NUS National University of Singapore

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Seen here are the PUB's NEWater Service Reservoir facilities in Tampines. Some companies are replacing potable water with NEWater and others are using less NEWater and/or replacing it with desalinated water. BT FILE PHOTO

Making the most out of every drop of Singapore's water

PUB says water-intensive companies could cut their usage by up to 70% through water recycling; a big problem is lack of motivation. BY CECILIA TORTAJADA AND RYAN TAN YI WEI

SINGAPORE'S manufacturing sector has emerged as a regional economic powerhouse, contributing at least 20 per cent to the country's gross domestic product. A major growth engine in the sector, accounting for more than 25 per cent of manufacturing output, is electronics semiconductors. The latter, however, are water-intensive operations.

Depending on their production, a single semiconductor manufacturing plant can use between 2 and 9 million gallons of water a day. In 2015, Intel, the world's largest semiconductor manufacturer, is said to have used 9 billion gallons of water. To put it in context, this is the amount of water that some 75,000 families in United States would have consumed in the year.

MANAGING WATER FOR THE GROWING INDUSTRY

With four national taps (local catchment water; imported water; NEWater; desalinated water), Singapore has developed a very successful supply management system. This has been supplemented with a fifth tap: managing water demand. The objective is that water is used more efficiently by both the domestic and non-domestic sectors.

A very pressing issue to address is water consumption by the non-domestic sector. Its consumption is projected to increase to 70 per cent of the total water consumption by 2060, one year before the water agreement between Singapore and Malaysia ends.

By that year, water supply will mostly rely on billions of litres of water produced by NEWater and desalination. Efficiency practices are part of the Fifth Tap. They are, and will continue being, the only way more water can be available for an increasing number of industries.

The non-domestic sector has enormous potential for water conservation. PUB, Singapore's national water agency, has said it believes water-intensive companies could reduce their consumption by up to 70 per cent through water recycling.

A serious limitation has been the lack of motivation for these companies to reduce their water consumption since their water bills are relatively insignificant compared to their profits.

Aware of Singapore's natural water scarcity and of the importance of a growing industrial base to support socio-economic development, PUB has developed initiatives to engage industries to consume water more sustainably.

In 2004, PUB launched the Water Efficient Building Certification programme motivating industries to play a bigger role in reducing water consumption. In 2007, the agency launched the Water Efficiency Fund to co-fund projects that would result in a reduction of water consumption of at least 10 per cent – or water savings of at least 6,000 cubic metres per year. Support comprised feasibility studies, water audits, recycling efforts and use of alternate sources of water such as NEWater or desalination.

In 2008, as part of the 10 per cent Challenge, PUB introduced the Water Efficient Building (WEB) Design Guidebook to encourage hotels, school or offices to save 10 per cent of monthly water consumption.

The efforts continued. In 2015, large water users with consumption of at least 60,000 cubic metres the previous year, were mandated to submit Water Efficiency Management Plans (WEMPs) to PUB on annual bases. Before this, the plans were submitted voluntarily. However, as of 2014, only 35 per cent of large water users had submitted their plans.

Based on water consumption data in 2017, the agency released water efficiency benchmarks for hotels, office buildings, retail operations, wafer fabrication and semiconductor plants, commercial laundry, data centres and biomedical manufacturing facilities.

These benchmarks enabled the companies to understand where they stood among others in their industry. They also served as recommended guidelines for companies to adopt.

Following the water efficiency benchmarks, PUB published several *Best Practice Guide in Water Efficiency* volumes in 2018 and 2019. These guidebooks – four sectoral and one for buildings – further equip companies with basic knowledge on managing water efficiency and adopting recommended solutions.

In June 2019, PUB announced a S$26 million fund for large water users to adopt on-site water solutions. Through the fund – pooled from three existing government schemes: Water Efficiency Fund, Industrial Water Solutions Demonstration Fund and the National Research Foundation's Living Lab – PUB provides technical help and monetary assistance for companies to implement high-impact water efficiency solutions.

The most recent effort, announced on Nov 1, 2020, increases the financial support for companies to become more water efficient. In addition to technical support among others, companies willing to try water recycling initiatives and projects using alternate water sources are eligible to receive higher funding for potable, NEWater and industrial water saved, capped at S$1 million per project.

It is commendable that PUB has placed much effort to engage industries in water conservation practices and improved water efficiency. Long-term actions like these have made Singapore a more water-secure country.

EFFORTS PAYING OFF

As a result of all these initiatives, some companies are using less potable water – those that are replacing potable water with NEWater, and others that are using less NEWater and/or replacing it with desalinated water.

Some companies are constructing recycling plants to reuse their treated water in their processes. In one of the cases, recycling plants will be able to treat up to 2,000-2,500 cubic metres of the daily water consumption, increasing its water recycling rate from the current 18 per cent to 41 per cent and reducing NEWater consumption by 2,000 cubic metres metres/day. This also means less energy use.

More companies are also working with PUB and with the local universities on how to reduce NEWater consumption. A key component of water conservation for non-domestic users has been to understand industries' water needs, which PUB aims to do as a matter of practice.

PUB continues to tackle complex challenges given that climate change-associated uncertainty and thus impacts on rainfall patterns will only increase. With the continuously improved measures the agency has implemented, it has shown that Singapore's commitment to a systems approach of water management goes well beyond engineering solutions. Planning and implementation have considered the city state's overall development goals and stakeholders' wants and needs. The agency is very clear of its indispensable role in achieving water security and is rising to the challenge.

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