



# CASE STUDY

## Integrating environmental costs to tackle water scarcity Singapore's water pricing policy

### Key points

- *Singapore's water management shows that basic utilities do not have to be under-priced for better access. By integrating ecological costs, the country has improved both security and quality of water while effectively tackling water scarcity and making its water industry more competitive.*
- *A separate tax rebate on utilities and subsidies targeting lower-income households have been introduced to decouple distributive impacts from over-consumption.*

### There was a concern...

Being a city-state with an area of about 700 square kilometres and a population of about 5 million (as of 2009), with steady high growth and prosperity, Singapore's water consumption has been continuously increasing and is still continuing to rise. Singapore has long been heavily dependent on imported water and experienced chronic water shortage. How to provide clean water to all its population in a sustainable manner has been a major concern for the government.

### What was done?

Since the 1980s, Singapore has been making significant efforts to create a comprehensive environmental management system, including water supply, control of river pollution, establishment of well-planned industrial estates and a world-class urban sanitation system for the entire population. As a result, the country has tackled its chronic water shortage and heavy dependence on imported water from neighbouring countries (mostly Malaysia).

### *Demand management through water pricing*

#### **1. Integrating ecological costs of water and streamlining the rate based on water use amount**

The effective water pricing reform starting in 1997 aimed to reflect not only the full cost recovery but also the increasing water scarcity and high incremental costs of additional water supplies. The existing increasing block tariff system composed of three tiers, and an exemption of the water conservation tax for the bottom tier (covering 56 per cent of the households with less than 20 cubic metres of water use per month, as of 1997) was transformed into a flat-rate system, which is comprised of two tiers with thresholds of 40 cubic metres per month, in which both the bottom and upper levels pay the water conservation tax. At the same time, favoured rates for households over industry and business were abolished to apply the same rate to both entities, only based on their respective water use amount.

As a result of the four annual increments, the price for water has risen by 120 per cent for households after the price reform in 1997. The average monthly domestic bill including taxes increased from S\$13 in 1996 to S\$30 in 2000. Water tariff also provided incentives for water conservation by including a water conservation tax whose proceeds are directly attributed to the government. Sewage tariff (called "waterborne fee") which consists in a share charged for the maintenance of the public sewage system, are also levied. Still this residential tariff is found to be much lower than those in some European countries such as Germany and industrial tariffs are set even lower.<sup>1</sup>

<sup>1</sup> Cecilia Tortajada, "Water management in Singapore" *Water Resources Development* (2006), vol. 22, No. 2, pp 227-240. Available from [www.adb.org/Documents/Books/AWDO/2007/br01.pdf](http://www.adb.org/Documents/Books/AWDO/2007/br01.pdf) (accessed 15 March 2012).

At the same time, by simplifying the tariff structure into a flat rate (a two-tier system) with the same rate application to both households and business, (dis)incentives of overuse by small-size households has been discouraged while businesses could decrease their tax burden, which resulted in a higher competitiveness.

**Tables 1, 2, and 3: Water pricing structure in Singapore (as of July 2011)**

Tariff category	Consumption block (m <sup>3</sup> per month)	Tariff (\$/m <sup>3</sup> ) (before GST)	Water conservation tax (% of tariff) (before GST)
Domestic	0 to 40	1.17	30
	Above 40	1.4	45
Non-domestic	All units	1.17	30
Shipping	All units	1.92	30

Note: \$= cents; GST= goods and services tax, currently at 7%

Tariff category	Consumption (m <sup>3</sup> per month)	Waterborne fee (\$/m <sup>3</sup> ) (before GST)	Waterborne fee (\$/m <sup>3</sup> ) (after GST)	Sanitary appliance fee (before GST)	Sanitary appliance fee (after GST)
Domestic	All units	0.2803	0.3	\$2.8037 per chargeable fitting per month	\$3.00 per chargeable fitting per month
Non-domestic	All units	0.5607	0.6		
Shipping	All units	-	-	-	-

Tariff category	Consumption block (m <sup>3</sup> per month)	Tariff (cents/ m <sup>3</sup> )	WCT (% of tariff)	WBF (cents/ m <sup>3</sup> )
Industrial water	All units	46	-	-

Note: WCT= water consumption tax; WBF = waterborne fee (sewage tax)

## 2. Decoupling distributive impact from (dis)incentive of over-consumption

The reformed water pricing system does not have a lifeline tariff component because it favoured small-size households rather than low-income households and failed to discourage wasteful use of water. Instead of the lifeline tariff or progressive water tariff system, such as an increasing block tariff, adverse impacts on poorer households were addressed in a separate scheme of subsidies and rebates on utility bills (including water, electricity and gas) to decouple the distributive impacts from disincentives on (wasteful) water consumption.

The U-Save rebate scheme, originally introduced in 1996 to offset an electricity price rise, is reviewed every year to assess the impacts on the lower-income households of the changed costs of living due to increases in water and electricity prices, general inflation and changes in goods and service tax rates. The scheme also addresses inadvertent impacts on the lower-income households of economic downturns incurred in economic restructuring or outbreak of epidemics (such as SARS).

The country's innovative public housing scheme (HDB housing scheme) made the targeting of beneficiaries relatively easy and effective, considering that more than 80 per cent of the population lives in HDB flats, including low-income households (who cannot afford to procure a house in the private market). The rebate scheme was based on the type (size) of the HDB flat as well as the number of residents. The rebate is credited by Singapore Power Services, Ltd., the country's billing agent, onto the account of the household utility bills. Households can use the credits to pay their utilities, including water, electricity and gas. Credits not used in the same month can still be used in subsequent periods: this provides stronger incentives to conserve water, energy and gas.

## Results

Impacts of the reformed water pricing and overall water management in Singapore are found to be remarkable:

- Domestic per capita water consumption reduced from 176 to 160 litres per day from 1994 to 2005. The country is targeting 140 litres per day by 2030.
- Water security has improved as the percentage of imported water has reduced from over 50 per cent in 1994 to 33 per cent in 2008. The country is positive about its goal of achieving self-sufficiency by 2061.
- The U-Save rebate scheme has covered more than the negative impact of the rising water prices on the low-income households.
- Strategic long-term investment in national water projects (such as the NEWater recycling scheme, the deep tunnel sewerage system, desalination and rainfall storage at the Marina Barrage) have spawned a thriving water industry with more than 50 international and local companies active in the Singapore water market.

## Success factors

**Comprehensive approach for water management:** This involved the combination of both supply and demand management through major national water projects; achieving balance between quantity and quality of water; considering equally efficiency and equity, strategic national interest and economic efficiency; and strengthening internal capacities and reliance on external sources.

**Importance of enabling environment:** Successful water management and pricing policies were possible because of the country's institutional effectiveness (including legal and regulatory frameworks), the Government's strong political will and an experienced and motivated workforce. The effectiveness of water management policies go hand in hand with the effective management of other utilities and sectors – overall fiscal efforts need to be taken into account.

The message from Singapore's water management practice is clear: Integrating ecological prices of water (and other utilities) to reflect full cost recovery as well as its scarcity level can be an effective way to tackle its quantity as well as quality challenge and to induce more efficient use.

## Lessons learned

**Being a public good does not mean that it should be cheap or free:** The perception that the price of water and (other utilities) should be artificially lowered through government subsidy to secure the unhampered access of the people (and particularly the poor) to the basic good water may need to be revised; empirical evidence shows that subsidized water price (or IBT) may not be effective, neither to address scarcity challenges nor to address the distributive problematic. As shown in the case of Singapore, securing ecological efficiency and sustainable use of water through restoring its full price by integrating ecological costs (and the real value) can be a more effective option. When combined with separate compensation measures which should be well-targeted for the most affected, equity concerns of the price reform could be addressed more effectively.

## Further reading

*Dealing with Water Scarcity in Singapore: Institutions, Strategies, and Enforcement* (Washington, D.C., The World Bank, 2006).

*2008 Annual Report* (Singapore, Public Utilities Board, 2008).

*2009 Annual Report* (Singapore, Public Utilities Board, 2009).

*2010 Annual Report* (Singapore, Public Utilities Board, 2010).

"Water management in Singapore", by Cecilia Tortajada, *Water Resources Development* (2006), vol. 22, No. 2, pp. 227–240. Available from [www.adb.org/Documents/Books/AWDO/2007/br01.pdf](http://www.adb.org/Documents/Books/AWDO/2007/br01.pdf)