STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITIES

IN THE MATTER OF THE PETITION OF **TRENTON RENEWABLE POWER, LLC** FOR APPROVAL OF A RENEWABLE ENERGY POWER PURCHASE AGREEMENT WITH PUBLIC SERVICE ELECTRIC AND GAS COMPANY	:	**VERIFIED PETITION** **BPU DOCKET NO. _____**

TO THE HONORABLE BOARD OF PUBLIC UTILITIES:

Trenton Renewable Power, LLC ("***Trenton Renewable"*** or "***Petitioner***"), a Delaware limited liability company, doing business at 1600 Lamberton Road, Trenton, NJ 08611, in support of the within Verified Petition, hereby petitions the New Jersey Board of Public Utilities ("***Board*****" or "*BPU*")** as follows and respectfully shows:

INTRODUCTION AND BACKGROUND

1. Petitioner owns and operates a food waste recycling facility, also known as a biomass facility, located at 1600 Lamberton Road, Trenton, New Jersey (the (***"Facility"***). The Facility includes a digester that recycles vegetative food waste and produces renewable natural gas as a byproduct of the recycling process.

2. The Facility also has three onsite 1.134 megawatt ("MW") electric generation turbines that use the renewable natural gas created by the digester to generate electricity ("***Generation System***"). The total nameplate capacity of the Generation System is 3.4 MW.

3. Because it is a biomass facility as defined in the Board's regulations, the electricity generated by the Generation System is classified as Class I renewable energy pursuant to N.J.A.C.

14:8-1.2 and N.J.A.C. 14:8-2.5(b)(8) and (c). In addition, the Generation System is a Qualified Facility ("QF") as that term is defined under the Public Utility Regulatory Policy Act of 1978 ("PURPA," originally codified at 16 U.S.C. § 2601 *et seq.*).

4. The Facility and Generation System are located within the service territory of Public Service Electric and Gas Company ("***PSE&G***"). The Generation System is interconnected with PSE&G's electric distribution system at voltage of 13.2 kV, at an interconnection point at 1600 Lamberton Road, Trenton, New Jersey.

5. PSE&G is a public utility of the State of New Jersey subject to the jurisdiction of the Board, and provides electric distribution and transmission service (along with basic generation service), and natural gas distribution service (along with basic gas supply service) within a service territory that encompasses numerous municipalities within the State of New Jersey, including Trenton, New Jersey. Petitioner is an electric distribution customer of PSE&G at the Facility.

6. Pursuant to an interconnection agreement between Trenton Renewable and PSE&G dated August 29, 2018, Petitioner currently sells the net electric generation from the Generation System to PSE&G under PSE&G's Purchased Electric Power ("***PEP***") tariff. *See* PSE&G Electric Tariff, Original Sheet No. 176, "Payment Schedule PEP - Purchased Electric Power." The pricing Trenton Renewable receives under PSE&G's PEP tariff is based on a wholesale "avoided cost" proxy. Essentially, the PJM Interconnection, L.L.C. ("***PJM***") wholesale locational marginal price ("***LMP***") at the PSEG node sets the price that Trenton Renewable receives for its Class I renewable energy under the PEP tariff.

7. The Generation System commenced commercial operation on November 5, 2019, and began selling renewable energy to PSE&G under the PEP tariff in May, 2020. Since it began

selling electricity to PSE&G, the average price that Trenton Renewable has received for its renewable energy under the PEP tariff is 3.8 cents/kWh.

8. The PEP tariff is a legacy of PURPA. PURPA, which has since been partially repealed, required electric public utilities to purchase electricity from certain non-utility generators at prices based on the utilities' avoided cost of generation. The pricing scheme under the PEP tariff is an outdated legacy of a federal policy that has been superseded by legal, regulatory, and structural changes to the electric industry over the last forty-odd years. Among other things, the Electric Discount and Energy Competition Act ("***EDECA***"), N.J.S.A. 48:3-49 *et seq.*, restructured the electric utility industry in New Jersey, required utilities to divest or functionally separate their generating assets, and opened the market to retail competition for electricity supply.

9. In the years since the enactment of EDECA, the Board has put in place financial incentives for several types of Class I renewable energy. The solar industry has enjoyed decades of financial incentives via grants, solar renewable energy certificates ("***SRECs***"), the "TREC" and "SuSi" REC initiatives, administrative programs under which the State's EDCs were required to purchase SRECs, and, more recently, the Board's community solar initiatives. Similarly, the Board has developed the Offshore Wind Renewable Energy Certificate ("***OREC***") program to provide financial incentives for developers of offshore wind projects.

10. However, no similar programs exist for biomass facilities, even though they are the most carbon-negative of all the Class I renewable technologies recognized under New Jersey law. *See* Report of Frank A. Felder entitled "Incorporating the Social Cost of Carbon based on the Environmental Benefits of Greenhouse Gas Emission Reductions from Trenton Renewable Power" being filed as Exhibit B to this Petition.

11. Trenton Renewable does receive Class I RECs for its renewable energy production. However, the current value of a Class I REC is only $29/MWh or 2.9 cents/kWh. After fees and commissions, Trenton currently receives 2.4 cents/kWh for a Class I REC. This value is substantially below the price of SRECs (which currently trade around $200/MWh or 20 cents/kWh)[1] even though, as discussed above and in the Exhibits to this Petition, the environmental and health benefits of a biomass facility are substantially greater than that of solar or offshore wind facilities.

12. Even when combining the price Petitioner receives from PSE&G under the PEP tariff with the realized value from its sale of Class I RECs, Trenton Renewable has only received approximately 6.20 cents/kWh on average. As of the most recently billing cycle, Trenton Renewable received only 2.32 cents/kWh from PSE&G under the PEP tariff, plus 2.4 cents/kWh for a Class I REC, which equates to 4.72 cents/kWh total.

13. Trenton Renewable has performed a carbon lifecycle analysis with respect to its operations. *See Trenton Renewable Power (TRP) Carbon Lifecycle Analysis***,** included herewith as Exhibit A to the Petition. The purpose of this analysis is to calculate the total carbon dioxide equivalent (CO_2e) or GHG emission avoidance from TRP's operations. This calculation considers all aspects of the TRP operations, including deliveries to and from the facility, less any carbon emitting processes (including energy consumption), and products that may be used or displaced outside of the operation. The results of this calculation reflect the net total tons of carbon eliminated per kilowatt hour of electricity produced by TRP.

[1] The prices for TRECs range from $91.20/MWh to $152/MWh depending on the type of solar facility.

14. Based on the Carbon Lifecycle Analysis in Exhibit A, Attachment A, Trenton Renewable's operations result in a gross avoided CO_{2e} of 239,787 metric tonnes per year ("TPY") and a net CO_{2e} offset of 224,895 metric TPY. *See* Exhibit A.

15. Dr. Serpil Guran, Director of Rutgers University's Clean Energy Innovation Center, has reviewed and verified the accuracy of the Carbon Lifecycle Analysis. *See* Exhibit A, Attachment B.

16. Trenton Renewable has also retained Dr. Frank A. Felder, an energy industry expert, to conduct a study of the value of its Class I renewable energy generated at the Facility, taking into account all of the environmental attributes of that energy. *See Incorporating the Social Cost of Carbon based on the Environmental Benefits of Greenhouse Gas Emission Reductions from Trenton Renewable Power: Qualifications for Energy Rate per kWh*, included herewith as Exhibit B to the Petition.

17. Dr. Felder has used the Carbon Lifecycle Analysis and other well-established data to calculate the social cost of carbon dioxide equivalent emissions avoided by Trenton Renewables operations. Dr. Felder has calculated this value to be $1.65/kWh. *See* Exhibit B.

18. Combining the $1.65/kWh value of avoided CO_{2e} emission with the average wholesale value of electricity Trenton has been receiving from PSE&G ($0.38/kWh on average) results in a total value of $2.03/kWh. *See* Exhibit B.

19. However, in this petition and the associated proposed PPA, Trenton Renewable is not seeking a price of $2.03/kWh from PSE&G. Based on the foregoing analysis and taking into account the potential rate impact on PSE&G's customers, Trenton Renewable has determined that an appropriate price for the renewable energy from its Generation System is $0.20/kWh or 20

cents/kWh. The proposed 20 cents/kWh price is approximately one-tenth the actual market/societal value of the electricity from the Generation System.

REQUEST FOR APPROVAL OF A RENEWABLE POWER PURCHASE AGREEMENT WITH PSE&G

20. While Trenton is currently selling its electricity to PSE&G's under the PEP tariff, there is nothing that prevents PSE&G from entering into a contract with a QF for the purchase and sale of power. Indeed, the comparable sections of the tariffs of Jersey Central Power & Light Company ("JCP&L") and Atlantic City Electric Company ("ACE") each contain language that allows the EDC to enter into a contractual arrangement for the purchase and sale of power. *See* JCP&L tariff, Original Sheet 56, Rider QFS (specifying that QF installations with more than 1,000 kW of capacity shall negotiate with JCP&L for specific contract arrangements, subject to approval of the BPU); ACE tariff, Fourth Revised Sheet 42, Rate Schedule SPP (providing that QFs with capacity of greater than 1,000 kW must negotiate customer specific contracts, which are subject to Board approval). Moreover, the Board has, historically, approved many contracts for specific rates as between electric utilities and QFs. *See, e.g., Re Cogeneration and Small Power Production*, 1988 N.J. PUC LEXIS 10, 102 P.U.R.4th 112 (N.J. P.U.C. September 28, 1988).

21. Similarly, the Board may approve contracts for the purchase and sale of energy between EDCs and electric generators whether or not the generator is a QF and whether or not the price is based on an "avoided cost" proxy. For more than twenty years, the Board has conducted annual basic generation service ("BGS") auctions and, thereafter, approved contracts between EDCs and electric generators for the purchase and sale of electricity at rates that have no connection to PURPA or so-called "avoided cost." There is nothing under New Jersey law that probits the Board from approving a contract between Trenton Renewable and PSE&G for the

purchase and sale of electricity. PSE&G would be able to use the purchased electricity as "committed supply" to offset its BGS requirements.[2]

22. In addition, under the Board's general authority pursuant to N.J.S.A. 48:2-13 and its rate-setting jurisdiction under N.J.S.A. 48:2-21, the Board can approve contracts between a public utility and a customer.

23. Accordingly, Petitioner is filing a proposed contract, captioned "CLASS I RENEWABLE ENERGY POWER PURCHASE AGREEMENT," as between Trenton Renewable and PSE&G ("PPA"). A copy of the PPA is attached here as Exhibit C. The PPA reflects a purchase price of $0.20/kWh as discussed and documented herein above. Petitioner requests that the Board approve the PPA.

24. Under the PPA, Trenton Renewable would sell, and PSE&G would purchase, all of the Class I renewable electricity produced by the Generation System and delivered to PSE&G at the interconnection point. As discussed above, the interconnection point is located within the Facility in Trenton, New Jersey. The term of the PPA is ten years.

25. There is no quantity of Class I renewable electricity specified or guaranteed under the PPA; rather, PSE&G would purchase the total delivered amount as determined by a utility-grade meter at the interconnection point.

26. The PPA, if approved by the Board, would replace and supersede Petitioner's sales to PSE&G under the PEP tariff.

27. The parties have not yet executed the PPA, pending the Board's review and approval of its terms. Trenton Renewable has shared a copy of the proposed PPA with PSE&G.

[2] "Committed Supply" is a term that New Jersey EDCs use for electricity they acquire via contract (or otherwise) outside of the BGS auction context, and which is used to offset the EDC's BGS load. *See, e.g., I/M/O the Provision of Basic Generation Service (BGS) for the Period Beginning June 1, 2024*, BPU Dkt. No. ER23030124, Decision and Order dated 11/17/23, at p. 5.

Trenton Renewable hopes that, upon Board approval, the parties will execute the PPA in short course.

COST RECOVERY

28. Cost recovery of PSE&G's payments to Trenton Renewable under the PPA is, of course, an issue for PSE&G and does not directly concern Petitioner.

29. However, to expedite the Board's review of this Petition, Petitioner will address cost recovery briefly. Should PSE&G determine to intervene or participate in this matter, PSE&G may, of course, take whatever position it deems appropriate in regard to its cost recovery mechanism.

30. Trenton Renewable understands that PSE&G currently recovers the costs it incurs to purchase Petitioner's electricity under the PEP tariff via PSE&G's non-utility generation charge component of its electric tariff ("NGC"). According to the PSE&G tariff, "This mechanism is designed to insure recovery of costs associated with activities that are required to be accomplished to achieve specific public policy determinations mandated by Government. This charge shall recover: 1) above market costs associated with non-regulated generation costs which are related to long-term contractual power purchase arrangements approved by the Board and/or established under requirements of the Public Utility Regulatory Policies Act of 1978 and 2) other generation costs as may be approved by the Board." PSE&G Electric Tariff, Sixth Revised Sheet No. 60.

31. Because PSE&G's purchases under the PPA will be for the same purposes as the purchases under the PEP tariff and is fully-consistent with the language of PSE&G's NGC, continued cost recovery via the NGC would appear to be appropriate.

SERVICE OF PETITION

32. Copies of this Verified Petition, and of all supporting Exhibits thereto, have been or will be duly served upon the Board's Staff, the Director, Division of Rate Counsel, upon the Department of Law & Public Safety, Division of Law, and upon PSE&G. Service will be via electronic mail, in accordance with the Board's March 19, 2020 Order in BPU Docket No. EO20030254, which directs that copies of this filing be submitted by electronic mail only.

WHEREFORE, Petitioner respectfully requests your Honorable Board to:

1) Approve the PPA in the form filed herewith as Exhibit C ;
2) Authorize PSE&G to recover the costs it incurs under the PPA; and
3) Grant such other approvals and provide such other authorizations as the Board shall deem necessary or proper in connection with the foregoing.

Respectfully submitted,

Dated: February 8, 2024

COZEN O'CONNOR P.C.
Attorneys for Petitioner, Trenton Renewable Power, LLC

By: _____

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AFFIDAVIT
OF
VERIFICATION

Brian Blair, being duly sworn upon his oath, deposes and says:

a) I am General Manager for Trenton Renewable Power, LLC, the Petitioner named in the above-captioned matter, and I am duly authorized by said Petitioner to make this Affidavit of Verification on its behalf.

b) I have read the contents of the foregoing Verified Petition and have reviewed the underlying documentation regarding the Petitioner's request. Based thereon, I hereby verify that the statements of fact and other information contained therein are true and correct to the best of my knowledge, information and belief.

Brian Blair

Sworn to and subscribed before me
this 7 th day of February 2024

NOTARY PUBLIC

ALISA L. WILSON
Notary Public of New Jersey
Commission # 2457193
My Commission Expires Nov. 3, 2027

EXHIBIT A

Trenton Renewable Power (TRP)

Carbon Lifecycle Analysis

Brian Blair, General Manager, Trenton Renewable Power, LLC

Introduction:

The State of New Jersey enacted into law the Global Warming Response Act (GWRA) in 2007 and updated it in 2019. The GWRA declared that in order to combat the impact of climate change, a greenhouse gas emission reduction program is in the public interest and set a goal to reduce emissions of greenhouse gas by 80% below 2006 levels by the year 2050.[1] In furtherance of this statute, it is the policy of the State that Executive Branch departments and agencies take proactive and coordinated efforts, where appropriate, to protect public health and safety and to promote and protect the physical, economic, and social vitality and resilience of New Jersey's communities from the current and anticipated impacts of climate change. [2]

The Interagency Council of the State department and agencies established by this Order is mandated to develop consistent statewide policies and actions and to establish both short- and long-term action plans by which the departments and agencies are to work both individually and collectively to accomplish the goals of the Order.

Pursuant to Executive Order No. 89, the New Jersey Department of Environmental Protection (DEP) published the *New Jersey Scientific Report on Climate Change*[3] in 2020. This report provides significant detail with respect to deleterious impact of climate change on many aspects of the quality of life in New Jersey and, more particularly, indicates that New Jersey emits approximately 97 million metric tons of CO_2 equivalent (GHG) per year, of which 19% (18,430,000 tons) is from the energy sector and 5% (4,850,000 tons) is from the waste sector.

More recently, the NJDEP Science Advisory Board Biofuels Report[4] referenced the Global Warming Response Act in stating that New Jersey must implement an economy-wide transformation that steadily phases out the use of fossil fuels and expedites the deployment of renewable energy resources and other measures (NJDEP, 2023).

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[1] GWRA NJDEP 80x50 Report at https://dep.nj.gov/climatechange/mitigation/80x50-report/

[2] Executive Order No. 89/ October 29, 2019 https://nj.gov/infobank/eo/056murphy/pdf/EO-89.pdf

[3] NJ report on Climate Change: https://dep.nj.gov/wp-content/uploads/climatechange/nj-scientific-report-2020.pdf

[4] SAB report https://dep.nj.gov/wp-content/uploads/sab/sab-biofuels-final.pdf

Trenton Renewable Power LLC ("Trenton Renewable" or "TRP") has performed this Life-Cycle Assessment (LCA) to calculate the net total tons of carbon eliminated from the atmosphere by its operations of producing electricity from food waste and other organic material diverted from landfill. We have relied largely on the "Report on the Social Cost of Greenhouse Gases (SC-GHG): Estimates Incorporating Recent Scientific Advances" (November of 2023)[5] issued by the federal EPA to determine an appropriate value in a benefit-cost analysis of TRP's operation in affecting GHG emissions.

Trenton Renewable is an NJDEP permitted class C food waste recycling facility that uses source-separated organics and food waste to produce electricity, recyclable plastic, and nutrients for farming.

The process begins with packaged or unpackaged organic products separated from regular waste streams that would otherwise be deposited in a landfill. A world class de-packaging process separates plastics or contaminants from the organic fraction. The organics are processed in anaerobic digesters at thermophilic temperature for approximately 30 days to destroy pathogens, while converting approximately 30% of the material to biogas.

The biogas supplies commercial combined heat and power ("CHP") generators that produce 3.3 MW of synchronous electric power to the utility grid and recovered thermal energy. The plastics are reclaimed for recycling and all metals and nutrients are recovered.

The digestate material remaining after the digestion process is pumped to a decant centrifuge that separates the liquid from the solids. The liquid fraction contains heavy concentrations of ammonia that, by design, may be converted to ammonium sulfate liquid, a commodity in farming and turf industries.

The solid fraction, which is treated at 52℃ for over 30 days in the digestion process, is reduced by the centrifuge to approximately 50% moisture. The resulting product has physical characteristics of regular compost with a more finished look and feel. This process exceeds the standard required for land application of biosolids under 40 CFR Part 503, a process deemed safe by the EPA for treatment of a far more complex material.

The TRP process results in significant avoided GHG emissions that have meaningful value in achieving the goals of State and federal policy. The following section describes the methodology Trenton Renewable has used to support this statement.

[5] Social Cost of Carbon https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf

Methodology for Lifecycle Assessment:

The life-cycle assessment (LCA) integrates the best available, reasonable estimates using published scientific models and empirical data from three years of TRP operations to calculate total carbon dioxide equivalent (CO_2e) or GHG emission avoidance. This calculation considers all aspects of the TRP operation including deliveries to and from the facility, any carbon emitting processes (including energy consumption) and products that may be used or displaced outside of the operation. The results of this calculation reflect the net total tons of carbon eliminated per kilowatt hour of electricity produced by TRP. The results are presented in Attachment A to this report.

A process flow diagram of the facility is used to map the inputs and outputs of the total operation. The inputs and outputs are quantified using actual data to derive volume. The CO_2 equivalents are then calculated using methods approved by recognized authority.

Trenton Renewable Power Process Flow Diagram

Traceable inputs and outputs from process flow diagram:

- *Food waste and Organics diverted from Landfill* – Utilizes EPA emission data that defines the amount of methane emitted from organic material placed in landfill. The most recent peer reviewed data indicates that controlled landfills have fugitive emissions from food waste of .838 CO2e per input ton. Furthermore, the rapid decay rate of organic material results in CH4 emissions that are not recoverable at a controlled landfill.[6] Four years of empirical data from the TRP facility is used to quantify the amount of CH4 created per input ton of food. This value of 4,513 standard cubic feet of biogas per input ton represents the actual total avoided emissions of organic material diverted from landfills.

- *Captured Ammonia*- In many anaerobic digester operations, ammonia is released with the digestate to lagoons, surface application or in waste water, becoming a source of CO_2e emissions. The TRP facility is designed to capture the ammonia and produce ammonium sulphate. The calculation for avoided carbon in this model comes from the Argonne research library[7], and is based on the energy required to produce ammonium sulphate commercially, offset by TRP's production of a comparable product without grid-provided energy.

- *Captured Solids*- The TRP process produces a compost product that may replenish nutrients in soil. Currently, there is no known standardized formula for calculating the total carbon offset value of this type of compost. To calculate this offset value, we have taken a conservative approach of calculating the known quantities of sulfur, nitrogen and potassium in our product and take account of the avoided energy to produce those fertilizer nutrients commercially.

- *Grid Avoidance*- Rutgers University[8] has provided a formula for calculating the amount of carbon emitted from power generation in New Jersey. All power generated from this digestion facility displaces grid-provided energy, including the parasitic load to power the facility. The calculation considers the kWh produced multiplied by the CO_2e value of grid energy.

- *Emissions-* The TRP facility operates under an air permit issued by the NJDEP. All permits are based on mathematical formulas that calculate the maximum potential to emit (PTE) from each source. These performance formulas for the specific equipment at TRP were

[6] https://www.epa.gov/system/files/documents/2023-10/food-waste-landfill-methane-10-8-23-final_508-compliant.pdf

[7] DOI: 10.1039/d0gc02301a www.rsc.li/greenchem Published on 12 August 2020. Downloaded by Argonne Research Library on 8/18/2020 2:40:20 PM https://www.anl.gov/argonne-research-library

[8] Rutgers calculates the total emissions from New Jersey power plants and the total power generated by those plants to arrive at the total CO2e per kWh.

added to the EPA emission factors model [9] to derive the total CO_2e emissions from the facility, or carbon created from the process. The calculation was provided by Roux

- *Transportation-* Transportation is the single largest contributor to carbon emissions. While it is assumed that the organics will be transported alternatively to a landfill, the model considers the additional carbon impact of transporting the organics to TRP. Using actual data, TRP quantifies the number of trucks delivering food to the facility and calculates the average distance each diesel truck travels to do so. Using the EPA model for diesel emissions per ton mile, we have determined the total carbon emissions for potential additional miles to divert to TRP.

- *Yard Equipment-* The operation requires machinery to unload and prepare the organics for processing and to move the final products to a station for delivery. Carbon emissions for this process were calculated by counting the total number of fork trucks, excavator and yard truck multiplied by total hours operated each day. The total hours are converted to mile equivalents and multiplied by the EPA emission calculator to determine the total CO_2e value.

- *Process Chemicals*- Process chemicals are used to extract sulfur compounds from the biogas prior to combustion. This eliminates SO_2 from the engine emissions and, over time, results in the collection of elemental sulfur to replace commercial fertilizer. While this is a positive attribute, consideration must be given to carbon emissions associated with manufacturing the process chemicals used to strip the sulfur. This formula is derived from the Australian Journal of Basic and Applied Sciences, 7(2): 421-431, 2013ISSN 1991-8178,whereas the total quantity of process chemical used is multiplied by the CO_2e per unit of TRP production.

- *Waste Water*- Waste water treatment plants are among the largest contributors of CO_2e emissions. This analysis utilizes the national average per input ton of waste water multiplied by the total tons of waste water produced by TRP to determine the total CO_2e emission.

- *Residual Disposal-* As seen on the process flow diagram, the facility produces outbound material which may be recyclable products or residuals for landfill. The actual volumes of outbound material are tracked and measured for carbon emissions and emissions from transportation.

Each category is assigned a baseline value from EPA, C.A.R.B. publications or D.O.E publications. Actual operational data including process flow and mass balance diagrams are used to define the total inputs and outputs. Emission data is derived from actual air permit on a Potential To Emit (PTE) basis which is ultimately conservative

[9] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98

References:

Scientific Report on Climate https://dep.nj.gov/wp-content/uploads/climatechange/nj-scientific-report-2020.pdf

Federal Standard for valuation of avoided emissions https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf

The NJDEP Science Advisory Board Biofuels Report https://dep.nj.gov/wp-content/uploads/sab/sab-biofuels-final.pdf

Interagency Council -Department of Agriculture; Department of Banking and Insurance; Department of Community Affairs; Department of Environmental Protection; Department of Health; Department of Human Services; Department of Law and Public Safety; Department of State; Department of Transportation; Department of the Treasury; Board of Public Utilities; Economic Development Authority; New Jersey Infrastructure Bank; New Jersey Transit; New Jersey Turnpike Authority; and the New Jersey Office of Emergency Management

EPA report on methane emissions https://www.epa.gov/land-research/quantifying-methane-emissions-landfilled-food-waste

Decay Rate- https://www.wastetodaymagazine.com/news/epa-measure-methane-emissions-landfilled-food-waste/

Quantifying emissions from landfilled food waste https://www.epa.gov/system/files/documents/2023-10/food-waste-landfill-methane-10-8-23-final_508-compliant.pdf

Fugitive emissions from landfill food waste https://www.wastetodaymagazine.com/news/epa-measure-methane-emissions-landfilled-food-waste/

NJ Landfill annual tonnage and emissions https://www.nj.gov/dep/dshw/recycling/swmp/pdf/section_c_06.pdf

EPA GHG reporting data NJ landfills in radius
https://ghgdata.epa.gov/ghgp/service/facilityDetail/2022?id=1006969&ds=E&et=&popup=true

EPA Landfill Methane Outreach Program (LMOP) https://www.epa.gov/lmop/lmop-landfill-and-project-database#comp

NJDEP solid waste characterization by county https://www.nj.gov/dep/dshw/recycling/WasteCharacteriazation.pdf

2021 Burlington County solid Waste Management Plan https://www.co.burlington.nj.us/DocumentCenter/View/14969/Burlington-County-District-Solid-Waste-Management-Plan-Update-2021?bidId=

A Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes
https://nepis.epa.gov/Exe/ZyNET.exe/P1001P7G.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2000+Thru+2005&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C00thru05%5CTxt%5C00000016%5CP1001P7G.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL

National Service Center for Environmental Publications
https://nepis.epa.gov/Exe/ZyNET.EXE?ZyActionL=Register&User=anonymous&Password=anonymous&Client=EPA&Init=1

Ammonia emissions https://www.iea.org/news/new-iea-study-examines-the-future-of-the-ammonia-industry-amid-efforts-to-reach-net-zero-emissions

https://media.rff.org/documents/WP_22-16_M8.pdf

In 2020, food waste was responsible for approximately 55 million metric tons of CO2 equivalents (mmt CO2e) emissions from U.S. MSW landfills. An estimated 58 percent of the fugitive methane emissions (i.e., those released to the atmosphere) from MSW landfills are from landfilled food waste. An estimated 61 percent of methane generated by landfilled food waste is not captured by landfill gas collection systems and is released to the atmosphere. Because food waste decays relatively quickly, its emissions often occur before landfill gas collection systems are installed or expanded. While total methane emissions from MSW landfills are decreasing due to improvements in landfill gas collection systems, methane emissions from landfilled food waste are increasing. For every 1,000 tons (907 metric tons) of food waste landfilled, an estimated 34 metric tons of fugitive methane emissions (838 mmt CO2e) are released. Reducing landfilled food waste by 50 percent in 2015 could have decreased cumulative fugitive landfill methane emissions by approximately 77 million metric tons of CO2 equivalents (mmt CO2e) by 2020, compared to business as usual.

William Brian Blair
1600 Lamberton Road
Trenton NJ, 08611

W. Brian Blair is the General Manager of Trenton Renewable Power, the first food waste anaerobic digestion facility in the state of New Jersey. Trenton Renewable Power commenced operations in 2019 and currently processes approximately 300 tons per day of organic material to produce in excess of 3 MW of energy. Prior to commencement of commercial operations, Mr. Blair was engaged in every aspect of the project's development, including, engineering, permitting, contract negotiation, and regulatory compliance.

Prior to joining Trenton Renewable Power, Mr. Blair had over 23 years of industrial process experience in waste management, recycling, and gasification, and sustainable energy process design. Most recently, Mr. Blair led the development of the Salem County Sustainable Energy Training Center (which included the development of a 39-acre sustainable energy park and a distributed energy resource micro grid in Salem County, NJ).

From 1996 to 2005, Mr. Blair founded and served as the CEO of AM Consortium, a consulting business to the automotive industry based in Akron, Ohio, which provided waste minimization design to the automotive industry. Mr. Blair's services included the creation and management of a zero-waste program for the DaimlerChrysler Newark Delaware assembly plant, which was the first program of this kind for a US auto manufacturer.

Mr. Blair attended the University of Akron and resides in Woolwich, NJ with his wife and two adult children.

SUMMARY:
Calculation of Net CO2e offset per year from Trenton Renewable Power Operations

Source		CO2e Tonnes per year
Landfill Offset (CO2e avoided)		(221,706.58)
Residual Disposal and recycle		(8,040.65)
Recovered Sulfur		(0.33)
Captured ammonia		(769.90)
Solid Nutrients		(17.92)
Recovered Heat		(2,912.97)
Grid Avoidance		(6,338.51)
Calculated Total	**Total CO2e reduction**	**(239,786.86) tpy**
Engine emissions CO2e		13,653.31
Transportation food		79.18
Transportation residuals		240.82
Yard equipment		0.38
Process Chemicals		808.13
Waste Water		109.64
Calculated Total	**Total CO2e emissions**	**14,891.45**

Summary

NET CO2e offest per year	**(224,895.41) tpy**
CO2e per input ton	(2.04) tons CO2e

Calculations are conservative in comparison to U.S. Environmental Protection Agency Office of Resource Conservation and Recovery Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM) Organic Materials Chapters December 2023 EPA-530-R-23-019

https://www.epa.gov/system/files/documents/2023-12/warm_organic_materials_v16_dec.pdf

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e removed from landfill (ES&T)

Comparison Model 1 (EPA averages based on assumptions)		
Total Nameplate tonnage capacity daily		
organic tons diverted from landfill	353	tonnes/day
Total Operating Days/ Year		
	312	6 days/wk
Total Annual tonnage of organics displaced		
metric tonnes/yr	109,980	tonnes

Biogas Potential from Food Waste Standard Calculations			
applied to TRP operation			*Result*
Cubic Meters potential biogas per input ton	134	M3	14,737,320.00
Cubic feet of biogas per input ton		ft3	520,374,769.20
Cubic feet of CH4 per input ton		ft3	317,428,609.21

1 m3=35.31ft3

In Imperial or US customary measurement system, the density is equal to 0.04475 pound per cubic foot [lb/ft³

0.04475 *pound per cubic foot* [lb/ft^3] dnsty methane

Notes:

Comparison Model 2 Actual Data collected from process		
Feedstock vs Energy Production 2019- 2023 xls		
Actual cubic feet of biogas per input ton from operating data	4,513	SCF biogas
cubic feet of methane per input ton from operating data	2,753	SCFMethane
total ch4 captured per year in ft3 (scf CH4 per ton x total tons)	302,765,041.80	ft3
total lbs ch4/yr (total scf x weight of CH4)	13,548,735.62	lbs
total tons ch4/yr (divide lbs by 2000)	6,774.37	tons
total metric tons (covert tons to tonnes)	6,158.52	tonnes

one tonne of methane is considered to be equivalent to 28 to 36 tonnes of CO_2 if looking at its impact over 100 years. In addition to its climate impacts, methane also affects air quality because it is an ingredient in the formation of ground level (tropospheric) ozone, a dangerous air pollutant.

CO2e= total metric tons of CH4 X 36

tonnes of co2e actually extracted from collected food	**(221,706.58)**	**tonnes CO2e**

Model 3 Landfill CO2e Emissions equivilant			
emitted from same volume at landfill with gas collection	ft3	yr	302,765,228.77
total lbs. of CH4 produced			13,548,735.62
Tons of CH4 produced from same volume			6774.36781

In Imperial or US customary measurement system, the density is equal to 0.04475 pound per cubic foot [lb/ft³

0.04475 *pound per cubic foot* [lb/ft^3]

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e contributed from residual disposal after processing(ES&T)

Total Nameplate tonnage capacity daily		
organic tons diverted from landfill	32	tonnes/day

Total Operating Days/ Year		
	312	6 days/wk

Total Annual tonnage of non organic residuals		
metric tonnes/yr	10,051	tonnes
total kg of residuals	10,050,817	kg

Emission Factors (mechanical and landfill)		
$CO_{2e\ landfill}$	0.4	kg/kg input
CO2e mechanical recycling	-2.0	kg/kg input
organics removed from residuals		

Annual CO2e of residuals		
50% landfilled	2,010,163.34	kg/ year
50% mechanically recycled	(10,050,816.70)	kg/year

TOTAL Annual CO2e Impact	(8,040.65)	tonnes
Total annual CO2e impact converted	(8,863.29)	tons

Plastic recycling at TRP estimated at 50/50
https://ccsi.columbia.edu/sites/default/files/content/COMET-making-plastics-emissions-transparent.p
Mechanical processing
Landfill

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e eliminated by sulfur capture (manufacturing comparison analysis)

Total Nameplate tonnage capacity daily		
Ammonium Sulphate produced (design)	0.005	tonnes/day
Total Operating Days/ Year		
	312	6 days/wk
Total Annual tonnage of fertilizer displaced		
metric tonnes/yr sulfur recovery	2	tonnes
Dilution factor	1	tonnes
Total Sulfur Recovered	562	kg
Emission Factors (epa fertilizer production analysis)		
CO_{2e}	0.58	kg/CO2e/kg product
Annual CO2e removed from production process		
CO_2	325.73	kg/co2e
	0.33	tonnes
TOTAL Annual CO2e Impact	**(0.33)**	tonnes

1 36% solution equivilant to AMS = the amount of AMS suspended in water. The dilluted value is used to compare to market fertilizer

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e eliminated by ammonia capture (manufacturing comparison analysis)

Total Nameplate tonnage capacity daily		
Ammonium Sulphate produced (design)	12	tonnes/day
Total Operating Days/ Year		
	312	6 days/wk
Total Annual tonnage of fertilizer displaced		
metric tonnes/yr AMS product	3,687	tonnes
36% solution equivilant to AMS 1	1,327	tonnes
AMS equivilant in kg/yr	1,327,418	kg
Emission Factors (epa fertilizer production analysis)		
of the 36% solution, ammonia = 22.3%	296.1469964	tonnes ammonia
CO2e per tonne produced = 2.6 x tonnes	769.982191	citation below 2
CO_{2e} (1kg = .001 tonne = .7699) using 44% of stated value	0.58	kg/CO2e/kg product
Annual CO2e removed from production process		
CO_2	769,902.55	kg/co2e
	769.90	tonnes
TOTAL Annual CO2e Impact	**(769.90)**	tonnes

1 36% solution equivilant to AMS = the amount of AMS suspended in water. The dilluted value is used to compare to market fertilizer

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION:
- Estimate of Co2e eliminated by soil replacement (solid Nutrients)

Total Nameplate tonnage capacity daily		
Solid Nutrients (carbon replenish and nutrients)	33	tonnes/day
Total Operating Days/ Year		
	312	6 days/wk
Total Annual tonnage of carbon replenish		
metric tonnes/yr solid nutrients product	10,296	tonnes
3% Nitrogen equivilant to AMS	31	tonnes
AMS equivilant in kg/yr	30,888	kg
Emission Factors (fertilizer production		
CO_{2e} (1kg = .001 tonne = .7699) using 44% of stated value	0.58	kg/CO2e/kg product
Annual CO2e removed from production process		
CO_2	17,915.04	kg/co2e
	17.92	tonnes
TOTAL Annual CO2e Impact	**(17.92)**	tonnes

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 1/5/2024

DESCRIPTION: - Estimate of Co2e eliminated by recovering heat without fossil fuel (mmbtu)

Total Nameplate recoverable heat output		
mmbtu/hr	4	mmbtu/hr
Total operating hours		
	22,870	hours
Total heat recovered		
Total Mmbtu recovered	91,481	mmbtu
Total heat recovered after losses (efficiency)	**54,889**	mmbtu
Emission Factors (emission factor natural gas)		
$CO_{2e\ per\ mmbtu\ Natural\ Gas}$	117	lbs/mmbtu
Annual CO2e offset from Trenton electricity		
CO_2	6,421,997.71	lbs
	3211.00	tons
TOTAL Annual CO2e Impact	**(2,912.97)**	tonnes

Notes:

based on nameplate capacity to derive total value per ton of input and out of energy

https://www.eia.gov/energyexplained/natural-gas/natural-gas-and-the-environment.php#:~:text=Natural%20gas%20is%20a%20relatively%20clean%20burning%20fossil%20fuel&text=About%20117%20pounds%20of%20CO,MMBtu%20of%20distillate%20fuel%20oil.

About 117 pounds of CO_2 are produced per million British thermal units (MMBtu) equivalent of natural gas compared with more than 200 pounds of CO_2 per MMBtu of coal and more than 160 pounds per MMBtu of distillate fuel oil. T

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e eliminated by offsetting grid provided electricity

			NJ energy data		
Total Nameplate electric output capacity			total	MWH/yr	65,060,636.00
Three reciprocating engine generators @1.13	79	MWh/day			
			total	CO2 m tons/yr	15,891,000.00
Total Operating Days/ Year			total	tons/Mwh	0.244249073
	365	days			
			total	Mwh/yr TRP	25,951
Total Annual electricity displaced (after de rate)			total	tonnes CO2e dispaced	6338.507681
Derating and 80% availability	71	MWh/day			
	25,951	MWh/yr			
Emission Factors (NJ Grid emission factor)					
$CO_{2e\ per\ MWh\ Natural\ Gas}$	244.24	kg/MWh			
Annual CO2e offset from Trenton electricity					
CO_2	6,338,272.24	kg			
	6338.27	tonnes			
TOTAL Annual CO2e Impact	**(6,338.51)**	tonnes		Displacement	

Notes:

based on nameplate capacity to derive total value per ton of input and out of energy

A landfill producing the same amount of energy will emit 15,718 more tonnes of CO2e than TRP. Not captured in this conservative model

New Jersey CO2e from energy production- Rutgers.edu				
	MWh		tonnes CO2e	CO2e/MWh
Data NJ	65,060,636			0.244249073
Data TRP	25,951			0.244249073

Total Mwh	79.2
Total Tons	109980
Mwh/nameplate	28,908
availability	0.897709976
Net Output	25951

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of 100-Year Engine Warming Potential in CO_2 Equivalents

SOURCE: ROUX- calculation from NJDEP air permit

Engine Operation Time		
E39 Run Time (Engine 1)	7,375	hr/yr
E40 Run Time (Engine 2)	7,375	hr/yr
E41 Run Time (Engine 3)	7,375	hr/yr
Max Engine Fuel Consumption		
E39 (Engine 1)	18,000	ft^3/hr
E40 (Engine 2)	18,000	ft^3/hr
E41 (Engine 3)	18,000	ft^3/hr
Total Annual Fuel Consumption		
E39 (Engine 1)	132,756,923	scf
E40 (Engine 2)	132,756,923	scf
E41 (Engine 3)	132,756,923	scf
Emission Factors (Biomass Fuels - Gaseous)		
CO_2	0.034106	kg/scf
CH_4	0.002096	g/scf[(1)]
N_2O	0.000413	g/scf[(2)]
Annual 100-Year Engine Warming Potential in CO_2 Equivalents (3-Engines)		
CO_2	14973.16	tons
CH_4	23.00	tons
N_2O	54.03	tons
TOTAL	13653.31	tonnes

Notes:

(1) To convert to 100-year CO_2e, must me multiplied by 25.

(2) To convert to 100-year CO_2e, must me multiplied by 298.

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e emitted from transportation vehicles

Total Nameplate tonnage capacity daily		
organic tons diverted from landfill	322	tonnes/day
average tons per truck from data	15	
average trucks per day	21	
Total Operating Days/ Year		
	312	6 days/wk
Note: This is a conservative assumption in that the CARB and EPA calculation for landfill CO2e includes transportation		
Total Annual truck deliveries		
deliveries	6,701	trucks/yr
average rt miles	90	miles
total miles from diesel powered deliveries	603,049	miles per year
national average mpg	6	mpg
Total diesel gallons	100,508	landfill route
Emission Factors (ecfr.gov)		
CO_{2e}	10.21	kg CO2e/gallon
Annual CO2e resluting emissions		
CO_2	1,026,188.38	kg CO2e/yr
CO_2 from delivering same organic material to landfill	(947,008.38)	kg CO2e/yr
CO2e from added average mileage	79,180.00	kg CO2e/yr
.001 tons per gallon		
TOTAL Annual CO2e Impact	79.18	tonnes

APPLICANT: Trenton Renewable Power, LLC (61498 **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e emitted from transportation vehicles residuals to landfill

Total Nameplate tonnage capacity daily		
organic tons diverted from landfill	15	tonnes/day
average tons per truck from data	15	
average trucks per day	1	
Total Operating Days/ Year		
	312	6 days/wk
Total Annual truck deliveries		
deliveries	312	trucks/yr
average rt miles	1	miles
total miles from diesel powered deliveries	156	miles per year
national average mpg	6	mpg
Total diesel gallons	26	
Emission Factors (ecfr.gov)		
CO_{2e}	10.21	per gallon
Annual CO2e resluting emissions		
CO_2	265.46	tons
TOTAL Annual CO2e Impact	240.82	tonnes

Notes:

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e emitted from operation of yard equipment

Total Nameplate tonnage capacity daily		
kubota excavator	8	hours/day
fork trucks	24	hours/day
yard truck	2	hours/day
Total equipment hours (maximum)	34	hours/day
Total Operating Days/ Year		
	312	6 days/wk
Total equipment hours		
total operating hours	10,608	hrs/yr
average rt miles	177	miles equiv
national average mpg	5	mpg
Total diesel gallons	33	
Emission Factors (ecfr.gov)		
CO_{2e}	10.21	kg/gal
Annual CO2e resluting emissions		
CO_2	340.59	kg/yr
TOTAL Annual CO2e Impact	0.38	tonnes

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate CO_2 Equivalents Process Chemicals based on energy to produce

Sodium Hydroxide

Tons consumed per year	5	tons/yr
	4,536	kg/yr

Emission Factors

n with respect to fossil energy resource consumption (MJ) for one	3.5	mj/kg product
CO2e using nat gas table	202.000000	kg/MWh
	15,875.74	mj energy per year
	4,409.93	kwh/yr
	4	total MWHe

Annual 100-Year Engine Warming Potential in CO_2 Equivalents from process chemicals

CO2e	890.81	tons

TOTAL 808.13 tonnes co2e

Notes:

To convert megajoules (MJ) to kilowatt-hours (kWh), you can use the following conversion factor: 1 megajoule = 0.277777778 kilowatt-hour To convert, simply multiply the number of megajoules by the conversion factor: kWh = MJ * 0.277777778 For example, let's say you have 10 megajoules: kWh = 10 MJ * 0.277777778 kWh = .

APPLICANT: Trenton Renewable Power, LLC (61498) **DATE:** 12/26/2023

DESCRIPTION: - Estimate of Co2e emitted from partially treated digestate waste water (ES&T)

Total Nameplate tonnage capacity daily		
digestate removed for further processing	300	tonnes/day
Remaining liquid fraction post ammonia strip	210	tonnes/day
Total Operating Days/ Year		
	312	6 days/wk
Total Annual tonnage of liquid discharged		
metric tonnes/yr	65,520	tonnes
Emission Factors (controlled landfill)		
CO_{2e}	1.518	kg/tonne
Annual CO2e removed from landfill		
CO_2	99,459.36	kg/yr
TOTAL Annual CO2e Impact	109.64	tonnes

RUTGERS
New Jersey Agricultural Experiment Station

Rutgers EcoComplex
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ecocomplex.rutgers.edu
609-499-3600
Fax: 609-499-3647

To Whom it May Concern: January 15, 2024

Please be advised that I am the Director of the Rutgers EcoComplex where I have responsibilities that include management of the EcoComplex operations and programs, as well as providing vision and leadership in establishing the EcoComplex as a nationally recognized center for the commercialization of environmental and alternative energy technologies. My expertise includes research, development and assessment of sustainable biofuels, innovative waste recycling technologies, and life cycle analysis of clean energy, alternative fuel production and sustainable food systems. My curriculum vitae setting forth my educational and professional background in greater detail is attached hereto for your information.

I have been requested to review the Carbon Lifecycle Analysis of the volume and value of carbon dioxide emission reduction effected by the operations of Trenton Renewable Power. I am familiar with the methodology employed by this analysis having reviewed and participated in the preparation of such reports in the past. Furthermore, I have considered the overall approach and assumptions and find them to be consistent with my experience and accepted standards. I have not audited the data generated by Trenton as inputs to the analysis but have no reason to regard them other than as accurate insofar as they comport with expectations.

Based on my review of this Carbon Lifecycle Analysis, it is my opinion that its results are accurate and meet the standards of industry practice in the determination of carbon displacement quantities.

Sincerely,

Serpil Guran Ph.D.
Director

SERPIL GURAN

74 Schindler Court
Lawrenceville, NJ 08648
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EDUCATION

1988 – 1993 Ph.D. The University of Leeds
Department of Fuel and Energy
Leeds, LS29JT, United Kingdom
Title of Thesis: "Effect of Process Conditions on the Yields of Pyrolysis of Waste and Biomass"
Advisor: Prof. Paul T. Williams

1986 – 1988 M.Sc. Chemical Engineering, Anadolu University, Eskisehir, Turkey
Dissertation Title: "Pyrolysis of Euphorbia Rigida as a Renewable Energy Source"
Advisor: Prof. Ersan Putun

1976 – 1980 B.S.E. Chemical Engineering, Anadolu University, Eskisehir, Turkey
Advisor: Prof. Mustafa Alpbaz

PROFESSIONAL EXPERIENCE

2011 – Present Director
EcoComplex "Clean Energy Innovation Center"
Rutgers, the State University of New Jersey
Bordentown, New Jersey

1998 – 2011 Research Scientist
Office of Sustainability and Green Energy
New Jersey Department of Environmental Protection
Trenton, New Jersey

1995 – 1998 Postdoctoral Research Associate
Department of Mechanical and Aerospace Engineering
Princeton University
Princeton, New Jersey
Advisor: Prof. Frederick Dryer

1993 – 1995 Postdoctoral Research Associate
National Renewable Energy Laboratory (NREL)
Field Test Laboratory Building
Golden, Colorado
Team Leaders: Prof. Foster A. Agblevor, Dr. Esteban Chornet,

May – Aug.1993 Assistant Professor
Department of Chemical Engineering
Anadolu University, Eskisehir, Turkey

SERPIL GURAN

1988-1993	Teaching Assistant Fuel and Energy Department, The University of Leeds, UK
1985-1988	Teaching Assistant Chemical Engineering Department Anadolu University, Eskisehir, Turkey
1980-1985	Chemical Engineer Turkish Ministry of Technology and Industry, Eskisehir Branch.

RESEARCH INTERESTS

Combining experimental and theoretical techniques to elucidate the role of sustainable biomass and waste in achieving a low-carbon energy economy. Research on sustainable biomass-to-energy technologies for clean power generation, development of low-carbon transportation fuels and manufacture of bio-based materials are an integral part of mitigating adverse effects of climate change and achieving energy security, sustainable development, and resiliency. Life Cycle Analysis (LCA) of bio-power, bio-heat, biofuels and bio-based materials to gain insight about their carbon footprint. Further, coupling innovative biomass conversion technologies with suitable biomass resources will provide for the efficient use of biomass. This approach is used to develop new materials to produce renewable and alternative low-carbon fuels and chemicals from a variety of renewable carbon resources. In addition, interdependencies the "Energy-Water-Food Nexus" concept components and in combining these components to achieve more efficient renewable energy and food manufacturing while conserving water resources.

AWARDS

- Institute of Energy, U.K., Redland Minerals Award for the best paper published in the Journal of the Institute of Energy, titled, "Pyrolysis of Automotive Tire Waste", London, U.K., March 1996.

- Scholarship for the Gordon Conference on "Analytical Pyrolysis and Oxidative Degradation of Materials", Plymouth State College, June 13-18, 1993.

- Institute of Energy, U.K., Steetley Magnesia Award for the best paper published in The Journal of the Institute of Energy, December 1992, London, U.K., March 1993.

- Institute of Energy, U.K., Foxwell Memorial Award for ranking as the best research student of the University of Leeds, Department of Fuel and Energy, London, U.K., March 1992.

SERPIL GURAN

INTELLECTUAL PROPERTY

PATENT: "Preparation of Brightness Stabilization Agent for Lignin-Containing Pulp from Biomass Pyrolysis Oils", Patent No: US 6,193,837 B1. Date of Patent: February 27, 2001.

INVENTION DISCLOSURE: "The Formation of Biomass Based Pyrolysis Oil to Cofeed to a Petroleum Refinery Fluid Catalytic Cracking Unit", 1994.

PUBLICATIONS

1. **Guran, S.,** "Thermochemical Conversion of Biomass" in "Practices and Perspectives in Sustainable Bioenergy: A Systems Thinking" ed. Madhumi Mitra, Springer, (Book Chapter, in review)
2. **Guran, S**., Agblevor, F.A., Brenan-Tonetta, M., "Biofuels, Bio-Power, and Bio-Products from Sustainable Biomass: Coupling Energy Crops and Waste with Clean Energy Technologies" Wiley Biotechnology Series, (*Book Chapter, in press*).
3. Brennan-Tonetta, M., **Guran, S**., Specca, D., 2014, "Feedstock Opportunities for Bioenergy Production: Assessment of Biomass Energy Potential in New Jersey" *Industrial Biotechnology*. December 2014, 10(6): 404-412. doi:10.1089/ind.2014.0023.
4. Brennan-Tonetta, M., **Guran, S**., and Specca, D., 2014, "Assessment of Biomass Energy Potential in New Jersey, 2.0." New Jersey Agricultural Experiment Station Publication No. 2014-1. Rutgers, the State University of New Jersey, New Brunswick, NJ.
5. Agblevor, F.A. **Besler-Guran S**., "Fractional Pyrolysis of Biomass for High-Valued Products", *Fuel Chemistry Division Preprints*, 47(1), 374, 2002.
6. Agblevor, F.A. **Besler-Guran S**., "Inorganic Compounds in Biomass Feedstocks. 1. Effect on the Quality of Fast Pyrolysis Oils, "*Energy and Fuels*", Vol. 10, 293-298, 1996.
7. Williams, P.T., **Besler-Guran, S**., Taylor, D.T., Botrill, R.P., "Pyrolysis of Automotive Tire Waste", *Journal of Institute of Energy*, Vol.68, No.474, 11-21, 1995.
8. Williams, P.T., **Besler-Guran, S**., "Pyrolysis-Thermogravimetric Analysis of Tires and Tire Components", *Fuel*, Vol. 74, No. 9, 1277-1283, 1995.
9. Agblevor, F.A**. Besler-Guran S**., and Wiselogel, A.E., "Fast Pyrolysis of Store Biomass Feedstocks", *Energy and Fuels*, Vol. 9, 635-640, 1995.
10. Williams, P.T., and **Besler, S.,** "Polycyclic Aromatic Hydrocarbon in Waste Derived Pyrolytic Oils", *Journal of Analytical and Applied Pyrolysis*, Vol. 30, 17-33, 1994.
11. Williams, P.T. and **Besler, S**., "The Pyrolysis of Rice Husks in Thermogravimetric Analyzer and Static Batch Reactor", *Fuel*, Vol. 72, No. 2, 1993.
12. Williams, P.T. and **Besler, S.,** "The Pyrolysis of Municipal Solid Waste", *Journal of the Institute of Energy*, Vol. LXV, No. 465, 192-200, 1992.
13. **Besler, S**., Kockar, O.M., Putun, A.E., Gercel, H.F., Putun, E., "Effect of Drying on Yields and Calorific Values of Bio-crudes from Euphorbia Rigida and Euphorbia Macroclada", *Turkish Journal for Chemistry*, Vol. 16, No. 3, 216-223, 1992.
14. Williams, P.T., and **Besler, S.**, "The Pyrolysis of Scrap Automotive Tires", *Fuel*, Vol. 69, 1474-1482, 1990.

SERPIL GURAN

15. Putun, E., **Besler, S.,** Putun, A.E., Ekinci, E., "Hydrocarbon Production in Arid Lands", *Chimica Acta Turcica*, Vol. 17, 1989.

PROCEEDINGS

1. Brennan-Tonetta, M., **Guran, S.,** Specca, D., Cowan, B., Sipos, C., Melillo, J., "Assessment of Biomass Energy Potential in New Jersey: A model for Evaluating Opportunities for Bioenergy Production and Informing Public Policy", International Consortium on Applied Bioeconomy Research Conference, Ravello, Italy, July 26-29,2016.
2. **Guran, S.,** "Biofuels and Bioenergy from Sustainable Biomass", BIOENERGY 2013, Nanjing, China, April, 25-27, 2013.
3. McKenna, D., Bhatia, K, Hesketh, R., Rowen, C., Marchese, A., Chipko, G., **Guran S.,** "Evaluation of Emissions and Performance of Diesel Locomotives with B20 Biodiesel Blends: Static Test Results" proceedings of the 2008 Rail Transportation Division Fall Technical Conference, Chicago, Illinois, September 24-25, 2008.
4. Agblevor, F.A. **Besler-Guran S**., Montane D., and Wiselogel, A.E., "Biomass Feedstock Variability and its Effect on Bio-crude Oil Properties, presented at "Developments in Thermochemical Biomass Conversion", Banf, Canada, May 20-24, 1996.
5. Agblevor, F.A. **Besler-Guran S**., and Wiselogel, A.E., "Plant Variability and Bio-oil Properties", in proceedings, Second Biomass Conference of the Americas: Energy, Environment, Agriculture, and Industry, Golden, Colorado, 1099-1109, 1995.
6. **Besler-Guran S**., Agblevor, F.A., and Scahill, J.W., "The Effects of Char Removal on the Alkali Metal Content of Bio-crude Oil", Frontiers of Pyrolysis Conference, Brenckenridge, Colorado, June 25-30, 1995.
7. **Besler-Guran S**., Agblevor, F.A., and Scahill, J.W., "Production of Oxygenated Fuels from Biomass: Impact of Feedstock Storage", presented at AIChE Annual Meeting, San Francisco, California, November 1994.
8. **Besler-Guran S.**, Agblevor, F.A., and Evans, R.J., "Inorganic Compounds in Biomass Feedstocks: Their Role in Char Formation and Effects on the Quality of Fast Pyrolysis Oils". Biomass Pyrolysis Oil Combustion Workshop, Estes Park, Colorado, 26-30, September 1994.
9. **Besler S.,** Agblevor, F.A., Davis M.F., Eddy, F.P., Johnson, D.K., and Wiselogoel, A.E., "Fluidized Bed Pyrolysis of Terrestrial Biomass Feedstocks. Bioenergy '94, Sixth National Bioenergy Conference, Reno/Sparks, Nevada, October 2-6, 43-50, 1994.
10. **Besler-Guran S**., Agblevor, F.A., and Scahill, J.W., "Production of Oxygenated Fuels from Biomass: Impact of Feedstock Storage", presented at AIChE Annual Meeting, San Francisco, California, November 1994.
11. **Besler, S.,** Taylor, D.T., Williams, P.T., Allen, R., Bevan, H.D., Jervis, A., and McKenzie, K.A., "The Fuel Properties of Pyrolytic Oil Derived from the Batch Pyrolysis of Tire Waste", Institute Mechanical Engineering Conference, "Waste, Handling, Processing, and Recycling", London, U.K., April 27, 1993.
12. Williams, P.T. and **Besler, S.,** "Thermogravimetric Analysis of the Compounds of Biomass", Advances in Thermochemical Biomass Conversion Conference, Interlaken, Switzerland (A.V. Bridgewater (ed.), May 11-15, 1992.

13. Williams, P.T., and **Besler, S.,** "The Pyrolysis of Rice Husks and the Influence of Temperature and Heating Rate on Product Composition", 6th European Conference on Biomass, Athens, Greece, March 17,1991.

14. Putun, E., **Besler, S**., Putun, A.E., and Uyar, T.S., "Euphorbia Species as a Renewable Energy Source," International Mediterranean New and Renewable Energy Congress, Antalya, Turkey, November 14-19, 1988.

EXTERNAL FUNDING

Pending:

USDA- NESUN Grant
"Food and Dairy Waste as Viable Feedstocks for Bioenergy and Bioproducts"
March 2016, $300,000 PI

USDA

"Sustainable Packaging Technology for Enhancing Safety and Quality of Specialty Crop"
1/1/2017–8/30/19 $3,000,000 Collaborator
Total Award Amount:

USDA
Consortium for Advanced Bioeconomy Leaders and Educators (CABLE)
1/1/2017–12/31/2020 $2,500 Collaborator

Funded:
USEDA
"Rutgers EcoIgnite: Clean Energy Proof of Concept Center & Accelerator Program"
11/1/2016-10/31/2019 $439,000 PI

USEPA
"Achieving a Greener &Safer Food Supply Chain in the Newark, NJ Region: Realizing Pollution Prevention, Energy Efficiency and Water Conservation Benefits through Sustainability & Resiliency Training"
September 2015-August 2017 $321,566 PI

USDA
"Creating Opportunities for Rural Development and Job Creation by Co-Digesting Dairy and Food Waste on Farm Business Opportunity Assessment"
August 2015-August 2016 $19,000 PI
Landfill Methane Outreach Program

USEPA
"Turkey's Landfill Inventory and Methane Emissions Assessment"
August 2012-September 2014 $100,000 PI

NJBPU

SERPIL GURAN

ARRA Funding for Electric Vehicle and Charger Demonstration
April 2012 $114,000 PI

NJBPU
"New Jersey Clean Energy Resource Network NJCERN"
2010-Ongoing $250,000 Collaborator

Not- Funded:

NSF-INFEWS
INFEWS/T4b: Citizen Education and Research FEWS Center - CERFEWS
9/1/2016–8/31/2019 $995,302 Collaborator

NSF-INFEWS/T3: Resource Recovery and Reuse (R3). A Sustainable Foundation for Societies of the Future
9/1/2016–8/31/2019 $1,000,000 Collaborator

USEPA
Pollution Prevention Capacity Building and Knowledge Transfer from New Jersey to Puerto Rico: Realizing Pollution Prevention in Food and Hospitality Sector through Sustainability and Resiliency Training"
1/9/2016-8/31/2018 $541,606 PI

NESARE
"Co-Digesting Farm Waste and Food Waste on Farm: Promoting Sustainable Farming and Reducing Greenhouse Gas Emissions"
June, 2015- Preproposal $177,428 PI

Environmental Research and Education Foundation
"New Approaches for Landfill and Waste Management Practices: An Environmental and Economic Analysis of Source Separated Organic Waste-to-Clean Energy Systems Co-located at Landfills"
January, 2015 $183,704 PI

National Clean Energy Incubator Program
U.S .Department of Energy, EERE
"Rutgers EcoComplex: Bringing Waste-Based Clean Energy Innovations to Market"
March, 2014 $658,133 PI

US Economic Development Administration
Investing in Manufacturing Communities Partnership Program
Accelerating Advanced Food Manufacturing Partnerships in the New Jersey Region
October 2013-March 2014 $177,762 Collaborator

North East Sun grant
Bio-based Chemicals for the Pharmaceutical, Food and Personal Care Industries in the New Jersey Region"
August 2014 $123,227 Collaborator

SERPIL GURAN

USAID
"Securing Water for Food in Turkey"
August 2014 $500,000 PI

NJDEP, Solid Waste Management Program
"Study of Composition of New Jersey's Municipal Waste Stream"
August 2013 $250,000 Collaborator

USDOE
"Combined Heat and Power Technical Assistance Partnerships"
March 2013 $379,027 Collaborator

USDOE
"Scale-up and integration of an aeroponic attached growth algal cultivation system generating high yields of biofuel feedstock"
March 2013 $627,474 Collaborator

SELECTED INVITED PRESENTATIONS

1. **Guran, S.,** "Business Incubation and Bioeconomy: Case of Anaerobic Digestion of Organic Waste, "The Bio-economy: Technology and Policy Path Forward" Conference, Rutgers University, New Brunswick, NJ, September 30-October1, 2016.
1. **Guran, S.,** "Promoting & Supporting Clean Energy Technology Innovation", "PEW, NJTC, New Jersey Clean Energy Business Workshop", the EcoComplex, Bordentown NJ, March 6, 2015.
2. **Guran, S.,** "Capacity Building for Sustainable Development: Assessment of Biomass Energy Potential "A methodology for municipalities"", IRENA 5th Session of the Assembly-Thematic Events, IRENA Bioenergy Programme-5, Abu Dhabi, U.A.E., January 16, 2015.
3. **Guran, S.,** "Energy from Waste, Research & Demo at the Rutgers EcoComplex "Clean Energy Innovation Center"", Renewable Energy from Waste "REW" Conference, San Jose, CA. November 17-20, 2014.
4. **Guran, S.,** "Systems Thinking for Efficient Development of Alternative Energy Technologies", SPER.2013, Sustainable Perspectives Symposium, Columbia University, March 30, 2013.
5. **Guran, S.**, "Sustainable Biomass to Clean Energy Pathways: Alternative Energy Innovation Centers", ICCI, 18th Int. Energy and Environment Fair & Conference, Istanbul, Turkey April 25-27, 2012.
6. **Guran, S.,** "Solving the Landfill Gas Cleanup Problem", 4th IWES "Waste Technologies Symposium and Exhibition", Istanbul, Turkey, November 14-15, 2012.

TEACHING

11:373:202:90 **Spring 2013- 2017** Sustainability Decision Tools (co-developed course)

11:776:112:01 **Spring 2015 -2017** Introduction to Bioenergy Technologies (developed course)

SERPIL GURAN

Proposed "**Master of Engineering Degree in Energy Systems Program"**, Invited Faculty (will develop a course when the program is finalized)

ADVISING INTERNS

Undergraduate Students

Christiana Dalton	(2017- Summer Intern)
Mete Eser	(2017- Summer Intern)
Catherine O'Connor	(2017- Summer Intern)
Emil Attardo	(2016-Summer Intern)
Langley Oudemans	(2016- Summer Intern)
Nicole Zougheib	(2016-Summer Inter)
Julia Burmistrova	(2015- Summer Intern)
Alessandra Looman	(2015- Summer Intern)
Kevin Marceski	(2015- Summer Intern)
Alec Roth	(2014- Summer Intern)
Selen Altiok	(2014- Summer Intern)
Boni Chang	(2014- Summer Intern)
Ian MacCloud	(2014- Summer Intern)
Austin Kaiser	(2013- Summer Intern)
Chris Sipos	(Intern, 2011)
Brett Cowen	(Intern2012, 2013)

UNIVERSITY SERVICE

2015- Present	Rutgers Energy Institute Annual Energy Contests reviewer.
2011- Present	Member, Rutgers Energy Institute
2011- Present	Member, SEBS Sustainable Energy Work Group
2015- Present	Chair, SEBS Sustainable Energy Work Group

PROFESSIONAL SERVICE

Member	New Jersey Clean Energy Innovation Council
Member	New Jersey Renewable Natural Gas Work Group
Member	New Jersey Biofuels Work Group
State Representative	North East Biomass Partnership

Journal Reviewer
Energies: www.mdpi.com/journal/energies

Professional Memberships
American Institute of Chemical Engineers
New Jersey Association of Energy Engineers
Institute of Energy, London, UK.

EXHIBIT B

Incorporating the Social Cost of Carbon based on the Environmental Benefits of Greenhouse Gas Emission Reductions from Trenton Renewable Power

Qualifications for Energy Rate per kWh

Frank A. Felder, Ph.D.

Independent Electricity Consultants, LLC
https://www.independentelectricityconsultants.com

Submitted in support of the
PETITION OF **TRENTON RENEWABLE POWER, LLC** FOR APPROVAL OF A RENEWABLE ENERGY POWER PURCHASE AGREEMENT WITH PUBLIC SERVICE ELECTRIC AND GAS COMPANY

February 2024

Executive Summary

Reducing greenhouse gas emissions is an international, national, and State of New Jersey priority. Trenton Renewable Power, LLC generates in New Jersey baseload electricity using methane from the anaerobic digestion of food waste. As a result, it avoids the annual release of the equivalent of 224,895 metric tons of carbon dioxide, after accounting for the release of carbon dioxide during the combustion of methane gas. Methane is the second most anthropogenic greenhouse gas after carbon dioxide and is much more potent than carbon dioxide at trapping heat in the atmosphere. The environmental benefit of reducing methane emissions net of carbon dioxide emissions from its combustion can be calculated using the *social cost of carbon*, a widely accepted and utilized numerical value of the economic costs of releasing one ton of carbon dioxide or global warming equivalent into the atmosphere.

Based upon the United States (U.S.) Environmental Protection Agency's (EPA) social cost of carbon, Trenton Renewable Power, LLC avoids $42.7 millions of environmental damage per year, and $1,647 per megawatt-hour when displacing electricity generated in the wholesale electricity market that includes New Jersey. Trenton Renewable Power, LLC is highly cost-effective in reducing greenhouse gas emissions compared to other alternatives for reducing greenhouse gas emissions, and its generation method is less expensive than solar, offshore wind, and onshore wind. Furthermore, Trenton Renewable Power, LLC is an operating enterprise that also provides local employment, economic benefits, and an in-state source of cost-effective electricity.

I. Introduction and Summary of Qualifications

Trenton Renewable Power, LLC is based in Trenton, New Jersey, and has been operating Trenton Biogas, LLC since 2019. Trenton Biogas, LLC is a 3.3-megawatt electric generation facility that produces up to 25,951 megawatt-hours per year from the anaerobic digestion of food waste collected from restaurants and other facilities in New Jersey. It collects and converts 110,000 tons of food yearly into methane gas, which is then used in three reciprocating engines of 1.134 megawatts each. The New Jersey Department of Environmental Protection has issued permits for the Trenton Biogas, LLC operation. For brevity, the name *Trenton Renewables* refers to its companies Trenton Renewable Power, LLC and Trenton Biogas, LLC.[1]

Trenton Renewable Power has commissioned this report by Frank A. Felder, Ph.D., of Independent Electricity Consultants, LLC, to quantify the environmental benefits of its reduction in methane emissions net of carbon dioxide emissions from its electricity generation, and to quantify the total value of Trenton's electricity on a per kWh basis. Dr. Felder is the former Director of the Rutgers Energy Institute and the Center for Energy, Economic, and Environmental Policy at the Bloustein School of Planning and Public Policy. While at the Bloustein School, Dr. Felder led numerous studies and reports related to New Jersey energy planning, quantifying the environmental benefits of reducing greenhouse gas emissions, and the economic and environmental benefits and costs of generating electricity from different resources for the New Jersey Board of Public Utilities and Department of Environmental Protection. A further description of his background and qualifications is available at the end of this document.

This report is organized as follows: Section II summarizes the objectives of the U.S. and New Jersey greenhouse gas emission reduction and clean electricity policies; Section III describes Trenton Renewables; Section IV presents the avoided greenhouse gas emissions due to Trenton Renewables and compares them to solar and offshore wind; Section V quantifies the environmental benefits of Trenton Renewables using the social cost of carbon and social cost of methane; Section VI discusses other qualitative benefits of Trenton Renewables; and Section VII concludes by calculating the net value of carbon per kilowatt-hour (kWh) combined with the electric rate per kWh to represent the total value of Trenton's electricity per kWh.

II. Summary of the Objectives of U.S. National and New Jersey Greenhouse Gas Emission Policies

The scientific community, many governments, researchers, and analysts find that to avoid more than a 1.5 degree Celsius increase in average global temperatures above pre-industrial levels, global emissions of greenhouse gases must be net zero by 2050.[2] Average global temperature increases and their impacts greatly damage public health and safety, economic activity, and the environment.[3] These damages can be quantified using the concept of the social cost of carbon.

[1] Trenton Renewable, LLC operates the Trenton Biogas facility, owned by Trenton Biogas, LLC and employs Biogas Operations, LLC, as a sub-contracted operations and maintenance provider.
[2] U.S. Department of State and U.S. Executive Office of the President, The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions 2050, November 2021.
[3] U.S. Government, Fifth National Climate Assessment, 2023.

Net zero means offsetting greenhouse gas emissions by removing an equivalent amount from the atmosphere.

The U.S. federal government has adopted and implemented numerous policies to reduce greenhouse gas emissions. For example, the Infrastructure Investment and Jobs Act of 2021 aims, in part, to address climate change by investing in clean energy transmission, electric vehicle infrastructure, and electrifying school and transit buses.[4] The Inflation Reduction Act of 2022 supports the deployment of distributed zero-emission technologies.[5] The Biden administration's goal is to achieve a net-zero electric power sector by 2035.[6] In November 2023, the Office of Management and Budget released a circular that updated the methodology and estimates it uses when conducting benefit-cost analysis, such as estimating the economic cost (benefit) of releasing (avoiding) one ton of carbon dioxide equivalent, denoted CO_{2e}.[7] An updated social cost of carbon allows for the economic assessment of competing alternatives to reduce greenhouse gas emissions. The social cost of carbon is discussed further in Section V, below.

New Jersey is a leader among states in its commitment to rapidly eliminating greenhouse gas emissions. In 2020, it passed the Global Warming Response Act (GWRA), which mandates that New Jersey lower its greenhouse gas emissions by 80% from 2006 levels.[8] Its 2019 Energy Master Plan was also directed at reducing greenhouse gas emissions.[9] In its 2024 Energy Master Plan efforts, the Governor's Office has recommitted to the importance of reducing greenhouse gas emissions and doing so cost effectively. The Governor signed Executive Order No. 315 to achieve "an accelerated target of 100% clean energy by 2035, defined as 100% of the electricity sold in the State to come from clean sources of electricity by January 1, 2035,"[10] and the Legislature is considering legislation to do the same.[11] Other significant legislation and policies, such as the State's Renewable Portfolio Standard and the Offshore Wind Economic Development Act, are also directed at reducing greenhouse gas emissions. The leadership of the Board of Public Utilities (BPU) and the Department of Environmental Protection (DEP) are also committed to the rapid and significant reduction of greenhouse gas emissions.[12]

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[4] The White House, Bipartisan Infrastructure Investment and Jobs Act, August 2, 2021.
[5] The White House, How the Inflation Reduction Act Will Help Small Businesses, September 12, 2022.
[6] United States Executive Office of the President, "The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050," 2021.
[7] Office of Management and Budget, Circular No. A-4, Regulatory Analysis, November 13, 2023.
[8] New Jersey's Global Warming Response Act 80x50 Report: Evaluating Our Progress and Identifying Pathways to Reduce Emissions by 80% by 2050, October 15, 2020.
[9] State of New Jersey, About the Energy Master Plan. "To fulfill Governor Murphy's commitment to achieve 100 percent clean energy by 2050 and the Global Warming Response Act (GWRA) mandate of reducing state greenhouse gas emissions by 80 percent below 2006 levels, the Energy Master Plan comprehensively addresses New Jersey's energy system, including electricity generation, transportation, and buildings, and their associated greenhouse gas emissions and related air pollutants." https://www.nj.gov/emp/energy/#:~:text=The%20Energy%20Master%20Plan%20defines,or%20exceed%20the%20GWRA%20mandates.
[10] State of New Jersey, Governor Murphy Announces Comprehensive Set of Initiatives to Combat Climate Change and Power the "Next New Jersey", February 15, 2023.
[11] NJ Spotlight News, Law would bolster NJ commitment to clean-energy goals, November 17, 2023.
[12] NJ Spotlight, Murphy names new BPU president, September 12, 2023 and NJ Spotlight, DEP commissioner: Climate change must be fought on several fronts, September 24, 2021.

In summary, cost-effectively achieving net-zero emissions in the energy sector in general, and the electricity sector in particular, are top priorities of the U.S. federal government and the State of New Jersey. Avoiding the release of methane, a greenhouse gas more potent per molecule than carbon dioxide, is a critical strategy. To achieve these objectives, the social cost of carbon is an essential component of policy analyses. Moreover, Trenton Renewables is a viable and operating enterprise, providing local employment and economic benefits and a cost-effective local source of electricity.

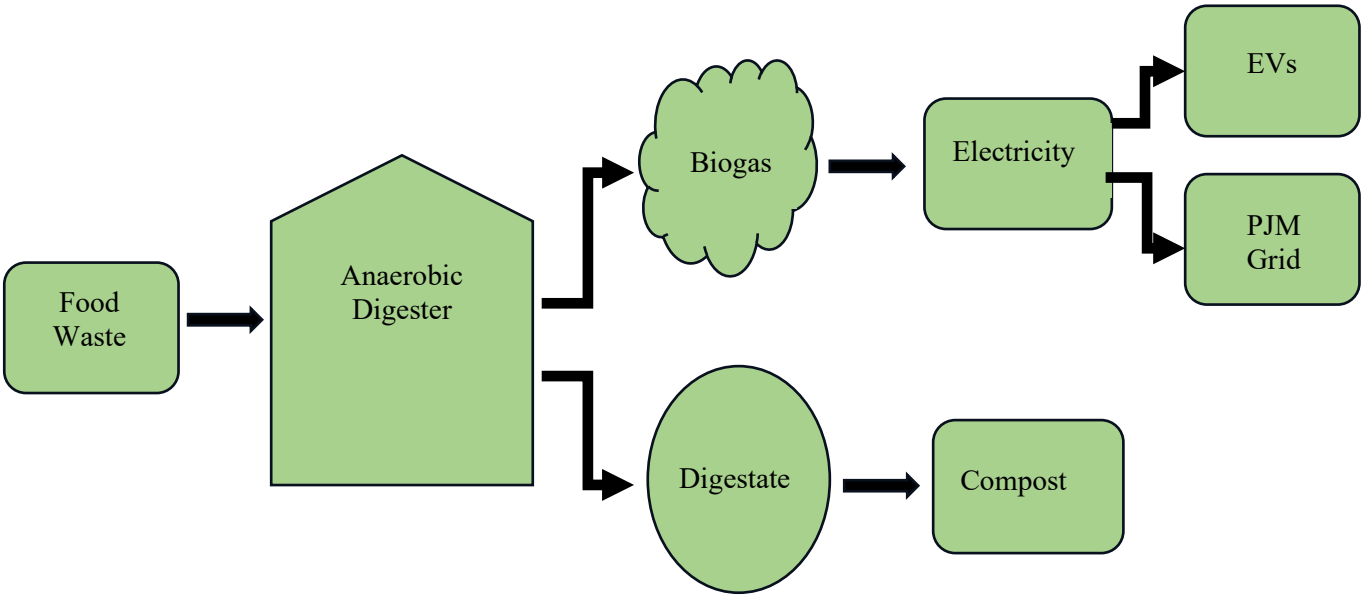
III. Description of Trenton Renewable Power and Trenton Biogas

Trenton Renewables is a food waste recycling and renewable energy company headquartered in Trenton, New Jersey. Trenton Renewables has 25 full time employees, over 100 ancillary employees who collect food waste from its customers, and others who provide support services. Entities that divert organics and food waste to Trenton Renewables save approximately $60 per ton compared to the waste flow-controlled rate of $132 per ton.[13] This enables them to lower their cost of operations, better serve their customers, employ staff, and contribute to New Jersey's economic and tax bases.

Trenton Renewables recycles food waste into renewable energy, premium compost, and recaptured packaging using advanced material handling technologies and anaerobic digestion.[14] It avoids 239,786.86 metric tons of carbon dioxide emissions equivalent annually, produces 225,000 million British thermal units (MMBtu) of renewable biogas, and generates up to 25,951 megawatt-hours of electricity using three reciprocating engines, each of 1.134 megawatts.[15] Figure 1 illustrates Trenton Renewable's anaerobic digestion process.

[13] Provided by Trenton Renewables.
[14] https://www.trentonrenewables.com.
[15] Provided by Trenton Renewables.

Figure 1: Illustration of Waste-to-Electricity Process Using Anaerobic Digestion[16]



Since 2020, Trenton Renewables has been converting food waste into electricity. Table 1 summarizes the annual intake and electricity production in megawatt-hours (MWh) projected through 2025.

Table 1: Historical (2020-2023) and Projected (2024-2025) Food Waste Input and Electricity Generation, 2020-2025

Year	Food Waste Feedstock (U.S. Tons)	Electricity Generation (MWh))
2020	16,614	2,052
2021	66,023	14,182
2022	52,697	13,123
2023	50,628	13,094
2024	90,690	23,021
2025	123,800	24,700

Source: Trenton Renewables.

IV. Net Greenhouse Gas Reductions due to Trenton Biogas

The reduction of greenhouse gas emissions by Trenton Renewables is straightforward. A lot of food waste is disposed of in landfills, and as it decomposes, it emits methane.[17] Methane is one of six greenhouse gases and has a global warming potential of 27-30 times that of carbon dioxide

[16] Author based upon Environmental and Energy Study Institute, Biogas: Converting Waste to Energy, October 3, 2017.

[17] On April 14, 2020, New Jersey enacted the Food Waste Recycling Act, which requires large food waste generators to separate and recycle food waste.

over 100 years and 81-83 over 20 years.[18] The methane molecule, CH_4, retains more heat than the carbon dioxide molecule, CO_2. Methane, however, does not last as long in the atmosphere as carbon dioxide, so its global warming potential decreases over time compared to carbon dioxide. Consequently, the carbon dioxide equivalent of methane is reported for different periods.

Instead of disposing of food waste in a landfill where it emits methane, Trenton Renewables collects the waste (via its transportation partners) and accelerates and captures the methane release. The methane is then combusted to generate renewable, baseload electricity, emitting some carbon dioxide. The resulting electricity can be used to displace electricity transmitted to New Jersey from the Pennsylvania-New Jersey-Maryland (PJM) wholesale electricity market that releases carbon dioxide. In addition, Trenton Renewables avoids the release of CO2e as listed in Table 2.

Table 2: Annual Gross Avoided Carbon Dioxide Equivalent (CO_{2e}) Emissions by Trenton Renewables (Metric Tons)

Source of Avoided CO_{2e} Emissions	**Avoided CO_{2e} Emissions, Metric Tons per Year (Parenthesis Indicate Negative or Avoided Emissions)**
Landfill Offset	(221,706.58)
Residual Disposal and Recycle	(8,040.65)
Recovered Sulfur	(0.33)
Captured Ammonia	(769.90)
Solid Nutrients	(17.92)
Recovered Heat	(2,912.97)
PJM Grid Avoidance	(6,338.51)
Gross Total Per Year	**(239,786.86)**

Source: Trenton Renewables Carbon Inventory Analysis and Serpil Guran, Ph.D., Director of the New Jersey Agricultural Experiment Station, Rutgers University, January 15, 2024, letter.

Trenton Renewables does emit CO_2 as part of its operations, which is itemized in Table 3.

Table 3: Annual CO_2 Emissions by Trenton Renewables (Metric Tons)

Source	**CO_2 Emissions from Trenton Renewables Operations**
Generation Engine Emissions	13,653.31
Transportation of Food Waste	79.18
Transportation Residuals	240.82
Yard Equipment	0.38
Process Chemicals	808.13
Wastewater	109.64
Emissions Total Per Year	**14,891.45**

[18] U.S. Environmental Protection Agency, Understanding Global Warming Potentials.

The net avoided CO_{2e} emissions are 224,895.40 metric tons per year (239,786.86 minus 14,891.45). Using an annual generation of 25,951 MWh/year, Trenton Renewables avoids 8.67 metric tons per MWh, equivalent to 19,108.87 pounds (lbs.)/MWh.[19]

New Jersey invests in solar and offshore wind to achieve its clean electricity policy objectives. Table 4 compares the reduction in carbon dioxide equivalent for solar, offshore wind, and Trenton Renewables. While both solar and offshore wind are important technologies to reduce greenhouse gas emissions, Trenton Renewables avoids approximately 18,000 lbs/MWh more of carbon dioxide equivalent than these other individual renewable energy technologies.

Table 4: Comparison of Avoided Greenhouse Gas Emissions from Solar and Offshore Wind to Trenton Renewables

Source of Avoided Greenhouse Gas Emissions	Avoided Greenhouse Gas Emissions per Megawatt-hour	Trenton Renewables' Additional Emission Reductions	Trenton Renewables' Emission Reduction Multiple
Solar	1,041 lbs/MWh	18,068 lbs/MWh	17 times
Offshore Wind	976 lbs/MWh	18,133 lbs/MWh	19 times
Trenton Renewables	19,109 lbs/MWh	not applicable	not applicable

Reference: PJM, 2018-2022 CO2, SO2 and NOx Emission Rates, April 27, 2023.

V. Economic Quantification of Environmental Benefits of Net Greenhouse Gas Reductions

The net reduction in greenhouse gas emissions due to Trenton Renewables can be quantified economically using the social cost of carbon. The *social cost of carbon* is an estimate of the additional cost, in dollars, of the economic damage done by each additional unit of carbon dioxide emissions. The concept and term also apply to other greenhouse gas emissions, such as methane and is referred to as the *social cost of carbon equivalent* or $CO_{2\text{-}eq}$. It is a well-established, accepted, and researched economic concept, recently updated based on extensive research and improved scientific understanding.[20] The U.S. EPA reports the social cost of carbon dioxide based on extensive research and modeling.[21] The social cost of CO_{2e} emissions increases over time for carbon dioxide. These values are presented in Table 5 and vary by year, assuming the net avoided CO_{2e} emissions are 224,895.40 metric tons per year.

[19] One metric ton is 2,205 pounds (lbs.).
[20] Tamma Carleton and Michael Greenstone, Updating the United States Government's Social Cost of Carbon, Energy Policy Institute at the University of Chicago, Working Paper NO. 2021-04, November 2021.
[21] U.S. EPA, Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances, November 2023.

Table 5: U.S. EPA's Social Cost of Carbon Midpoint Value[22] (Near-term Discount Rate of 2% in 2020 Dollars) and Annual Economic Value of Net Avoided Greenhouse Gas Emissions by Trenton Renewables

Estimation Year	Social Cost of Carbon Dioxide Equivalent, $/metric ton of CO_{2e}	Annual Economic Value of Net Avoided Greenhouse Gas Emissions (2020 Dollars)	Economic Value of Net Avoided Greenhouse Gas Emissions (2020 Dollars) per MWh and per kWh
2020	$190	$42,730,127 per year	$1,647 or $1.65/kWh
2030	$230	$51,725,943 per year	$1,993/MWh or $1.99/kWh

Using the 2020 social cost of CO_{2e}, on a per MWh basis, the value of the avoided greenhouse gas emissions is $1,647/MWh (or $1.65/kilowatt-hour (kWh)) before including the wholesale value of the electricity.

VI. Other Economic Benefits of Trenton Biogas

Trenton Renewables provides other benefits that lower the cost of providing a net reduction in greenhouse gas emissions and contribute to the local and state economies. It produces baseload power that does not require energy storage, transmission, or other means to mitigate intermittent electricity from solar photovoltaics or wind. The cost of intermittent sources of electricity can be substantial, although they vary widely. Some estimates put them in the range of $22 to $31 per megawatt-hour.[23] Like distributed solar, Trenton Renewables injects its electricity at the distribution level, avoiding transmission losses. When the electricity is used on-site, such as to charge electric vehicles, it also avoids distribution losses. The U.S. Energy Information Administration (EIA) reports that New Jersey's transmission and distribution losses are 5.4%.[24]

Trenton Renewables also supports the local and state economies and tax base. It reduces the disposal costs for restaurants and food facilities, which generally operate on low margins, employs 25 persons, and helps support numerous transportation partners. Its technology and business model is scalable to the rest of New Jersey and the wider region, further providing substantial reductions in greenhouse gases and boosting economic activity.

VII. Conclusion

Based on this report's analysis, the social cost of carbon dioxide equivalent emissions avoided by Trenton Renewables is $1.65/kWh. In addition, the wholesale market value of Trenton Renewables is $0.38/kWh based upon the average price at which it has sold its renewable electricity since May 2020 via PSE&G's Purchased Electric Power (PEP) tariff.[25]

[22] Ibid, Table ES.1, p. 4.
[23] Lazard, LCOE, April 2023, p. 8.
[24] U.S. EIA, State Electricity Profiles, Table 10, November 2, 2023.
[25] Provided by Trenton Renewables.

The total quantifiable economic and environmental value of the electricity Trenton Renewables produces is $2.03/kWh, which exceeds its proposed rate of $0.20/kWh as requested in its petition.

Trenton Renewables is a local, ongoing operation that provides community, New Jersey, and global benefits by accomplishing the following:

- Avoids 224,895 metric tons annually and 8.67 metric tons per megawatt-hour of carbon-dioxide equivalent;
- Provides $42.7 million per year and $1,647 per megawatt-hour of environmental benefits, and its electricity is used to displace PJM wholesale market electricity and used to fuel electric vehicles;
- Saves 18,068 more pounds of greenhouse gas emissions per megawatt-hour and is 17 times more effective than solar;
- Saves 18,133 more pounds of greenhouse gas emissions per megawatt-hour and is 19 times more effective than offshore wind;
- Generates firm, baseload electricity locally that reduces transmission and distribution electrical losses and does not require energy storage; and
- Contributes directly to the local and state economic and tax bases by lowering food disposal costs for New Jersey restaurants and food facilities.

Acknowledgments

The author acknowledges the contributions of Brian Blair of Trenton Renewables, LLC, Jason Hickey of Roux Associates, and Rutgers University.

Background and Qualifications of the Author

Frank A. Felder, Ph.D., is the Principal Partner of Independent Electricity Consultants, LLC. Since 1998, Independent Electricity Consultants, LLC has been serving all sectors of the electric power industry, including utilities, independent system operators and regional transmission organizations, independent power producers, energy service companies, law firms, the U.S. Department of Energy, and the U.S. Agency for International Development.

Frank is the former Director of the Rutgers Energy Institute, a former Research Professor at the Bloustein School of Planning and Public Policy, Rutgers University, and the former Director of the Center for Energy, Economic and Environmental Policy (CEEEP). At CEEEP, Frank led numerous studies on the New Jersey Energy Master Plan, the New Jersey Renewable Portfolio Standard, offshore wind, energy efficiency, and combined heat and power. His consulting, research and teaching have spanned over a dozen countries in Africa, Europe, the Middle East, and North America. He holds a Ph.D. from MIT and is a former nuclear engineer and submarine officer for the U.S. Navy.

More information on IEC is available at https://www.independentelectricityconsultants.com, and Frank's background and curriculum vitae are available at https://www.independentelectricityconsultants.com/about-us.

EXHIBIT C

D R A F T

CLASS I RENEWABLE ENERGY POWER PURCHASE AGREEMENT

By and between

TRENTON RENEWABLE POWER, LLC

and

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

_____, 2024

THIS CLASS I RENEWABLE ENERGY POWER PURCHASE AGREEMENT (this "***Agreement***") is entered into as of [INSERT MONTH] ___, 2024 (the "***Effective Date***") by and between **TRENTON RENEWABLE POWER, LLC,** a Delaware limited liability company, located at 1600 Lamberton Road, Trenton, NJ 08611 ("***Seller***"), and **PUBLIC SERVICE ELECTRIC AND GAS COMPANY,** a New Jersey corporation, located at 80 Park Plaza, Newark, NJ 07102 ("***Buyer***"), individually referred to as "***Party***" and collectively as "***Parties***" in this Agreement.

RECITALS:

WHEREAS, Seller owns and operates a food waste recycling facility, also known as a biomass facility, located at 1600 Lamberton Road, Trenton, NJ (***"Facility"***); and

WHEREAS, the Facility includes a digester that recycles vegetative food waste and produces renewable natural gas as a byproduct of the recycling process; and

WHEREAS, the Facility also includes three 1.137 megawatt ("MW") electric generation turbines that use the renewable natural gas to generate electricity ("***Generation System***"); and

WHEREAS, the electricity generated by the Facility is classified as Class I renewable energy pursuant to N.J.A.C. 14:8-1.2 and N.J.A.C. 14:8-2.5(b)(8) and (c); and

WHEREAS, Buyer is a public utility of the State of New Jersey subject to the jurisdiction of the New Jersey Board of Public Utilities ("***BPU***") and provides electric distribution and transmission service, as well as basic generation service, within a service territory than encompasses numerous municipalities within the State of New Jersey, including Trenton, NJ; and

WHEREAS, the Facility is located within Buyer's service territory and is electrically interconnected to Buyer's electric distribution system at 1600 Lamberton Road, Trenton NJ 08611, as more fully depicted on Exhibit A hereof ("***Delivery Point***"); and

WHEREAS, the Facility is interconnected to Buyer's electric distribution system at 13.2 kV pursuant to an interconnection agreement dated August 29, 2018 ("***Interconnection Agreement*"**); and

WHEREAS, the Generation System is currently in operation and producing Class I renewable electricity ("***Class I Electric Energy***"); and

WHEREAS, Seller desires to operate the Generation System for the purpose of delivering and selling one hundred percent (100%) of the Class I Electric Energy produced to Buyer, subject to the terms and conditions, of this Agreement; and

WHEREAS, Buyer desires to take and purchase from Seller one hundred percent (100%) of the Class I Electric Energy produced by the Generation System, subject to the terms and conditions, of this Agreement; and

WHEREAS, Seller and Buyer have agreed to enter into this Agreement in furtherance thereof.

NOW, THEREFORE, in consideration of the premises, the covenants set forth herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereto agree as follows.

1. DEFINITIONS

a. **Incorporation of Recitals.** The Recitals above are incorporated by reference into this Agreement and made a part of this Agreement.

b. **Definitions**. As used in this Agreement, the following terms, when initially capitalized, shall have the meanings specified in this Section 1b.

"***Affiliate***" means, with respect to any Person, (i) each Person that, directly or indirectly, controls or is controlled by or is under common control with such designated Person, (ii) any Person that beneficially owns or holds fifty percent (50%) or more of any class or voting securities of such designated Person or fifty percent (50%) or more of the equity interest in such designated Person, and (iii) any Person of which such designated Person beneficially owns or holds fifty percent (50%) or more of any class of voting securities or in which such designated Person beneficially owns or holds fifty percent (50%) or more of the equity interest. For the purposes of this definition, "control" (including, with correlative meanings, the terms "controlled by" and "under common control with"), as used with respect to a Person, means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of such Person, whether through the ownership of voting securities or by contract or otherwise. For the avoidance of doubt, the term "Affiliate" shall not include any Project Lender.

"***Agreement***" has the meaning set forth in the Recitals.

"***Applicable Law***" means any law, statute, act, code, ordinance, rule, regulation, requirement, judgment, writ, decree, injunction, governmental approvals, licenses, permits, directives, determination or order of a federal, state, city, county or other subdivision thereof Governmental Authority, or any other Governmental Authority having jurisdiction over either of the Parties, their Affiliates, the Project, the Interconnection Facilities, any other goods or services provided or received or to be provided or received by either Party under this Agreement.

"Board of Public Utilities" or "BPU" has the meaning set forth in the Recitals.

"***Claim***" or "***Claims***" has the meaning set forth in Sections 11 and 16.

"***Claiming Party***" has the meaning set forth in Section 11.

"***Class I Electrical Energy***" means the instantaneous electrical energy output, intermittent and variable within the hour, made available from the Facility, as measured by the revenue Meter(s) installed at the Delivery Point.

"***Class I Renewable Energy Certificates***" or "***Class I RECs***" means those RECs as defined in N.J.A.C. Sections 14:8-1.2, 14:8-2.2 and 14:8-2.5(b)(7).

"***Commercially Reasonable Efforts***" means efforts that are reasonably within the contemplation of the Parties to this Agreement and that do not require the performing Party to expend any funds other than expenditures that are customary and reasonable in transactions of the kind and nature contemplated by this Agreement in order for the performing Party to satisfy its obligations hereunder.

"***Confidentiality***" has the meaning as described in Section 18p.

"***Contract Price***" means the $/kWh amount corresponding to the applicable Contract Year as set forth in the "Energy Rate" column on Exhibit B.

"***Contract Year***" has the meaning set forth in Section 4c.

"***Delivery Point***" has the meaning set forth in the Recitals.

"Dispute" has the meaning set forth in Section 16.

"Distribution System" means the electrical distribution facilities owned and operated by Buyer.

"***Effective Date***" has the meaning set forth in the Preamble.

"***Energy Rate***" has the same meaning as "***Contract Price***."

"***Environmental Attributes***" means any and all environmental characteristics, environmental claims, environmental credits, environmental benefits, environmental emissions reductions, environmental offsets, environmental allowances and environmental allocations, existing now or in the future, howsoever characterized, denominated, measured or entitled, attributable to the generation of Class I Electrical Energy by the Facility. Environmental Attributes include but are not limited to: (i) any avoided emissions of pollutants to the air, soil or water including but not limited to sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), particulate matter and other pollutants; (ii) any avoided emissions of carbon dioxide (CO2), methane (CH4) and other greenhouse gases that have been or may be determined by the United Nations Intergovernmental Panel on Climate Change to contribute to the actual or potential threat of altering the Earth's climate by trapping heat in the atmosphere; (iii) all set-aside allowances and/or allocations from emissions trading programs; and (iv) all credits, certificates, registrations, recordations or other memorializations of whatever type or sort, representing any of the above, including but not limited to all RECs. Environmental Attributes do not include (a) any energy, capacity, reliability or other power products, such as Ancillary Services (as defined by PJM) or (b) federal, state or local tax credits, incentives, subsidies or financial grants of any type.

*"**Event of Default**" means a Buyer Event of Default or Seller Event of Default, as applicable, under Sections 13 or 14 of this Agreement.

"Facility" has the meaning set forth in the Recitals.

"***Force Majeure Event***" or "***Force Majeure***" has the meaning set forth in Section 11.

"***Forced Facility Outage***" means a System Emergency or any other immediate reduction in the Generation System's Class I Electrical Energy output or removal from service, in whole or in part, of a generating unit by reason of an emergency or threatened emergency, unanticipated failure, or other cause beyond the control of Seller or the operator of the Facility.

"***Good Utility Practice***" means any of the practices, methods, and acts engaged in or approved by a significant portion of the electric industry during the relevant time period, or any of the practices, methods, and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, reasonably could have been expected to accomplish the desired result in a timely manner and at a reasonable cost consistent with good business practices, reliability and safety. Good Utility Practice is not intended to be limited to the optimum practice, method, or act, to the exclusion of all others, but rather is intended to include acceptable practices, methods, and acts generally accepted in the industry.

"***Governmental Authority***" means any federal, state, provincial, local or municipal government, any political subdivision thereof or any other governmental, regulatory, quasigovernmental, judicial, public or statutory instrumentality, authority, body, agency, department, bureau, or similar entity with authority to bind a Party at law.

"***Indemnified Parties***" has the meaning set forth in Section 17.

"***Indemnified Party***" has the meaning set forth in Section 17.

"***Indemnifying Parties***" has the meaning set forth in Section 17.

"***Indemnifying Party***" has the meaning set forth in Section 17.

"***Interconnection Agreement***" means the interconnection agreement entered into by Seller pursuant to which the Generation System will be interconnected with the Distribution and/or Transmission System.

"***Interconnection Facilities***" means the interconnection facilities, control and protective devices and metering facilities required to interconnect the Generation System with the Distribution and/or Transmission System pursuant to the Interconnection Agreement in order to meet the terms and conditions of this Agreement.

"***kWh"*** means kilowatt-hour.

"***Loss" or "Losses"*** has the meaning set forth in Section 17.

"***Metered Output***" means the electric energy, expressed for purposes of this Agreement in kilowatt hours (kWh) made available by Seller to Buyer at the Delivery Point, which for any Month (or any relevant measured period), shall equal the amount of hourly Electrical Energy delivered by Seller at the Delivery Point for such Month (or such relevant measured period).

"***Meter(s)***" has the meaning set forth in Section 7.

"***Month***" means a calendar month commencing at 00:00 EPT on the first calendar Day of such month and ending at 24:00 EPT on the last Day of such month.

"***Non-Defaulting Party***" means, with respect to any Event of Default, the Party that is not the Defaulting Party.

"***Outage***" means either a Planned Outage or a Forced Facility Outage, as the case may be.

"***Party***" or "***Parties***" has the meaning set forth in the Preamble and includes any permitted assignee of a Party.

"***Person***" means an individual, partnership, corporation, limited liability company, joint venture, association, trust, unincorporated organization, Governmental Authority, or other form of entity.

"***Planned Outage***" means a period of time during which the Generation System does not operate, in whole or in part, due to a Scheduled Maintenance Period.

"***Project Maintenance***" means Seller's routine maintenance requiring the planned partial or complete reduction of the Project's generating capability.

"***Buyer***" has the meaning set forth in the Preamble.

"Buyer Agreement Documents" has the meaning set forth in Paragraph 9(a)(ii).

"***Buyer Event of Default***" has the meaning set forth in Section 13.

"***Renewable Energy Credits***" or "***RECs***" has the meaning set forth in Section 6.

"***Scheduled Maintenance Period"*** means a time during which the Seller has scheduled maintenance or repair of the Generation System and during which the Generation System does not operate, in whole or in part.

"***Seller***" has the meaning set forth in the Preamble.

"***Seller Agreement Documents***" has the meaning set forth in Section 9(b)(ii).

"System Billing Meter" has the meaning set forth in Section 7.

"***System Emergency***" means any system condition (including, but not limited to, Emergency Actions as defined and declared by PJM Interconnection, LLC) that requires, as determined and declared by a transmission provider, automatic or immediate action to prevent or

limit harm to or loss of life or property, to prevent loss of transmission facilities or generation supply, or to preserve system reliability.

"***Tax***" or "***Taxes***" means all foreign and domestic taxes, and levies, whether currently in effect or adopted during the Term, including but not limited to, ad valorem, consumption, distribution, excise, franchise, gross receipts, import, export, license, property, sales, stamp, storage, transfer, turnover, use or value-added taxes, the Philadelphia Business Income and Receipts tax and any other business income and/or receipts tax, and any and all items of penalty, addition to tax, interest or assessment related thereto.

"***Term***" has the meaning set forth in Section 2.

"***Total Monthly Amount"*** shall have the meaning set forth in Section 4b.

"***Transmission System***" means the electrical transmission facilities operated or owned by the Buyer.

2. TERM

The term of this Agreement shall comment on the Effective Date and shall continue thereafter until for a period of **ten years**, unless sooner terminated as provided for in this Agreement (the "***Term***").

3. SALE AND PURCHASE OF CLASS I ELECTRIC ENERGY

a. Throughout the Term, subject to the terms and conditions of this Agreement, Seller shall own, operate, and maintain the Generation System in order to sell, and Seller shall sell, to Buyer, and Buyer shall purchase from Seller, all of the Class I Electric Energy produced by the Generation System and delivered to the Delivery Point.

b. The Class I Electric Energy produced by the Generation System shall be delivered by Seller to Buyer at the Delivery Point.

c. The Class I Electric Energy produced by the Generation System shall be delivered in compliance with all of the requirements of Buyer and in compliance with Applicable Laws.

d. Except as provided herein, Seller does not warrant or guarantee the amount of Class I Electric Energy to be produced by the Generation System for any hourly, daily, monthly, annual, or other period.

e. Except for Force Majeure events, Seller defaults, or as otherwise expressly provided for herein, Buyer's obligation hereunder to purchase and pay for all of the Class I Electric Energy produced by the Generation System shall not be excused or relieved.

4. PRICE, PAYMENT, AND BILLING

a. **Price.** Commencing on the Effective Date, Buyer shall pay Seller, or its assigns, the price per kWh of Class I Electric Energy as set forth in Exhibit B hereto.

b. **Payment.** Buyer shall pay the applicable price from Exhibit B for the Class I Electric Energy produced by the Generation System monthly in arrears during the Term. The total monthly amount due shall be an all-inclusive charge, including all applicable Sales and Use Tax and applicable credits, if any ("***Total Monthly Amount***"). Buyer shall pay each monthly invoice issued by Seller (as set forth below) within thirty (30) days of receipt of the invoice.

c. **Billing.** After the end of each calendar month of the Term, Seller shall provide Buyer with an invoice setting forth the quantity of Class I Electric Energy produced by the Generation System in each such month, the applicable rates for such quantity, and the Total Monthly Amount due. The monthly invoices shall be either mailed or emailed to Buyer as requested by, and at the addresses and to the person or persons designated by the Buyer from time to time; provided, however, that Buyer shall use Commercially Reasonable Efforts to limits its request for changes in its instructions related to the monthly invoices to no more than two (2) times per contract year ("***Contract Year***"). The term "***Contract Year***" means the twelve-month period beginning at 12:00 AM on the Effective Date or on any anniversary of the Effective Date and ending at 11:59 PM on the day immediately preceding the next anniversary of the Effective Date, *provided* that the first contract year shall begin on the Effective Date.

d. **Late Payment.** Any part of the Monthly Payment Amount not paid when due shall accrue interest at a fixed annual rate equal to the lesser of (a) the "prime rate" (as published in the Wall Street Journal) from time to time plus two percent (2%), and (b) the highest rate permitted by Applicable Law, from its due date.

e. **Method of Payment**. Buyer shall make all payments of invoices for Class I Electric Energy under this Agreement by electronic funds transfer in immediately available funds to the account designated by Seller from time to time.

f. **Disputed Payments**. If a bona fide dispute arises with respect to any invoice, Buyer shall not be deemed in default under this Agreement and the Parties shall not suspend the performance of their respective obligations hereunder, provided that Buyer shall not be required to pay the disputed amounts owed hereunder until such dispute has been resolved by the Parties. If an amount disputed by Buyer is subsequently deemed to have been due pursuant to the applicable invoice, interest shall accrue on such amount as set forth in subsection "d." of this Section 3.

5. NO PRODUCTION WARRANTY OR GUARANTEE

a. Notwithstanding anything to the contrary herein, Seller does not warrant or guarantee that the Generation System will produce any quantity of Class I Electric Energy at any time during the Term.

6. ENVIRONMENTAL ATTRIBUTES AND TAX CREDITS, TITLE/RISK OF LOSS

a. Environmental Attributes, Incentives, Tax Credits. The Buyer's purchase of Class I Electric Energy hereunder, shall not include, and Seller shall retain title to, and be the owner of, any state and federal environmental attributes, renewable energy credits or certificates ("***RECs***"), including New Jersey Class I RECs, incentives and tax credits associated with, or arising from, its ownership and operation of the Generation System free and clear of any Buyer liens, security interests, claims and encumbrances or any other Buyer interest. Seller shall be responsible, at its sole cost and expense, for registering and/or claiming, monetizing, selling, trading or otherwise transferring same. Buyer shall use Commercially Reasonable Efforts to assist Seller in obtaining, securing and transferring same provided, however, that Buyer shall not be obligated to incur any out-of-pocket costs or expenses in connection with such efforts unless reimbursed by Seller.

b. Electric Energy Title and Risk of Loss: Title to, and risk of loss related to, the Generation System's Class I Electric Energy shall pass and transfer from Seller to Buyer at the Delivery Point. Seller shall deliver the Class I Electric Energy to Buyer free and clear of all liens, security interests, claims and encumbrances or any other interest therein or thereto by any person arising prior to the Delivery Point.

7. METERING AND MONITORING.

a. The PSE&G-owned bi-directional meter that is currently in place at the Facility (meter number 5320340) shall be used to measure the output of the Generation System, and shall be designated as the "***System Billing Meter.***"

b. The System Billing Meter shall be conclusive as to the amount of Class I Electric Energy generated by the Generation System; provided, however, that Seller shall periodically test the System Billing Meter no less than once every two (2) Contract Years (unless said meter fails to register), and provided, further, that Buyer may request, and Seller will arrange for a meter test to be performed, every other Contract Year (i.e., when no periodic test is scheduled), at Buyer's sole cost and expense. Buyer shall have a right to witness any such meter test and Seller shall provide reasonable advance notice in writing as to the time, date, and location of such testing. If such testing requires removal of the System Billing Meter, any replacement meter shall serve as the System Billing Meter until subsequently replaced.

c. If, as a result of such periodic test, or Buyer requested test, the System Billing Meter is found to be ± two (2) percent inaccurate, Seller shall make a reasonable adjustment in the

form of a credit or debit to the next monthly invoice to reflect and account for the degree, and the period of inaccuracy. Upon presentation of said invoice, Seller shall include a written report to Buyer of its findings, including an explanation of its calculation of the adjustment.

d. If the System Billing Meter is discovered to have failed to register, Seller shall promptly replace said meter, at which time, the replacement meter shall become the System Billing Meter. Seller shall test the failed meter to determine the cause of failure and shall reasonably estimate the period of time during which such failure was in effect. Seller shall reasonably estimate the amount of Class I Electrical Energy delivered during the period of such failure based on historical billing records and shall reflect that estimate in the next monthly invoice together with Seller's written report of its findings, including an explanation of the calculation.

e. Seller shall provide Buyer with access to Seller's Generation System electronic monitoring, together with access codes and use instructions. Such access shall not impose any Generation System operations responsibilities on Buyer or relieve Seller of any of its responsibilities hereunder.

8. GENERATION SYSTEM OPERATION AND MAINTENANCE

a. Seller shall operate and maintain the Generation System in a manner consistent with all Governmental Authorizations, Good Utility Practice, and all Applicable Laws.

b. Buyer shall not interfere with Seller's operation and maintenance of the Generation System and shall expend Commercially Reasonable Efforts to cooperate with Seller regarding Seller's scheduling of operation and maintenance activities, including planned outages for maintenance and unplanned outages due to emergencies or otherwise.

c. Buyer shall ensure that the Generation System remain interconnected to Buyer's electric distribution system at all times and will not cause cessation of electric service to the Facility from the electric utility. Buyer also shall be solely responsible for maintaining in good working order and, when prudent or necessary, repairing all of Buyer's equipment necessary for the interconnection of the Generation System with Buyer's electric distribution system. Buyer shall promptly notify Seller of any matters of which it is aware pertaining to any damage to, or loss of use of, the Buyer's electric distribution system that could reasonably be expected to adversely affect the Generation System.

d. Seller shall not be responsible for any loss, damage, cost or expense arising out of or resulting from improper environmental controls or improper operation or maintenance of the Generation System by anyone other than Seller or Seller's contractors.

9. REPRESENTATIONS AND WARRANTIES.

a. Representations and Warranties of Buyer. Buyer hereby makes the following representations and warranties and covenants to Seller effective as of the Effective Date, all of which have been relied upon by Seller in entering into this Agreement:

i. Formation. Buyer is duly formed and validly existing under the laws of the State of New Jersey.

ii. Authority. Buyer has the power and authority to enter into, deliver and perform this Agreement and the other documents contemplated to be executed and delivered by Buyer in connection with the transactions contemplated hereby (collectively, the "***Buyer Agreement Documents***"). The execution, delivery and performance of the Buyer Agreement Documents by Buyer have been duly and validly approved by Buyer and any and all persons or entities whose approval is necessary to the validity hereof or thereof, and no other action on the part of Buyer is necessary to approve the Buyer Agreement Documents and to consummate the transactions contemplated in the Buyer Agreement Documents, or any of them.

iii. No Violations or Defaults. Neither the execution and delivery of the Buyer Agreement Documents by Buyer nor the consummation by Buyer of the transactions contemplated in the Buyer Agreement Documents, nor compliance by Buyer with the terms and provisions of any one or more of the Buyer Agreement Documents will: (i) violate any provision of the instruments or agreements by which the Buyer is formed and/or governed; or (ii)violate any judgment, order, writ, decree or injunction applicable to Buyer.

iv. Consents and Approvals. Aside from the approval of this Agreement by the New Jersey Board of Public Utilities as discussed in Section 10 of this Agreement, no consents or approvals of, or filings or registrations with any court, administrative agency or commission or other governmental authority or instrumentality or with any other third party by each is necessary in connection with the execution, delivery and performance of this Agreement and the other Buyer Agreement Documents.

b. Representations and Warranties of Seller. Seller hereby makes the following representations and warranties and covenants to Seller effective as of the Effective Date, all of which have been relied upon by Buyer in entering into this Agreement:

i. Formation. Seller is duly formed and validly existing under the laws of the State of Delaware.

ii. Authority. Seller has the power and authority to enter into, deliver and perform this Agreement and the other documents contemplated to be executed and delivered by Seller in connection with the transactions contemplated hereby (collectively, the "***Seller Agreement Documents***"). The execution, delivery and performance of the Seller Agreement Documents by Seller have been duly and validly approved by

Seller and any and all persons or entities whose approval is necessary to the validity hereof or thereof, and no other action on the part of Seller is necessary to approve the Seller Agreement Documents and to consummate the transactions contemplated in the Seller Agreement Documents, or any of them.

iii. No Violations or Defaults. Neither the execution and delivery of the Seller Agreement Documents by Seller nor the consummation by Seller of the transactions contemplated in the Seller Agreement Documents, nor compliance by Grantee with the terms and provisions of any one or more of the Seller Agreement Documents will: (i) violate any provision of the instruments or agreements by which the Seller is formed and/or governed; or (ii) violate any judgment, order, writ, decree or injunction applicable to Seller.

iv. Consents and Approvals. Aside from the approval of this Agreement by the New Jersey Board of Public Utilities as discussed in Section 10 of this Agreement, no consents or approvals of, or filings or registrations with any court, administrative agency or commission or other governmental authority or instrumentality or with any other third party by each is necessary in connection with the execution, delivery and performance of this Agreement and the other Seller Agreement Documents.

c. Legal Proceedings.

i. Neither Seller nor any of its Affiliates is a party to any, and to the knowledge of Seller, there are no pending or threatened legal, administrative, arbitral or other proceedings, claims, actions or governmental or regulatory investigations of any kind or nature whatsoever against it challenging the validity or propriety of this Agreement and/or transactions contemplated in this Agreement; and

ii. To the knowledge of Seller, there is no injunction, writ or governmental order, judgment or similar decree applicable to it which imposes any restrictions on Seller with respect to this Agreement that would materially interfere with construction, operation, maintenance or removal of the Generation System.

iii. Neither Buyer nor any of its Affiliates is a party to any, and to the knowledge of Buyer, there are no pending or threatened legal, administrative, arbitral or other proceedings, claims, actions or governmental or regulatory investigations of any kind or nature whatsoever against it challenging the validity or propriety of this Agreement and/or transactions contemplated in this Agreement; and

iv. To the knowledge of Buyer, there is no injunction, writ or governmental order, judgment or similar decree applicable to it which imposes any restrictions on Buyer with respect to this Agreement that would materially interfere with construction, operation, maintenance or removal of the Generation System.

10. REGULATORY APPROVAL

a. Seller and Buyer each acknowledge and agree that this Agreement must be filed with the BPU for approval.

b. Seller and Buyer each agree that this Agreement will not become legally binding or effective until the BPU issues an order approving this Agreement in a form that is acceptable to both Seller and Buyer.

c. Seller and Buyer each agree to use best efforts to:
   i. file the Agreement with the BPU for approval;
   ii. cooperative with the BPU during the BPU's review of the Agreement;
   iii. provide information requested by the BPU or other parties during the BPU's review of the Agreement; and
   iv. obtain the BPU's approval of the Agreement in a timely manner.

11. FORCE MAJEURE.

a. If either Party's performance under this Agreement (other than the payment any monetary amounts due hereunder) is prevented or delayed, despite such Party's reasonable efforts to perform, by: industry-wide strikes; riots; fires, floods, lightning, rain, earthquake or other casualty; extraordinary wind or other weather events; war, invasion, insurrection or civil commotion; epidemic, pandemic (including COVID-19); unavailability of resources due to national defense priorities; binding orders, actions or inactions of any court or governmental authority which could not have reasonably been anticipated; or any other similar cause beyond its reasonable control and not attributable to its negligence ("***Force Majeure***"); then, provided such Claiming Party provides written notice of the nature of the Force Majeure event (in reasonable detail) to the other Party as promptly after the occurrence thereof as is reasonably practicable, the requirement of performing such obligation shall be postponed by a period equal to the period of time of such delay. Provided, however, that if the Force Majeure results in a delay in performance which exceeds six (6) months, and such non-performance materially and adversely impacts on the other Party, such other Party may terminate this Agreement at any time thereafter but prior to the Claiming Party recommencing performance.

b. Upon such termination for a Force Majeure event, neither Party shall have any liability to the other (other than any such liabilities that have accrued prior to such termination). In the event of termination of this Agreement pursuant to Section 10.a. the Parties shall not be released from any payment or other obligations arising under this Agreement prior to the Force Majeure Event; and (ii) the indemnity obligations under Section 17, and the dispute resolution provisions of Section 16 shall continue to apply notwithstanding the termination of this Agreement.

12. ASSIGNMENT.

a. If Seller, at any time during the Term of this Agreement, decides to sell, lease or otherwise transfer ownership of the Generation System, or any part of the Generation System to any other party, Seller shall promptly notify Purchase in writing ninety (90) days prior to the closing of such sale, lease or transfer. Notwithstanding any other provision of this Agreement to the contrary, Seller may assign its rights, duties, and obligations to such purchaser; provided, however, that Seller presents evidence reasonably acceptable to the Buyer of such purchaser's intention to accept such assignment and to be bound by this Agreement and to assume Seller's duties and obligations herein.

13. SELLER DEFAULT AND BUYER REMEDIES.

a. Seller shall be in default of this Agreement if any of the following shall occur:

i. Seller fails to operate the Generation System in accordance with the Good Utility Practice and such failure continues for thirty (30) days (or such longer period as may reasonably be required to cure such failure or omission (not to exceed an additional sixty (60) days), provided that cure has commenced within such thirty (30) days and Seller is diligently proceeding to complete such cure after written notice from Buyer to Seller.

ii. Seller fails to operate the Generation System and thereby fails to deliver Class I Electric Energy produced by the Generation System to Buyer as required by this Agreement, for a period of [ninety (90)] consecutive days or for a total of one hundred and eighty (180) days, in each case, during a Contract Year, which failure is not due to an act of Governmental Authority, or related to a Force Majeure Event, or during a Scheduled Maintenance Period, or due to a Forced Facility Outage.

iii. Seller fails to perform any obligation hereunder, such failure is material, such failure is not excused by the provisions relating to the occurrence of a Force Majeure Event, and such failure is not cured within thirty (30) day after receipt of notice from Buyer identifying the failure.

iv. Seller becomes insolvent or makes a general assignment for the benefit of creditors or offers a settlement to creditors, or if a petition in bankruptcy or for reorganization or for an arrangement with creditors under any federal or state law is filed by or against Seller, or a bill in equity or other proceeding for the appointment of a receiver for any of Seller's assets is commenced, or if the Generation System shall be levied upon.

v. Seller consolidates or amalgamates with, or merges with or into, or transfers all or substantially all of its assets to, another entity and, at the time of such consolidation, amalgamation, merger or transfer, the resulting, surviving or

transferee entity fails to assume all the obligations of Seller under this Agreement to which it or its predecessor was a party by operation of law or pursuant to an agreement reasonably satisfactory to Buyer.

vi. Seller takes any action authorizing its dissolution.

b. If Seller is in default under the terms of this Agreement, Seller shall have thirty (30) days after receipt of written notice to cure such default (or such longer period as may reasonably be required to cure such failure or omission (not to exceed an additional sixty (60) days), provided that cure has commenced within such thirty (30) days and Seller is diligently proceeding to complete such cure). A failure to cure shall result in the termination of this Agreement and Buyer may pursue its legal remedies.

14. <u>BUYER DEFAULT AND SELLER REMEDIES</u>.

a. Buyer shall be in default of this Agreement if any of the following shall occur:

i. Except as otherwise permitted herein, Buyer fails to take or pay for Class I Electric Energy produced by the Generation System and delivered to the Delivery Point, and fails to correct such action within ten (10) days after receipt of notice thereof from Seller.

ii. Buyer fails to perform any obligation hereunder, such failure is material, such failure is not excused by the provisions relating to the occurrence of a Force Majeure Event, and such failure is not cured within thirty (30) day after receipt of notice from Seller identifying the failure.

iii. Buyer becomes insolvent or makes a general assignment for the benefit of creditors or offers a settlement to creditors, or if a petition in bankruptcy or for reorganization or for an arrangement with creditors under any federal or state law is filed by or against Buyer, or a bill in equity or other proceeding for the appointment of a receiver for any of Buyer's assets is commenced, or if the Buyer's Property shall be levied upon.

iv. Buyer consolidates or amalgamates with, or merges with or into, or transfers all or substantially all of its assets to, another entity and, at the time of such consolidation, amalgamation, merger or transfer, the resulting, surviving or transferee entity fails to assume all the obligations of Buyer under this Agreement to which it or its predecessor was a party by operation of law or pursuant to an agreement reasonably satisfactory to Seller.

v. Buyer takes any action authorizing its dissolution.

b. If a Buyer Default described in Section 14.a. has occurred and is continuing, in addition to other remedies expressly provided herein, and subject to Section 15, Seller may terminate this Agreement and upon such termination, Seller shall be entitled to receive

from Buyer any and all other amounts previously accrued under this Agreement and then owed by Buyer to Seller, and Seller may pursue its legal remedies.

15. LIMITATIONS OF LIABILITY.

a. THE PARTIES AGREE THAT THE OBLIGOR'S LIABILITY SHALL BE LIMITED TO DIRECT ACTUAL DAMAGES ONLY, SUCH DIRECT ACTUAL DAMAGES SHALL BE THE SOLE AND EXCLUSIVE DAMAGES. UNLESS EXPRESSLY HEREIN PROVIDED, NEITHER PARTY SHALL BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL, PUNITIVE, EXEMPLARY OR INDIRECT DAMAGES, LOST PROFITS OR OTHER BUSINESS INTERRUPTION DAMAGES, BY STATUTE, IN TORT OR CONTRACT OR OTHERWISE. TO THE EXTENT ANY DAMAGES REQUIRED TO BE PAID HEREUNDER ARE LIQUIDATED, THE PARTIES ACKNOWLEDGE THAT THE DAMAGES ARE DIFFICULT OR IMPOSSIBLE TO DETERMINE, OR OTHERWISE OBTAINING AN ADEQUATE REMEDY IS INCONVENIENT AND THE DAMAGES CALCULATED HEREUNDER CONSTITUTE A REASONABLE APPROXIMATION OF THE HARM OR LOSS.

b. NOTWITHSTANDING THE FOREGOING, SELLER SHALL REMAIN LIABLE, WITHOUT MONETARY LIMITATION, FOR DIRECT DAMAGES FOR PERSONAL INJURY, DEATH OR DAMAGE TO REAL PROPERTY OR TANGIBLE PERSONAL PROPERTY ATTRIBUTABLE TO THE NEGLIGENCE OR OTHER TORT OF THE SELLER, ITS OFFICERS, EMPLOYEES OR AGENTS.

c. NOTWITHSTANDING THE FOREGOING, BUYER SHALL REMAIN LIABLE, WITHOUT MONETARY LIMITATION, FOR DIRECT DAMAGES FOR PERSONAL INJURY, DEATH OR DAMAGE TO REAL PROPERTY OR TANGIBLE PERSONAL PROPERTY ATTRIBUTABLE TO THE NEGLIGENCE OR OTHER TORT OF THE BUYER, ITS OFFICERS, EMPLOYEES OR AGENTS.

16. DISPUTE RESOLUTION.

a. The Parties shall negotiate in good faith and attempt to resolve any dispute, controversy or claim arising out of or relating to this Agreement or the breach, interpretation, termination or validity thereof (a "**Dispute**") within thirty (30) days after the date that a Party gives written notice of such Dispute to the other Party. If, despite the Parties' good faith negotiations, the Parties are unable to reach agreement within such thirty (30) day period (or such longer period as the Parties may agree) then either Party may bring suit in any state or federal court of competent jurisdiction sitting in the State of New Jersey.

b. BUYER AND SELLER WAIVE, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, THEIR RESPECTIVE RIGHT TO A JURY TRIAL WITH REGARD TO ANY DISPUTE ARISING IN CONNECTION WITH THIS AGREEMENT.

c. Attorneys' Fees. In the event of any Dispute, the successful Party shall be entitled to recover (as part of damages or arbitration award) all costs and reasonable legal fees spent by the successful Party in pursuing its claim.

17. INDEMNIFICATION.

a. **Seller Indemnification.** Seller shall indemnify, defend and hold Buyer and its directors, officers, employees, agents, volunteers, and invitees ("***Buyer's Indemnified Parties***"), harmless from and against all Losses (as defined below) incurred by the Buyer Indemnified Parties to the extent arising from or out of the following: (i) any claim for or arising out of any injury to or death of any person or loss or damage to property to the extent arising out of Seller's, or Seller's Indemnified Parties' (defined below) negligence or willful misconduct or breach of this Agreement; (ii) Seller's or Seller's Indemnified Parties' violation of Applicable Law; (iii) any failure to properly operate and maintain the Generation System, or its interconnection with, or to comply with the procedures and other requirements of the Buyer or the orders of Governmental Authorities pertaining to the Generation System or Applicable Law; or (iv) any failure to properly handle or dispose of any hazardous materials brought onto the Property by Seller or by any of Seller's Indemnified Parties.

Such duty to indemnify with respect to any injuries to, or death of, any person, or loss or damage to property arising from the Seller's generation of Class I Electric Energy from the Generation System shall not extend to Losses associated with the use or presence of Class I Electric Energy on Buyer's side of the Delivery Point except to the extent caused by Seller's or Seller's Indemnified Parties' acts or omissions on Seller's side of the Delivery Point. Such duty to indemnify shall not apply to any action or claim, whether in tort (including negligence and strict liability), contract or otherwise for any loss, injury, or costs resulting from interruptions in electric service except to the extent caused by Seller's or Seller's Indemnified Parties' acts or omissions in operating the Generation System, including, but not limited to the failure to deploy appropriate or to properly maintain protective devices at the Delivery Point. Seller shall not be obligated to indemnify Buyer or any Buyer Indemnified Party for any Loss to the extent such Loss is due to the negligence or willful misconduct of Buyer or any Buyer Indemnified Party. "***Loss" or "Losses***" means any and all losses, liabilities, claims, demands, suits, causes of action, judgments, awards, damages, cleanup and remedial obligations, interest, fines, fees, penalties, costs, and expenses (including all attorney's fees and other costs and expenses incurred in defending any such claims or matters or in asserting or enforcing any indemnity obligation).

b. **Buyer Indemnification.** Buyer shall indemnify, defend and hold Seller, its contractors, subcontractors, shareholders, directors, officers, employees, agents, and invitees, and financing party ("***Seller's Indemnified Parties***"), harmless from and against all Losses incurred by the Seller's Indemnified Parties to the extent arising from or out of (i) any claim for or injury to or death of any person or loss or damage to property to the extent arising out of the negligence or willful misconduct of any of Buyer's Indemnified Parties; or (ii) Buyer's violation of Applicable Law; or (iii) the presence, removal or remediation

of any hazardous materials on the Property (other than any hazardous materials brought on to the Property by Seller's Indemnified Parties). Buyer shall not be obligated to indemnify Seller or any Seller Indemnified Party for any Loss to the extent such Loss is due to the negligence or willful misconduct of Seller or any Seller Indemnified Party.

c. **Notice of Claims.** Whenever any claim arises for indemnification under this Agreement, the Indemnified person shall notify the Indemnifying Party in writing as soon as possible (but in any event prior to the time by which the interest of the Indemnifying Party will be materially prejudiced as a result of its failure to have received such notice) after the Indemnified person has knowledge of the facts constituting the basis for such claim (the "***Notice of Claim***"). Such Notice of Claim shall specify all facts known to the Indemnified person giving rise to the indemnification right herein and the amount or an assessment of the amount of the liability arising therefrom.

d. **Defense of Claims.** The Indemnifying Party has the right, but not the obligation to assume the defense of the matter for which indemnification is sought hereunder. If the Indemnifying Party does not assume the defense, it shall timely pay all costs of counsel and case expenses incurred by Indemnified person in connection with the defense, when and as incurred. If the Indemnifying Party assumes the defense, the Indemnified person has the right to hire its own counsel to defend it, but the Indemnified person shall be responsible for the reasonable costs of such counsel. The Indemnifying Party shall not consent to the entry of any judgment or enter into any settlement with respect to the matter for which indemnification is sought without the prior written consent of the Indemnified person (which consent shall not be unreasonably withheld) unless the judgment or settlement involves the payment of money damages only and does not require the acknowledgement of the validity of any claim.

e. **Payments.** At the time that the Indemnifying Party makes any indemnity payments under this Agreement, the indemnification payment shall be adjusted such that the payment will result in the Indemnified person receiving an indemnity payment equal to the Loss after taking into account (i) all federal, state, and local income taxes that are actually payable to the Indemnified person with respect to the receipt of such payment and (ii) all national, state, and local tax deductions allowable to the Indemnified person for any items of loss and deduction for which the Indemnified Party is being indemnified.

f. **Survival of Indemnification.** The obligations of indemnification hereunder shall survive termination of this Agreement.

18. <u>INSURANCE</u>.

a. **Seller and Buyer shall each maintain in effect throughout the Term of the Agreement the following minimum coverages:**

1. Workers' Compensation insurance in accordance with statutory limits, as required by the State of New Jersey, and Employer's Liability insurance with limits of not less than one million dollars ($1,000,000) per occurrence.

2. Commercial General Liability insurance (occurrence form) providing coverage for premises, bodily injury, property damage, personal injury, advertising liability, blanket contractual liability covering each Party's obligations under this Agreement, coverage for independent contractors and broad form property damage coverage with limits of not less than one million dollars ($1,000,000) for each occurrence with an annual aggregate of three million dollars ($2,000,000).

3. Commercial Automobile Liability insurance providing coverage for all owned, non-owned, and hired automobiles used by each Party in the connection with activity under this Agreement with a combined single limit of not less than one million dollars ($1,000,000) for each occurrence of bodily injury and property damage.

4. Excess or Umbrella Liability insurance with a limit of not less than five million dollars ($5,000,000) for each occurrence with an annual aggregate of five million dollars ($5,000,000). This limit applies in excess of each of the coverages set forth above in paragraphs 1.a (Employer's Liability), 1.b (Commercial General Liability insurance) and 1.c (Commercial Automobile Liability insurance), which are scheduled as primary.

5. Pollution/Environmental Liability insurance with a minimum limit of five million dollars ($5,000,000) each occurrence where the work involves or includes contractor handling, transporting, disposing, or performing work or operations with hazardous substances, contaminates, waste, toxic materials, or any potential pollutants.

b. **Additional Insurance**. Buyer and Seller shall also acquire and maintain any additional insurance that may be required from time to time by any legal or regulatory authority affecting the premises or operation of the Generation System.

c. **Insurance Certificates.** Each Party shall furnish current certificates, or other evidence of insurance (including self-insurance, to the extent applicable), indicating that the insurance coverages required under this Section 18 are being maintained. Each Party's insurance policy provided hereunder shall contain a provision whereby the insurer agrees to give the other Party written notice before the insurance is cancelled or materially altered.

19. <u>SURVIVAL OF OBLIGATIONS</u>.

a. Termination of this Agreement for any reason shall not relieve Buyer or Seller of any obligation accruing or arising prior to such termination.

20. MISCELLANEOUS.

a. Notices. The address of each Party hereto for all notices required or permitted to be given hereunder shall be as follows, or such other address of which the other Party has received notice:

If to Seller:

Trenton Renewable Power, LLC
1600 Lamberton Road
Trenton, NJ 08611
Attn: _____
Telephone: ___-___-____
Email: _____

With a copy to:

[_____]
[_____]
[_____]
Attention: [_____]
Telephone: [(___) _____]
Email: [_____]

If to Buyer:

Public Service Electric and Gas Company
80 Park Plaza
Newark, NJ 07102
Attention: _____
Telephone: ___-___-____
Email: _____

with a copy to:

[_____]
[_____]
[_____]
Attention: [_____]
Telephone: [(___) _____]
Email: [_____]

All notices shall be in writing, and may be delivered by any of the following methods, with all delivery charges and/or postage pre-paid: personal delivery (including delivery by private courier services), reputable overnight courier service (*i.e.*, Federal Express, UPS, DHL), United States first class certified mail with return-receipt requested, or email transmission.

Any notice personally delivered shall be deemed to have been validly and effectively given on the date of such delivery, unless such date shall not be a business day, in which case such delivery shall be deemed to have been validly and effectively given on the next succeeding business day. Any notice transmitted by email shall be deemed to have been validly and effectively given on the date on which it is transmitted, provided that it is received during normal business hours (*i.e.*, between 9:00 a.m. and 5:00 p.m. local time of the recipient), and otherwise on the next succeeding business day. Any notice sent by reputable overnight courier or by United States first class certified mail shall be deemed to have been validly and effectively given on the date of the receipt for delivery thereof.

b. Estoppel Certificate. Seller and Buyer shall at any time upon not less than ten (10) business days' prior written notice from the other Party hereto execute, acknowledge and deliver a statement in writing to the requesting Party's designee certifying that this Agreement is unmodified and in full force and effect (or, if modified, stating the nature of such modification and certifying that this Agreement, as so modified, is in full force and effect) and specifying such other matters as the requesting Party may reasonably request.

c. Conventions of Construction. In addition to the specific definitions set forth herein, the following conventions shall apply. Wherever the word "including" appears, it shall be deemed to be followed by the words "without limitation". All reference to "days" shall mean calendar days unless business days (weekdays, excluding national holidays) are specifically referenced, but if the last day of any referenced period of days shall fall on a day that is not a business day, the expiration of the period shall be extended to the next business day. All references to a "Section" shall mean a Section in this Agreement. As the context requires, words used in the singular form shall include the plural and words used in the plural shall include the singular.

d. Further Documents. Each Party agrees to perform such further acts and execute such further documents as may be necessary or appropriate to carry out the expressed intents and purposes of this Agreement.

e. Severance Clause. If any term or provision of the Agreement, or the application thereof to any person or circumstance shall, to any extent, be determined by judicial order or decision to be invalid or unenforceable, the remainder of this Agreement or the application of such term or provision to persons or circumstances other than those as to which it is held to be invalid or unenforceable shall not be affected thereby, and each term and provision of this Agreement shall be valid and shall be enforced to the fullest extent permitted by law consistent with the intent of the Parties and their respective bargains as reflected in this Agreement.

f. Entire Agreement. This Agreement contains all agreements of the Parties with respect to the subject matter hereof. No prior agreement or understanding pertaining to any such matter shall be effective. This Agreement may be modified only by a writing signed by all Parties.

g. Waiver. No waiver by a Party of any provision hereof shall be deemed a waiver of any other provision hereof or of any subsequent breach of the same or any other provision. A Party's consent to or approval of any act shall not be deemed to render unnecessary the obtaining of such Party's consent to or approval of any subsequent act.

h. Cumulative Remedies. No remedy or election hereunder shall be deemed exclusive but shall, whenever possible, be cumulative with all other remedies in law or equity.

i. Binding Effect. This Agreement shall bind the Parties, their personal representatives, successors and permitted assigns.

j. Execution in Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be deemed to be an original and all of which shall be deemed to be one and the same instrument. Electronically delivered signatures shall be enforceable as original signatures. The parties agree to accept a digital image of this Agreement and all amendments hereto, as executed, as true and correct originals and admissible as best evidence for purposes of State law, Federal Rule of Evidence 1002, and like statutes and regulations.

k. Resolution of Drafting Ambiguities. Each Party hereto acknowledges that it was represented by counsel in connection with the preparation, execution and delivery of this Agreement and that such Party's counsel reviewed and participated in the revision of this Agreement and all exhibits hereto and that any rule of construction under the laws of the State of New Jersey to the effect that ambiguities are to be resolved against the drafting Party shall not be employed in the interpretation of any of the provisions of this Agreement.

l. Exhibits. The Recitals at the head of this Agreement and any Exhibits and Schedules attached to this Agreement, including all amendments and supplements thereto, are incorporated into and made a part of this Agreement by reference as if fully set forth in this Agreement.

m. Captions. The headings to the Sections of this Agreement have been inserted solely for convenience of reference and shall not modify, define or limit the express provisions of this Agreement.

n. No Joint-Venture or Partnership. Nothing contained in this Agreement shall be deemed or construed to create or constitute a partnership, joint venture, or other co-ownership by and between the Parties as to the rights, duties and obligations of the Parties hereunder. The respective obligations of each Party shall be construed as separate and independent obligations of each respective Party, and shall be deemed several, and not joint.

o. Governing Law and Waiver of Jury Trial. This Agreement shall be construed and enforced in accordance with and governed by the internal laws (and not the conflicts law) of the State of New Jersey. Each Party waives any rights they may have to a jury trial of any claim or cause of action based on or arising from this Agreement, any transaction contemplated thereby or effected pursuant to, any dealing or cause of business between or among themselves relating in any way to the subject matter of this Agreement, or any statement or action of any of them or their Affiliates. The scope of this waiver is intended to be all-encompassing, and this waiver shall apply to all Disputes of any nature whatsoever, whether deriving from contract, arising by law, based on tort or otherwise. **EACH PARTY HAS MADE THIS WAIVER KNOWINGLY AND VOLUNTARILY AND THIS WAIVER IS IRREVOCABLE. THIS WAIVER SHALL ALSO APPLY TO ALL**

AMENDMENTS, SUPPLEMENTS, RESTATEMENTS, EXTENSIONS AND MODIFICATIONS OF THIS AGREEMENT AFTER THE EFFECTIVE DATE OF THIS AGREEMENT.

p. Confidentiality. Buyer shall maintain in the strictest confidence, for the sole benefit of Seller, all information pertaining to the financial terms of or payments under this Agreement, Seller's site or product design, methods of operation, methods of construction, power production or availability of the Generation System, and the like, whether disclosed by Seller or discovered by Buyer, unless such information (i) is in the public domain by reason of prior publication through no act or omission of Buyer or its employees or agents, (ii) was already known to Buyer, at the time of disclosure and which Buyer is free to use or disclose without breach of any obligation to any person or entity, or (iii) required pursuant to any law, code or ordinance or the rules of any governmental or quasi-governmental entity (including, without limitation, disclosures required by the Securities and Exchange Commission), or (iv) otherwise compelled by legal process (provided Buyer shall provide notice thereof to Seller promptly after receipt of notice of such). Buyer shall not use such information for its own benefit, publish or otherwise disclose it to others, or permit its use by others for their benefit or to the detriment of Seller. Notwithstanding the foregoing, Buyer may provide information as required or appropriate to attorneys, accountants, lenders, potential lenders, investors, potential investors, or third parties who may be assisting Buyer or with whom Buyer may be negotiating in connection with the Property, Buyer's financial or other planning, or as may be necessary to enforce this Agreement. The Parties shall cooperate with each other to permit mutually agreed publicity concerning the Project and the role of the Parties in connection therewith.

IN WITNESS WHEREOF, intending to be legally bound hereby, Seller and Buyer have duly executed this Power Purchase Agreement as of the date set forth below.

[Signature Page Follows]

SELLER:

TRENTON RENEWABLE POWER, LLC

By: _____

_____
[TITLE]

Date: _____

BUYER:

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

By: _____

_____
[TITLE]

Date: _____

Exhibit A

Delivery Point

[graphic to be provided]

Exhibit B: Energy Rates

The rates paid during the term of this Agreement are as follows:

Year	Energy Rate in $/kWh
1	0.20
2	0.20
3	0.20
4	0.20
5	0.20
6	0.20
7	0.20
8	0.20
9	0.20
10	0.20