



SCENARIO #5: ... And Not a Drop to Drink

Water is crucial to the tiny island nation of Singapore. Surrounded by the salty sea, they get 50 percent of their potable water from rainfall and must import the other 50 percent. As of 2007, Singapore had a water purchase agreement with Malaysia, acquiring fully half of their nation's water supply through a dual pipeline running across the Straits of Johor. The Malaysia-Singapore agreement was due to run out in 2011, however, and an intractable disagreement over the price of water had caused negotiations to stall.

In an effort to increase water supply, catchments, recycling, and desalination projects had been in the works in Singapore since the early '00s, along with aggressive water conservation practices. Aiming for water self-sufficiency, they opened their first desalination plant in 2005. At the time, experts suggested that Singapore could become the world's leading hub for water recycling and desalination technologies and could export this technology widely, based on their previous success with economic initiatives in science and technology.

In 2009, terrorist attacks severely damaged the massive Malaysia-Singapore water pipelines. Among the top suspects was Jemaah Islamiyah, a group of Southeast Asian Islamic Jihadists based in Indonesia but with cells in Malaysia. They had a history of attempted attacks on Singapore, but had been successfully foiled before. The attack this time was on the Malaysian end of the pipeline and Singapore believed that Malaysia, which is largely Islamic, had not tried hard enough to prevent it. Malaysia was known to be unhappy about Singapore's close political and economic ties to the U.S., and Singapore also suspected that allowing the pipeline damage was a convenient tactic by Malaysia to leverage the water renegotiations. Neither Malaysia nor Singapore were eager to pay for rebuilding the pipeline, and their relationship became increasingly difficult and antagonistic; in the end, no new agreement was reached.

Draconian water conservation efforts were initiated in Singapore starting in early 2010, and the compliant populace went along. Singapore was able to purchase some water from other neighbors such as Indonesia, but they remained desperate for an independent water supply. This critical shortage provided the impetus for considerable investment of money and energy over the next few years. A well-funded joint government-commercial effort drew experts from around the world and invested heavily in an R&D infrastructure, developing nanotechnologies to produce high-volume, high-efficiency water filtration systems suitable for recycling. A small but significant fraction of this effort was aimed at a general-purpose molecular manufacturing capability.

In April of 2007, Vladimir Putin had announced that Russia would pour over US\$1 billion in the next three years into equipment for nanotechnology research, hoping to restore its global economic status and prestige. That amount was quickly boosted to almost a billion dollars per year through 2015, putting Russia on par with the United States, Japan, and Western Europe in nanotechnology investment.

Five years after their 2007 announcement, Russia found major success in developing 'conventional nanotechnology' as part of their creation of a viable nanotech industry. In 2012, they began marketing an advanced generation of water filters, after building the huge manufacturing base needed to produce them in large quantities, thereby developing a new water purification and desalination industry. Russian desalination technology was installed along coastlines in many areas of the world during the next several years.

Meanwhile, a major breakthrough in the fight against AIDS occurred in 2009 when a relatively inexpensive treatment developed in Europe showed great success. By 2011, philanthropists, including the Gates Foundation, were funding a massive humanitarian effort for the treatment's roll-out to African nations. While some implementation difficulties were encountered with certain African governments and clerics, money paved the way, and to great success. However, the resulting economic revival soon clashed with an unexpected severe drought in many parts of Africa, creating a critical demand for clean water that could only be supplied by advanced technology.

By 2015, Singapore had developed a limited molecular manufacturing method to produce water filters in the quantities they needed. Their technology was a precursor to full-fledged molecular manufacturing, in that it went beyond chemical or random assembly, but was still well short of a general-purpose nanofactory. Within a year, they were mass-producing inexpensive water filters capable of recycling water from any source. The Singaporean technology required less energy than the Russian, and solved wastewater disposal problems as well; it found wide use in the interior of continents, including Africa, and was used heavily in many areas of Asia. Perhaps influenced by the United States, Singapore would not license and build manufacturing plants in certain U.S.-unfriendly countries, including China, although they were willing to install filtration plants in those countries.

In late 2016, reports came of a new disease that appeared to be spreading rapidly in several parts of the world. Patients exhibited severe brain damage, something like a cross between meningitis and spongiform encephalopathy (prion diseases).

A World Health Organization researcher then made a shocking correlation. While the clean water provided by Singapore's filtration systems had greatly decreased the incidence of parasitical diseases in installed areas, the new brain disease was concentrated in geographical regions serviced by Singaporean water filters. Investigation quickly uncovered an apparent problem with the Singaporean systems: although most pathogens were filtered out, a rare human virus was encapsulated so that it could survive post-filtration treatment and cross the blood-brain barrier. When this news broke, several water treatment plants in Africa were destroyed in massive rioting, increasing that continent's political instability. A number of affected nations threatened to cut economic ties with Singapore until they dealt with the problem, but with its pride and prestige on the line, Singapore was unwilling at first to admit the mistake. The U.S. pushed for the creation of a WHO subgroup to regulate nanotech water filters, but Singapore shied back, refusing to comply and complaining that the U.S. and Russia were trying to squelch its successful industry solely for their economic gain.

China began exporting its own brand of nanotech-based water filters in 2017, asserting they were a product of long-running Chinese R&D efforts. Experts found this not only unexpected but unlikely given the obvious similarities to the Singaporean model, and considering that further outbreaks of brain disease were also associated with the Chinese filters. Singapore accused China of industrial espionage, but given Singapore's diminutive size and lack of power over the giant to the North, all they could do was complain. Meanwhile, China accused Singapore of deliberately spreading the disease -- despite the fact that Singapore itself was heavily affected. When the design problems finally were corrected, Chinese filters suffered less stigma than Singaporean ones, and the two countries continued to compete and even to rattle sabers over the next half-decade.

In 2019, Singapore's molecular manufacturing capabilities matured and they introduced general-purpose nanofactories, manufacturing a host of high-performance goods for export. This epitomized the next step forward of the "Asian Tiger" economic model.

The United States then moved to establish and enforce international regulations on all nanotechnologies, including nanofilters. In the process, the U.S. revealed a big surprise to the international community: they also had molecular manufacturing. They'd been working on it secretly all along, funded by the government in an attempt to control molecular manufacturing before the nano-genie could escape the nano-bottle. The nanomanufacturing game changed yet

again, to include North America in the competition. Several key American patents, which had been concealed due to national security concerns, were unveiled, and it turned out that Russian as well as Chinese/Singaporean water filters were covered -- not to mention Singaporean nanofactories. American holding corporations immediately sued for tens of billions of dollars of infringement, ratcheting up economic tensions around the world.

By the early 2020's, many regions around the world were asking the same political question... If nanofactory-based infrastructure allowed regions to make their own clean water and energy (nanotech-aided energy production had happened concurrently to the water issue), providing the basis of political autonomy, why should they answer to a central or foreign authority which often has an agenda, culture or history in opposition with their own, and which demands high rates for the use of nanofactory technology? The balkanization of the world accelerated, causing conflicts to flare in some regions and abate in others.

By the CRN Scenario Working Group (see INTRODUCTION)