

Klickitat PUD RNG Research Memo

May 9, 2017

Background:

Early in 2014, KPUD staff began to become concerned about falling power prices and the impact of subsidized renewable energy, wind and solar, might have on KPUD's energy projects and hence on our electric rate payers. The direction from the Board of Commissioners was to "Maximize Value of Assets" and to look for other sources of income beyond rates and power generation.

In April 2014 staff began to investigate the possibility of producing high btu landfill gas, i.e. Renewable Natural Gas (RNG) at the Land Fill Gas facilities. The idea started with the notion that it would be a great story for Republic to tell their customers that the trash they send to Roosevelt is made in to fuel that powers equipment at the landfill. It became apparent very quickly that the volume of energy produced by the landfill in a week would power over 30 haul trucks for a year and a larger consumer would be required. KPUD met with a Developer/Off-Taker and began to develop a business model that would take the LFG cleaned by the existing equipment and install additional equipment to remove CO₂, O₂ and N₂ to inject pipeline quality gas in the nearby Williams Northwest Pipeline.

In May 2014 KPUD commissioned a study by Sierra Research to investigate the Renewable Fuel Standard and the possibility of producing RNG at the H.W. Hill Facility to generate RNG fuel and generate marketable environmental attributes from the fuel. The Renewable Fuel Standard (RFS) program was signed in to law in 2005 by U.S. President George W. Bush and was amended in 2007 as part of the Energy Independence and Security Act.

In June 2014, KPUD staff met with BP for the first time to discuss a possible off-take agreement.

In July 2014, the RNG research memo was complete. Also in July 2014, the EPA qualified Landfill Gas RNG as "D3" cellulosic RIN generation, the most valuable of all renewable fuels. It was at this point it became apparent that production of RNG at the LFG facility could dramatically improve the finances of the KPUD. Over the next three years, KPUD staff held discussions with over 80 companies, conducted at least 8 site visits, evaluated proposals, worked with engineers, equipment vendors, off-takers and manufacturers, industry associations, and governmental representatives to develop the KPUD RNG Project Plan. Some of the involvement of the listed companies below range from phone discussions, to evaluations of proposals and designs, to entering into two formal Memorandums of Understanding (MOU) and one Letter of Intent (LOI), to participation in trade associations and commissioning of research memos. The listing is grouped into 9 different categories and represents to a large extent the KPUD's body of knowledge on the subject of RNG.

Before arriving at contracts with British Petroleum, in addition to numerous detailed discussions on proposals, we worked through two formal MOUs with Clean Energy Renewable Fuels and an LOI with

Toro Energy. These endeavors ultimately did not arrive at satisfactory contractual relationships that would have provided value for our rate payers.

Also during these three years, we engaged several formal requests for proposals for continuing to sell renewable electrical energy to ensure we had a continuing option to utilize the HW Hill electrical generation facility if an RNG option could not be brought to fruition. We also evaluated selling and shutting down the generation facility.

After careful consideration, it was determined that the contracts negotiated with British Petroleum constituted the best risk versus reward proposition for the use of our renewable natural gas.

Developer/Off-takers

Campus Biogas
Element Markets
Toro
Mantau Energy
Twin Eagle
Berq RNG
EDF Trading
PowerEx
Cambrian Energy
Iberdrola
Port of Seattle
Cost Management Services (CMS)
Promus Energy
Direct Energy
Constellation
logen
Clean Energy Renewable Fuels
Aria Energy
Toro Energy
Escudero & Associates
Whole Energy
Loves Travel Centers
Carbon Solutions Northwest

Equipment Manufacturers

BCKK
Morrow Renewables
Chart Industries
ARI
Xebec
Guild
Kobelco Compressors
Greenlane Biogas
Air Liquide
Griffith Consulting
Air Products & Chemicals

Financing

Umpqua Bank
Columbia Bank
Riverview Bank
US Bank
Wells Fargo
North Cascades Bank
Barclays Bank
Washington Federal
Bank of America
Zions Bank
Bank of the West

Governmental Agencies

U.S. Environmental Protection Agency
U.S. Department of Agriculture
Landfill Methane Outreach Program
Northwest National Labs
Klickitat County Commissioners
Klickitat County Planning Department
Governor Jay Inslee
Department of Ecology

Industry Associations

Solid Waste Association of North America
RNG Coalition
Northwest Environmental Business Council
Public Generating Pool

Market Information and Pricing

Argus Media
TEA
S&P Global Platts

Obligated Parties

Shell Oil
British Petroleum
Chevron

Owner/Operator/Peers

Republic Services
King County Solid Waste Division
Puget Sound Energy
BioEnergy Washington Cedar Hills Landfill
Enerdyne Power Systems
Walther Resources, Birmingham AL
Sunshine Canyon Producers, LA California
Waste Management, Altamont Hills CA

Professional/Legal

Strategies 360
Sierra Research
HDR
Genscape
Aciem Consultants
Blue Planet Law
Power Engineers
Cascadia Law
Weaver
ALS Lab Services
Short Cressman & Burgess
McMillen Jacobs Associates
Lands Energy
K&L Gates
ES Engineering
SCS Engineers

Other Involved Parties

Whitmore & Sons
Williams Northwest Pipeline
Michels Construction