



PPEA Proposal – Unsolicited Proposal for a Public-Private Partnership to Develop a Municipal Solid Waste Sorting Facility and/or Advanced Recycling Facility

Fairfax County
October 19, 2022





Fairfax County
Department of Procurement and Material Management
12000 Government Center Parkway, Suite 427
Fairfax, Virginia 22035-0013

Attn: Kimberly Callahan, P3 Project Coordinator
Kimberly.Callahan@fairfaxcounty.gov

Dear Ms. Callahan,

Anaergia Services, LLC (Anaergia) is pleased to submit this response to Fairfax County (County) Notice of Receipt of an Unsolicited Proposal for a Public-Private Partnership to Develop a Municipal Solid Waste Sorting Facility and/or Advanced Recycling Facility on a Portion of the Closed I-95 Landfill Site (PPEA).

Anaergia is the leading technology and solution provider in the landfill diversion and recovery of resources from municipal solid waste. Our technologies and integrated solutions are used to achieve landfill diversion goals, reduce Greenhouse Gas emissions, leverage existing infrastructure, and minimize costs.

Anaergia is interested in collaborating with the County to deliver a solution that maximizes landfill diversion and value generation for the County. Based on the information provided and Anaergia's proven capability, we see an opportunity for a successful public-private-partnership (P3) project with increased landfill diversion and improved economic impacts.

Anaergia is uniquely positioned to deliver a best-value landfill diversion facility to the County, with the following:

- 1) A P3 to design, build, own, operate, and finance a turn-key Combined MSW Sorting and Advanced Recycling Facility at the County Landfill
- 2) The facility would receive and process MSW and beneficially reuse into recyclables, renewable energy, and soil amendments.
- 3) Deliver a facility capable of processing the County's 650,000 TPY of County MSW.
- 4) Anaergia can leverage its experience developing several landfill diversion facilities in the US to support the County with in-house management, engineering, permitting, financing, commissioning, and operations staff.

Anaergia acknowledges Addenda No. 1 and No. 2 released as part of this PPEA. We look forward to partnering with you on this project to achieve the County's landfill diversion and solid waste management goals. If you have any further questions, please don't hesitate to contact me at 949 – 974 – 1118.

Regards,

Yaniv Scherson, Ph.D., P.E., Chief Operating Officer
Anaergia Services, LLC
705 Palomar Airport Road, Suite 200, Carlsbad, CA 92011
949-874-1118
Yaniv.Scherson@anaergia.com



Table of Contents

1) PROJECT CHARACTERISTICS 1

A. COMMERCIALLY PROVEN TECHNOLOGY..... 1

 i) *Equipment Design & Manufacturing* 1

 i) *Organics Extraction*..... 2

 i) *Organics Polishing* 4

 i) *Omnivore® High Solids Anaerobic Digestion* 4

 i) *Biogas Treatment & Beneficial Reuse*..... 6

 i) *Combined Heat and Power*..... 6

B. FACILITY SIZE AND SITE UTILIZATION PLAN 6

C. PROJECT ALIGNMENT WITH COUNTY VISION AND CRITERIA..... 9

D. ANAERGIA COMPANY AND STAFF EXPERIENCE 10

 i) *Facility Design, Engineering, and Permitting*..... 11

 i) *Project Development, Delivery, and Execution*..... 11

 ii) *Operations & Maintenance* 12

 iii) *Financing Services* 12

 iv) *Resource Recovery Program Management*..... 12

 v) *Staff Experience* 13

 vi) *Reference Facilities*..... 13

E. FACILITY PROCESSING CAPACITY AND ANNUAL TONNAGE COMMITMENTS 16

2) ENVIRONMENTAL STEWARDSHIP, SUSTAINABILITY..... 16

A. ENVIRONMENTAL BENEFITS AND SUSTAINABLE ELEMENTS 16

B. ALIGNMENT WITH FAIRFAX COUNTY’S ZERO WASTE PLAN..... 16

3) ECONOMIC IMPACT AND SUSTAINABILITY, AND REVENUE GENERATION TO THE COUNTY 16

A. REVENUE TO THE COUNTY 16

B. ECONOMIC FEASIBILITY 17

C. ECONOMIC COMMITMENTS AND INCENTIVES 17

D. PROJECT TERM..... 18

4) PUBLIC BENEFIT AND COMPATIBILITY..... 18

A. PUBLIC BENEFITS 18

B. PROJECT RISKS 19

5) COMMUNITY OUTREACH AND EDUCATION 19

APPENDIX A – REFERENCE FACILITIES.....



1) Project Characteristics

a. Commercially Proven Technology

Anaergia Services, LLC (Anaergia) is a Delaware limited liability company, incorporated in 2011, whose ultimate parent company is Anaergia Inc., a publicly traded Canadian company that has developed, implemented, and operated a suite of turnkey solid organic waste recycling facilities and anaerobic digestion (AD) solutions for over 25 years. With a proven track record of delivering solid waste, wastewater, and beneficial reuse projects on four continents and its portfolio of proprietary technologies and vertically integrated structure, Anaergia Inc.'s solutions create value to its partners in the form of landfill diversion, renewable energy, high-quality fertilizers, and clean water. Anaergia Inc. and its subsidiaries like Anaergia are uniquely positioned to provide unmatched solutions in the most pressing organics resource recovery challenges, as exemplified by their 1,700 worldwide references. Anaergia has brought together a talented team of professionals in process engineering, finance, plant operations, and manufacturing who strive to fulfill the company's mission of combatting climate change through innovative organics management practices and renewable energy production.



Figure 1: Anaergia's Facilities in North America

i) Equipment Design & Manufacturing

Anaergia and its subsidiaries develop, design, and manufacture technologies and equipment to maximize the effectiveness and reliability of core waste treatment processes, including pre-processing and sorting of municipal solid waste (MSW) and source separated organics (SSO), organics polishing, high-solids AD, nutrient recovery, biogas conditioning, combined heat and power generation, renewable natural gas (RNG) production and pipeline injection, digestate management, and wastewater treatment. Anaergia's key in-



house equipment and technologies include Organics Extrusion (OREX™) press, Organic Polishing System (OPS™), Omnivore® anaerobic digester (comprised of high-solids mixers and Sludge Screw Thickening (SST)), Sludge Screw Dewatering (SSD), ammonia recovery (AMR), membrane bioreactor (MBR), Biogas Upgrading system (BUG™), and sludge pyrolysis. Anaergia’s approach to the development and integration of its unique technologies is unparalleled in the waste, wastewater, and resource recovery industries.

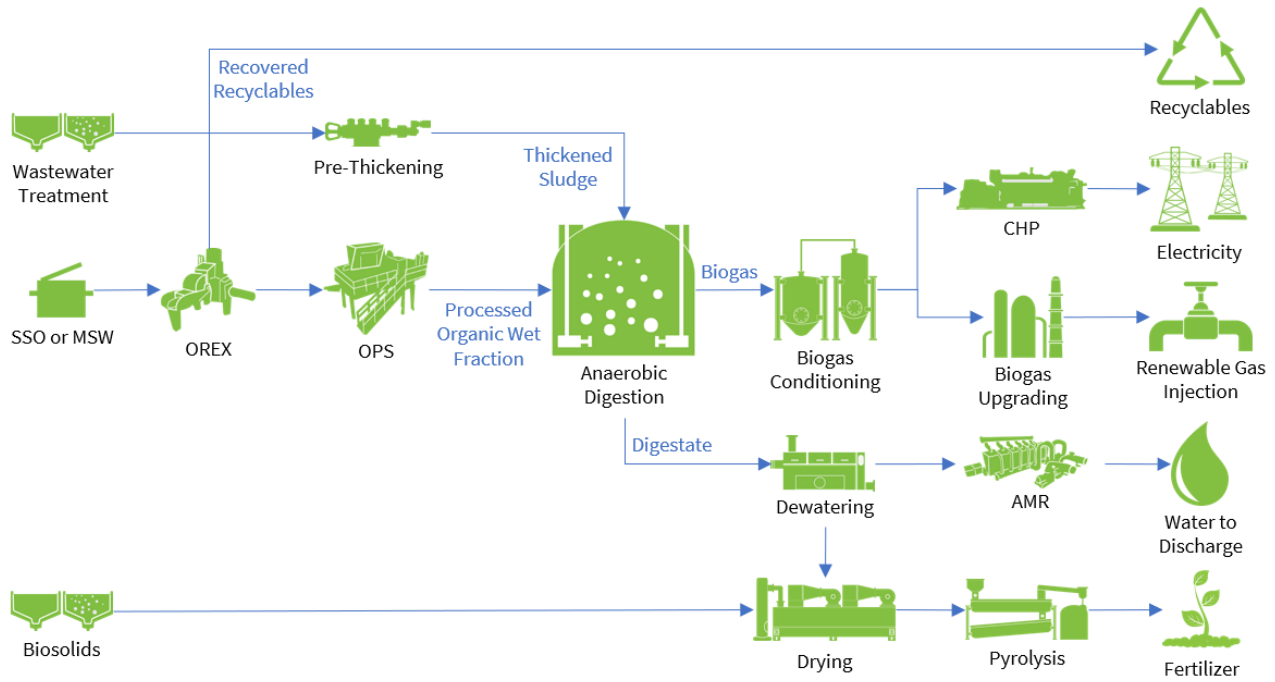


Figure 2: Anaergia's Technologies and Solutions

As a technology leader, Anaergia is intimately familiar with a spectrum of possible solutions to help achieve the County’s goals. The sections below provide an overview of technologies and solutions that may be considered as part of the County’s solution(s).

i) Organics Extraction

Anaergia offers solutions to recover organic materials from any solid waste stream, including source separated organics and MSW. Recovered organics are energy dense and ideal for generating renewable

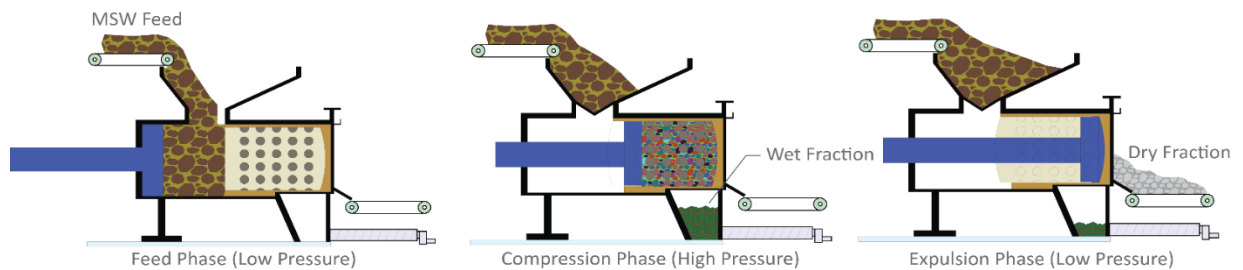


Figure 3: OREX™ Phases of Operations



energy within anaerobic digesters, in addition to septage and other high strength waste from local industry. Such solutions produce reliable, clean organic feedstock supply needed to support a bioenergy project, while reducing waste volumes sent to landfill.

Anaergia’s Organics Extrusion (OREX™) extracts over 90% of putrescible organics from the material fed to it and generates a clean and highly digestible wet organic fraction ideal for conversion to biogas and fertilizer through AD. The waste stream is fed into an enclosed extrusion chamber in the OREX press where it is compressed with a hydraulic ram under high pressure. As pressure is applied, wet organics squeeze through the compressed co-mingled material and out through orifices in extrusion plates. The product is an organic fraction cake (25-30% total solids). The dry “reject” fraction that remains in the compartment is removed after each extrusion cycle. The OREX is compatible with the County’s current collection program and can leverage existing solid waste infrastructure – through installation at an existing transfer station or MRF – to support the County’s zero waste initiatives.

Anaergia’s OREX enables cost-effective recovery of organics from waste streams with varying levels of contamination. As shown in the Figure below, OREX can recover 30% of total incoming MSW, or approximately 96% of putrescible organic materials in the incoming waste (variable yields over time reflect differences in MSW composition). This level of recovery would contribute significantly to achievement of County’s diversion goals.



Figure 4: Anaergia OREX™ Press

The resulting organic fraction cake typically has ~2% contamination. Following polishing to remove any remaining plastic, film, or grit, the recovered material (less than 0.2% contamination) is suitable for direct beneficial reuse via AD. The resulting material is clean, energy-dense, and reliable in supply, enabling cost-effective beneficial reuse via AD. In addition, the reduced volumes minimize hauling costs.

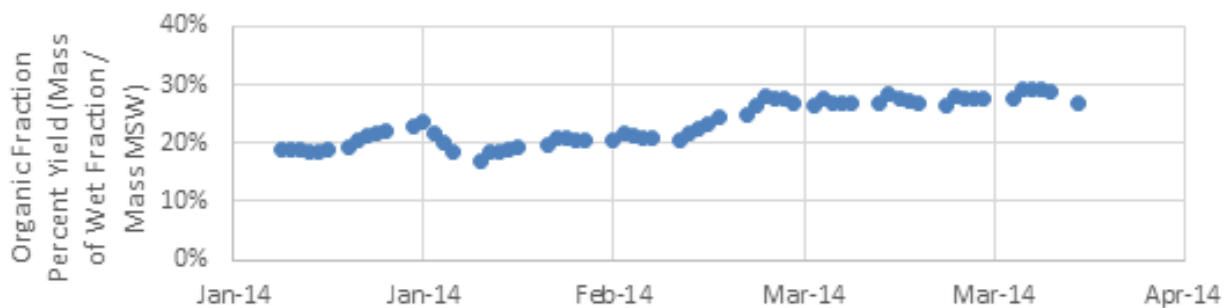


Figure 5: OREX™ Extracted Organic Fraction, Percent of Total MSW Mass Extruded and Captured as Organic Fraction



i) Organics Polishing

Organics separated from the waste stream require additional polishing prior to digestion to ensure removal of contaminants extruded through the OREX press. The organics polishing system (OPS™) includes a dynamic cyclone to remove floatable contaminants such as film plastic and a hydrocyclone to remove grit, followed by grit washing and draining. In the process, the clean organic slurry is diluted to approximately 12-16% TS.



Figure 6: Anaergia's OPS™

The OPS developed by Anaergia is designed to produce a clean organics slurry for wet AD to minimize equipment maintenance, maximize biogas production, and eliminate floating layers and settling of grit in digesters. Polishing also reduces contamination in digestate so that it can be used as a fertilizer material or for land application, meeting state and federal compost quality standards for physical contaminants (drying or other thermal processing may be required).

The OPS may be co-located with an OREX line or can be co-located with AD and bioenergy facilities. This approach reduces hauling expense and trucks required for material transport.

Materials which cannot be digested, including contaminants such as plastics, grit, and glass will be directed to landfill. As is shown in the Figure below, Anaergia's OPS process ensures that the organics slurry produced for AD is virtually free of foreign materials harmful to downstream equipment, while reject streams can be transported and disposed of with ease.



Figure 7: Input and Products from the Organics Polishing System (Left to Right) - Infeed from OREX™, Polished Wet Fraction, Light Rejects, Heavy Rejects

i) Omnivore® High Solids Anaerobic Digestion

Once collected, recovered organics and high strength waste can be processed in anaerobic digesters, either as stand-alone facilities or those used for municipal wastewater treatment plants (WWTP). Anaergia's AD technology is specially designed to process such materials via either mono-digestion of organics, or co-digestion with municipal sludge, and can be installed at new facilities or retrofitted to existing digesters at WWTP.



Pre-processed materials are fed to digesters where bacteria convert organic material to biogas. The optimal residence time is typically 20 days, which allows for most of the energy content to be captured. This approach provides economic benefits through the harvesting of biogas (to produce either renewable power or RNG), as well as generation of fertilizer products derived from the clean, nutrient-rich digestate. Environmental benefits include diversion of waste from landfills, prevention of discharge of untreated liquid waste, reduction of greenhouse gas emissions, generation of renewable energy, and reduction in chemical fertilizer for agriculture.

Anaergia's proprietary Omnivore® is a high solids AD technology that can be operated at three times the organic loading rate of conventional anaerobic digesters. Unlike traditional anaerobic digesters which retain wastewater liquids along with digesting solids, Omnivore® uses thickening to remove unnecessary liquid and increase the solids loading of the feedstock fed to the digester, increasing the working volume available to process organics streams. This provides value in co-digesting applications, should the County desire to include municipal sludge in the project scope to support expanded wastewater treatment capacity.

Anaergia's advanced high solids mixing technology is employed to effectively move material within the digesters, even in viscous applications such as organics processing. Effective, thorough mixing is essential to maintaining appropriate conditions for AD and volatile solids reduction (and therefore biogas production). It also reduces O&M by keeping grit suspended.

Anaergia's Omnivore® technology is utilized globally. The platform provides an economical and reliable solution for high solids applications such as this and can be delivered at reduced capital cost and with smaller footprint as compared to both conventional digestion and compost facilities.



Figure 8: Camden County WWTP AD and Co-Generation Facility



i) Biogas Treatment & Beneficial Reuse

Biogas has varying concentrations of methane, carbon dioxide, hydrogen sulfide, trace gases, siloxanes, and other VOCs. Appropriate biogas treatment technology is essential to utilizing the resource for renewable energy, and the solution required varies upon the intended biogas beneficial use application. For example, RNG (derived from biogas) must meet stringent standards for pipeline injection. Meanwhile, biogas intended to power cogeneration systems must be conditioned to remove potential pollutants for emissions permitting and to reduce negative impacts on the system. Anaergia offers a variety of biogas treatment systems that are cost-effective and equipped to manage the variability of biogas, both in terms of quality and volume. Generally, biogas is sent through condensate and H₂S/VOC removal systems, along with a compressor, prior to gas upgrading (as applicable).

Anaergia would work with the County to determine the beneficial use that provides the best value for its needs and priorities, including renewable energy options for local customers. Typically, upgrading to RNG for pipeline injection is the most economically favorable option.



Figure 9: Biomethane Upgrading System

i) Combined Heat and Power

A Combined Heat and Power (CHP) system would offer the County renewable energy in the form of electricity. Such systems can be designed to self-sufficiently power an AD facility or tie into the grid to generate revenue through a PPA with the local utility. CHP packages typically include a heat recovery system that would provide recoverable heat with rated 42.2% thermal efficiency, available for circulation to the existing sludge heat exchangers to provide heat for the digesters.



Figure 10: Anaergia's 1.6 MWe Biogas CHP at the Victor Valley Wastewater Reclamation Authority in Victorville, CA

The CHP packages can also include a post combustion treatment system consisting of an Oxidation Catalyst, a Selective Catalytic Reduction system, and an Ammonia Slip Catalyst (ASC).

b. Facility Size and Site Utilization Plan

Anaergia proposes to design, finance, build, own, and operate a turn-key Combined MSW Sorting and Advanced Recycling Facility (Project) at the County's I-95 Landfill Complex – located at 9850 Furnace Road,



Lorton, VA, 22079. The Project would consist of both a Municipal Solid Waste (MSW) Sorting Facility co-located with an Advanced Organics Recycling Facility. Based on information provided in the PPEA, there is a tremendous opportunity to develop a Project capable of receiving the County’s 650,000 TPY of Mixed MSW, processing and diverting material from landfill, and beneficially reusing in the form of carbon-negative renewable energy, recyclables, and soil amendments.

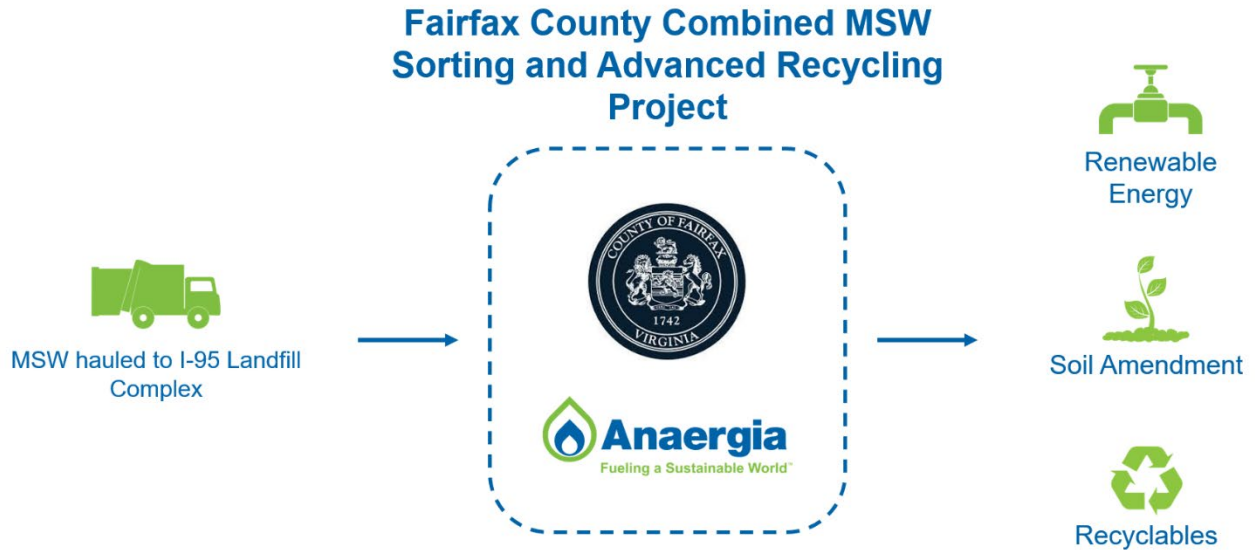


Figure 11: Proposed Fairfax County Bioenergy Project

MSW Sorting Facility

Anaergia proposes to design, finance, construct, and operate an MSW Sorting Facility at the I-95 Landfill Complex. The MSW Sorting Facility would consist of a turn-key OREX™ processing line, capable of recovering materials from mixed waste. The line would be intended to process 650,000 TPY of County MSW. The proposed line would target the recovery of a range of divertible / recyclable materials, including plastics, metals, packaging paper, yard debris, food waste, etc. To achieve this, the proposed line would consist of a shredder, disk screen, sort table, magnet, OREX Press, and OPS. A proposed process diagram can be found below.

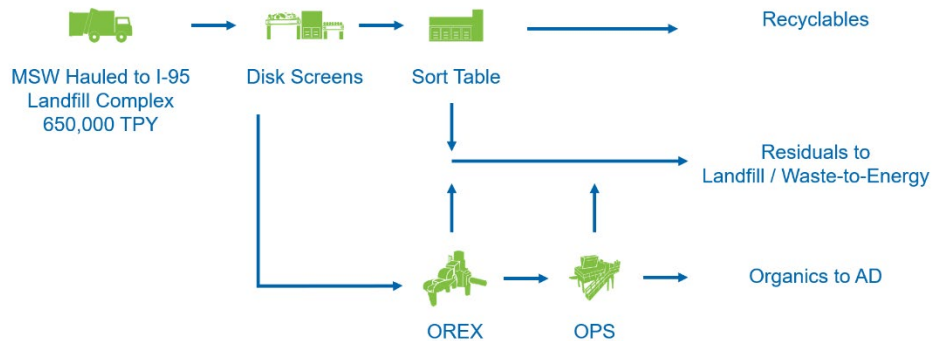




Figure 12: Proposed MSW Sorting Facility Process Flow

Collection trucks would first enter the Landfill Complex and be weighed at the Landfill’s existing weigh scales. The scale house operator would direct the relevant trucks to proceed towards the MSW Sorting Facility where they would enter the facility through dedicated bays. Anaergia trained operators would spot/guide each vehicle and allow it to tip the material onto the tip floor.

Once tipped onto the floor, the material would be fed into a shredder using a front-end loader. The shredder would be utilized to open bags, size reduce the inbound waste, and prepare the material for further downstream processing. The shredded material would then be conveyed to a screen separator to separate the overs from the unders. The screened overs would proceed to a sort station for further recovery of recyclables. The screened unders would be sent to a drum magnetic separator to recover steel (tinned) cans and other ferrous metal. The recovered metals would be collected in a small forklift type bin and then dumped into a metal roll-off container.

Following the drum magnet, the screened unders would be sent to a re-metering storage walking floor that would feed material directly to the OREX Press. The walking floor would be designed to feed material at the correct throughput based on the OREX Press cycle time. The recovered organics would then be conveyed via screw conveyors to a storage bin, where they would be fed at a steady rate into a co-located OPS to generate a polished organic slurry. Rejects from OREX and OPS would be conveyed back onto the tip floor, loaded into a trailer truck, and hauled for final disposal at the Landfill Complex.

Advanced Recycling Facility

Anaergia proposes to design, build, finance, construct, and operate an Advanced Recycling Facility. The Advanced Recycling Facility would be capable of beneficially reusing the organics slurry produced in the MSW Sorting Facility into carbon-negative renewable energy and a nutrient rich soil amendment. The organic slurry would then be transferred to receiving storage tanks, which would then be pumped at a constant feed rate to the on-site anaerobic digesters. The AD process would generate two outputs: biogas and digestate. The biogas would be treated on-site and upgraded to pipeline quality carbon-negative RNG. The digestate would be dewatered and land applied as a nutrient rich soil amendment capable of rejuvenating local soils. A proposed process diagram can be found below.

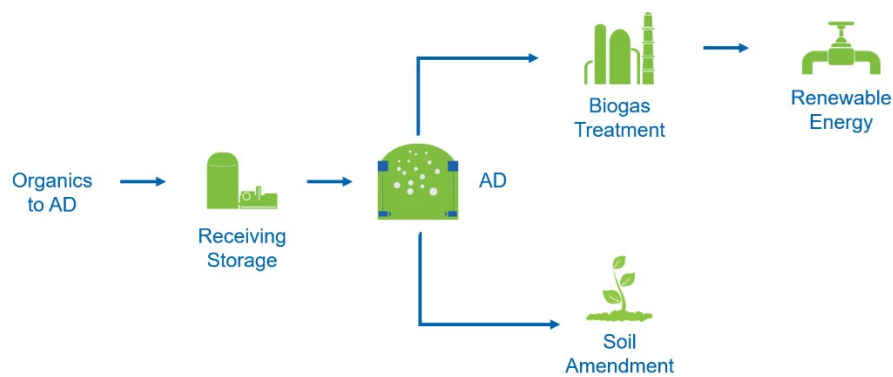




Figure 13: Proposed Advanced Recycling Facility

This proposed approach would generate significant revenues from the marketing and sale of the RNG and its associated environmental attributes. Anaergia has experience marketing and selling RNG through California’s Low Carbon Fuel Standard Program, the US EPA’s Renewable Fuel Standard (RFS) Program, and directly to gas utilities. Importantly, the biogas from digestion of the organics slurry would qualify as D3 under the EPA’s RFS Program as the “Organic Fraction of MSW.” This is enabled by the proposed OREX, which would recover organics from the County’s mixed MSW.

Site Utilization

The proposed Project would be constructed in the County’s desired submission area, per the PPEA. A preliminary assessment indicated that the specified area corresponds to approximately 13 acres, which is sufficient area to allow for the development of a Project that can meet the County’s needs. As a reference, Anaergia built its Rialto Bioenergy Facility – capable of processing up to 1,000 TPD – on 5.5 acres. Anaergia intends conduct a more thorough site assessment to develop an optimal site utilization plan, accounting for a range of items including traffic flow, utility interconnections, easements, setbacks, and available permits.



Figure 14: Proposed Site Utilization

c. Project Alignment with County Vision and Criteria

Anaergia’s proposed Project closely aligns with the County’s Climate Action Plan and would play an integral role in helping the County achieve its carbon neutrality goals by 2050. The proposed Project offer the opportunity for the County to achieve various sector-specific goals, per the County’s Community-wide Energy and Climate Action Plan (CECAP), including:



Increase transit and non-motorized commuting to 30% (including teleworking) by 2030.

Anaergia’s proposed Project offers a tremendous opportunity for the County to decarbonize its transit and transportation sector. The Project would be capable of generating carbon negative RNG that could either be injected into the gas grid or used directly as a fuel through an on-site fueling station. Anaergia’s Rialto Bioenergy Facility is capable of generating up to 1,000,000 MMBtu/year of carbon negative RNG and has been successfully injecting RNG into the SoCal Gas grid since Q1 2021.

Increase plug-in electric hybrid vehicles and battery electric vehicles to at least 15% of all light-duty vehicle registrations by 2030.

The Project would be capable of generating firm, renewable power that could feed-in to the County’s power grid and offer a carbon-negative electric power source for the County’s increasing battery electric vehicle fleet. Anaergia’s Rialto Bioenergy Facility (RBG) can generate up to 13.5 MW of electric power.

Achieve zero waste by 2040, defined as at least 90% waste diverted from landfill/incineration, in alignment with the definition by the Zero Waste International Alliance.

The Project would significantly increase the amount of County MSW that would be diverted from landfill/incineration. The Project would be capable of processing the County’s 650,000 TPY of MSW and beneficially reusing in the form of recyclables, renewable energy, and soil amendments.

Anaergia has deep expertise collaborating with municipalities to help develop landfill diversion facilities through a P3 agreements. In fact, Anaergia was selected by Kent County, MI as the anchor tenant to develop a Sustainable Business Park to divert up to 90% of waste from landfill and convert organics into RNG. Anaergia intends to leverage this expertise to help the County achieve its own landfill diversion targets.



Figure 15: Kent County, MI Sustainable Business Park Rendering

d. Anaergia Company and Staff Experience

Anaergia offers end-to-end landfill diversion and resource recovery solutions, including flexible technical and project delivery approaches to suit the County’s needs. As a result, Anaergia would be able to support the County in several areas:



i) Facility Design, Engineering, and Permitting

Anaergia is recognized for engineering turn-key waste processing solutions that are highly versatile, efficient, and reliable. Anaergia offers unique processing solutions developed through a world-class innovation and product development program. Anaergia has a global team of engineers and technologists with deep domain expertise in process design and integration of both Anaergia and third-party process technologies and equipment. These broad capabilities allow Anaergia to offer unparalleled and complete integrated solutions to our customers and to our own facilities. Anaergia has in-house expertise and engineering capabilities to establish design bases and develop 30% design packages. From there, we select a qualified EPC contractor and detailed design firm to complete the design-build process.

i) Project Development, Delivery, and Execution

Anaergia has delivered projects that are at the forefront of the industry including some of the largest and most complex facilities of their kind for both public and private clients. Anaergia has overseen these projects from conceptualization and has led the projects through all stages of project execution including permitting, financing, engineering, construction, and operations/maintenance. Anaergia has executed projects using traditional and alternative project delivery methods including capital equipment and system sale, Design-Build (DB), Design-Build-Operate-Maintain (DBOM), Design-Build-Operate-Maintain-Finance (DBOMF), Design-Build-Own-Operate (DBOO), Design-Build-Own-Operate-Maintain-Finance (DBOOLF) and Operate-Maintain (OM). Anaergia's deep global experience and strong local presence, combined with the flexibility and know-how to offer alternative project delivery methods brings unparalleled experience in the marketplace for a trusted and reliable partner.



Figure 16: Anaergia's Rialto Bioenergy Facility (Largest Food Waste AD and Supplier of RNG Derived from Landfill Diverted Organics in North America)



ii) Operations & Maintenance

Anaergia has broad experience in the operations and maintenance of organics processing facilities, AD facilities, and bioenergy facilities. Anaergia provides a multitude of services to clients including remote technical support, local operational support and staffing, and full facility operations and maintenance services, both for client owned and self-financed facilities. Anaergia also provides technical support for over a thousand installations globally where Anaergia equipment is utilized for organics processing and AD. With the in-house expertise and lessons learned through the operation of similar facilities, Anaergia can identify and propose optimal design upgrades and operational parameters.

iii) Financing Services

Anaergia's financing capability is bolstered by our experience as a developer, our overall commitment to project execution, strength of our network of EPC contractors, and expert operators. Lenders demand high bonding capability, transparency, and integration experience from project proponents. Anaergia has demonstrated capabilities in developing and financing significant projects, including the Rialto Bioenergy Facility (RBF), the largest food waste anaerobic digester facility in North America. RBF is owned, financed, and operated by Anaergia. Private funding sources for this \$185M USD project came from our network of financial partners and private equity from Anaergia. Public sources included tax-exempt Green Bonds issued by the California Pollution Control Financing Authority (\$117M USD) and over \$33M USD of grants, rebates, and incentives from public agencies. Anaergia has significant experience obtaining grants to finance its projects, including RBF and Escondido Bioenergy Facility (also partially financed using Green Bonds and various types of federal and state grants, rebates, and incentives). If awarded the project for the County, Anaergia would explore potential grant opportunities to minimize costs. Additionally, Anaergia Inc.'s IPO and new market capitalization has established a strong company valuation and has positioned Anaergia strongly regarding the financing of this Project, if desired by the County.

iv) Resource Recovery Program Management

Anaergia's expertise spans multiple industries, from solid waste, to wastewater, to energy. As such, Anaergia is uniquely positioned to facilitate resource recovery programs. Anaergia often acts as coordinator, offering services to connect recovered organic waste with outlets for beneficial reuse, or to market and sell valuable end-products. In particular, Anaergia has deep expertise marketing products including:

- ✓ Renewable power – through feed-in tariff or power purchase agreement (PPA)
- ✓ RNG – through long-term gas purchase agreements (GPA) and through the EPA RFS and California LCFS markets
- ✓ Soil amendment – through collaboration with fertilizer blending and manufacturing companies

The success of Anaergia's facilities – whether solid waste, wastewater, or bioenergy – hinges on our proven ability to align the needs of various processes and partners and provide effective materials management. Our experience in engaging with stakeholders in numerous industries makes Anaergia a valuable partner in advancing the County's resource recovery, regardless of the ultimate solution delivered.



v) Staff Experience

Anaergia has brought together a highly talented team of professionals in all stages of organics processing projects. Certain areas of expertise include commercial development, siting and permitting, preliminary engineering design, project financing, manufacturing, construction, and operations. The Table below provide a summary of key individuals and their respective experience.

Personnel Name	Personnel Title	Project Responsibilities	Qualifications
Yaniv Scherson, Ph.D., P.E.	Chief Operations Officer	Project Executive & Project Management	-15 years of experience -Direct oversight on very similar solid waste and anaerobic digestion projects -Civil P.E., Ph.D. work in wastewater and organic waste
Jeremy Metts, MBA, P.E.	Managing Director	Project Management	-15 years of experience -Managed over \$300M of solid waste projects -Civil P.E.
Andrew Dale, P.E.	Director, Application Engineering	Engineering and Environmental Review/Permitting	-Wastewater design with >15 years of experience and >30 WWTP plant designs with co-digestion for organics processing -Civil P.E.
Hans Ouellet	Lead Design	Layout Design and Equipment Specification	-Over 30 years of experience (6 at Anaergia) -Designed and built >300 solid waste plants at MRFs
Juan Josse, P.E.	Chief Engineer	Engineering Overview	-20 years of experience in municipal and industrial wastewater treatment research, design, and process -Holds patents for anaerobic biological fluidized bed reactor and organic slurry treatment
John Hutson	Director, Plant Operations	Operations Management	-25 years of experience in Plant Operations
Shayne Petkiewicz	Business Development	Contracts Development	-6 years of experience delivering solid waste and wastewater treatment solutions -Responsible for identifying build-own-operate organic materials bioenergy projects

vi) Reference Facilities

Anaergia has partnered with many municipal agencies, with a focus on developing turn-key organics processing and beneficial reuse services. Underpinning this effort involves retaining strong relationships with our clients during and after the project, as exemplified by Anaergia’s P3 partnership with Victor Valley Water Reclamation Authority (VWVRA). Through this P3, Anaergia fully financed the necessary infrastructure to enable VWVRA to receive, process, and beneficially reuse organic waste through AD. Both the Table below and Appendix A summarize a list of reference facilities in North America.



Project	Contact	Location	Capacity/Output	Cost	Project Description
City of Toronto's Dufferin Organics Processing Facility	Mike Boersma Project Manager WS Nichols [REDACTED]	Toronto, Canada	-60,600 TPY SSO -125,000 MMBtu/yr RNG -10,000 TPY fertilizer	\$75M	60,600 TPY of SSO are processed by two OREX™ lines and digested onsite to produce digestate fertilizer and RNG (for pipeline injection). Anaergia is also responsible for the O&M of the facility. Plant Operational: 2019
Anaergia's Rialto Bioenergy Facility	Arun Sharma President Anaergia [REDACTED]	Rialto, CA, USA	- 200,000 TPY of organics - 100,000 TPY of biosolids - 4.6 MW Power - 985,000 MMBtu/yr RNG	\$185M	300,000 TPY organics recycling facility processing organic waste from MSW and SSO and biosolids to produce up to 4.6 MW of electricity and 985,000 MMBtu/year of pipeline injected RNG. Facility designed, build, owned, financed, and operated by Anaergia. Plant Operational: 2020
South Bayside Waste Management Authority (SBWMA) OREX™	Hilary Gans Sr. Operations & Engineering Manager SBWMA [REDACTED]	San Carlos, CA, USA	85,000 TPY SSO and MSW	\$5M	85,000 TPY SSO and MSW processing facility using Anaergia OREX™ and Organics Polishing System (OPS) to produce clean slurry for co-digestion at multiple wastewater treatment facilities. Plant Operational: 2020
Waste Management Sun Valley OREX™	Mike Hammer Director of Operations Waste Management [REDACTED]	Sun Valley, CA, USA	200,000 TPY SSO and MSW	\$100M	200,000 TPY of SSO and MSW are processed by OREX™ line at a MRF to extract organic fraction sent to the Rialto Bioenergy Facility. Plant Operational: 2020
East Valley Water District's Sterling Natural Resource Center	John Mura General Manager, CEO, East Valley Water District [REDACTED]	Highland, CA, USA	- 1.6 MW Power - 8 mgd wastewater - 130,000 gpd organic waste	\$28M	3.0 MW state-of-the-art anaerobic digestion at an MBR wastewater treatment facility. Anaerobic Digestion facility designed and supplied by Anaergia for sludge and organic from SSO co-digestion. Plant Operational: 2022
Universal Waste Systems OREX™	Matt Blackburn Vice President Universal Waste Systems [REDACTED]	Los Angeles, CA, USA	156,000 TPY SSO and MSW	\$20M	125,000 TPY of SSO and MSW are processed by OREX™ line to extract organic fraction sent to the Rialto Bioenergy Facility. Plant Operational: 2022
Anaergia's VVWRA Biogas Project (Phase 1)	Darron Poulsen General Manager VVWRA [REDACTED]	Victorville, CA, USA	- 36,000 TPY organics - 1.6 MW Power	\$2M	1.6 MW CHP facility located at the VVWRA wastewater treatment plant converting biogas from co-digestion into renewable electricity and heat for the wastewater plant. Plant Operational: 2015



Project	Contact	Location	Capacity/Output	Cost	Project Description
Anaergia's VVWRA Biogas Project Expansion (Phase 2)	Darron Poulsen General Manager VVWRA [REDACTED]	Victorville, CA, USA	1,200 scfm biogas	\$25M	After exceptional success in the first phase of the project, the biogas output and processing capacity was increased to 1,200 scfm. Plant Operational: 2021
Anaergia's Camden Bioenergy Facility	Scott Schreiber Executive Director Camden County MUA [REDACTED]	Camden, NJ, USA	- 3.8 MW Power - 539 scfm biogas	\$23M	3.8 MW CHP capacity and four Omnivore® digesters located at the Camden wastewater treatment plant. Anaergia is also responsible for the O&M of the facility. Plant Operational: 2020
Anaergia's Escondido Bioenergy Facility	John Delfante Operations Superintendent City of Escondido [REDACTED]	Escondido, CA, USA	1.2 MW Power	\$8M	1.2 MW CHP facility located at the Escondido wastewater treatment plant converting flared biogas into renewable electricity and heat the wastewater plant. Anaergia has a 20-year PPA in place and is responsible for the operations of the facility. Plant Operational: 2018
Anaergia's Rhode Island Bioenergy Facility	Alex MacFarlane Director, Project Development Anaergia [REDACTED]	Johnston, RI, USA	- >120,000 TPY SSO and MSW - 3.2 MW Power - >300,000 MMBtu/yr RNG	\$44M	120,000 TPY organics recycling facility processing organic waste from MSW and SSO to produce up to 3.2 MW of electricity and 300,000 MMBTU/year of pipeline injected RNG. Facility designed, built, owned, financed, and operated by Anaergia. Plant Operational: 2023
Anaergia's Charlotte Bioenergy Facility	Alex MacFarlane Director, Project Development Anaergia [REDACTED]	Charlotte, NC, USA	- 130,000 TPY SSO and MSW - 5.2 MW Power	\$12M	130,000 TPY organics recycling facility processing organic waste from MSW and SSO to produce up to 5.2 MW of electricity. Facility designed, built, owned, financed, and operated by Anaergia. Plant Operational: 2023



e. Facility Processing Capacity and Annual Tonnage Commitments

Anaergia proposes to process the County's 650,000 TPY of MSW.

2) Environmental Stewardship, Sustainability

a. Environmental Benefits and Sustainable Elements

Anaergia was created with the mission "to convert waste into useful resources, protect the environment, and sustain life for generations to come". To fulfill this mission, Anaergia is combatting climate change through innovative organics management practices and renewable energy production. Its wide array of technologies and solutions allow public and private clients to realize financial gains and environmental benefits through sustainable goals and innovating projects. Anaergia's ultimate sustainability goals are to promote waste diversion, stimulate a circular economy, and generate renewable energy. Our central business model is, itself, contributing to climate change mitigation, water reclamation, and soil renewal. This commitment is core to each member of our team.

Embracing environmental, social and governance (ESG) principles are central to Anaergia's growth and corporate responsibility. Anaergia recently released its 2021 ESG Report, indicating that Anaergia's global projects resulted in 465,000 tonnes of avoided CO₂e emissions. This represents a 41x benefit reduction in greenhouse gas emissions compared that was produced by Anaergia's operations. Anaergia's installed capacities since 2010 have also resulted in:

- ✓ ~8 million tonnes per year of feedstock processing capacity
- ✓ 5 million MMBtu per year of RNG production capacity
- ✓ 134 MW of renewable electricity generation capacity

b. Alignment with Fairfax County's Zero Waste Plan

The Project aligns closely with the County's Zero Waste Plan. Anaergia has significant experience developing MSW Sorting Facilities and Advanced Recycling Facilities capable of achieving a municipality's zero waste targets. Anaergia is currently developing a Sustainable Business Park with Kent County, MI to help it achieve up to 90% waste diversion by 2030. Anaergia proposes to enter a similar P3 with the County to help it achieve its own zero waste goals.

3) Economic Impact and Sustainability, and Revenue Generation to the County

a. Revenue to the County

As part of a P3 between Anaergia and the County, Anaergia proposes to fully finance the proposed Combined MSW Sorting and Advanced Recycling Facility. Such a delivery model eliminates the need for any capital outlay from the County. Further, the County could see financial benefits through this project in the form of a long-term ground lease, host fees, and revenue share of the marketing of end products.



b. Economic Feasibility

Anaergia proposes entering a P3 Agreement with the County to develop the Project at the I-95 Landfill Complex. With Anaergia as an experienced and knowledgeable technical partner in this capacity, the Project can be realized in a manner that maximizes the social, economic, and environmental benefits for the County while minimizing investment and risk.

Anaergia's financing capability is bolstered by our experience as a developer, our overall commitment to project execution, strength of our network of construction partners, and expert operators. Lenders demand high bonding capability, transparency, and integration experience from project proponents. Anaergia has demonstrated capabilities in developing and financing projects, including RBF, the largest food waste anaerobic digester facility in North America. RBF is owned, financed, and operated by Anaergia. Private funding sources for this \$185M USD project came from our network of financial partners and private equity from Anaergia. Public sources included tax-exempt Green Bonds issues by the California Pollution Control Financing Authority (\$117M USD) and over \$33M USD of grants, rebates, and incentives from public agencies. Additionally, Anaergia Inc.'s IPO and new market capitalization has established a strong company valuation and has positioned Anaergia strongly regarding the financing of its project.



Figure 17: Anaergia and Victorville Wastewater Reclamation Authority (VWRA) entered P3 to develop AD facility at the VWRA wastewater treatment plant

c. Economic Commitments and Incentives

Anaergia anticipates that the Project would deliver several incentives to the County, including:

P3 Financing

As a partner to the County, Anaergia would secure financing if desired. P3 financing can support capital improvements for which budgetary funding has yet to be allocated, support ancillary upgrades to enhance overall project performance, or free up funds for other important County initiatives, without burdening taxpayers. Further, P3 financing supports project timelines by securing funds on an as-needed basis rather than relying on budgetary approval processes.



One Dedicated Partner

P3 partnerships provide the County with a primary partner to streamline the delivery of complex projects versus traditional procurement processes. Not only does this simplify logistics, communications, and scheduling for the County, this approach supports achievement of design intent and incentivizes delivery of high-quality solutions. P3 partners are aligned in their goals of a successful landfill diversion project, whereas multiple contractors over numerous independent scopes may not be.

Expedited Schedule to Project Realization

Anaergia is capable of rapidly delivering an operational project to the County. Anaergia would leverage its experience constructing other facilities and ability to implement strict schedule controls through clear communication, identification of critical path methods, and early manufacturing of long lead time items. We anticipate a study period of 2-3 months, development period of 12 months, and typical construction durations of 12-24 months. Combined, this is shorter than the extended durations typical for consultant evaluations and design-bid-build procurement processes. Ultimately, this translates to reduced cost spent supporting extended development and procurement processes and enables the County to realize project benefits sooner.

d. Project Term

Anaergia proposes to enter a long-term twenty (20) year P3 agreement with the County.

4) Public Benefit and Compatibility

a. Public Benefits

Anaergia anticipates that the Project would also significant public benefits beyond landfill diversion. They include:

- ✓ **Local Job Creation:** Anaergia proposes a hiring policy to facilitate the employment of members of the local communities and contracting with local businesses to the greatest extent possible. For comparison, construction of Anaergia's RBF resulted in the need for 500,000 hours of construction work, which resulted in indirect spending locally on food, gas, lodging, and supplies, and has resulted in over 25 permanent, skilled, green tech jobs
- ✓ **Local Scholarships:** Anaergia supports annual scholarships for local, low-income students near its Rialto, CA facility to attend college and/or technical/vocational programs relating to environmental sciences and related disciplines. Anaergia could assist the County in the development of a similar program.
- ✓ **Increased Economic Activity:** Supporting local economy with prevailing wages and procuring services from local purchases and service providers. This state-of-the-art facility will attract visitors from the globe that will patronize local hotels, restaurants, and other businesses.
- ✓ **Job Training:** Training for local community members include unskilled workers and/or workers who may not have industry standard qualifications and support to obtain advanced certifications, certificates, and credentials.



-
- ✓ **Community Spaces:** Community partnerships can prioritize development of green spaces, including tree and shade plants. The project can incorporate opportunities for education, leisure, entertainment, or other events by seamlessly combining the facility with community spaces.

b. Project Risks

Anaergia does not anticipate the Project would present adverse social, economic, and environmental impacts. Anaergia intends to work closely with the relevant regulatory agencies throughout the development period to develop and implement Best Available Control Technology to ensure appropriate air pollution, odor, and noise control measures.

5) Community Outreach and Education

Anaergia strongly supports the local communities, businesses, and markets surrounding its projects. Such measures could include, but are not limited to:

- ✓ **Project Status Web Page:** This page would disseminate information about the Project, its progress, and benefits delivered. Here, Anaergia would also communicate relevant community information, including job opportunities/announcements and notification of other community programs.
- ✓ **Community Outreach:** Hold one or more open houses to educate local community members about the project, its environmental benefits, upcoming job openings, and upcoming job training.

Anaergia is committed to continue promoting sustainability, local communities, environmental goals, and its ESG principles at all of its future projects.



Appendix A – Reference Facilities

1. Dufferin Organics Processing Facility, ON, Canada

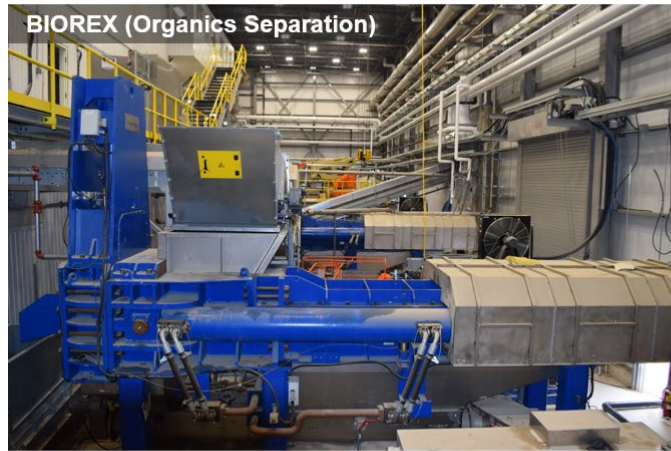
Total Processing Capacity	60,600 TPY SSO
Plant Operational	2019
Structure	Design, Supply, and Operate by Anaergia
Size	800 scfm biogas
Markets	125,000 MMBTU/year RNG pipeline injection, 10,000 TPY fertilizer

The City of Toronto undertook a competitive bidding process to expand its Dufferin Organics Processing Facility ("DOPF"). The Facility was initially built for the annual processing of 25,000 TPY of SSO from the City's Green Bin Program using a BTA Hydro-Pulper system followed by anaerobic digestion and the dewatering of digestate for composting. The chosen Team would upgrade and modify the Facility such that it could process an expanded capacity of 55,000 MTPY (60,600TPY) of SSO.

Anaergia is part of a team led by W.S. Nicholls Construction Inc. which also included the Ontario Clean Water Agency ("OCWA") and EXP Services Inc. ("EXP"). The WSN led team was selected by the City of Toronto to design, build, and operate the upgraded and expanded DOPF. The City announced the award of the contract on September 4, 2015 and a contract was signed in December 2015. Construction activities began in Q1 of 2016 with start-up in 2018.

Anaergia supplied the Expanded DOPF with all major processing equipment including two SSO pre-processing trains, each equipped with Anaergia's OREX™ system for the extraction of organic material from contaminated SSO and its CleanREX™ and Grit Removal systems to generate a clean feedstock for anaerobic digestion by removing small plastic contaminants and grit from the organics separated by the OREX™. The project is utilizing two existing anaerobic digesters while two new centrifuges were added for digestate dewatering. Finally, Anaergia also supplied a Membrane Bioreactor (MBR) wastewater treatment system for the treatment of centrate utilizing FibrePlate™ membranes from Fibracast, an Anaergia subsidiary. The digested SSO produces 800 scfm of biogas which is upgraded to 125,000 MMBTU per year of RNG for pipeline injection and 10,000 TPY of digestate fertilizer.

The contract also includes responsibility for a 3-year facility O&M period that can be extended at the client's discretion for an additional 2 years. Anaergia is providing the O&M services and will use OWCA as a sub-contractor to provide the day-to-day operation of the facility with technical support and guidance provided by Anaergia.



Key Equipment at the Dufferin Organics Processing Facility

2. Rialto Bioenergy Facility, CA, USA

Total Processing Capacity	300,000 tons per year
Plant Operational	2020
Structure	Design, Built, Own, Operate, finance by Anaergia
Outputs/Markets	1,000,000 MMBTU/year RNG pipeline injection, 4.6MW electricity, 10,000 TPY Fertilizer

The Rialto Bioenergy Facility (RBF) is resource recovery facility that provides organics diversion and energy generation solution for the Southern California region mandated by California law SB 1383. RBF is designed to produce 13 MW electrical equivalent of renewable energy from up to 1,000 tons per day (TPD) of a combination of food waste extracted from municipal waste streams, liquid waste, and municipal biosolids. RBF is capable of converting up to 700 TPD of food waste into up to 1,000,000 MMBTU per year of carbon negative renewable natural gas (RNG). Food waste feedstock is extracted via Anaergia's Organics Extrusion Press (OREX™) at an off-site materials recovery facility (MRF) and transported in end-dump trucks to RBF.

Once onsite, the organic waste is pre-processed via Anaergia's Organics Polishing System (OPS™) to remove residual contaminants and create an organic slurry, which is fed directly to two 3.5MG food waste digesters. The biogas from the mono-digestion of food waste is conditioned to remove contaminants and upgraded to pipeline-quality RNG (99% methane) before being injected into the SoCal Gas grid. Dedicated on-site wastewater treatment infrastructure further treats the digestate prior to discharge from the facility.

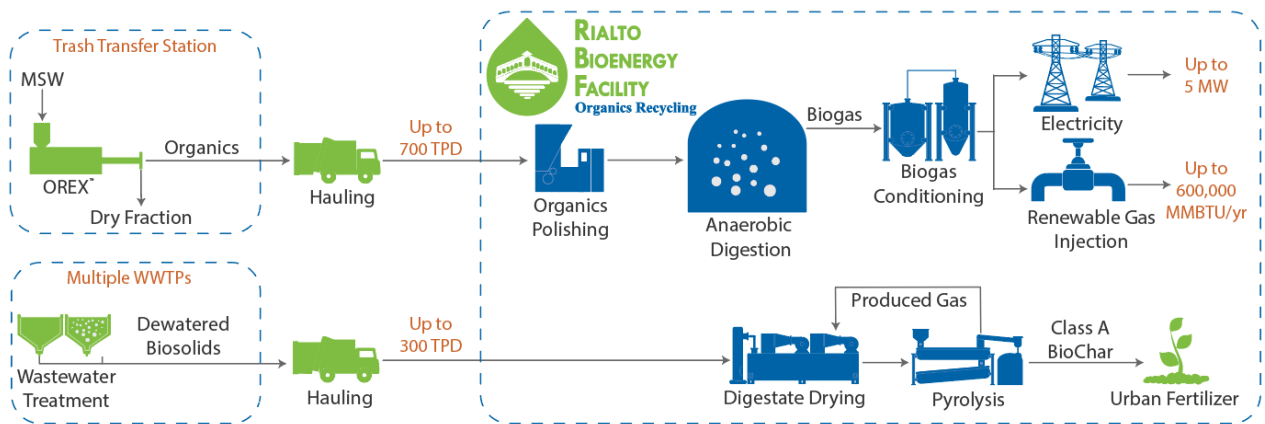
The facility also includes biosolids dryers and a pyrolysis system to convert up to 300 TPD of Class B dewatered biosolids from municipal wastewater treatment plants into fertilizer.

The facility operates 24 hours a day, 7 days per week for biogas production and drying operations. The materials reception occurs 16 hours per day, 6 days per week.

The project is designed, owned, operated, and financed by Anaergia and is the largest supplier of RNG derived from landfill diverted organics in California. RBF provides dedicated capacity to process landfill diverted organic waste and biosolids to generate carbon-negative renewable energy and fertilizer.



Rialto Bioenergy Facility Aerial and Process



3. South Bayside Waste Management Authority, CA, USA

Total Processing Capacity	85,000 TPY SSO / MSW
Plant Operational	2020
Structure	Anaergia as Equipment Provider
Markets	Slurry distributed to five local WWTPs

Anaergia successfully implemented an Organics Extrusion (OREX™) Test Press trial at Recology in South San Francisco that demonstrated the ability to exceed threshold requirements for total diversion in a future full-scale solid waste processing line with organics recovery. The OREX™ system was removed from the trial site and installed at the South Bayside Waste Management Authority facility (SBWMA), serving as a stepping stone to the larger project and allowing SBWMA to collaborate with other wastewater treatment plants by producing an expected 50 TPD of organic cake that when converted into a polished slurry generates roughly 25,000 gal/day or 5 tanker truck loads. This system includes a bag opener, OREX™, and polisher that are sized for the future full-scale system to ensure reuse of this equipment in the future.

SBWMA diverts up to 200 TPD of organic waste from landfill to five local wastewater treatment plants (WWTPs) where anaerobic digesters will convert the organics rich slurry generated by OREX into carbon-negative energy.



OREX™ at SBWMA

4. Sun Valley, CA, USA

Plant Operational	2020
Structure	Design and Install by Anaergia, Owned by Waste Management
Processing Capacity	200,000 TPY of SSO and MSW
Markets	Processed Organics to Rialto Bioenergy Facility

The Sun Valley Recycling Park, owned by Waste Management, is an organics recovery facility located in Sun Valley, California. Anaergia designed a turnkey OREX line for the facility to process up to 800 TPD of single stream organics and municipal solid waste from the greater Los Angeles metro region. At the facility, inbound waste is processed via a shredder, disk screen, and magnet prior to being fed to the OREX™. The OREX™ efficiently and reliably extracts up to 300 TPD of organics, producing a clean, energy-dense, and highly digestible wet fraction.



OREX™ at Sun Valley

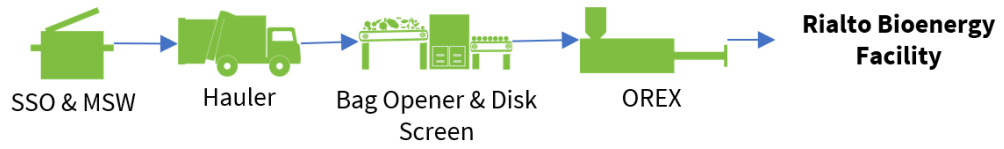
The recovered organics are transported via end-dump trucks to the Rialto Bioenergy Facility (owned by Anaergia) to be processed into RNG via anaerobic digestion. Rejects from the OREX™ line are sent to landfill, or further processed for recycling.

Anaergia organics extraction facilities provide unmatched throughput capacity to maximize recovery of plastics, paper, and metal while transforming the non-degradable and non-recyclable rejects coming out of OREX™ into dense refuse-derived fuel with increased calorific value and lower moisture content. Additionally, Waste Management's Sun Valley facility has advanced features that promote efficiency and environmental quality for the community, including a dust and odor system, and electric vehicle charging stations.



Receiving Floor and Process Diagram at Sun Valley

Up to 200,000 TPY



5. Sterling Natural Resource Center, CA, USA

Total Processing Capacity	-8 MGD of wastewater -130,000 gallons per day of imported organic waste streams
Plant Operational	2022
Structure	Design and Supply by Anaergia
Outputs	3MW electricity
Markets	Biogas to CHP

Sterling Natural Resource Center (SNRC), being built in Highland, California, will be a state-of-the-art wastewater treatment facility. It will recover clean water, energy, and nutrients, from the wastewater and provide the community with a place for, and opportunities for, education, entertainment, plus other events. It will also offer advanced job training opportunities. The facility will initially convert up to 8 million gallons per day of wastewater and up to 130,000 gallons per day of imported organic waste streams, into 3 MW of renewable power for the facility, clean water for replenishing the natural groundwater aquifer, and the potential for fertilizer to improve soil quality.

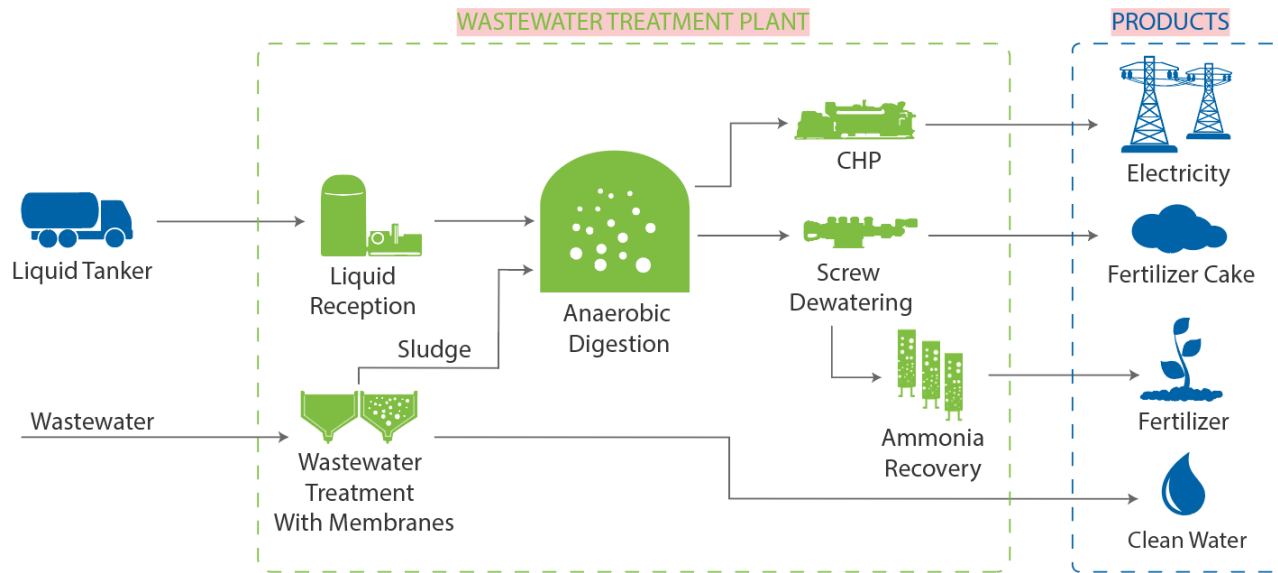


Sterling Natural Resource Recovery Facility Rendering

SNRC will recover value from the waste streams by utilizing a series of technologically advanced solutions. These include Fibracast's (Anaergia's sister company) state of the art FibrePlate™ membranes and Anaergia's high efficiency Omnivore® Anaerobic Digestion system.

FibrePlate™ hybrid-membrane technology offers several unique benefits to facility owners and operators. This proprietary technology product combines the best advantages of hollow-fiber membrane systems, including the high packing density and the backwash capability, with the low trans-membrane pressure and the ease of operation of flat sheet membrane systems.

Anaergia's high efficiency Omnivore® digester system triples digester throughput with one tenth the energy use of conventional digesters, providing efficient high solids digestion. Anaergia is delivering a turnkey system solution which includes the equipment for organic waste reception, the Omnivore® high efficiency digester, renewable energy generation, and digestate management with ammonia recovery. This facility is currently being constructed by Balfour Beatty with detailed engineering services provided by Arcadis.

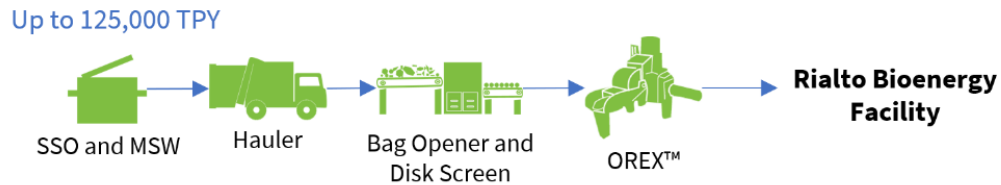


Sterling Natural Resource Recovery Facility Process

6. Universal Waste Systems, CA, USA

Plant Operational	2022
Structure	Design and Install by Anaergia, Owned by UWS
Processing Capacity	125,000 TPY of SSO and MSW
Markets	Processed Organics to Rialto Bioenergy Facility

The UWS facility, owned by Universal Waste Systems, is an organics recovery facility located in Los Angeles California. Anaergia designed an OREX™ line for the facility to process up to 500 TPD of SSO and MSW to extract organics that will be transported to the Rialto Bioenergy Facility (owned by Anaergia) for anaerobic digestion. The facility will be operational in 2022.



UWS Simplified Process Diagram

7. Victor Valley Waste Reclamation Authority (Biogas Power Systems – Mojave) - Victorville, CA, USA (Phase 1)

Plant Operational	2015
Structure	Design, Supply, and Finance by Anaergia
Outputs	400 scfm biogas, 1.6 MW electricity
Markets	Biogas to CHP

Anaergia won the opportunity to design, construct, finance, and own the Facility through a Request for Proposal issued by Victor Valley Wastewater Treatment Authority (VWVRA). The project equipment package was inclusive of membrane gas holder covers, hydraulic mixers with Service-Boxes and platforms, a recuperative thickening system, and high strength waste receiving station. The project showcases Anaergia's innovative Omnivore® high solids wet anaerobic digestion technology with recuperative thickening and unique Hydraulic Mixers and Service Box, along with Anaergia's low energy screw press solids separator technology used for dewatering of the digestate, on a municipal sludge feedstock.

Anaergia has partnered with VWVRA to build this Demonstration Project and showcase our high solids anaerobic digestion process, facilitated by recuperative thickening of digested sludge. With funding from the Public Interest Energy Research (PIER) Fund of the California Energy Commission (CEC) and fund matching from Anaergia, existing infrastructure at VWVRA was retrofitted and re-commissioned to meet the needs of the demonstration. The focus of this project is to exhibit a cost-effective option for WWTP with existing anaerobic digestion infrastructure to increase their digester capacity and biogas production without investing in costly additional tank volume. The demonstration project showcases a cost effective and technically feasible method to shift wastewater treatment plants from grid dependent consumers to energy-neutral or energy-positive facilities.

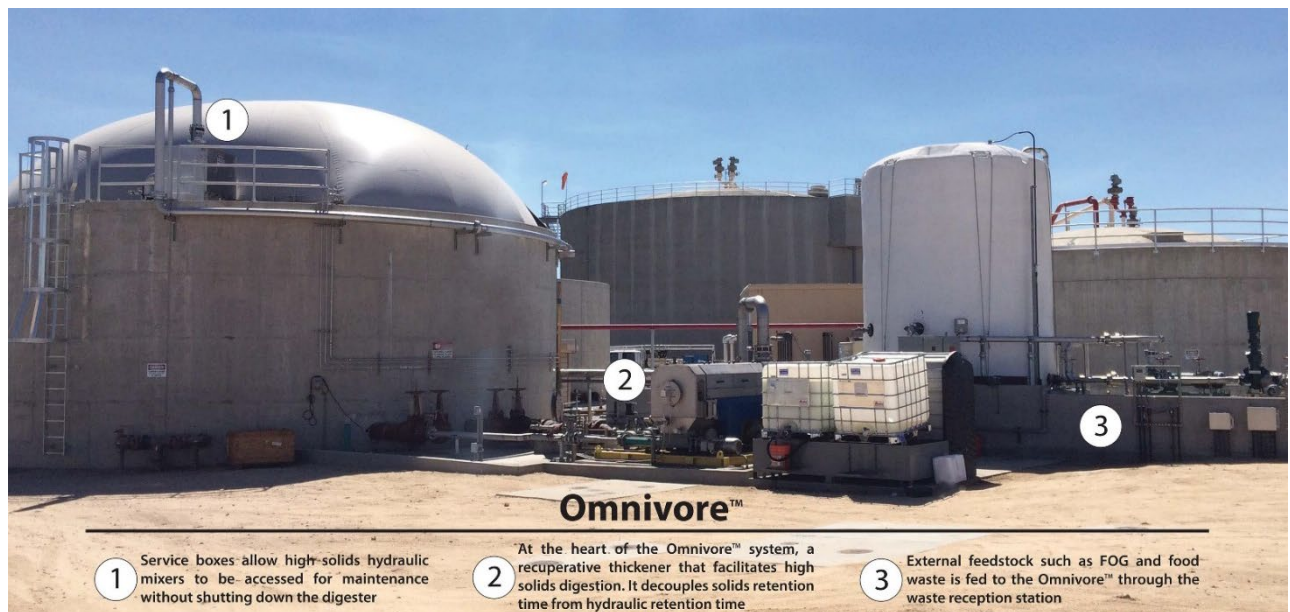


CHP Engines at VWVRA

This demonstration consisted of a full scale retrofit to VVWRA's existing 300,000-gallon digester. The digester roof was upgraded from a floating cover to a double membrane gas holder. A recuperative thickening system, utilizing Anaergia's screw sludge thickener, was installed as well as a high strength waste receiving skid. The digesters were equipped with hydraulic mixers and service-boxes including platforms.

Anaergia's high solids Omnivore® digestion process allows the retrofitted digester's capacity to triple by means of recuperative thickening and high-solids mixing. By decoupling solids retention time (SRT) and hydraulic retention time (HRT), gas producing materials remain in the digester for longer periods and in greater quantities than in conventional digestion. External high strength organic wastes (FOG, Food Wastes, etc.) are also introduced for co-digestion with the existing stream of municipal sludge.

The Facility uses all the biogas generated in the facility, including biogas generated in Anaergia's high solids digestion system, to deliver thermal heat and electrical energy to the VVWRA using two containerized 800 kW combined heat and power modules. VVWRA engaged in this project in an effort to better utilize their biogas resources, offset high electricity costs, minimize energy price fluctuations, and achieve zero net energy wastewater treatment operations.



Omnivore® at VVWRA

8. Victor Valley Waste Reclamation Authority - Victorville, CA, USA (Phase 2)

Plant Operational	2021
Structure	Design, Built, Own, Operate Finance by Anaergia
Outputs	1200 scfm biogas, 1.6 MW electricity
Markets	Biogas to CHP and pipeline injection

The facility utilizes anaerobic digesters to treat and break down organic compounds present in the influent wastewater. These digesters produce waste biogas, the majority of which is methane. Currently, the VVWRA is in partnership with Biogas Power Systems - Mojave, LLC, a separate project entity (subsidiary of Anaergia) which owns and operates two 800 kW combined heat and power (CHP) units, capable of utilizing the biogas to produce approximately 70% of the electricity required to power the VVWRA plant equipment.



VVWRA Facility

However, the facility wanted to pursue utilizing the biogas for producing renewable natural gas. Therefore, the Phase 2 Project will be capable of using all of the biogas from the digesters to make biomethane for injection into the natural gas grid owned by Southwest Gas, producing a renewable substitute for fossil-derived natural gas.



BUG at VVWRA

At full capacity, the WWTP can produce 1200 standard cubic feet per minute (scfm) of biogas through anaerobic digestion of a combination of municipal sludge generated at the WWTP and liquid organic waste streams including liquid food wastes and fats, oils, and grease.

The Project upgraded the biogas produced from anaerobic digestion through a multistage treatment process ultimately producing 765 scfm of biomethane for injection into the local natural gas grid. Anaergia supplied its Biogas Upgrading (BUG) System to upgrade the digester biogas into RNG. The separation and purification equipment and processes used to produce the biomethane are not a source of regulated air pollutant emissions, and therefore do not require permitting. Rather, they receive biogas from the existing permitted digesters, which are the source, and separate the biogas into a biomethane product stream, which meets the quality specifications of natural gas, and a regeneration waste gas stream of undesired byproducts that were present in the original biogas. Up to 600 scfm of waste gas will be generated as a result of this biomethane production. The waste gas will be sent to a thermal oxidizer (TO) for VOC and odor control to achieve approximately 99% VOC removal before being vented to the atmosphere. The waste gas odor and VOC control system is an emission control device that requires an air permit from MDAQMD.

9. Camden Bioenergy, NJ, USA

Total Processing Capacity	80 MGD
Plant Operational	2019
Structure	Delivered and operated by Anaergia, O&M by Anaergia
Outputs	950 scfm biogas, 3.8 MW electricity
Markets	Biogas to CHP

In 2015 Anaergia was selected by the Camden County Municipal Utilities Authority (CCMUA), through a public bidding process, to provide the technology solution for their digester project and energy generation project.

The Anaerobic digestion system is sized to process waste primary and secondary sludge produced by Camden's 302,800 m³/d Delaware No. 1 Water Pollution Control Facility as well as up to 246 m³/w of high strength organic waste (fats oils & greases). Biogas produced from the digesters provides energy to offset the cost of power purchased from the grid.

Originally bid as a single design-build-own-operate project for both the digester and power, the complete project was divided into two distinct projects so that the CCMUA could take advantage of government grants and low-cost public financing. The first part of the project is the digester system for which Anaergia provided the overall process design and key process equipment. The second part of the project is for the power generation CHP equipment capable of generating 3.8 MWe that was delivered by Anaergia as a design-build-operate project with a 20-year O&M contract.



CHP Engines at Camden Bioenergy

The digester project utilizes Anaergia's innovative Omnivore® high solids wet anaerobic digestion incorporating Anaergia's PSM Electric Mixers and Service Boxes.

The retrofit to the Camden County Municipal Utilities Authority's (CCMUA) Delaware No. 1 Water Pollution Control Facility utilizes anaerobic digestion technology and combined heat and power generation systems to recover energy from primary and waste activated sludge in the form of biogas and generate electricity and thermal energy from the biogas to help satisfy the electrical and thermal energy needs of the Facility.

The Facility has four existing sludge storage tanks onsite, each with a volume of approximately 823,000 US gal (69 ft diameter, 30 ft high). They are arranged in a cloverleaf arrangement with an equipment building connecting the four tanks. In the design, these tanks will be repurposed to anaerobic digesters and a new smaller primary sludge storage tank will be constructed.

This modification includes the installation of recuperative thickeners and hydraulic power-driven submersible mechanical mixers to enable the digesters to operate at higher solid concentrations, as well as the use of double membrane gas holders on each digester to capture the biogas generated during digestion.

A new Biogas Treatment System was installed to remove excess moisture, hydrogen sulfide, siloxanes, and non-methane volatile organic compounds from the biogas stream before it is fed to two prepackaged internal combustion engine combined heat and power (CHP) units. The CHP units will be equipped with advanced emissions control systems for the removal of CO and NOx in the form of selective catalytic reduction (SCR) post-combustion treatment.

The exhaust gas from the CHPs is designed to meet New Jersey's air emission standards. Both the Biogas Treatment System and the pre-packaged CHP units are new process stages added to the Facility. Combined, they produce 3.8 MWe (1.9 MWe each) of electrical power and 4.0 MWth of thermal energy during operation. The electrical energy is provided to the Wastewater Treatment Plant (WWTP) while the thermal energy is distributed to the digester through a heating loop, and any additional thermal energy are used by the rest of the plant as required. Some of the exhaust thermal energy is used to supplement the existing biosolids dryer using a thermal oil heat exchanger system. To provide an outlet for the biogas in the event the CHPs units cannot utilize all the biogas generated, the system includes an emergency flare to handle up to 100% of the biogas produced.



Anaerobic Digesters at Camden Bioenergy

The design also includes the addition of a WAS Holding Tank to store WAS from the WWTP prior to digestion, and a FOG Receiving Station to accept high BTU feedstock in the form of fats, oils and grease that can boost the biogas generation capacity of the digesters and minimize or eliminate the need to supplement with natural gas.

10. Escondido Bioenergy Facility, CA, USA

Plant Operational	2018
Structure	Design, Own, Finance, and Operate by Anaergia
Outputs	300 scfm biogas and 1.2 MW electricity
Market	Biogas to CHP

The Escondido Bioenergy Facility is installed at the Hale Avenue Resource Recovery Facility (HARRF) in Escondido, California. HARRF is an activated sludge, secondary treatment wastewater treatment plant that consists of biological processes of which digester gas is a by-product. Digester gas is composed of about 40% carbon dioxide and 60% methane. The project consists of a pre-packaged Combined Heat and Power (CHP) system rated at 1200 kW, along with required gas conditioning and emissions control equipment. The CHP system is integrated into the infrastructure of the existing HARRF and produces heat and power for HARRF's loads. The project utilizes HARRF's digester gas as fuel (biogas) and generates both electricity to offset HARRF's electrical power and heat to offset natural gas demand from the local utility, San Diego Gas and Electric (SDG&E).

As a result of this new system, all the biogas produced by HARRF's anaerobic digestors, which was previously flared, is now utilized to generate sustainable green energy. Anaergia and the City of Escondido have entered into a 20-year power purchase agreement, so that the electricity and heat are sold by Anaergia at below market rates, for the operations of the HARRF. The California Public Utilities Commission's (CPUC) Self-Generation Incentive Program (SGIP) supported this project.



CHP Engines at Escondido Bioenergy Facility

11. Rhode Island Bioenergy Facility, RI, USA

Plant Operational	2023
Structure	Design, Build, Own, Operate, Finance by Anaergia
Inputs	>120,000 TPY of SSO and MSW, 3.2 MWe CHP
Outputs / Market	Biogas to CHP (3.2 MWe) and RNG (>300,000 MMBtu)

Anaergia acquired the Rhode Island Bioenergy Facility (RIBF) in 2021 as an existing distressed asset with plans to revitalize the facility using Anaergia equipment and systems. At the time of acquisition, RIBF, located in Johnston, Rhode Island, was operating as the only large-scale organic waste digester in Rhode Island; adjacent to a central landfill. Anaergia designed the facility upgrades at RIBF targeting significant improvements with the infrastructure and ability to monetize the biogas produced on-site through renewable natural gas (RNG) sales. RIBF will have the capacity to receive over 120,000 tons per year of feedstock including source separated organics (SSO, or food scraps) and the organic fraction of municipal solid waste (OFMSW). Through the expansion of the existing digester capacity and the installation of a gas interconnection, RIBF will produce over 300,000 MMBtu of RNG to sell on the market. In addition, the existing CHP engines will service house electrical and thermal loads. RIBF will be fully operational with all Anaergia upgrades in 2023.



Existing Rhode Island Bioenergy Facility

12. Charlotte Bioenergy Facility, NC, USA

Plant Operational	2023
Structure	Design, Build, Own, Operate, Finance by Anaergia
Inputs	130,000 TPY of SSO, 5.2 MWe CHP
Outputs / Market	Biogas to CHP (5.2 MWe) with PPA

Anaergia acquired the Charlotte Bioenergy Facility (CBF) in 2021 as an existing distressed asset with plans to revitalize the facility using Anaergia equipment and systems. At the time of acquisition, CBF, located in Charlotte, North Carolina, was operating as large digester facility with sustainable feedstock supply. CBF will have the capacity to receive over 130,000 tons per year of feedstock consisting primarily of waste products from local food industries, especially poultry processing. CBF generates 5.2 MW of electricity on-site with CHP engines selling renewable electricity to Duke under the established power purchasing agreement. CBF will be fully operational with all Anaergia upgrades in 2023.



Existing Charlotte Bioenergy Facility