The Washington Post

Transportation

D.C. Water begins harnessing electricity from every flush

The $470 million "Class A" Biosolids and Energy Facilities section at D.C. Water's Blue Plains Advanced Wastewater Treatment Plant. (Katherine Frey/The Washington Post)

By Katherine Shaver October 7

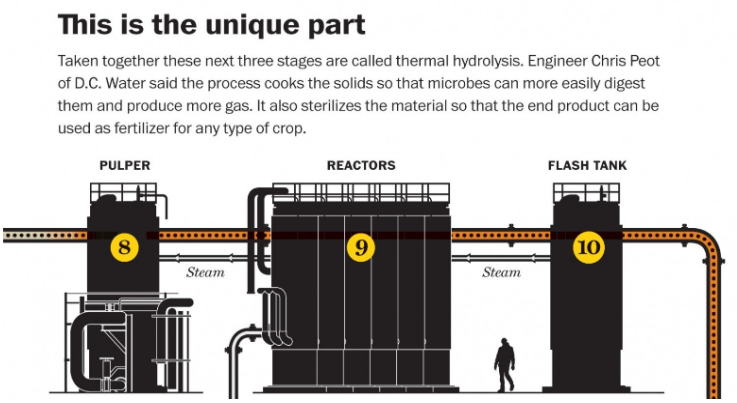
The next time you flush in the nation's capital, you might consider this: You — or, more precisely, whatever you have flushed — will help generate clean energy.

D.C. Water, which also treats sewage from much of the Maryland and Northern Virginia suburbs, recently became the first utility in North America to use a Norwegian thermal hydrolysis system to convert the sludge left over from treated sewage into electricity.

Yes, to put it bluntly, the city's sewage treatment plant is turning poop into power.

"It's a huge deal on so many fronts," D.C. Water General Manager George S. Hawkins said after Wednesday's official unveiling of the system. "It's a public utility leading the world in innovation and technology. We have private and public water companies coming from all over the world to see this."

[How D.C. Water officials planned to turn poop into power]



From toilet to turbine (or poop to power) View graphic here.

Other utilities have generated electricity from sludge, and some — as D.C. Water plans to do soon — sell a byproduct of such systems as a compost-like soil mixture to fertilize landscaping and even vegetable gardens.

But the Blue Plains Advanced Wastewater Treatment Plant, officials say, is the first in North America to do so using “pressure cooker” technology that can fit such a system in the relatively tight confines of an urban treatment plant. D.C. Water officials say it’s the largest of its kind in the world.

Hawkins said the system, which began producing electricity in September, will provide one-third of the 157-acre plant’s power, saving about $10 million annually. Vast amounts of water and sewage need a lot of power to move through pipes and pumps, making D.C. Water the city’s biggest consumer of electricity.

The utility expects to save an additional $2 million or so annually on treatment chemicals and $11 million annually in trucking expenses. Previously, the plant produced 1,200 tons of “Class B” biosolids daily, the industry term for the dark gunk left over from treated sewage. That wet, smelly residue had to be carried away in 60 truckloads every day, traveling about 75 miles to farms in Virginia. The new system produces about half as much of a cleaner “Class A” biosolid, which requires half the number of truck runs and smells more like damp mulch.

The Class A compost-like substance could show up in the next year or so on the shelves of Home Depot as a soil nutrient for home gardens, officials said.

D.C. Water officials say the $470 million system, which took four years to build, will end up paying for itself and shrink the plant's overall carbon footprint by one-third.

At the dedication ceremony, officials from the U.S. Environmental Protection Agency and the U.S. Energy Department touted the system as an example of how localities can invest in infrastructure while conserving energy and cleaning the environment. Officials noted that water and sewer utilities account for 4 percent of the country's overall energy usage, making them the largest energy consumers in most communities.

Ryu Suzuki, an engineer at the new Bailey Bioenergy Facility, walks past the state-of-the-art machinery that creates thermal hydrolysis. (Katherine Frey/The Washington Post)

"This is on the cusp of science, my friends," D.C. Del. Eleanor Holmes Norton (D) told the crowd of about 100 local officials and utility workers. "This is the kind of magic that results when science is put to its 21st-century use."

D.C. Mayor Muriel E. Bowser (D) said the system dovetails with the city's sustainability efforts.

"We can't afford to have waste be just waste," Bowser said. "Every dollar spent to convert that waste into energy will help us to reach our goals."

Here's how it works: When you flush or send soapsuds down the drain, the contents travel through miles of pipe and ultimately reach Blue Plains, off Interstate 295 in Southwest Washington . There, what looks like brown, murky water flows through screens that remove debris and then sits to allow solids to settle. Then, enormous centrifuges spin off the water and concentrate the remaining solids. (Don't think too long about that part.)

The liquid is sent off to be treated and then returned to the Potomac River, and the concentrated sludge is pumped into large steel Cambi reactors, named for the Norwegian manufacturer. The reactors function like pressure cookers, using 338-degree steam and pressure to cook the sludge. Then it gets pumped to another tank at a much lower pressure, which causes the cell walls of the unhealthful pathogens and other microbes to burst.

“We’re not just burning up the bacteria,” Hawkins explained. “We destroy it.”

The sludge is then sent into one of four “digesters” — concrete cylinder tanks as tall as eight-story buildings — that each hold 3.8 million gallons. There, it spends about three weeks as microbial bugs nibble at it. The bugs convert the organic matter into methane gas, which is cleaned and sent to a nearby building, where turbines burn the methane gas and produce electricity. The entire system covers about five acres.

The key, Hawkins said, is the Cambi pressure cookers that burn off much of the sludge, leaving less of it to be treated. That allowed D.C. Water to have only four enormous cylinder-like digester buildings instead of eight, which it didn’t have room for.

Hawkins lauded the crowd of local leaders for their support, saying that they and D.C. Water customers had made the project possible.

“One could say it’s a project generated by you, too,” Hawkins said, as the crowd of toilet-flushers chuckled. “I’ll let you think about that one a minute.”

Katherine Shaver is a transportation and development reporter. She joined The Washington Post in 1997 and has covered crime, courts, education and local government but most prefers writing about how people get — or don’t get — around the Washington region.