

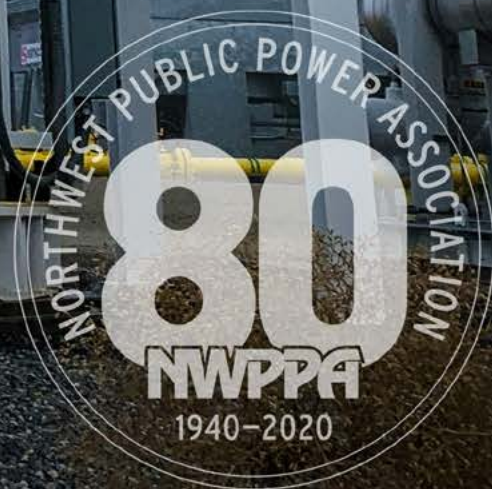
BULLETIN

KLICKITAT PUD PRODUCES NATURAL GAS FROM LANDFILL



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KLICKITAT PUD PRODUCES NATURAL GAS FROM LANDFILL

Washington's governor praises PUD for creating innovative RNG plant

By Brenda Dunn

September 18, 2019, proved to be a memorable day for Klickitat County and Klickitat PUD for several reasons. Most notably, Klickitat PUD dedicated its H.W. Hill Renewable Natural Gas (RNG) facility to a crowd of more than 100 people at Republic Services' Roosevelt Regional Landfill in Roosevelt, Wash. The PUD staff had worked on this project for over five years and it was time to unveil it to the masses.

Klickitat PUD General Manager Jim Smith and his PUD commissioners, managers, and staff were on hand at the ceremony, as were Republic Services management, Fourteenth District State Senator Curtis King, and Johannes Escudero, the CEO from California-based Renewable Natural Gas Coalition. Even Washington's governor, Jay Inslee, attended, which was another memorable detail. (A sitting governor had not visited Klickitat County since 1986!)

"That month was a whirlwind," said Klickitat PUD's Kevin Ricks. "Gov. Inslee coming to the dedication required extra security and clearances, plus we had over 200 visitors to the site in three weeks. Inslee was the first governor in this area in more than 30 years, so that alone was a big deal. We are not used to that much fanfare, but it was great."

This memorable day happened because of Klickitat's RNG project. Natural gas and renewable natural gas serve a similar purpose, but they are inherently different. Natural gas is commonly extracted from fossil fuels deep in the earth. Renewable natural gas, while also being primarily methane, is not a fossil fuel and does not involve practices such as fracking. Instead it takes the landfill gas (composed of methane, carbon dioxide, oxygen, and nitrogen), cleans it, and produces a product that is up to 98% methane and ready for the natural gas pipeline.

"The idea is that you're not digging up something from the deep earth and adding it to the environment," said Smith, who Inslee recognized as the Washingtonian of the Day at the celebration. "You're using organic material that's already in a carbon dioxide life cycle, and you're harnessing energy that would otherwise be wasted."

Inslee attending a ribbon-cutting at the country's fourth-largest landfill raised a few eyebrows because less than a month earlier he had been in the national eye as a contender for the Democratic presidential nominee campaigning on an environmental ticket. However, Inslee fully supports the project for the clean energy it produces. At the ceremony, he referred to the RNG process as a "virtuous cycle."

“We’re bringing up oranges from California, and we’re enjoying and eating those oranges. Then we’re taking the rotting orange peels and turning them into a transportation fuel and shipping it back to California,” Inslee said in his keynote speech at the dedication. “That is a virtuous circle if I’ve ever seen one.”

Roosevelt Regional Landfill

The first part of this virtuous cycle involves the massive landfill that sits on 2,500 acres. Klickitat County, with its low precipitation, makes it an ideal location for the landfill. Roosevelt is the largest landfill in Washington and employs nearly 200 people. The site accepts over two million tons of waste per year, though it is permitted to receive five million tons per year and has a total capacity of 245 million tons. (In comparison, Hanford only has a 20-million-ton capacity.) Two trains with 300 containers weighing 30 tons each drop garbage off at the landfill every day. Each train equals one mile of garbage. The garbage comes from five western states and Canada. If you drive up the windy, steep road to the site in the winter months, you will share the pass with semi-trucks going back and forth from the trainyard below to the landfill at the top. From a distance, the trucks look like ants steadily marching up and down an anthill.

The landfill was designed with generation in mind and in 1998 Klickitat PUD began harvesting landfill gas for electricity via five internal combustion engines. In 2008, Klickitat PUD used landfill gas to power turbines generating electricity. Ten years later, the PUD does not currently use methane to generate electricity; now it cleans the gas and transports the RNG to California via the Williams Northwest Interstate Pipeline, which is a 4,000-mile bi-directional transmission pipeline that



Klickitat PUD’s Kevin Ricks explains to NWPPA Executive Director Scott Corwin how they monitor levels, temperatures, and pressure in the control room, which is staffed 24/7.

is the primary artery for the transmission of natural gas to customers throughout the Pacific Northwest and Intermountain Region. Roosevelt Regional Landfill, with a lifespan of about 80 years, will generate enough renewable energy to avoid the consumption of 20.4 million tons of coal. This means the system will offset a total of 35.4 million tons of carbon-dioxide emissions. Republic Services owns and operates the landfill, and Klickitat PUD owns the project and the gas. The project has been lauded as a terrific example of a public-private partnership.

“With 20 years of experience harvesting gas from a living, breathing biological entity, the landfill gas plant technicians are the skilled link that make the various chemical and thermodynamic processes all work seamlessly together,” said Ricks.

A five-year project

The PUD started discussing the RNG project in 2014.

“It was going to cost \$6-7 million to overhaul the gas turbines and power prices were too low to justify the expense, so we needed to look for alternatives,” said Ricks.

Utilities and landfills have been collecting the methane, the primary component of natural gas, from decomposing garbage for decades now. Ricks explained that oftentimes methane and the other gases are flared off at landfills. Though less harmful than releasing the gases directly into the atmosphere, flaring does not take advantage of methane’s power-producing potential.

“Methane is 30 times more harmful as a greenhouse gas than carbon dioxide, so harnessing that gas in a good way just made sense,” said Ricks. “Why not make something good out of something bad. The gas produced here and piped down to California could run our home furnaces. It’s just as effective as natural gas.”

The Klickitat Board gave the RNG project the green light.



Washington Gov. Jay Inslee (with scissors) was the first sitting governor to visit Klickitat County since 1986.

“A project that is this far out in front of where the industry currently was doesn’t happen without board support,” said Smith. “They set our strategic direction, then supported our staff as we figured out how to deliver. When we ran into challenges, they did not waiver and they pushed us as a team. It made us and the project better.”

Next up was putting the team together. Having worked in the nuclear power program in the Navy, Ricks was a perfect fit to be named as the renewable energy assets manager to research, design, and implement the H.W. Hill project with a small PUD team. He and Smith are quick to acknowledge that the project was indeed a team effort.

“The project would not have been possible without the engineering genius of the designers, Dan Waineo and Aaron Parker of Montrose Engineering,” said Ricks.

“KPUD’s director of finance and accounting, Mike DeMott, and his staff successfully navigated the complex financing, risk management, and off-taker contracts of the project as well,” said Smith. “It’s not every day a small PUD in Eastern Washington is negotiating with some of the biggest names in the petroleum industry.”

Ricks explained how challenging a project like this can be. “For 3.5 years it was near-constant struggle with construction issues, financial dealings, safety specs. For example, the regulators didn’t understand us because it involves unique safety standards,” he said. “Not until after it was running and viable were we able to take a deep breath and relax. Do I regret it? Not at all. I am very, very proud of what my team and I accomplished. Definitely! Do I want to do it again? Ask me in a few years.”

Ricks noted that the challenges ranged from companies dropping out along the process to having to wade through an onslaught of over 80 interested vendors to logistical details such as how to get the massive equipment to Roosevelt.

“The equipment comes from Midland, Texas, and that was a challenge at times because much of it is built and then transported. The skid for example; I told them it was too big to get over the bridge at Biggs but they assured me it would fit,” said Ricks. “And then on the delivery date I got a call saying

“This Eastern Washington enterprise created jobs in a small town using the best of innovative Washington thinking. That’s from one small PUD.”

— Washington Governor Jay Inslee

indeed the skid was too big to get over the bridge at Biggs. We obviously managed to get it here, but with some added steps along the way.”

Smith is thankful for Rick’s perseverance, as well as the Klickitat Board’s support and his small but mighty staff at the utility.

“This project was conceived and designed in a small town, remote from a lot of resources and remote from labor pools. Klickitat PUD is a small utility and we all wear many hats as a result of that. But when the PUD commissioners wanted to find a way to improve our net revenues and reduce our debt, they didn’t hire more people to figure it out. We had to do it ourselves,” he said. “We are both lucky and blessed with dedicated and skilled employees and are very, very proud of their efforts in accomplishing something that larger utilities would struggle to do.”

Uniqueness of the H.W. Hill Project

The way Klickitat PUD harvests and produces the RNG is quite ground-breaking—they do it through a process called cryogenic nitrogen removal. H.W. Hill was the first landfill to use the process and now two other sites use it as well. The process extracts contaminants and nitrogen, essentially purifying the methane. The methane is recycled and used as its own refrigerant. Identifying where this occurs at the plant is quite easy—look for the heavily frost-covered sections next to the bright yellow pipes. This process even reduces the facility’s electrical load for cooling, saving up to 16 million kilowatt-hours of electricity per year!

Visitors to the site would probably never guess that the landfill plant has something in common with Paris, France, but it does. Solar, a CAT company, manufactures the 10-megawatt turbines being used for the RNG project—only 1,200 of these turbines exist in the world, and only four of those are being used at landfill gas projects. Klickitat uses two of them in Roosevelt; a landfill in Paris uses the other two. Keeping with the international theme, Ricks explained that businesses as far as Denmark can use the gas produced by Klickitat PUD.

Klickitat PUD built two 2.9-mile pipes for delivery and receiving to the Northwest Pipeline.



H.W. HILL RNG PLANT FACTS



2018

The plant began producing RNG in November 2018.



15 Mil.

Annually the plant produces renewable fuel equivalent to 15 million gallons of gasoline.



5,700 per day

It produces 5,700 decatherms per day, which is equivalent to 40,714 gallons of diesel fuel or 50,892 gallons of gasoline per day.



The RNG is an EPA-approved cellulosic biofuel that can be used for transportation, replacing diesel in heavy-duty engines and thereby reducing the greenhouse gas emissions of those vehicles by 60-100% percent.

60%
CH₄

What is pulled from the landfill is 60% methane, 40% carbon dioxide.

1 : 25 lbs.

One pound of methane = 25 pounds of carbon dioxide.

100%

The plant uses 100% of the methane captured.



In order for the gas to be pipeline-suitable, it needs to be 97.35% methane; the PUD runs it closer to 98% for a buffer.



Along the 4,000-mile pipeline, there is a compression station every 50 miles.

2.9 miles

The PUD built two 2.9-mile pipes for delivery and receiving to the Northwest Pipeline.

11

11 of Klickitat PUD's 75 employees work full-time at the plant.

While having these connections to Europe is fun, back in Washington's Klickitat County, Ricks points out that the RNG project has also helped bridge an all-too-familiar divide between interest groups—at least as far as the RNG plant is concerned. The more environmentally conscious enjoy that the gas results in a 60% reduction in greenhouse gas emissions over traditional fuels, whereas those more financially minded appreciate that it provides an alternate revenue source, allowing Klickitat PUD to diversify and provide stable utility rates.

"Another great thing about this project is that all sides of the political divide love it," said Ricks. "They may come with questions, but once I explain the benefits of it—both the environmental and financial benefits—they are hooked no matter which side they were originally coming from."

Nearly five months after the ribbon-cutting, Inslee still sends his accolades to Klickitat PUD and the clean energy they are producing at the RNG plant. In his State of the State address on January 14, he praised the PUD when talking about the state's need for establishing a clean fuel standard.

"Klickitat County PUD implemented an advanced cryogenic nitrogen removal system that allows it to scrub methane from the landfill in Roosevelt. Methane that otherwise pollutes the planet is then put into a pipeline and shipped to California where it replaces dirty and dangerous diesel in trucks," he said. "This Eastern Washington enterprise created jobs in a small town using the best of innovative Washington thinking. That's from one small PUD. Think about what the impact could be across our entire state."

Next steps

Smith, Ricks, and the Klickitat PUD team are proud of what they have built, but they know there is still more to be done.

"Being in the black in the first year is an accomplishment, but we can still do better with reliability," said Ricks.

Because the PUD has a 15-year contract with an obligated party (defined as a petroleum producer or importer who is required by law under the Federal Renewable Fuel Standard to produce or purchase certain volumes of renewable fuels based on their sales), the PUD will continue to pump the RNG down to Southern California for now.

"It would have been really nice to keep the fuel in state," Ricks said. "But California is a little further down the road with their renewable fuel standards and infrastructure. So, for right now, that's where the fuel ends up going."

Over 2,000 landfills exist across the country—not including 8,000 large dairies and 17,000 wastewater treatment plants—and most of them burn the methane instead of harvesting it. If the H.W. Hill RNG Plant can serve as an example to others, it was all worth it to Ricks, who says he is constantly getting calls and questions from other utilities about what they have been able to do in Klickitat.

"It's a \$40 million project and the debt will be repaid in five years. It helps the environment while also lowering our customers rates. In my opinion, everyone who can do this should do it," said Ricks. **NWPPA**

Brenda Dunn is NWPPA's editor. She toured H. W. Hill with NWPPA Executive Scott Corwin and Klickitat's Kevin Ricks on December 6. She can be contacted at brenda@nwppa.org.