

1. Webinar Series Information

Proposed Title * **The Feasibility of Biogas Utilization**

Name of Sponsoring PNCWA Committee(s) * **Sustainability, Resource and Recovery, Residual & Biosolids**

Schedule:

Webinar #1 (Late June/Early July, 11:00 am -12:30 pm, PST)

- Introduction: 11:00 -11:05 am
- Talk 1 with Q&A: 11:05-11:45 am
- Talk 2 with Q&A: 11:45 am – 12:25 pm
- Adjourn: 12:25 -12:30 pm

Webinar #2 (July, 11:00 am -12:30 pm, PST)

- Introduction: 11:00 -11:05 am
- Talk 1 with Q&A: 11:05-11:45 am
- Talk 2 with Q&A: 11:45 am – 12:25 pm
- Adjourn: 12:25 -12:30 pm

Webinar #3 (July, 11:00 am -12:00 pm, PST)

- Introduction: 11:00 -11:05 am
- Talk 1 with Q&A: 11:05-11:55 am
- Adjourn: 11:55 -12:00 pm

Webinar #4 (August, 11:00 am -12:30 pm, PST)

- Introduction: 11:00 -11:05 am
- Talk 1 with Q&A: 11:05-11:45 am
- Talk 2 with Q&A: 11:45 am – 12:25 pm
- Adjourn: 12:25 -12:30 pm

Webinar Organizer

Name ***Miaomiao Zhang**

Company/Institution * **Murraysmith**

Mailing Address **600 108th Avenue NE, Suite 1030, Bellevue, WA 98004**

Phone * **425.943.9130**

E-mail * Miaomiao.Zhang@murraysmith.us

Webinar #1 (Late June/Early July, 11:00 am -12:30 pm, PST)

Moderator

Webinar #1 Moderator * **Usama Zaher**
Company/Institution * **EAST, pllc**
Mailing Address * **2730 Stonecreek Dr., Richland, WA99354**
Phone * **509-432-4112**
E-Mail * **usama.zaher@east-pllc.com**

Speaker #1

Title/Topic: **Sustainable Biogas Use**
Workshop Speaker * **David L. Parry**
Company/Institution * **Jacobs**
Mailing Address * **720 S 1950 E**
Heber City, UT 84032
Phone * **425-301-4070**
E-Mail * **Dave.Parry@jacobs.com**

Biography *

Dr. Dave Parry has an international reputation for providing proven innovative solutions in wastewater, biosolids, and energy. He has 40 years of experience in planning, designing, researching, and providing construction and operation assistance for wastewater treatment, solids processing, and energy projects. He has been principal investigator for research on, anaerobic digestion, co-digestion, pyrolysis, gasification, and combustion. He served as the principal investigator for the Water Environment Research Foundation's co-digestion project and the Environmental Security Technology Certification Program demonstrating the conversion of food waste to fuel at the US Air Force. Dr. Parry served as the Chair of the Bioenergy Technology Subcommittee of the Water Environment Federation Residuals and Biosolids Committee. He was the lead author of the chapter on anaerobic digestion in the published WEF/EPA/WERF Solids Process Design and Management Manual. He has authored and presented more than 50 technical papers and has conducted numerous workshops on recovery of resources from wastewater, solids processing, anaerobic digestion, and energy management

Abstract: *

Insights on the sustainable use of biogas are discussed from the perspective of one water resource recovery facility (WRRF) and one Wastewater Treatment Plant (WWTP) with reference to others as examples (Parry 2007, 2008). The Clinton River WRRF currently flares most of its biogas and an evaluation was conducted on how to beneficially use it. The City of Gresham WWTP currently beneficially uses its biogas to fuel a combined heat and power (CHP) system to achieve energy neutral status and is conducting an evaluation on how to go beyond energy neutral. Both facilities evaluated using biogas to fuel a CHP system compared to using it to produce renewable natural gas (RNG) to fuel compressed natural gas (CNG) vehicles on-site or through injection into a natural gas (NG) pipeline. The purpose of these evaluations was to determine how the biogas should be beneficially used to meet specific objectives for each utility. Objectives included having a sustainable, cost effective, self-sufficient, and reliable operation. Being sustainable meant to beneficially use

the valuable biogas and minimize flaring. Sustainability also included having a cost-effective operation that would be adaptable to changing energy values of electricity and natural gas. Self-sufficiency captured the desire for energy independence and not being overly dependent on temporary incentives or gas and electric utilities. Providing reliable heat and power for uninterrupted operation of the facility was considered critical.

Speaker #2

Speaker *Anthony Tartaglione, P.E., BCEE

Title/Topic:

- Economic Feasibility and Implementation Guidelines for Combined Heat and Power Projects

Company/Institution * Black & Veatch

Mailing Address * 5885 SW Meadows Road, Suite 700
Lake Oswego, OR 97035

Phone * 503-443-4434

E-Mail *tartaglionea@bv.com

Biography *

Mr. Tartaglione is a Senior Engineering Manager with 22 years' experience. His experience includes pumping station design, alternative energy, solids treatment – preliminary treatment through digestion including screening, grit removal, thickening, anaerobic digestion, and dewatering applying mass and energy balance principles to optimize plant operations and assess future capacity needs. Anthony is a contributing author to Water Environmental Federation publications including 1) Design of Water Resource Recovery Facilities. Manual of Practice No. 8, 6th Ed., Water Environmental Federation Publication, 2017; 2) Energy in Water Resource Recovery Facilities, Manual of Practice No. 32, 2nd Ed., Water Environmental Federation Publication, 2020 and 3) Wastewater Treatment Fundamentals III, 1st Ed., Water Environmental Federation Publication, 2021

Abstract: *

Many parameters influence the economic feasibility of CHP projects. This paper identifies digester gas production and electricity prices as key parameters and presents the results from an economic analysis of CHP at various plant scales and electricity prices. For a 20 mgd facility, the economic feasibility threshold is found to be between \$0.08 and \$0.10/kWh, while for a 40 mgd facility, CHP is found to be viable at electricity prices as low as \$0.06/kWh. The economic model does not include incentives, which may further improve the economic feasibility of CHP.

Another key parameter considered is sizing philosophy. To illustrate its impact, two real-world case studies are presented, each based on a fundamentally different CHP sizing philosophies. One City aimed to maximize digester gas utilization, while the other City desired to meet their total power demand through on-site CHP with natural gas fed engines.

Webinar #2 (July, 11:00 am -12:30 pm)

Moderator

Webinar #2 Moderator * **Cyndy Bratz**

Company/Institution * **Tetra Tech**

Mailing Address *

Phone * **503.684.9097**

E-Mail * **cyndy.bratz@tetratech.com**

Speaker #1

Title/Topic: **Conversion of WWTP Digester Gas into Compressed Natural Gas Vehicle Fuel**

Speaker * **Paul Stout**

Company/Institution * **Cornerstone Environmental Group, a Tetra Tech company**

Department

Mailing Address *

Phone * **925-640-7266**

E-Mail * **Paul.Stout@cornerstoneeg.com**

Biography *

Mr. Paul Stout, P.E. currently serves as Vice President for Cornerstone's West Region overseeing all aspects of operations, including project performance, client satisfaction, personnel, business development, and company development for the Western United States. Mr. Stout has 24 years of experience in air quality and landfill gas (LFG) projects and is a leader in the LFG field. His experience includes all aspects of LFG projects, including LFG migration assessment, energy feasibility studies, all phases of design (preliminary through construction plans), permitting, construction, start-up, and operations and maintenance. Mr. Stout has been involved in several of Cornerstone's recently developed BioCNG projects as the engineer of record for the St. Landry Parish project installed in 2012 and the Sacramento Area Transfer Station project currently being developed. Previously, Mr. Stout completed ancillary design of the facilities supporting a LFG to LNG facility in Livermore, California. Mr. Stout has also completed planning and design for a covered aerated static pile composting facility in Novato, California and completed air permitting of a large dry anaerobic composting facility in San Jose, California.

Abstract: *

Utilization of the energy resource represented by digester gas from wastewater treatment plant (WWTP) anaerobic digesters can be an important contribution to sustainability of our communities. Historically, digester gas was converted to electricity and heat on larger WWTP projects with sufficient digester gas flows. Smaller WWTP projects with smaller flows often flared the digester gas. With changes in the electric markets, additional technologies that provide greater scalability can provide flexibility to maximize the technical and cost-efficiency of utilization of the biogas energy resource. One of those effective technologies is conversion of digester gas into renewable compressed natural gas (RNG) for vehicle fuel.

This paper presents the technical aspects of converting digester gas to RNG and several case studies of recent projects that study and convert WWTP digester biogas into RNG vehicle fuel. Conversion

of digester biogas requires capturing and cleaning the gas prior to processing it into vehicle fuel. Additional organic wastes can also be added into the digester to increase biogas production.

Speaker #2

Title/Topic: A Presentation on the Cogen project at Central Kitsap WWTP

Speaker *Peter Zemke

Company/Institution *Brown and Caldwell

Mailing Address * Brown and Caldwell, Inc.
6975 Union Park Center
Suite 490
Salt Lake City, UT 84047

Phone * 801.316.9825

E-Mail * pzemke@brwncald.com

Biography *

Peter has over 10 years of experience as a mechanical engineer with expertise in waste-to-energy and energy efficiency. He has been with Brown and Caldwell since 2013 as part of the national energy design group.

Abstract: *

Central Kitsap WWTP provides an example of how cogeneration can be feasible for smaller municipalities. This presentation describes the performance and features of the plant's 250-kW cogeneration system.

Webinar #3 (July, 11:00 am -12:00 pm)

Moderator

Webinar #3 Moderator * **Cyndy Bratz**

Company/Institution * **Tetra Tech**

Mailing Address *

Phone * **503.684.9097**

E-Mail * **cyndy.bratz@tetrattech.com**

Speaker #1

Title/Topic: **Valuing Carbon – Incentives for Beneficial Use of Digester Gas and Other Sustainable Projects**

Workshop Speaker * **Steve Krugel**

Company/Institution * **Brown and Caldwell**

Mailing Address * **Brown and Caldwell, Inc.**

701 Pike St

Suite 1200

Seattle, WA 98101

Phone * **206.749.2214**

E-Mail * **skrugel@brwnncald.com**

Biography *

Steve is a senior vice president and process mechanical engineer at Brown and Caldwell, with over 40 years of experience specializing in major wastewater treatment planning and design projects. Much of his career has focused on innovative designs for biosolids treatment and energy use. Mr. Krugel is a recognized expert in enhanced anaerobic digestion and Class A digestion technologies, has authored many innovative papers on the subject and is asked to act as process analyst on these projects around the country. He has served as process designer, project engineer, and project manager on over 20 WWTP designs including 16 major biosolids upgrades and has provided expert consulting on many more.

Abstract: *

This presentation will discuss ways communities are adding a value to carbon and other sustainable benefits into their more traditional cost evaluations and how these valuations can incentivize project development. Carbon valuation approaches, including those based on cap and trade markets, the social cost of carbon, and adopted values based strictly on community environmental ethic, will be discussed as well as available direct monetary incentives for some uses such as Renewable Identification Number (RIN) credits.

Webinar #4 (August, 11:00 am -12:30 pm)

Moderator

Name *Miaomiao Zhang
Company/Institution * Murraysmith
Mailing Address
Phone * 425.943.9130
E-mail * Miaomiao.Zhang@murraysmith.us

Speaker #1

Title/Topic: Pacific Northwest Biogas Monetization
Workshop Speaker * Jeremy Kellerman
Company/Institution * Ameresco
Mailing Address *
Phone * 206-708-2937
E-Mail * jkeller@ameresco.com

Biography *

Jeremy Keller, P.E. received his B.S. in Mechanical Engineering from the University of Washington in 2005 and his M.B.A from Oregon State University in 2007. He is a Business Developer for Ameresco with a focus on the wastewater and Industrial markets to deliver energy infrastructure projects. He spends most of his time helping customers develop energy efficiency, operational cost savings and renewable natural gas projects.

Abstract: *

Reduce the biogas energy options to consider with an early focus on return on investment and risk transfer. An updated discussion on the state of the RNG market and projects for 2020.

Speaker #2

Title/Topic: Cost of Operating and Maintaining a Cogeneration System
Workshop Speaker *Patrick Orr
Company/Institution * Clean Water Services
Department
Mailing Address *
Phone * 503-547-8014
E-Mail * orrrp@cleanwaterservices.org

Biography *

Patrick Orr received his BS in ME from the State university of New York at Buffalo. He is a registered Professional Engineer in State of Oregon, with 30 years in HVAC and Mechanical design, including industrial ventilation, chiller and boiler plants, VAV systems, Kitchen and hood design, Odor control, and Energy analysis.

Abstract: *

- i) Keeping a cogeneration facility online and producing electricity and heat will require planning. An operational strategy is important to maximize the potential benefits and maintenance planning to ensure reliable operation and avoiding premature breakdowns.
 - (1) Operational strategy; the operational strategy for operating a cogeneration facility will require managing the available fuel sources to maximize the engine outputs. Identifying the available sources of fuel, the factors that affect the availability of the fuel sources, and a determination of the best available fuel source depending upon operating conditions.
Understanding the economics of the operation of the facility is critical in determining the best operational strategy.
 - (2) A fully functioning cogeneration facility contains many moving parts. In addition to the engines and generator, other pieces of equipment that will be needed to receive beneficial use include heat recovery pumps, radiators, heat rejection pumps, heat exchangers, engine room environmental equipment, gas cleaning equipment, and electrical switchgear. Each of these areas will have a combination of mechanical equipment and controls that require regular attention such as inspections, adjustments, and calibrations.
Each of the required activities will have an associated cost. Cost will typically include labor, material or parts, and consumables. Breaking down each task into these components combined with the frequency of each activity will yield an operating budget and allow for anticipating the necessary budget planning and labor requirements associated with a successful cogeneration installation.

3. Overview

Description of Webinar

This webinar series will cover the components of biogas utilization projects (particularly cogeneration) in an attempt to answer the question of the feasibility of biogas utilization. There will be an overview of the costs associated with procuring, operating, and maintaining a cogeneration facility through its lifecycle. Included in the analysis will be a list of benefits and revenue streams that can be generated to cover some or all of the costs associated with running such a facility. Alternatives to cogeneration will be discussed as well. Various case studies will be presented all in an attempt to answer the question, Cogeneration – Is it right for you?

Short Description

Provide one paragraph (25 words or less) incorporating a brief description, the intended audience, and learning objectives. This will be used in targeted publicity where brevity is required. * A discussion of costs, revenues, and benefits for engineers, managers and decision makers to help determine if co-generation or other biogas utilization projects are right for your facility.

Learning Objectives

Describe what the attendees will learn. *Factors and means that go into the decision of whether to implement cogeneration or other biogas utilization projects at your facility.

Assessment

How will you assess that the participant has met the learning objectives? (Quizzes, successful completion of a lab exercise, Q&A session time?) Q&A

Who Should Attend?

Describe the target audience: * engineers, plant staff, plant managers, municipality decision makers.