**FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION**
BOB MARTINEZ CENTER
2600 BLAIRSTONE ROAD
TALLAHASSEE, FLORIDA 32399-2400

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

**PERMITTEE**

U.S. EcoGen Polk, LLC
601 Heritage Drive, Suite 127
Jupiter, Florida 33458

Authorized Representative:
Mr. William F. Quinn, P.E., President

Air Permit No. 1050444-002-AC
Air Construction Permit Modification
Permit Expires: June 30, 2017

US EcoGen Polk Generating Facility
Polk County, Florida

**PROJECT**

This is the final air construction permit, which modifies Permit No. 1050444-001-AC for the previously approved US EcoGen Polk Generating Facility. This permit includes updated details of the project's power island, including the boiler heat input rating of 860 million Btu per hour. The US EcoGen Polk Generating Plant is an electric power plant categorized under Standard Industrial Classification No. 4911. The new plant will be located in Polk County at County Road 630, Fort Meade, Florida. The UTM coordinates are Zone 17; 418.721 kilometers (km) East and 3,073.665 km North.

This final permit is organized into the following sections: Section 1 (General Information) and Section 2 (Permit Revisions). As noted in the Final Determination provided with this final permit, no changes were made to the draft permit.

**STATEMENT OF BASIS**

This air pollution construction permit is issued under the provisions of: Chapter 403 of the Florida Statutes (F.S.) and Chapters 62-4, 62-204, 62-210, 62-212, 62-296 and 62-297 of the Florida Administrative Code (F.A.C.). This project is subject to the general preconstruction review requirements in Rule 62-212.300, F.A.C. and is not subject to the preconstruction review requirements for major stationary sources in Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality. A copy of this permit modification shall be filed with the referenced permit and shall become part of the permit.

Upon issuance of this final permit, any party to this order has the right to seek judicial review of it under Section 120.68 of the Florida Statutes by filing a notice of appeal under Rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department of Environmental Protection in the Office of General Counsel (Mail Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida, 32399-3000) and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The notice must be filed within 30 days after this order is filed with the clerk of the Department.

Executed in Tallahassee, Florida.

David Read
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*for* Jeffery F. Koerner, Program Administrator
Office of Permitting and Compliance
Division of Air Resource Management

## CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this Final Air Permit package (including the Final Permit Revision) was sent by electronic mail, or a link to these documents made available electronically on a publicly accessible server, with received receipt requested before the close of business on the date indicated below to the following persons.

William F. Quinn, P.E., U.S. EcoGen Polk, LLC: bill.quinn@usecogen.com
Steven Frey, Kennedy/Jenks Consultants: stevefrey@kennedyjenks.com
Nizom Ghantous, P.E., Mott MacDonald: nizom.ghantous@mottmacinc.com
Heather Ceron, US EPA Region 4: ceron.heather@epa.gov
Kelly Boatwright, Administrator, DEP SWD: kelley.m.boatwright@dep.state.fl.us
Lynn Scearce, DEP OPC: lynn.scearce@dep.state.fl.us

Clerk Stamp

**FILING AND ACKNOWLEDGMENT FILED**, on this date, pursuant to Section 120.52(7), Florida Statutes, with the designated agency clerk, receipt of which is hereby acknowledged.

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## FACILITY DESCRIPTION

The following permit conditions are revised as indicated. ~~Strikethrough~~ is used to denote the deletion of text. Double-underlines are used to denote the addition of text. All changes are emphasized with yellow highlight.

The facility will consists of a bubbling fluidized bed (BFB) boiler fueled primarily by clean woody biomass and eucalyptus tree chips, with natural gas used only for boiler startup, shutdown and bed stabilization. The BFB boiler will provide steam to a steam turbine electrical generator (STEG). The following control equipment will be used to control emission from the BFB: ammonia ($NH_3$) injection into the furnace and selective catalytic reduction (SCR) reactor will be used to control emission of nitrogen oxide ($NO_X$); an acid gas control system will be used to control emission of sulfur dioxide ($SO_2$) and hydrogen chloride (HCl); and a fabric filter baghouse to control emissions of particulate matter (PM)/PM with a mean diameter of 10 microns or less ($PM_{10}$)/$PM_{2.5}$. The BFB is equipped with a continuous opacity monitoring system (COMS) for visible emissions (VE) and a continuous emission monitoring systems (CEMS) to measure carbon monoxide (CO), $NO_X$ and $SO_2$.

The facility also includes an emergency diesel generator with a maximum design rating of 670 horsepower (hp), 500 kilowatts (kW), a diesel fire pump with a maximum design rating of 200 hp (150 kW) and miscellaneous activities.

This project will consist of the following emissions units (EU).

| EU No. | Emission Unit Description |
|---|---|
| 001 | Fuel receiving, handling, storage and processing |
| 002 | Power island |
| 003 | Ash handling, storage and shipment |
| 004 | One emergency diesel generator with a maximum design rating of 670 hp (500 kW) |
| 005 | One emergency diesel firewater pump with a maximum design rating of 200 hp (150 kW) |

## FACILITY REGULATORY CLASSIFICATION

- The facility is not a major source of hazardous air pollutants (HAP).
- The facility operates a unit subject to the Acid Rain provisions of the Clean Air Act (CAA).
- The facility is a Title V major source of air pollution in accordance with Chapter 213, F.A.C.
- The facility is not a major stationary source in accordance with Rule 62-212.400(PSD), F.A.C.
- The facility is not subject to the Electric Power Plant Siting provisions under Chapter 403, Part II, Florida Statutes (F.S.) because the electrical power plant will have a capacity less than 75 MW in gross capacity.
- The facility is subject to the provisions of the Clean Air Interstate Rule (CAIR), including applicable portions of Chapters 62-204, 62-210 and 62-296, F.A.C.
- The facility is subject to Chapter 62-204-800, F.A.C for New Source Performance Standards (NSPS) under Section 111 of the Clean Air Act (CAA) and National Emissions Standards for Hazardous Air Pollutants (NESHAP) under Section 112 of the CAA.

## PROPOSED PROJECT

U.S. EcoGen, LLC was authorized under permit no. 1050444-001 to construct a biomass-fueled power plant. The previously approved project includes: fuel receiving, handling, storage and processing systems; a power island consisting of a woody biomass-fueled boiler and steam turbine-generator; and fly ash handling, storage and shipment systems. The company is requesting to revise permit no. 1050444-001-AC to update the following changes in the design of the facility:

- Update the maximum heat input description of the BFB boiler from 740 MMBtu/hour to 860 MMBtu/hour;
- Update the power generation description from 63 MW (nominal) to 74.9 MW (gross) and approximately 66-68 MW (net);
- Increase the maximum steam production of the BFB boiler from 565,000 pounds per hour (lb/hour) to 650,000 lb/hour;
- Indicate that the selective catalytic reduction (SCR) system used to control nitrogen oxides ($NO_X$) emissions may now consist of injecting ammonia into both the boiler furnace via a selective non-catalytic reduction (SNCR) system in conjunction with the SCR system (a SCR system must still be installed);
- Update the description of the spray drier absorber (SDA) system used to control acid gas emissions from the boiler;
- Indicate that aqueous ammonium sulfate in a 40% concentration may be used as a corrosion reduction agent and support $NO_X$ reduction in the boiler furnace via a SNCR system (if used, the ammonium sulfate will be stored on-site in a 10,000 gallon tank); and
- Make minor changes to the description of the ash (fly and bottom) handling, storage and shipment emission unit to reflect the updated engineering design.

No changes to the previously authorized emission limits will occur as a result of the change in the design of the biomass-fueled power plant.

1. Section 3, Subsection B, Emission Unit Description: The emission unit description is revised as follows.

| EU ID No. 002 | Emission Unit Description |
|---|---|

*Description*: The boiler will be a woody biomass-fueled BFB boiler wherein wood is combusted within a bed of hot sand. The heat from the exhaust will be recovered to generate superheated steam to generate ~~a nominal 63~~ 74.9 MW of electricity (gross basis) in a STEG of which approximately 66-68 MW (net) will be exported to the electric power grid.

*Fuels*: The primary fuel for the BFB will be eucalyptus trees once the eucalyptus trees from the plantations becomes established. The secondary fuel will be clean woody biomass as described in Section 3-A, Specific Condition 5 and Appendix BMP of this permit. Natural gas will be used for startup, shutdown and flame (bed) stabilization fuel.

*Maximum Continuous Rating (Heat Input)*: The maximum continuous rating to the BFB boiler is ~~740~~860 million British thermal units per hour (MMBtu/hr). The maximum design rate using natural gas alone is 160 MMBtu/hr.

*Maximum Continuous Rating (Steam Production)*: The maximum continuous rating (MCR) of steam production of the BFB boiler is ~~565,000~~650,000 pounds per hour (peak is 110% of MCR).

*Controls*: GCP in the BFB boiler to minimize formation of PM, $NO_X$, CO and VOC; limitation of biomass to woody untreated biomass to minimize $SO_2$ and HAP formation, including HCl; use of natural gas for startup, shutdown and flame (bed) stabilization; ammonia injection into the furnace and SCR reactor or only into the SCR to destroy $NO_X$; acid gas control system to control $SO_2$ and HCl emissions; and a fabric filter baghouse to control PM emissions.

*Stack Parameters*: The stack will be approximately 11 feet diameter and 180 feet tall.

*Continuous emissions and opacity monitoring systems (CEMS, COMS)*: Emissions of CO, $NO_X$ and $SO_2$ will be monitored and recorded by CEMS. VE will be monitored and recorded by a COMS.

*Applicability of 40 CFR Subpart Db (NSPS Subpart Db)*: This unit is subject to NSPS Subpart Db – Industrial-Commercial-Institutional Steam Generating Units because it has a maximum heat input capacity greater than 100 MMBtu/hr from the fuels combusted and is not subject to NSPS Subpart Da because it has a maximum heat input capacity less than 250 MMBtu/hr from the fossil fuels combusted.

In addition to the BFB boiler the following equipment is also associated with this EU:

- *Aqueous Ammonia Storage Tank:* Aqueous ammonia at a 19% concentration level or less will be used as the reactant and will be stored onsite in a nominal 10,000 gallon pressurized horizontal tank. No air emissions are associated with the ammonia storage tank.
- *Aqueous Ammonium Sulfate Tank: Aqueous ammonium sulfate at a typical concentration of 40% will be used as a corrosion reduction chemical and will be stored onsite in a nominal 10,000 gallon pressurized horizontal tank. No air emissions are associated with the ammonia storage tank.*
- *Air Cooled Condenser and Auxiliary Cooling Towers*: Cooling of spent steam in the steam turbine power system will be provided by an air cooled condenser unit. The air cooled condenser does not have the potential to emit regulated air pollutants. The auxiliary cooling tower will provide cooling for various components, including turbine lube oil, BFB lube oil, and generator coolers. The auxiliary cooling tower has the potential to emit a small amount of PM.
- *Sand Storage Silo*: A sand storage silo will be installed to store the makeup sand for use in the bed of the BFB boiler. PM will be controlled by a breather vent or vent filter.
- *Sorbent Storage Silo*: A sorbent storage silo will be installed to store the sorbent used in the spray dryer absorber (SDA) ~~system or multilevel/multiple injection location~~ dry sorbent injection (DSI) system. PM will be controlled by a breather vent or vent filter.

2. Section 3, Specific Condition No. 2. This condition is revised as follows:

   BFB Boiler Air Pollution Control Equipment: To comply with the emission standards of this permit, the permittee shall install the following add-on air pollution control equipment on the BFB boiler.

   a. Baghouse: The permittee shall design, install, operate and maintain a baghouse to control PM and VE. The design control efficiency of the baghouse shall be 99%.

   b. SCR System: The permittee shall design, install, operate, and maintain an ammonia based SCR system including ammonia storage tank, pumps, metering system, injection grid, reactor and catalyst to reduce $NO_X$ emissions in the flue gas exhaust and achieve the $NO_X$ emissions standards specified in this subsection. The SCR shall be brought on line and functioning properly whenever the boiler is in operation in accordance with the manufacturer's procedures and guidelines. Ammonia and ammonium sulfate may also be injected though nozzles directly into the furnace to effect higher temperature $NO_X$ removal under the principle of selective non-catalytic reduction (SNCR). The storage tank of ammonia shall comply with all applicable requirements of 40 CFR 68.

   c. Acid Gas Control System:

      (i.) A spray dryer absorber (SDA) system utilizing lime or equivalent shall be installed, operated and maintained to control acid gas emissions such as $SO_2$ and HCl to achieve the respective emission standards specified in this subsection. The SDA process consists of an absorber chamber, a rotary atomizer, a flue gas disperser, a downstream dust collector, and an absorbent feed preparation system, or;

      (ii.) ~~A multilevel/multiple injection location~~ DSI system utilizing sodium bicarbonate as its sorbent shall be installed, operated and maintained to control acid gas emissions such as $SO_2$ and HCl to achieve the respective emission standards specified in this subsection. The DSI ~~and multicyclone~~ system involves injection of finely milled sodium bicarbonate or equivalent ~~multi-level injection after the economizer and just~~ prior to baghouse~~, with addition of multicyclone separator prior to the baghouse inlet~~. The permittee shall notify the Department of the specific technology selected as the control device within 90 days of selecting the final design.

   d. No changes.

3. Section 3, Specific Condition No. B.4. This condition is revised as follows:

   Sorbent Storage Silo: A sorbent storage silo will be installed to store the sorbent use in the spray dryer absorber (SDA) system or ~~multilevel/multiple injection location~~ dry sorbent injection (DSI) system. PM will be controlled by a breather vent or vent filter.

4. Section 3, Specific Condition No. B.10: This condition is revised as follows.

   Emission Limits: Emissions from BFB boiler shall not exceed the following standards.

| Pollutant | Emission Standard | Basis | Compliance Demonstration |
|---|---|---|---|
| $NO_X$ [1] | 0.30 lbs/MMBtu | NSPS Db<br>40 CFR 60.44b<br>Avoid PSD<br>Rule 62-212.400(12), F.A.C. | 30-day rolling average, rolled daily compliance by CEMS |
| | 246 TPY | Avoid PSD<br>Rule 62-212.400(12), F.A.C. | 12-month rolling average, rolled monthly, compliance by CEMS |
| CO | 246 TPY | Avoid PSD<br>Rule 62-212.400(12), F.A.C. | 12-month rolling average, rolled monthly, compliance by CEMS |

| Pollutant | Emission Standard | Basis | Compliance Demonstration |
|---|---|---|---|
| $SO_2$ | 227 TPY [2] | Avoid PSD<br>Rule 62-212.400(12), F.A.C. | 12-month rolling average, rolled monthly, compliance by CEMS |
| PM [3, 7] | 0.03 lbs/MMBtu<br>(filterable only) | NESHAP JJJJJJ<br>NSPS Db 60.43b(h)(1)<br>Avoid PSD<br>Rule 62-212.400(12), F.A.C. | Initial and Annual Stack Test |
| VE[4] | 10% average, daily block | NESHAP JJJJJJ,<br>Reasonable Assurance[4] | Compliance by COMS |
| | 20% (27%), one 6-minute block/hour | NSPS Subpart Db | |
| HCl | 9.9 TPY | Avoids Major HAP Status [5] | Initial and Annual Stack Test,<br>Performance Curves [6] |

1. $NO_X$ limit in pounds per million Btu heat input (lb/MMBtu) on a 30-day basis is pursuant to NSPS Subpart Db applicable to units that combust wood with very low sulfur natural gas. Mass rate limit in TPY insures annual emissions will be less than 250 TPY and avoids PSD.
2. Use of low sulfur fuels including wood and natural gas insure that uncontrolled $SO_2$ emissions are less than 0.32 lb/MMBtu. Therefore, no specific limit from NSPS Subpart Db applies. Compliance with this exemption is by fuel monitoring. Mass rate limit in TPY insures annual emissions will be less than 250 TPY.
3. Meeting the NSPS and NESHAP PM limits equals approximately ~~97.2~~ 114 TPY. Meeting these limits will provide reasonable assurance that annual emissions of $PM/PM_{10}/PM_{2.5}$ (including condensable) will be less than 250 TPY. *{Note: Expected annual PM emissions will be much less.}*
4. VE by continuous opacity monitoring system (COMS). VE standard of 10% opacity per NESHAP Subpart JJJJJJ. VE must meet 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent to meet NSPS Subpart Db requirements. Meeting the Subpart Db requirements ensure meeting the VE requirements of Rules 62-296.320 and 62-296.406, F.A.C. The permittee must meet the work practice standard requirements of the NESHAP JJJJJJ during periods of startup, shutdown and malfunction. A work practice standards plan to minimize emissions during these periods shall be submitted to the Compliance Authority for approval no later than 180 days prior to boiler startup. Opacity of 10% provides reasonable assurance of continuous compliance with $PM/PM_{10}$ and is a reasonable expectation given catalyst-based $NO_X$, CO, VOC controls.
5. Must stay below 10 TPY threshold for an individual HAP to avoid becoming a major source of HAP and triggering NESHAP Subpart DDDDD - Major Sources: Industrial, Commercial, and Institutional Boilers.
6. Performance curves in conjunction with annual stacking testing to determine suitable sorbent injection rates show compliance with the 9.9 TPY emission cap.
7. Compliance with this PM limit ensures compliance with Rule 62-296.410, F.A.C. and 62-296.406, F.A.C.

5. Section 3, Specific Condition No. B.23: This condition is revised as follows.

   SCR $NH_3$ Injection: In accordance with the manufacturer's specifications, the permittee shall install, calibrate, operate and maintain a flow meter to measure and record the $NH_3$ injection rate for the furnace and SCR system. The permittee shall document the general range of $NH_3$ flow rates required to meet the $NO_X$ standard over the range of load conditions by comparing $NO_X$ emissions with $NH_3$ flow rates. During $NO_X$ CEMS downtimes or malfunctions, the permittee shall operate at an $NH_3$ flow rate that is consistent with the documented flow rate for the given load condition. Records shall be maintained on site and made available upon request. [Rule 62-4.070(3), F.A.C.]

6. Section 3, Subsection C, Emission Unit Description: The emission unit description is revised as follows.

This section of the permit addresses the following emissions unit.

| EU ID No. 003 | Emission Unit Description |
|---|---|

Ash Handling, Storage and Shipment: Ash consists of fly ash and bottom ash. Fly ash from the baghouse hoppers will be transferred via enclosed conveyors to a fly ash storage silo which shall be equipped with a vent filter or similar device. The vent filter or similar device will be designed to achieve a $PM/PM_{10}$ emission rate or "dust outlet loading" of 0.01 grains per dry standard cubic feet (gr/dscf). Fly ash from the storage silo will be sent to a truck loading operation for removal off-site. The conveyor system will be enclosed and the chute used to dispense fly ash into the truck will be designed to minimized PM emissions.

Bottom ash will be in the form of large solid particles and will be removed from the bottom of the boiler and stored in a metal container for future removal offsite.

Design parameters include:

- The fly ash handling system shall have a maximum design transfer rate of ~~0.75~~ 10 TPH with a maximum annual design transfer rate of ~~6,570~~ 10,500 TPY.
- The fly ash shipment system shall have a maximum design transfer rate of 80 TPH (average design transfer rate of 5.5 TPH) with a maximum annual design transfer rate of 48,180 TPY.
- The bottom ash handling system shall have a maximum design transfer rate of ~~1.0~~ 5.0 TPH with a maximum annual design transfer rate of 8,760 TPY based on design eucalyptus fuel.
- The fly ash storage system shall have a maximum design transfer rate of ~~0.75~~ 1.2 TPH with a maximum annual rate of ~~6,570~~ 10,500 TPY based on design eucalyptus fuel.

7. Section 3, Specific Condition No. B.23: This condition is revised as follows.

Equipment: The permittee is authorized to construct ash handling, storage and shipment system, which consists of the following equipment:

a. Fly Ash Handling: Fly ash baghouse hoppers, fly ash convection pass hoppers, mechanical dust collector hoppers and fly ash transfer conveyors;

b. Fly Ash Storage: Fly ash storage silo to store fly ash from the ash conveyor. The fly ash storage silo which will be equipped with a vent filter or alternative control technology;

c. Fly Ash Shipment: Ash haul out – trucks inbound and outbound;

d. Bottom Ash System: ~~Vibrating~~ Screw coolers and drag chain conveyors to move bottom ash from the bottom of the boiler to the metal storage container prior to shipment offsite.

[Application No. 1050444-001-AC]