remove all contaminants. By 1998, our studies showed that the cost and performance of reverse-osmosis membranes had improved significantly, making it economical for wastewater to be treated and recycled into ultra-clean water. Our research and development efforts culminated in two full-scale NEWater plants which commenced operations in 2003. NEWater, Singapore's third Tap, was thus established.

11 Today, we have five NEWater plants in operation. NEWater is Singapore's brand of ultra-clean, high-grade water reclaimed from treated wastewater. NEWater allows Singapore to close the water loop and re-use water endlessly. With it, we can "multiply" our water supply through recycling. What this means is that if we recycle half our wastewater, we effectively double our water supply, if we recycle three-quarters of our wastewater, we quadruple it.

12 However, we cannot rest on our laurels. If we continue business-as-usual, by 2060, we will require four times the energy footprint to meet future water needs. To ensure NEWater's sustainability, we continue to focus on R&D, with the aim of increasing NEWater recovery rate from the current 75% to 90%, while reducing our energy consumption. Electrodialysis reversal, which uses an electric field to remove

charged pollutants from wastewater, is one potential technology that we are currently exploring.

13 Beyond the technical aspects of NEWater, equally if not more key was to convince our people that NEWater was not only safe but acceptable for consumption. Before we launched NEWater as our third Tap, we undertook extensive public engagement, through exhibitions, briefings and publicity to foster public acceptance. Our then-Prime Minister Goh Chok Tong endorsed NEWater by drinking a bottle on national television. Religious leaders also came out to reassure their believers of NEWater's acceptability. Today, our people stand firmly behind NEWater being part of our water supply.

14 In 2012, then-UN Secretary General Ban Ki-Moon visited our NEWater complex and said that he would recommend the strategy of recycling wastewater to water-stressed countries, and called NEWater the "elixir of life".

DESALINATED WATER

15 Our fourth Tap is desalinated water. As a small island surrounded by seawater, desalination may appear to be an obvious and practical choice for Singapore. There are many parallels between our ventures into NEWater and desalinated water. Desalination faced the same problems with membrane technology in the early days. Desalination was also expensive as it was extremely energy-intensive. As with NEWater, advancements in membrane technology in the 1990s allowed us to build our first desalination plant in 2005.

16 Today, we have three desalination plants in operation. As with NEWater, we are exploring new technologies to make the desalination process more energy-efficient. For example, we are experimenting with electro-deionisation technology, which can potentially more than halve our current energy consumption. Another project which we are looking into is the use of more energy-efficient membranes based on biomimicry, or mimicking the biological mechanisms by which mangrove plants and euryhaline fish extract seawater.

THE SECOND ELEMENT – RIGHT PRICING

17 I have touched on our Four National Taps, the first element of our water sustainability approach. The second element is right-pricing of water. In Singapore, water is unlike any other ordinary public good. Right-pricing water, while still keeping water affordable for all, is crucial so that we can continue to upgrade our water system to ensure a reliable and sustainable supply, in the face of challenges such as climate change. Singapore's potable water is priced to reflect its long-run marginal cost. This means that the price of water is pegged to the cost of supplying the next drop of water. This is part of instilling a national consciousness of the value of water. It helps to prevent excessive consumption and wastage of water.

THE THIRD ELEMENT – MANAGING WATER DEMAND

18 Long-term sustainability in water cannot be achieved by boosting water supply alone. Our third element lies in managing water demand, which is equally critical to our

water management policy. By 2060, Singapore's water demand is expected to double from today. Every drop of water saved today can contribute to meeting future demand.

19 Inculcating the right mindsets is key. In Singapore, we conduct extensive community outreach efforts such as public education and campaigns for our people and water efficiency courses for companies, so that they develop a water-saving mindset. While we have comprehensive initiatives to educate, support and recognise consumers in their water conservation journey, we still require a regulatory push.

20 We have mandated measures to ensure that companies and households use water efficiently. Companies using large quantities of water are required to look into water conservation measures. We also introduced a Mandatory Water Efficiency Labelling Scheme to allow consumers to make informed decisions when purchasing water fittings and appliances. Less water-efficient products are phased out from our market by law. Our efforts have borne fruit and our household water consumption has fallen over the years to 143 litres per person per day. We are continuing to work with our people to reduce this further.

THE FOURTH ELEMENT – COLLABORATION WITH THE PRIVATE SECTOR

21 The fourth element is collaboration with the private sector. We partner the private sector to encourage innovation, create incentives for optimisation, mobilise expertise and allow for risk-sharing, in a cost-effective manner. We have awarded seven Public-Private-Partnership projects for some of our desalination and NEWater plants. Let me illustrate the benefits of collaborating with the private sector with a recent example, the Marina East Desalination Plant. This plant will be designed, built, owned and operated by Keppel Infrastructure Holdings. Breaking new grounds, this will be Singapore's first large-scale dual-mode plant that, when completed in 2020, can treat both reservoir and sea water. It will also be our first plant to feature a green rooftop which serves as a recreational area for our people.

22 Singapore's spirit of continuous innovation and willingness to try out new technology are evident globally. We have attracted international water companies to conduct research in Singapore and use it as a base for their business. This year, we also launched the Singapore Water Exchange to house an ecosystem of companies along the value chain, allowing them to work together and tap on mutual strengths to push water innovation and business growth. Today, Singapore has established ourselves as a global hydrohub, having 200 local and international water companies and 25 research centres.

THE FIFTH ELEMENT – CULTIVATING STEWARDS OF OUR WATERS

23 Finally, the fifth element in our water sustainability plans is to cultivate stewards of our waters. This stems from our belief that when our people enjoy and appreciate our reservoirs and waterways, they are more likely to care for them and keep them clean. We launched the Active, Beautiful, Clean Waters Programme, or ABC Waters Programme, in 2006, to transform Singapore's utilitarian drains, canals and reservoirs into clean and beautiful streams, rivers and lakes, and integrate them with our urban landscape. Doing so enhances our living environment with community spaces that bring the public close to water. Through this programme, our people learn to value and cherish

our waterways, and become stewards of our water, passing on Singapore's Water Story for generations to come.

24 Private developers have also embraced the concept and incorporated ABC Waters design features in their developments. With the combined efforts of the government and private developers, there are now 115 of such projects, meaning that there is an ABC Waters project in almost every Singaporean neighbourhood.

25 One of our most iconic ABC Waters Projects is the Bishan-Ang Mo Kio Park where we naturalised a concrete canal into a flood plain and integrated it with a neighbourhood park. Many families and friends now have picnics and gatherings beside the river while enjoying its tranquillity. Another project is the Paya Lebar Quarter, a mixed-use development by a private developer, with ABC Waters design features that allows storm water runoff to be cleansed before it is discharged into the river.

CONCLUSION

26 Singapore's water story is still being written. How the story will end will depend on how we respond to the growing threat of climate change, which has already brought about extreme weather patterns, both droughts and floods alike. We are determined to meet this challenge.

27 Even as we continue to grapple with our water challenges, we note that there is no single recipe for sustainable water development. Each country will have their individual circumstances and will need to find a solution that works for them. Nevertheless, underlying each solution must be a strong will to improve people's lives, and the willingness to change and keep up with evolving times.

28 With this, I look forward to a lively panel discussion later in the plenary session, and I wish everyone a fruitful week ahead at the Cairo Water Week. Thank you.

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