

WEEKEND EXTRA | CONSERVATION

Canadians among top water hogs

Global cities that conserve the most use incentives, new technologies and metering

RANDY SHORE

While public education and water restrictions help to conserve water, dramatic reductions can be achieved through water pricing and government incentives to upgrade wasteful appliances. A study by researchers at University of California Davis found that the Golden State was able to trim per capita water consumption by 10 per cent over a decade with a combination of watering restrictions and public policy, which required people to install water-saving toilets in new construction.

Efforts in Metro Vancouver — which have included toilet bylaws, rain barrel rebates, sprinkler bans and public education — have brought down per capita water consumption by 20 per cent in the past 10 years, a worthy achievement. However, Australia was able to reduce water use by 35 per cent over roughly the same period, according to the UC Davis study.

"In the water conservation world, Australia is the furthest ahead of any jurisdiction," said Troy Vassos, a professor of engineering at the University of British Columbia.

New South Wales requires all new homes to incorporate water-saving features such as dual-flush toilets, rainwater collection, surface stormwater collection, and on-site treatment of greywater recovered from baths, showers and laundry. Greywater is untreated waste water that contains relatively few pathogens compared with so-called black water, which comes from kitchen sinks and toilets. Greywater can be used for landscape irrigation and toilet flushing, which represents 30 to 40 per cent of indoor water use.

In NSW, the builder must select a suite of conservation measures that meet the state's sustainability goals before construction permits are issued. Plus, state and federal governments offer rebates on the purchase of rainwater and greywater systems.

"You get 100-per-cent uptake on conservation technology in this way," said Vassos. As a result, 46 per cent of Australian homes have rainwater collection and 86 per cent have dual-flush, ultra low-flow toilets, which use 50 to 75 per cent less water than conventional toilets.

Despite passing a requirement for ultra low-flow toilets in 1978, the uptake in California is only 26 per cent.

The City of Melbourne — among the stingiest water consumers in Australia — adopted permanent year-round watering restrictions in 2012.

Melbourne also recovered and treated about 50 million litres of water from its sewage, equal to about one-eighth of its total drinking water supply. The water is used mainly for irrigation.

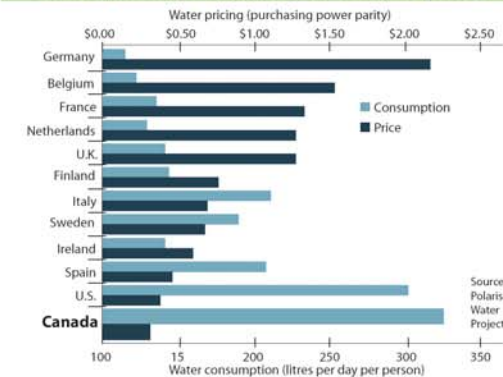
Water metering

Metering and water pricing in Australia have also served to drive consumption down. Australians pay about 62 per cent more for water and sewage services than Canadians and 100 per cent more than Americans, according to the Organization for Economic Co-operation and Development.

Water pricing — which goes hand in glove with household water metering — is by far the most effective way to curb residential water use and a handful of European nations have used it to drive per capita water use down to levels that make North Americans look positively profligate.

In the pantheon of water hogs, Metro Vancouverites are among the biggest consumers, according to the POLIS Project, a collaboration between governments,

Water pricing versus water consumption



foundations and universities. We use less than Los Angeles, but so does nearly everyone.

We use twice as much water per capita as Germany, where metering is universal for single-family homes. To achieve such gains, Germans pay five times more by volume than Canadians, according to POLIS.

Even without punitive pricing for water, metering and the opportunity to pay only for what you use can generate modest reductions in water consumption.

Nowhere is it easier to see the impact of metering than Surrey, where 56,000 homes are metered and 27,000 are not.

Water use in single family homes equipped with meters is about 40-per-cent lower than that of homes without meters in Surrey, according to the city's water planning manager, KK Li.

"We have had a full-scale voluntary metering program since 2007 and all new construction is mandated to have meters since 1999," he said.

The city's total water consumption has been flat for more than 10 years, despite welcoming 1,000 new residents each month.

Surrey's success at curbing water use is driven in part by

people who have self-selected for metering, who likely did so on the assumption they would pay less than the 2014 flat rate of about \$1,360 a year, said Li.

The annual savings for a household of two is estimated to be as much as \$900, while a family of four could pay up to \$527 less.

In 2009, UBC dean of forestry John Innes decided to walk the sustainability talk and installed a variety of water-saving technologies in order to certify his West Vancouver home to LEED standard, the first of its kind in Canada.

Innes installed dual-flush toilets and a rainwater collection system that stores 15,000 litres of water, which he is now using to irrigate his garden.

The problem is that drinking water in Canada is cheap by international standards, "so you have to do quite a lot to realize any significant savings," he said.

Innes would have installed a greywater system, too, had regulations existed at the time. Even now the regulation of greywater systems is spread across several government departments so few municipalities have adopted it into building code.

Vancouver allows residential greywater systems, but only for flushing toilets, while Guelph,

Ont., offers \$1,000 rebates on the purchase of the equipment, which can run up to \$5,000. But greywater represents up to 50 per cent of indoor water use and offers great potential as a conservation strategy.

Turning off the taps

When metering is universal — as it is in Nanaimo, Sidney and Victoria — the water savings are significant.

Nanaimo residents use about 17-per-cent less water than Metro Vancouver residents, the result of a metering program that started more than 35 years ago because of consistent drought-like conditions on southern Vancouver Island. Nanaimo water resources manager Bill Sims expects that gap to widen in 2015.

"It's dropping this year with the drought," he said. "Our daily flows are 15-per-cent below normal."

The city also employs water pricing that places the entire cost of water delivery on users without any subsidy from property tax.

"That has had a huge impact," said Sims. "As (capital) costs have gone up, we've turned the water rates up and people have

"As (capital) costs have gone up, we've turned the water rates up and people have responded by turning their hoses off."

BILL SIMS
NANAIMO WATER RESOURCES MANAGER

Water use per capita in litres each day

Total use includes industry and agriculture

Residential	Total
use	use
Metro Vancouver	282* 471
Nanaimo	242 429
Portland, Ore.	219 390
Los Angeles, Calif.	376 547
San Francisco, Calif.	172 295
Melbourne, Australia	150 238
Sydney, Australia	207 312
Frankfurt, Germany	122 142

*Estimate based on 40 per-cent share for industrial and commercial uses.
Sources: U.C. Davis, Metro Vancouver, City of Nanaimo, City of Frankfurt

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Nanaimo overhauled its water conservation strategy last year and plans to promote greywater use at the residential level, as well as expand its toilet rebate program. And, just to keep the message positive, Nanaimo promotes awareness with "water hero" promotions that encourage people to report their neighbours for extraordinary conservation.

Time to transition

So, should we bite the bullet and install meters on every home in the region? Not so fast, said Vassos. There is an argument to be made for the gradual approach.

A rush to save water on a large scale will come with consequences, such as dramatically lower sewage flows that lead to blocked pipes and confounding disruptions in the way we fund water systems.

In Germany, sewage flows dropped so much in some cities that drinking water has to be used to flush the pipes just to move solid waste through the system.

"One of the things the Australians discovered when radical water savings are achieved is that as water use dropped, so did revenue to the water utilities," he said.

Water conservation technologies were meant to be incorporated into new home construction, allowing a long, smooth transition. Instead, homeowners flocked to the program and began to retrofit their homes en masse, causing a deep drop in water use and cash flow.

Many Metro Vancouver municipalities require meters on newly constructed homes, meaning total conversion will likely take decades.

The City of Vancouver began to require meters in new and substantially renovated homes and duplexes in 2012 and has 1,200 metered homes. The Greenest City Action Plan lists metering and greywater capture as goals, but sets no time frame for implementation.

Uptake of water-saving technology in commercial and office buildings remains stubbornly slow, with just a handful of developers opting to harvest rainwater, according to Alberto Cayuela, director of UBC's Centre for Interactive Research on Sustainability.

Buildings seeking LEED sustainability certification can easily collect and use rainwater for irrigation and, with a larger investment, for flushing toilets. About 90 per cent of water used by an office building is for flushing.

The potential, however, is enormous. He estimates five billion litres of rain falls on UBC's campus each year, while the university buys four billion litres of water annually from Metro.



John Innes, dean of forestry at UBC, at his LEED-certified home in West Vancouver, which includes two underground water cisterns capable of trapping and storing 15,000 litres of rain water. The water is used to irrigate his garden.

JASON PYNNE/PHG

rsshore@vancouvernews.com