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## Opinion: 'Toilet to tap' water can be better

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Direct potable reuse projects, which put treated municipal waste water directly back into the same city's drinking water supply, are creating headlines all over the Southwest — especially in Texas, where Big Spring is already doing it, and Wichita Falls started just this month.

Are there not better solutions to severe water shortages? On the contrary, direct potable reuse would be an improvement over the current situation for several cities in Texas.

We all learn about the hydrologic cycle in elementary school: Rain falls, runoff drains directly or through groundwater into rivers that eventually reach the oceans, evaporation returns water to the atmosphere and rain falls again.

As the rising population has increasingly concentrated in cities, the water cycle has become more complex.

Cities take water from rivers or wells, contaminate it as they use it, send it to waste water treatment plants for sufficient cleanup to return to the rivers, where it heads downstream to the next city.

A recent study by the University of Arizona showed several drinking water treatment plants in the U.S. get their water from sources that, under low flow conditions, consist of 100 percent waste water from upstream cities.

In other words, the waste water discharges from one city are not diluted at all by clean "natural" water when the next city takes it for their drinking water source.

Even under average flow conditions, some drinking water plants use water containing more than 20 percent waste water.

Of the 11 drinking water plant intakes in the U.S. with the highest percentage of such *de facto* reuse, eight are in Texas. So, many Texans are now, probably unknown to them, ingesting water that was recently municipal waste water.

Simply put, if you want to drink very clean water, direct potable reuse will likely provide higher quality water than many drinking water plants currently produce now.

Highly engineered, well-monitored, advanced treatment processes remove contaminants much better.

The first operating direct potable reuse plant, in Big Spring, receives treated waste water and uses multiple sophisticated treatment processes before sending it to the existing drinking water plant for yet more treatment.

Those processes include membrane ultrafiltration to remove particles down to extremely small size and amounts, reverse osmosis to remove all molecules larger than the smallest inorganics to a very high degree, and an "advanced oxidation process" (a combination of UV light and hydrogen peroxide) to oxidize remaining contaminants and inactivate pathogens.

Furthermore, the Texas Commission on Environmental Quality limits the amount of water that can be recycled to 20 percent of the total drinking water influent.

The key to success is monitoring to detect any operational failure rapidly so that recycling can be suspended. For the best drinking water, I'll take direct potable reuse with its advanced treatment, multiple barriers and extensive water quality monitoring. You should too.

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