

Mecklenburg County Air Quality
PERMIT APPLICATION REVIEW SUMMARY
Title V

Section A: FACILITY INFORMATION		Existing	X	New
Company Name (Legal Corporate Name)	Charlotte Bioenergy Facility, LLC			
Site Name (If Different From Above)	Charlotte Bioenergy Facility			
Site Address (Street, City, Zip Code)	600 Johnson Road, Charlotte NC 28206			
General Description of Business	Waste-to-energy biogas production plant			
Facility AQ Classification(s)	Title V	Site Consistent w/ Zoning? (Y/N)		Y

Section B: APPLICATION INFORMATION		Modified	X	New
Date of Application	5/30/2023	Application Tracking Number		2023-AQ-56860
Date Complete Application Received	10/22/2024	AQC Date/Public Comment Opens		Public comment begins with website posting; Also included at the 3/24/25 AQC Meeting.
Confidentiality Requested?	No	AQC Agenda Type: Notice, Alternate, FYI		Notice
Application Results: Brief description of actions requested by application and/or taken by MCAQ.		5-year renewal of Title V permit. Name change from Orbit Energy Charlotte, LLC to Charlotte Bioenergy Facility, LLC.		
Permit Issued as a Result of Application – Number:		25-01V-021		
Permit Voided as a Result of Application – Number:		19-02V-021		

Section C: REGULATORY INFORMATION						
MCAPCO Regulations Applicable: List only <u>specific</u> conditions and/or regulations cited in permit issued. Indicate subpart for regulations 2.0524, 2.1110 & 2.1111.	2.0515 – Particulates from Miscellaneous Industrial Processes 2.0516 – Sulfur Dioxide Emissions from Combustion Sources 2.1104 – Toxic Air Pollutant Guidelines 2.1409 – Stationary Internal Combustion Engines 2.1418 – New Electric Generating Units, Large I/C Engines 2.1423 – Large Internal Combustion Engines 2.1111 – 40 CFR 63 Subpart ZZZZ – RICE MACT, 40 CFR 63 Subpart DDDDD – Boiler MACT 2.0524 – 40 CFR 60 Subpart JJJJ – NSPS - Stationary Spark Ignition I/C Engines					
Miscellaneous Applicability (Y/N)	N	112r (40CFR68)	N	Strat. Ozone (40CFR82)	N	CAM (40CFR64)
HAPs >10tpy, Potential Emissions: facility-wide		Formaldehyde				
TAPs Modeled: this application		None				

Section D: FACILITY- WIDE EMISSIONS INFORMATION					
AIR POLLUTANTS	Calculated Actual Emissions With Control (tons/year)				
	Existing	New	Total	# Change + / (-)	% Change + / (-)
Particulate Matter < 10 microns - PM-10	0.04	0	0.04	0	0
Particulate Matter < 2.5 microns – PM2.5	0.04	0	0.04	0	0
Sulfur Dioxide - SO ₂	0.28	0	0.28	0	0
Nitrogen Oxides - NO _x	28.12	0	28.12	0	0
Carbon Monoxide - CO	26.69	0	26.69	0	0
Volatile Organic Compounds - VOC	2.16	0	2.16	0	0
All Hazardous Air Pollutants - HAPs	5.00	0	5.00	0	0

AQ Specialist Signature: Aaron B. Matijow **Date Completed:** 1/7/2025

Supervisor Signature: Jason Rayfield **Date Approved:** 2/7/2025

SECTION A DETAILS

FACILITY INFORMATION

Detailed discussion of any items in Section A. At a minimum provide the following information:

- 1. Basis for permit: reason facility/source is "major" under Title V and submitting a Title V application*
- 2. description of business operation (more detailed than summary page)*

Basis for Permit:

Charlotte Bioenergy Facility (CBF) has submitted their Title V renewal application and has the potential to emit the following pollutants above major source thresholds:

- Particulate Matter (PM10/PM2.5)
- Nitrogen Oxide (NOx)
- Carbon Oxide (CO)
- Volatile Organic Compounds (VOCs)
- Hazardous Air Pollutants (HAPs – Formaldehyde)

Business Operation:

CBF uses anaerobic digestion of food and cellulose waste to generate biogas. The biogas can be used to fuel three (3) combined heat and power units for both electrical and thermal energy production. The solids generated from anaerobic digestion are processed in two belt dryers to create fertilizer.

The main components of the system are:

- Feedstock Reception
- Bio-Squeezing System or Separation
- BioPulping
- Anaerobic Digestion
- Gas Combustion in combined heat and power engines
- Liquid/Solid Separation
- Liquid Thermostripping
- Solids Drying
- Solids Storage

Most of the CBF process is an enclosed system, however, emissions will result from digester gas combustion and solids drying.

Feedstock Reception Building: Trucks bringing feedstock (food/organic waste) to the facility will enter the Reception Building to unload material for processing and squeezing out free water. The material then enters the bio-pulper to homogenize the waste. The building is designed to be under negative pressure to avoid fugitive odors. Air from the reception building, as well as the bio-pulper will pass through a packed-bed wet scrubber followed by the biofilter (root wood media) for odor control only. The biofilter will be equipped with a pressure gauge to identify channeling and compaction issues. There are no regulated pollutant emissions from this part of the process.

Hot Digester Tank: The hot digesters are continuously mixed biological reactors. The anaerobic microbial cultures present in the digesters breakdown organic feedstock pumped from the Biopulper into biogas and residual digestate. The process is inherently isolated from outdoor air and all biogas is directed to the combined heat and power engines.

Combined Heat & Power (CHP) Engines (ES-1): Digester gas will be combusted in two (2) 2,000 kW and one 1,200 kW lean burn, spark ignition reciprocating internal combustion engines.

Safety Torches for combustion of methane gas during CHP maintenance (ES-1): Two small safety torches will be located between the digester and the CHPs. These are strictly safety devices to flare residual digester gas and prevent explosion when the CHPs are down for maintenance.

Solids Drying (ES-2): After digestion, to extract the methane, the solids are centrifuged to remove free water. They are then transferred to a belt dryer to reduce the moisture content of the solid material. The belts are each equipped with a two-stage scrubber. The first stage uses water spray for PM control and the second stage uses dilute acid spray (50% sulfuric acid / 50% water) to control ammonia, PM and VOC emissions. Heat for the belt dryer is provided by the CHP engines.

Boiler (IA ES-3): A 4.12 mmBtu/hr biogas and natural gas-fired boiler will be used to provide additional heat to the belt dryer when needed.

SECTION B DETAILS				
APPLICATION INFORMATION				
[List all emission sources [□] (permitted and exempt) reviewed as a result of this application, their associated control devices and pollutants. Provide a detailed discussion of any other items in Section B at bottom under “Application Notes”]				
EMISSION SOURCE ID	EMISSION SOURCE DESCRIPTION 1. Type, manufacturer, capacity 2. Control device with ID (if any)	POLLUTANT (s) EMITTED	MISCELLANEOUS NOTES	Previous Permit No. (If applicable)
ES-1	Three (3) Combined Heat and Power units each with a Lean Burn, Spark Ignition, Internal Combustion Engine burning digester gas including: - CHP-1: One (1) 2,000 kW (2,682 BHP) engine. - CHP-2: One (1) 2,000 kW (2,682 BHP) engine. - CHP-3: One (1) 1,200 kW (1,609 BHP) engine.	PM/PM ₁₀ /PM _{2.5} , NO _x , CO, VOC, SO ₂ , HAP	No change to equipment since the last permit.	19-02V-021
	Two (2) safety torches to flare residual gas from the digesters during CHP maintenance.	PM/PM ₁₀ /PM _{2.5} , NO _x , CO, VOC, SO ₂ , HAP	No change to equipment since last permit	19-02V-021
ES-2	Two (2) Solid Fraction Digestate Belt Dryers CD-DBD1 & CD-DBD2: Two (2) two-stage Spray Scrubbers for Ammonia, PM and VOC control.	PM/PM ₁₀ /PM _{2.5} VOC, Ammonia	No change to equipment since last permit	19-02V-021
IA ES-3	One (1) 4.12 mmBtu/hr boiler burning biogas and natural gas.	PM/PM ₁₀ /PM _{2.5} NO _x , CO, VOC, SO ₂ , HAP	Insignificant Activity under MCAPCO 1.5503 – Definitions, Paragraph (8) – Insignificant Activities because of Size or Production Rate. Potential emissions of criteria pollutants are each less than 5 tpy and potential emissions of HAP are each less than 1000 lb/yr.	19-02V-021
IA	Biosqueezer with biofilter and wet scrubber for odor control	N/A		
IA	Wastewater Treatment			
IA	Gas Refinement Process to included: • Desulphurization wet scrubber • Ferrosorp H2S Removal • Ammonia Wet Scrubber • Activated Carbon System • Biogas Upgrade (BUG) Unit • Two (2) 8.53 MMBtu Natural Gas Burners	PM, NO _x , CO, VOC, SO ₂ , HAP		N/A

	• Six (6) gas analyzers			
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Note: In accordance with MCAPCO 1.5508(i)(13), fugitive emissions as defined in 40 CFR 70.2 or for HAP emission purposes, shall be included in the same manner as stack emissions. All fugitive emission sources may be grouped and listed as one (1) emission source under Emission Source ID No.

APPLICATION NOTES

On May 30, 2023, MCAQ received an electronic copy of the Title V renewal application from Anaergia Services, LLC.

On June 30, 2023, MCAQ deemed the application substantially incomplete. MCAQ requested a complete application be submitted by August 10, 2023. The facility requested an extension to the end of September due to a consultant being hired to help with the application.

On August 8, 2023, MCAQ received the \$12,000 Title V application fee.

On October 20, 2023, the revised application was received.

The revised application requested a name change from Orbit Energy Charlotte, LLC to Charlotte Bioenergy Facility, LLC (CBF).

On October 25, 2023, MCAQ issued a Notice of Objectionable Odor to the facility that required an Odor Management Plan (OMP) to be submitted by December 26, 2023. On December 22nd, an OMP was submitted and MCAQ responded with comments. On February 19, 2024, a revised OMP was received and MCAQ conditionally approved the plan on March 20, 2024 (copy included). The permit will have a condition requiring the facility to comply with the OMP, stating recurrence of off-site objectionable odors will result in the implementation of the requirements listed in MCAPCO Regulation – “Determination of Maximum Feasible Controls for Odorous Emissions”. Monitoring and reporting requirements related to the OMP will also be entered into the permit. A copy of the most recent MCAQ-approved OMP will be included as Attachment 3 to the permit.

On December 4, 2023, an applicability determination was submitted for the facility to refine the biogas to a pipeline-grade gas for distribution. The new processes will treat the gas to remove sulfur and other impurities. Since the biogas produced at the facility will also be conveyed via pipeline for offsite distribution, the use of the CHPs that provide heat at the belt dryers will decrease, therefore supplemental heat will be required (two natural gas burners). The proposed gas refinement process is completely enclosed with the exception of the gas analyzers and natural gas burners for the dryers.

The following equipment will be associated with the gas refinement process:

- Desulphurization wet scrubber
- Ferrosorp H₂S Removal
- Ammonia Wet Scrubber
- Activated Carbon System
- Biogas Upgrade (BUG) Unit
- Two (2) 8.53 MMBtu Natural Gas Burners
- Six (6) gas analyzers

The emissions associated with the gas analyzers and gas burners are under 5 tons per year for criteria pollutants and each below 1,000 pounds per year HAPs. The equipment/process will be exempt from permitting per MCAPCO Regulation 1.5503 – “Definitions” Part (8) “Insignificant Activities because of Size or Production Rate”. An exemption letter was issued on January 3, 2024, and the gas refinement process will be added as an insignificant activity (IA) emission source.

In April 2024, MCAQ was made aware that the facility was not in operation and the facility's previous Responsible Official was no longer associated with CBF. A field visit conducted on April 29, 2024, confirmed the facility had idled operations. On June 10, 2024, based on facility compliance history and idling of operations, MCAQ issued a letter requiring the following additional information be submitted to process this renewal application:

- Identification of Charlotte Bioenergy Facility's Title V Responsible Official as defined by 40 CFR Part 70.2 – "Definitions";
- Submittal of MCAQ's A1 – Facility General Information application form providing relevant information about operations at Charlotte Bioenergy Facility;
- Documentation showing that Anaergia Services, LLC. is financially qualified to carry out the permitted activities listed in current Air Quality Permit No. 19-02V-021 at the Charlotte facility; and,
- Documentation or a certified statement showing that Anaergia Services, LLC has substantially complied with the air quality and emissions standards applicable to any activity in which the applicant has previously been engaged and has been in substantial compliance with federal and State environmental laws and Rules.

On October 22, 2024, MCAQ received all required information and CBF's Title V renewal application was deemed complete. The facility remains idled as of the date of this Application Review Summary; however, CBF has requested that MCAQ proceed with renewing their permit.

SECTION C DETAILS		
REGULATORY INFORMATION		
<i>(Identify the MCAPCO Regulations reviewed because of this application. At minimum, the regulations already listed should be reviewed and a reason given for applicability or non-applicability. If a Regulation has a standard, list the standard and indicate how the source is in compliance.)</i>		
MCAPCO REGULATION NUMBER/TITLE	EMISSION SOURCE ID No(s). SUBJECT	NOTES ON REGULATION (compliance demonstration, applicability, etc.)
1.5500 Title V Provisions	All	The facility has the potential to emit above Title V permitting thresholds (100/25/10 tpy) for PM10/PM2.5, NOx, CO, VOC, and HAP (formaldehyde). Only sources that are subject to PSD for another pollutant are required to address GHGs under PSD review and Title V permitting.
1.5700 Toxic Air Pollutant Procedures	ES-2	Modeling for ammonia was performed in 2015 at emission rates greater than potential (prorated to achieve 90% of AAL). Compliance with the acceptable ambient level (AAL) was demonstrated. A toxic review was not triggered as a result of this application.
2.1110 NESHAP (40 CFR 61)	N/A	None of the emission sources at the facility emit any HAP that is regulated under a Part 61 NESHAP.
2.1111 NESHAP (40 CFR 63) (MACT)	ES-1 CHPs	ES-1 is subject to Subpart ZZZZ for RICE generators. The units must comply with monitoring, recordkeeping, and reporting requirements. Compliance is verified through inspections and through the annual compliance report due January 31 st . The 2023 compliance report was submitted January 31, 2024, and documented compliance. The facility was found to be in compliance at its last inspection on January 30, 2024.
	IA ES-3	ES-3 is NOT subject to Subpart 6J for boilers because the unit will burn only gaseous fuel. ES-3 is subject to Subpart DDDDD Boiler MACT. The boiler is designated as the subcategory "units designed to burn gas 1 fuels" and will have to complete a tune-up every 5 years. If biogas is burned, a fuel specification analysis will need to be conducted and the facility will need to develop a site-specific fuel analysis plan. Frequency of the fuel analysis and associated recordkeeping depends on the mercury results. A tune-up was performed January 19, 2024. Compliance is

		verified through inspections and compliance reports (5 year report for tune-up and semi-annual reports for fuel analyses). The facility is in compliance with the requirements.
2.0524 New Source Performance Standards	ES-1 CHPs <	

		Stack testing is not required for toxics (ammonia) from the digestate belt dryers (ES-2) because CBF is claiming 85% control and they modeled at rates above potential. MCAQ accepts 85% as an acceptable “default” control efficiency for scrubbers controlling inorganic compounds, therefore, no testing is required.
Senate Bill 3 – Best Available Control Technology	ES-1	<p>In accordance with NC General Statute 62-133.7, the “Renewable Energy and Energy Efficiency Portfolio”, an air permit application for a new renewable energy facility must comply with the requirements for installation of BACT on the energy producing combustion sources in order to generate Renewable Energy Credits.</p> <p>The facility is not major for any pollutants under the PSD criteria and is not subject to a Federal PSD BACT analysis. Therefore, the facility is subject to a case-by-case SB3 BACT analysis.</p> <p>The SB3 control levels are based on manufacturer specified achievable emission rates associated with good combustion control. Each of the three gensets will be 4-stroke, lean burn units equipped with engine controls that adjust the ignition timing and air/fuel ratio with variations in digester gas composition to meet the manufacturer specified emission rates. No post combustion add-on emission control systems will be used.</p> <p>See SB3 BACT analysis submitted with the initial application for more details.</p> <p>Biogas flow is monitored and recorded daily to ensure the engines are operating using good combustion practices. Daily biogas flowrates are also reported in the facility MACT 4Z annual compliance report. Continued compliance will be verified through future performance tests.</p>
2.1210 – Commercial and Industrial Solid Waste Incineration units	N/A	Based on a February 13, 2013 memo from Don van der Vaart of NCDAQ, the USEPA has determined that gas conveyed in a pipe (e.g. digester gas) to a combustion unit is not a “contained gaseous material” and therefore not a “solid waste”. The CISWI rule does not apply.
40 CFR 82: Stratospheric Ozone Protection	N/A	The facility is not subject to this rule.
40 CFR 64 Compliance Assurance Monitoring	N/A	<p>Facilities are subject to CAM when the following criteria is met:</p> <ol style="list-style-type: none"> 1. Classified as a TV facility; 2. Subject to an emission limit; 3. Use a control device for compliance with an emission limit; and, 4. Uncontrolled potential emission of applicable pollutant is at least 100% of TV threshold <p>The requirements of CAM do not apply sources subject to emission limitations or standards proposed by the Administrator after 11/15/90 pursuant to section 111 or 112 of the Act (NSPS and MACT sources).</p> <p>Therefore, the facility is not subject to CAM requirements as the facility’s CHPs are subject to MACT Subpart 4Z and NSPS Subpart JJJJ, and the insignificant boiler is subject to MACT Subpart DDDDD.</p>
2.0503 – Particulates from Fuel Burning Indirect Heat Exchangers	N/A	IA ES-3 is the only source that meets the definition of an indirect heat exchanger. The boiler is an insignificant activity with minimal emissions and therefore is expected to be in compliance with the requirements.
2.0515 Particulates from Miscellaneous Industrial Processes	ES-2	The design rate of the dryers is 3 tons per hour. Based on the equation $E=4.10(P)^{0.67}$, the allowable PM emission rate is 8.56 lb/hr. Each of the two belt dryers will be equipped with a spray scrubber for PM control. Potential controlled emissions are 3.49 lbs/hr. Compliance is expected and will be verified through annual emissions review.
2.0516 – Sulfur Dioxide Emissions from Combustion Sources	ES-1 IA ES-3	<p>ES-1 and IA ES-3 boiler are the only sources of SO₂. Emissions are expected to be extremely low. Fuels used will only include biogas and natural gas. Compliance will be verified through annual emissions review.</p> <p>IA ES-3 is an Insignificant Activity and will not be subject.</p>
2.1418 New Electric Generating Units, Large Boilers, and Large I/C	ES-1 (CHP-1 and CHP-2 only)	Lean burn stationary internal combustion engines rated at 2,400 brake horsepower or greater are subject to this regulation. Therefore, the two 2,000 kW (2,682 hp) generators are subject. To comply with this rule, the generators must comply with

Engines.		the requirements of MCAPCO 2.1423. See below.
2.1423 Large Internal Combustion Engines	ES-1 (CHP-1 and CHP-2 only)	<p>The two 2,000 kW generators are subject to this rule. Per the regulation, the maximum allowable NO_x emission concentration for these units is 125 ppm. This concentration is expressed as NO₂ corrected to 15 % ppmv stack gas oxygen on a dry basis, averaged over a rolling 30-day period.</p> <p>The facility is required to conduct performance testing because they chose not to install a CEMS. Performance testing has been completed (CHP-2 was completed May 2023 and CHP-1 completed in December 2019) results are above.</p> <p>A report documenting the engines' total NO_x emissions beginning May 1 and ending September 30 of each year will be required to be submitted to the Director by October 31 of each year. Additional recordkeeping requirements are also required by the rule (hours engine operated each day, date and results of each emission inspections, emissions corrective maintenance taken and results of all compliance tests). Compliance will be verified through inspections.</p>
2.1409 – Stationary Internal Combustion Engines	ES-1 (CHP-3 only)	ICE's with rated capacity greater than 650 hp but less than 2400 hp are subject to this regulation. NO _x emission rate shall be less than 2.5 g/hp-hr. Annual source testing will be required as outlined in the rule ((f) if operated > 475 hrs). The last performance test was completed on May 3 & May 18, 2023. See above for details on the test results.

SECTION D DETAILS				
EMISSION INFORMATION				
CALCULATION METHOD CODES (List all that apply)		1= Stack test result 2= Material (mass) balance 3= EPA approved information (AP-42, CTG, etc.) 4= Other (specify in Table below)		
CALCULATION REJECTION CODES (List all that apply)		1= Calculation error 2= Wrong emission factor(s) used 3= Control efficiency(ies) not accepted 4= Other (Specify in Table below)		
EMISSION SOURCE ID NUMBER	CALCULATION METHOD CODE	ACCEPT OR REJECT?	CALCULATION REJECTION CODE	MCAQ CALCULATIONS ATTACHED?
All	3	Accept		Yes

SECTION E
SUPPORTING DOCUMENTATION
<i>(Provide brief description of any ATTACHMENTS)</i>

1. Draft Permit No. 25-01V-021
2. Application submitted 5/30/2023, Revised 10/20/2023
3. Cover Letter
4. Emission Calculations
5. Supporting email correspondence and additional information
6. Copy of 2/19/24 Odor management Plan
7. EJ Snapshot