Appendix A

The City of Albany, NY
Capital Region Solid Waste Management Plan
Evaluation of Municipal Solid Waste Technologies

REQUEST FOR INFORMATION

I. INTRODUCTION

The City of Albany, New York is preparing a New Long-Term Solid Waste Management Plan (SWMP) for the Capital Region Solid Waste Management Partnership Planning Unit (the Planning Unit). This new SWMP will define the key elements of the future solid waste management program for the Planning Unit, for the period through the year 2030.

The Capital Region Partnership Planning Unit operates as an informal consortium of 13 municipalities with a jurisdiction of approximately 450 square miles in the Albany, New York region. Planning Unit participants currently include 3 cities, 7 towns, and 3 villages located in Albany and Rensselaer Counties. The City of Albany acts as the lead participant. The total population of Planning Unit communities is approximately 220,000 persons.

The City of Albany presently operates the Rapp Road landfill facility, which accepts waste from the Planning Unit communities and other local sources. During the year 2007, the Rapp Road landfill accepted approximately 253,300 tons of waste for disposal. The vast majority of this waste (97%) is characterized as Municipal Solid Waste (MSW). The Rapp Road landfill accepts some waste from communities located outside of the Planning Unit, and some waste from the Planning Unit is disposed of at other facilities. Net waste disposal from the Planning Unit in 2007 is estimated at approximately 238,100 tons. Another 118,500 tons of waste material were reported recycled in the Planning Unit in 2007, yielding an overall diversion rate of 33%.

The City of Albany and the member municipalities operate mandatory source separation and recycling programs for a variety of mixed paper streams, for commingled bottles, cans and plastic containers (Nos. 1&2), and yard waste, among other materials. The implementation of the most recent SWMP Modification will result in the expansion of local recycling programs across all sectors (residential, commercial, institutional and industrial) beyond these current levels. If the 47% reduction and recycling goal contained in the most recent SWMP Modification is achieved, estimated net disposal requirements in the year 2011 will be reduced to 227,000 tons per year.

For purposes of this RFI, this should be considered the baseline waste quantity. No detailed data are currently available on the quality of the post-recyclable waste that is delivered for disposal, so for purposes of this RFI, responders should assume that MSW quality is as per recent estimates available from the United States Environmental Protection Agency.

Assuming the approval of a pending expansion application, the Rapp Road Landfill will near its full capacity during the year 2016. As part of the New SWMP process, the City of Albany is

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identifying and evaluating solid waste management technologies that could potentially reduce the amount of solid waste requiring landfill disposal. The evaluation will consider both established and emerging technologies for possible inclusion in the region's long-term solid waste program.

This Request for Information (RFI) is being distributed to solicit preliminary statements of interest and background information from parties wishing to participate in the evaluation process. Interested parties are invited to provide basic information regarding their sponsored technologies, including measures of actual or anticipated performance in each of the following categories of criteria:

- Experience of Project Sponsors
- Facility Sizing
- Costs of Ownership and Operation
- Environmental Impacts
- Readiness and Reliability
- Beneficial Reuse of MSW Byproducts
- Residues Requiring Landfill Disposal

Section II of the RFI specifies the information requested for this evaluation.

Responses to the RFI will be compiled, and the suitability of technologies for further consideration will be evaluated within the context of the Planning Unit's future needs and priorities. The current solicitation marks a preliminary measure in the ongoing process of SWMP preparation. Should the Planning Unit decide to pursue a more detailed evaluation of solid waste technologies, parties identified as potentially suited to contribute to the Planning Unit's future solid waste management program may be invited to participate in further discourse. Advanced levels of evaluation may include the solicitation of detailed technical documentation and verifiable statements of qualification from technology sponsors, to be evaluated at a more resolute level of detail for possible implementation.

Actual implementation of a facility and/or technology, if any, by or on behalf of the City or the Planning Unit, would be conducted under a formal procurement process, pursuant to the requirements of applicable law.

II. RESPONSE REQUIREMENTS

Potential project sponsors shall provide a statement of interest describing their desire and qualification to participate in the evaluation of solid waste management technologies for the Capital Region Solid Waste Management Partnership Planning Unit's New SWMP. Responses to this RFI must address each component of the following criteria.

Experience of Project Sponsors

Provide background information on the project sponsor, including:

- Name, address and contact information for the Company;
- Type of company and brief history;
- Management team including brief biographies of key personnel;
- Qualifications and experience with similar projects;
- Brief description of the proprietary technology owned by or licensed to the company that is proposed for consideration.

If the sponsor has experience with reference facilities similar to one that may be appropriate for the Planning Unit, please provide background information for those existing facilities which have been constructed and/or operated under the sponsorship of your party. For each reference facility, provide the following information:

- Location;
- Date of facility's commencement of operations;
- Type(s) of feedstock and average daily throughput (tpd);
- Initial capital cost in U.S. dollars, including the costs of planning, design, construction, materials and machinery;
- Current cost of operations in U.S. dollars per ton of material processed including the costs of labor, equipment and facility maintenance, residue disposal, and other costs associated with routine facility operations on an annual basis;
- Current tipping fee (in U.S. dollars per ton) for contractually committed waste deliveries from sponsoring or host municipality, if applicable;
- Quantity (tpd) and composition of residuals requiring landfill disposal.

Potential project sponsors who do not own or operate reference facilities should provide comparable information about their proposed technology, along with the specific basis of the information (i.e. operating histories, pending proposal, etc.)

Facility Sizing

Potential project sponsors should provide information related to facility sizing. Potential sponsors may propose a facility sized to accommodate all or a portion of the baseline waste quantity (227,000 tpy) . Because the New SWMP process will also involve assessing the potential expansion of the Planning Unit to include other communities in the region, potential

sponsors are asked to provide information regarding the size of a larger facility or an optimally-sized facility.

The following information should be provided regarding the anticipated characteristics of a proposed facility designed to serve the Planning Unit.

- Types of feedstock (MSW, C&D, etc);
- Unacceptable wastes;
- Annual processing capacity (tpy) and average daily throughput (tpd);
- Site acreage required to support a proposed facility;
- Alternate size for larger or optimally-sized facility (tpy and tpd);
- Minimum feasible facility size (tpy and tpd).

Costs of Ownership and Operation

Recognizing that these are planning level estimates, potential project sponsors should provide anticipated cost information regarding a facility designed and constructed to serve the Planning Unit.

- Initial capital cost in U.S. dollars, including the costs of planning, design, construction, materials and machinery;
- If applicable, alternative capital cost estimates for optimally-sized and minimum sized facilities;
- Estimated cost of operations in U.S. dollars per ton of material processed;including the costs of labor, equipment and facility maintenance, residue disposal, and other costs associated with routine facility operations on an annual basis;
- If applicable, the net value of any energy or material recovery resulting from the process, in U.S. dollars per ton of material processed.

Environmental Impacts

Please characterize, and quantify to the degree possible, the anticipated environmental impacts of a facility designed to serve the Planning Unit.

- *Air Emissions- provide a summary description of process air emissions and controls, including:*
  - Anticipated greenhouse gas emissions (tpy of CO2 equivalent) resulting from MSW processing and/or associated energy generation
  - Anticipated emissions of Criteria Pollutants (tpy)
  - Air pollution control equipment and odor control

- *Water – provide a summary description of process water use and wastewater discharges, including:*
  - Process water consumption (gpd)
  - Wastewater discharge (gpd)
  - Wastewater pre-treatment requirements

- *Utility Requirements – provide a summary description of the utility consumption necessary to sustain facility operations, including:*
    - Anticipated gross and net electrical consumption (kWh per ton of MSW)
    - Natural gas requirements
    - Other types of fuel and anticipated consumption (in units per ton of MSW)

Readiness and Reliability

- Please describe the status of your sponsored technology in terms of its maturity and readiness for commercial implementation, as well as its suitability for permitting in the State of New York;
- Describe how construction and operational performance guarantees would be provided;
- Describe the timeframes necessary for each of the following:
    - Facility Design
    - Facility "permitting"
    - Facility construction
    - Start-up and Acceptance Testing
    - Total time from Facility Design through Acceptance Testing

Beneficial Reuse of MSW Byproducts

- If applicable, quantify the gross and net generation of energy (in kWh or other appropriate measure per ton of waste processed) anticipated from the processing of waste at a facility designed to serve the Planning Unit.
- Describe the composition and quantify the production of marketable solid or gaseous byproducts generated as outputs of a facility designed to serve the Planning Unit. Responses should be expressed in units per ton of waste processed.

Residue Requiring Landfill Disposal

Briefly describe any solid residue from the process which might require landfill disposal, including:

- The anticipated percentage (by weight of incoming waste processed) of solid residue requiring land disposal;
- Anticipated hazardous waste characterization as per TCLP or other applicable procedure:
- Potential beneficial uses of solid residue.

III. SUBMITTAL OF RESPONSES

Due Date

One copy of each submittal should be received by CHA, III Winners Circle, Albany NY ***no later than 4:30 p.m. Eastern Time on Friday, March 27, 2009***. Responses may be submitted via standard or overnight mail, or by hand in accordance with the time and date noted. Responses should be addressed to:

Ms. Suzanne Christopher
CHA
III Winners Circle
Albany, NY 12205-0269

Questions or comments should be submitted in written format to Ms. Suzanne Christopher at schristopher@chacompanies.com .

Company Name: Bigold Fuels Corporation
Technology Category: Front-End Sterilization, Gasification

BioGold Fuels Corporation is a Nevada corporation based in New York City, and was formed as a result of a merger with Full Circle Industries, Inc. in April 2007, and became a publicly traded company in October 2007.

The BioGold process takes place entirely within its building. MSW is unloaded from trucks and conveyed to a sterilizer where it is sterilized, reduced in size, and mechanically sorted to remove recyclable metals and other inorganic material from the organic fraction of the waste. The sterilized organic and energy-containing materials are then fed into a thermo-chemical gasifier, where they are transformed at high temperature into compounds that produce a syngas composed mostly of hydrogen and carbon monoxide. Remaining solid residue can be vitrified into a glass-like solid that can be used for various construction applications.

Syngas can be used to generate electricity using commercial electricity-generating equipment, or converted to a biofuel using a standard gas-to-liquid catalytic process. BioGold would build infrastructure to generate both electricity and transportation biofuels, and would shift production according to the relative market value of these commodities.

Biogold responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects:
BioGold has "successfully implemented the front-end processing aspect of its technology using MSW to create a marketable recycled long-fiber product sold for liner-board manufacture". To date, the company has not constructed or operated a MSW processing facility.

Facility Sizing
Types of feedstock: MSW; can also accommodate certain specialty waste streams such as dewatered sewage sludge and other organic waste streams.
Unacceptable wastes: Information not provided.
Proposed processing capacity to serve Planning Unit: BioGold would propose a facility to accommodate 290,000 tpy with an expected average throughput of 880 tpd. The facility would operate 24 hours/day, 7 days/week and waste acceptance would be tailored to local needs.
Site requirements: Approximately 20 acres.
Alternate size for larger or optimally-sized facility: A larger facility could be designed if market analysis indicates a need. Additional sterilizing units could be deployed at satellite locations, with the sterilized processed waste being delivered to the main facility.
Minimum feasible facility size: 300 tpd (100,000 tpy).

Costs of Ownership and Operation

Initial capital cost: Approximately $230 million or $261,364/tpd of installed capacity.
Operating cost: $83.55/ton; includes costs of labor, equipment and facility maintenance, residue disposal, and other routine annual costs. Excludes debt service.
Tipping fee: Information not provided.
Electric revenues: Based on the information provided by BioGold, CHA calculates estimated electrical revenues of $24.50/ton at a price of $0.07/kWh.

Environmental Impacts
Greenhouse gas emissions: Information not provided.
Criteria pollutant emissions: Information not provided.
Air pollution control equipment and odor control: The sterilization process eliminates odors, and all processing is contained within a negative-pressure building. Gasification process emissions are entirely captured in the syngas, which is processed to neutralize any remaining pollutants. Air emissions from the catalytic production of biofuels are captured and processed through the gasifier, where they are broken down and rendered inert. Air emissions from electric generation are less than those from other similarly sized generation facilities; standard controls and exhaust treatment are applied.
Process water consumption: Volume of water consumption not provided. The sterilization process yields water as 10-15% of the feedstock by weight is purged as excess water. This purged water is treated and reintroduced as a reagent. Net result is "small" water usage.
Wastewater discharge: Volume of wastewater discharge is not provided. Purged water is treated and recycled in the process.
Electrical consumption: 612 MWh/day generated; 334 MWh/day consumed; net generation of 278 MWh/day or 350 kWh/ton. Alternatively, 47,790 gpd of ethanol produced.
Natural gas requirements: 500,000,000 scf/annum or 1,724 scf/ton.

Readiness and Reliability
Maturity and suitability for permitting: The facility would combine commercially proven technologies that are ready for implementation on the scale required for the Planning Unit. Anticipated to meet all NYS permitting and approval requirements.
Construction and performance guarantees: To be provided under a standard engineering/procurement/construction (EPC) arrangement. Process efficacy insurance will likely be required by financial backers. BioGold will incorporate storage technology and space for prepared materials, for use in the event of short-term outages of the gasification units. The company would enter into arrangements for alternate use, sale or disposal of the prepared sterilized material in the event of an extended outage of the gasification units, and for alternate disposal of MSW in the event of an extended outage of the sterilizer units.
Timeframes:

Facility design: 6 months
Facility "permitting": 1 year
Facility construction: 7 months
Start-up and acceptance testing: 2 months
Total timeframe: 2 ½ years.

Beneficial Reuse of MSW Byproducts

Energy generation: Syngas can be used to produce a net 278 MW/day of electricity or up to 86 gallons of second generation ethanol per dry ton of sterilized processed waste. Based on the information provided by BioGold, CHA calculates a net electrical output of 350 kWh/ton of waste processed.

Solid or gaseous byproducts: Recyclable materials recovered by the separation process would be sold to market. Remaining solid residue material is stabilized through a vitrification process and can be used as an aggregate material.

Residue Requiring Landfill Disposal

Percent residue requiring landfill disposal: Maximum 7% to 15% of the MSW waste stream.

Anticipated hazardous waste characterization: Residual material is inert. No characterization or testing information provided.

Company Name: Carbon Diversion, Inc.
Technology Category: Pyrolysis/Gasification

Carbon Diversion Inc. is a Hawaiian corporation that was formed in 2004. CDI creates small-scale systems that can process MSW to generate electricity and bio-char products. The company identifies a pilot plant and two commercial facilities, located in Hawaii and Tennessee. CDI will break ground on the first of three planned manufacturing facilities in April 2009, which will allow the company to produce and deliver its systems.

Incoming waste, including tires, animal waste and green waste, is pre-processed (briquetted) and fed into the processors. A pressurized partial pyrolysis gasification process is used to produce a liquid fuel and syngas, which are used to generate electricity. Bio-char can be used for water filtration or as a soil amendment. Units can be remote-started by local power providers, and can be used for emergency power generation if provided access to natural gas utilities.

CDI responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: CDI has built a pilot plant at Campbell Industrial Park in Hawaii. The plant consists of three 1-ton processors, and the main product is a petroleum product in the kerosene range.

A second system is located in Dunlop, Tennessee as part of a sustainable community development, and consists of two 3.5 ton/hr. units. The Dunlop facility is designed to operate 10 hours/day and generate 2 MW of electricity. Bio-char byproducts are bagged and sold under the Eterna Green trade name as a soil amendment.

Work has begun on a third site in Hawaii; four additional sites have been identified at transfer stations in Hawaii, pending final bond passage with a start date in July 2009.

Facility Sizing
Types of feedstock: Various waste streams.
Unacceptable wastes: Information not provided.
Proposed processing capacity to serve Planning Unit: Dual 3.5 ton/hour processing system capable of processing 50 tons of waste per 8-hour day.
Site acreage required: As little as 0.5 acre, designed to be co-located at an existing transfer station.
Alternate size for larger or optimally-sized facility: Information not provided, but submittal notes that plants are scalable by adding modular units.
Minimum feasible facility size: Information not provided.

Costs of Ownership and Operation
Initial capital cost: $6.25 million or $125,000/tpd installed capacity calculated using information provided by CDI.
Operating cost: $240/ton.

Tipping fee: $65/ton.
Electric revenues: Approximately $160/day (2 MWh x $0.08/kWh). Bio-char revenue is estimated at $350/ton of incoming waste.

Environmental Impacts
Greenhouse gas emissions: CDI describes its system as a "carbon negative system".
Criteria pollutant emissions: "...complies with all relevant EPA and local emission standards". Emissions data not provided.
Air pollution control equipment and odor control: Emissions from electrical generation are passed through catalysis; a carbon filter is used in both the exhaust gas and secondary exhaust systems.
Process water consumption: The process recycles 80% of all water used. Typical consumption is less than 500-1,000 gallons/day with onsite water conditioning.recycling system.
Wastewater discharge: Information not provided.
Electrical consumption: Little energy required to run the process; 2 MW electricity generated.
Natural gas requirements: Natural gas can be used to operate facility for emergency power generation.

Readiness and Reliability
Maturity and suitability for permitting: CDI's new manufacturing facilities will allow it to produce a two-processor system every six weeks. The company will offer maintenance, training and support for the system.
Construction and performance guarantees: Information not provided.
Timeframes: Information not provided.

Beneficial Reuse of MSW Byproducts
Energy generation: 2 MWh/day or 40 kWh/ton as calculated by CHA..
Solid or gaseous byproducts: Bio-char can be marketed as a soil amendment to enhance crop yields, a steel additive or for water filtration.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: No landfill disposal.
Anticipated hazardous waste characterization: NA.

Company Name: Casella Waste Systems, Inc.
Technology Category: Single-Stream Recycling, WTE

Casella Waste Systems, Inc. is a vertically integrated resource management company that operates primarily in the northeastern U.S, and was founded in 1975. The company operates a number of collection divisions, transfer stations, disposal facilities, recycling facilities, and landfill gas to energy facilities. FCR, Inc. is a wholly owned subsidiary of Casella that designs, builds and operates recycling facilities throughout the U.S.

Casella proposes a four-phased waste management approach for the Planning Unit.

Phase 1 includes:

- Introduction of a single-stream recycling system, coupled with commodity marketing.
- Piping landfill gas that is currently flared at the Rapp Road Landfill to the SUNY-Albany campus as a direct-use application.[1]

Phase II includes:

- Establishment of a multi-material processing system platform, located at Rapp Road Landfill, to recover additional recyclables and develop engineered feedstocks for subsequent conversion processes.[2]

Phase III includes:

- Manufacturing engineered feedstocks from non-recoverable waste streams for co-firing and direct hydrocarbon fuel substitution for boilers, kilns, and similar energy uses.

Phase IV includes:

- Establishment of a waste-to-energy facility operating by means of pyrolysis and gasification to process MSW. Syngas products would be used to produce electricity, liquid fuels or chemicals.

Casella responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: Casella is a well-established waste management company with experience in constructing and operating solid waste disposal and other facilities throughout the northeastern U.S. The company operates 32 collection divisions, 31 transfer stations, 11 disposal facilities, 37 recycling facilities, and 5 landfill gas to energy facilities. Casella operates recycling facilities located in 10 states.

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[1] *Note: This element may not be feasible because the City of Albany has committed its landfill gas to another user.*
[2] *Note: This location may not be feasible because the City of Albany has committed the Rapp Road site for Pine Bush habitat preservation.*

Casella's Camden, NJ, Philadelphia, PA and Ontario, NY MRFs have each been constructed since 2005, and serve as reference facilities for recycling. The Ontario County, NY direct-use landfill gas pipeline project powers the only office complex in the U.S. fueled directly by landfill gas. The company's Charlestown, MA facility serves as a multi-material processing platform reference project. Casella has a WTE commercial demonstration unit currently in acceptance testing, which would serve as a reference facility upon completion; other reference facilities are operated by Eco Technology, a project partner.

Facility Sizing

Types of feedstock:

Phase I: Acceptable recyclables include various papers, cardboard, and metal, glass and plastic (MGP) containers. The Direct-use landfill gas pipeline would utilize landfill gases from the Rapp Road Landfill that are currently flared.

Phase II: All dry recoverable materials from the waste stream.

Phase III: Non-recyclable MSW.

Phase IV: Engineered Phase III output.

Site Requirements:

Unacceptable wastes:

Phase III: Wet recoverable organics and non-convertible material.

Phase IV: Wet organics and non-convertible material.

Proposed processing capacity to serve Planning Unit: Casella would propose facilities to accommodate the Planning Unit's 227,000 tpy baseline waste quantity:

- Phase I MRF capacity up to 120,000 tpy (460 tpd assuming 260-day operating year).
- Phase II Multi-material processing platform capacity 150,000-200,000 tpy (575-750 tpd assuming 260-day operating year).
- Phase III Feedstock engineering capacity 35,000-50,000 tpy (135 tpd assuming 260-day operating year)or more.
- Phase IV WTE capacity 100,000 tpy (385 tpd assuming 260-day operating year).

Alternate size for larger or optimally-sized facility: Information not provided.

Minimum feasible facility size: Phase III Feedstock engineering minimum capacity 35,000-50,000 tpy.

Costs of Ownership and Operation

Initial capital cost:

- Phase I MRF equipment capital costs $8 million; operating costs $45-75/ton.
- Phase I landfill gas pipeline estimated capital costs $2 million; operating costs $400,000/year ($1/MMBtu).
- Phase II multi-material processing platform equipment capital costs $12 million assuming use of existing building located at Rapp Road Landfill; operating costs $45/ton.
- Phase III feedstock engineering equipment capital costs $2 million; operating costs $25/ton.
- Phase IV WTE equipment capital costs $24 million; operating costs $75/ton.

- CHA calculates the total capital cost at

Operating cost:

- Phase I MRF operating costs $45-75/ton.
- Phase I landfill gas pipeline operating costs $400,000/year ($1/MMBtu).
- Phase II multi-material processing platform operating costs $45/ton.
- Phase III feedstock engineering operating costs $25/ton.
- Phase IV WTE operating costs $75/ton

Tipping fee: Information not provided. Anticipated net profit sharing revenues of $15/ton to the Planning Unit.

Electric revenues: Anticipated $2 million/year in additional revenue share to the Planning Unit.

Environmental Impacts

Greenhouse gas emissions:

- Phase I MRF greenhouse gas emissions reduced by 170,840 tons/year CO_2 equivalent.
- Phase I landfill gas pipeline greenhouse gas emissions reduced by 215,220 tons/year CO_2 equivalent.
- Phase II greenhouse gas emissions reduced by 83,317 tons/year CO_2 equivalent.
- Phase III feedstock engineering avoided greenhouse gas emissions 129,540 tons/year CO_2 equivalent.
- Phase IV WTE avoided greenhouse gas emissions 198,171 tons/year CO_2 equivalent.

Criteria pollutant emissions:

- Phase III feedstock engineering, "below coal or traditional fuel".
- Phase IV WTE, no SO_x and trace NO_x.

Air pollution control equipment and odor control:

- Phase II multi-material processing platform, none.
- Phase III feedstock engineering, information not provided.
- Phase IV WTE, syngas scrubbing towers.

Process water consumption: Required for scrubbing towers; volume of consumption not provided.

Wastewater discharge: Yes for scrubbing towers; wastewater volume not provided.

Electrical consumption: Information not provided.

Natural gas requirements: Information not provided. Phase I direct-use landfill gas pipeline would displace 375,000 MMBtu of natural gas consumption at SUNY-Albany annually.

Readiness and Reliability

Maturity and suitability for permitting:

Facilities and technologies are proven with commercial reference facilities in the U.S. Casella has permitting experience in the northeastern U.S., including New York State.

Construction and performance guarantees: Casella would finance and operate the proposed facilities.

Timeframes:
If the process were initiated in 2009, Phases I-IV would be completed by 2016.

Beneficial Reuse of MSW Byproducts.
Energy generation:
Phase I landfill gas pipeline to provide 375,000 MMBtu energy to SUNY-Albany; Casella indicates that Phase IV WTE would generate 98,000,000 MWh/year, but this value likely overstates the electrical generation.
Solid or gaseous byproducts: Recyclables recovered by Phase I and Phase II facilities will be sold to market, and fuel pellets will be produced by the Phase III feedstock engineering facility.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: An estimated 20% of incoming MSW would require landfill disposal upon completion of Phases I-IV.
Anticipated hazardous waste characterization: Information not provided.

Company Name: Covanta Energy Corporation
Technology Category: WTE

Covanta is the largest independent owner and operator of WTE facilities in North America, and operates a network of waste management facilities in the vicinity of the Capital District.

Covanta proposes to accept solid waste from the Planning Unit at its nearby WTE facilities in order to relieve the pressure to address the closure of the Rapp Road Landfill by 2016. Available transfer capacity at Covanta's B3 Transfer Station in Columbia County would allow the transfer and delivery of waste to WTE facilities that may include the nearby Covanta facilities in Pittsfield, MA and Springfield, MA. As an option, the Planning Unit could deliver waste to Covanta for processing at its WTE facilities and take the inert process ash back to the Rapp Road Landfill at a volume reduced by 90%.

Covanta responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Covanta is recognized as a leader in the WTE industry. The company provides integrated WTE design, engineering, construction and operation and maintenance services. Covanta operates more than 20 WTE facilities in the Northeast, including 5 in New York State and several others in Massachusetts and Connecticut.

Experience with similar projects: Noting that Covanta does not propose to build a WTE facility in the Capital Region, the company has provided a list of more than 35 WTE facilities that it owns and operates in the U.S. Covanta operates a number of transfer stations, and is experienced in managing the logistics of solid waste transport.

Facility Sizing
Types of feedstock: MSW
Unacceptable wastes: Waste materials posing a threat to public health, are too large or bulky for disposal, or are present in concentrations or quantities that could negatively impact the facility's operational or environmental performance.
Proposed processing capacity to serve Planning Unit: Existing Covanta facilities could accept all or a portion of the Planning Unit's solid waste.
Alternate size for larger or optimally-sized facility: NA
Minimum feasible facility size: NA

Costs of Ownership and Operation
The Planning Unit would not incur the costs associated with introducing a new waste disposal facility in the Capital Region. The Planning Unit would pay a per-ton tipping fee to drop off waste at the B3 Transfer Station. Covanta does not provide a proposed tipping fee.

Initial capital cost: NA.
Operating cost: NA

Tipping fee: Information not provided.
Electric revenues: NA

Environmental Impacts
Greenhouse gas emissions: Information not provided.
Criteria pollutant emissions: Covanta provides emission data for pollutants including VOC, NO_x, CO, particulates, SO_2, Pb and NH_3 at four reference facilities.
Air pollution control equipment and odor control: Information not provided.
Process water consumption: Information not provided.
Wastewater discharge: 327.9 gallons/day (0.92 gallons/ton MSW) at Agawam, MA facility in 2008.
Electrical consumption: Net electrical generation of 380 kWh/ton based on reference facilities.
Natural gas requirements: 292 cuft/ton based on reference facilities.

Readiness and Reliability
Maturity and suitability for permitting: No permitting would be necessary, and the plan utilizes existing Covanta facilities.
Construction and performance guarantees: NA
Timeframes: Covanta could begin accepting solid waste from the Planning Unit immediately.

Beneficial Reuse of MSW Byproducts
Energy generation: NA
Solid or gaseous byproducts: NA

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: Inert ash representing approximately 10% of incoming MSW by volume or 25-30% by weight.
Anticipated hazardous waste characterization: No anticipated hazardous waste characterization.

Company Name: Dongara Pellet Factory, Inc.
Technology Category: Mechanical Processing -Engineered Fuel Pellets

Dongara is a Canadian company based in Woodbridge, Ontario, and uses the Dongara Process to convert MSW into an engineered pellet product with energy content similar to that of bituminous coal.

In the Dongara Process, MSW is delivered to the plant and passes through a series of processes to remove recyclable and unacceptable materials from the feedstock. Materials to be used for pellet production are shredded, fiberized and stored, and later mixed with high-BTU materials such as carpet waste and some plastic derivatives. The materials are transferred through pellet mills to produce the fuel pellets.

The fuel pellets may be used in various solid fuel systems, including solid fuel boilers or gasification processes, which in turn generate electricity and/or steam. It is possible to co-locate a fuel pellet facility with electrical generation equipment in order to produce electricity onsite.

Dongara responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: Dongara has operated a commercial fuel pellet facility in Woodbridge, Ontario, Canada since July 2008. The company has a 20-year contract to receive 110,000 tpy of MSW from York Region, with the option to increase its capacity to 220,000 tpy. The fuel pellets are presently used in the heating systems of large commercial greenhouses in Ontario, and are also used to fuel kilns in cement plants.

Facility Sizing
Types of feedstock: MSW
Unacceptable wastes: Hazardous, large and inorganic materials.
Proposed processing capacity to serve Planning Unit: 240,000 tpy. CHA estimates daily design capacity at 750 tpd.
Site acreage required: 8-11 acres
Alternate size for larger or optimally-sized facility: A 400,000 tpy facility would allow cost-saving efficiencies and reduce tipping fees.
Minimum feasible facility size: 200,000 tpy

Costs of Ownership and Operation
Dongara would propose a build-own-operate arrangement.

Initial capital cost: Approximately $80 million U.S., pre-tax for 240,000 tpy facility. Based on the assumed 750 tpd design capacity, CHA estimates an initial capital cost of $106,700/tpd of design capacity.
Operating cost: $55-$75/ton
Tipping fee: Woodbridge, Ontario reference facility tipping fee is currently $78/ton U.S.

Electric revenues: NA; pellets would be sold as a fuel source and/or potentially used to generate electricity, but no revenue information is provided.

Environmental Impacts

Greenhouse gas emissions: None from fuel pellet production.
Criteria pollutant emissions: None from fuel pellet production.
Air pollution control equipment and odor control: Tipping floor is located inside the facility. A negative pressure system is used to contain odor, dust and debris within the facility. Air filtration and scrubbing equipment would be used to treat exhaust from the plant.
Process water consumption: Water is generated in the process; approximately 3,000 gpd of wash-down water is required. CHA calculates water consumption at 4 gallons per ton of input MSW.
Wastewater discharge: A biological treatment system is used to ensure that effluent meets regional requirements before being discharged. 25% of the process wastewater is recycled to the wash-down system. Approximately 20-24% by weight of incoming MSW is moisture content. 50-60% of this moisture content is lost to evaporation; the remainder is combined with wash-down water to arrive at approximately 3,000 gpd wastewater discharge. CHA calculates wastewater discharge at 4 gallons per ton of input MSW.

Electrical consumption: Net electricity demand is expected to be 81-83 kWh/ton per day. If fuel pellet products are used in an energy production facility, the ratio of energy produced by such a facility vs. the energy used to produce the pellets would be approximately 15:1.
Natural gas requirements: Natural gas would be used primarily to heat the facility, with minimal natural gas used in the MSW drying process. Waste heat generated by equipment is used to offset natural gas usage.

Readiness and Reliability

Maturity and suitability for permitting: The technology to be employed has been developed based on a review of similar European commercial facilities. The Toronto facility has been operational since July 2008; operations of this facility and U.S. waste streams have been evaluated to guide the development of future facilities. Dongara provides a patented process that depends on an arrangement of well-proven equipment that has been used in the solid waste industry for years.
Construction and performance guarantees: Dongara is "comfortable in saying that they believe the fuel pellets will be within a 95-96% consistency, for both energy and chemistry". Contingency plans would be put in place for an outage that could interrupt MSW flow to the facility; Dongara would assume any such costs.
Timeframes:

Facility design: 4-5 months following site selection
Facility "permitting": depends on local requirements
Facility construction: 13-15 months
Start-up and acceptance testing: 4 months following construction
Total timeframe: 22-24 months for proposed (240,000 tpy) facility; 26-28 months for alternate (400,000 tpy) facility

Beneficial Reuse of MSW Byproducts
Energy generation: Fuel pellets are used as a source of energy.
Solid or gaseous byproducts: Stone, gravel and glass removed from MSW are issued to companies in the brick and concrete industries. Recyclable metals and plastics are recovered and sold to market.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: Small fractions of glass, sand and gravel representing approximately 5-8% of incoming MSW. 17,000-19,000 tpy residue requiring landfill disposal for a 240,000 tpy facility.
Anticipated hazardous waste characterization: No anticipated hazardous waste characterization.

Company Name: Ecodeco
Technology Category: Biodrying Process

Ecodeco is an international company with headquarters in Italy, and has recently established a cooperative arrangement with International Center for Commercial Affairs (ICCA) to assist in the pursuit of opportunities in the U.S. market.

The company presents the Biocubi Process, an aerobic biological treatment, to remove moisture and improve the heating efficiency of products to be used as fuel inputs for subsequent processes. Processing takes place in the company's ITS (Intelligent Transfer Station). The putrescible fraction of MSW undergoes an aerobic treatment, and the released heat is used to dry and thermally hygienise the feedstock. Separation occurs following the biodrying phase, and recyclable materials are removed from the feedstock. The biodried material is mechanically refined to produce a solid recovered fuel (SRF), which can be used to generate electricity or as a fuel source by cement kilns.

Ecodeco responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: Ecodeco's technology has been successfully implemented in Europe for more than a decade. The ITS (Intelligent Transfer Station) technology has been assigned a "Fully Proven" rating in a survey conducted by the Juniper consulting agency, indicating that it "has been used in active plants for at least two years and that the requirements set by the customer have been met by reaching the performance levels demanded by international standards". Ecodeco identifies several facilities in Italy, Spain and England, and states that there are 17 ITS facilities in total. To date, no facilities have been constructed in the U.S.

Facility Sizing
Types of feedstock: MSW
Unacceptable wastes: Information not provided.
Proposed processing capacity to serve Planning Unit: 230,000 tpy (2 lines x 115,000 tpy each). CHA estimates daily design capacity at 750 tpd.
Site acreage required: approximately 7 acres
Alternate size for larger or optimally-sized facility: No alternate plant size provided.
Minimum feasible facility size: 230,000 tpy

Costs of Ownership and Operation
In Italy, Ecodeco generally installs and manages its own plants, and in other European countries it designs, erects and tests plants for third parties. The company feels its best approach in the U.S. is to act as technology provider for authorities or local operators depending on local requirements.

Initial capital cost: Approximately $56,700,000 U.S. Based on the assumed 750 tpd design capacity, CHA estimates an initial capital cost of $106,700/tpd of design capacity.

Operating cost: Ecodeco is working to calculate operational costs for the U.S. market. Information not provided.
Tipping fee: 95 to 125 euros at existing European facilities ($126-$165 U.S.)
Electric revenues: NA; solid recovered fuel (SRF) product would be sold as a fuel source and/or potentially used to generate electricity, but no revenue information is provided.

Environmental Impacts
Greenhouse gas emissions: 85,500-171,000 tpy biogenic CO_2 process emissions; additionally, 50% of total CO_2 generated in SRF combustion (no value provided).
Criteria pollutant emissions: Information not provided.
Air pollution control equipment and odor control: Tipping floor is located inside the facility. A negative pressure system is used to contain odor, dust and debris within the facility. Process emissions pass through biofiltration and dedusting systems.
Process water consumption: 6,340-9,510 gallons/day depending on weather and local climate conditions.
Wastewater discharge: Approximately 3,170 gpd depending on weather and local climate conditions.
Electrical consumption: 30 kWh/ton for biodrying process, 55 kWh/ton for material refinement.
Natural gas requirements: Information not provided.

Readiness and Reliability
Maturity and suitability for permitting: Ecodeco had constructed and operated a number of facilities in Europe, but has no experience with permitting or operations in the U.S. Substantial work would be required in adapting operations to U.S. and local standards, and Ecodeco would work with local consultants to meet all requirements.
Construction and performance guarantees: Ecodeco would work with a local consultant to ensure all requirements are met. The facility would be equipped with a remote control system that allows monitoring of the process and equipment, to ensure prompt response to technical issues.
Timeframes:
- *Facility design:* 15 months
- *Facility "permitting":* 12 months (in EU)
- *Facility construction:* 16 months
- *Start-up and acceptance testing:* 4 months
- *Total timeframe:* 35 months

Beneficial Reuse of MSW Byproducts
Energy generation: SRF product is used as a source of energy.
Solid or gaseous byproducts: Recyclable metals and plastics are recovered and sold to market.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: 33.8% of incoming waste.
Anticipated hazardous waste characterization: No anticipated hazardous waste characterization.

Company Name: Energy Answers
Technology Category: WTE

Energy Answers was founded in Albany in 1981 and has operated in the Albany region for 28 years under the same ownership. Energy Answers is actively developing projects in the U.S., Caribbean and the European Union, and is in the early development stages of projects in other regions.

Energy Answers presents the Processed Refuse Fuel (PRF) technology. The Mechanical Treatment Facility is designed to accept and process incoming MSW to create a shredded, readily combustible PRF material. PRF is fed into the combustor and produces minimal ash residue. Steam generated by combustion is used to generate electricity. Bottom ash is processed in a materials recovery facility in order to recover metals and solid aggregate material.

Energy Answers responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: Energy Answers was the conceptual designer, developer, technology provider, co-operator and General Manager of the SEMASS WTE facility in Rochester, MA from its commencement of operations in 1988 until 1996. This WTE facility utilizes the PRF system. The base plant has a 2,000 tpd capacity and a subsequent 1,000 tpd expansion was created in 1993. The SEMASS facility received several awards for environmental performance under Energy Answers management.

Energy Answers also identifies WTE reference facilities in Pittsfield, MA and Springfield, MA. The company lists experience in managing and operating transfer stations.

Facility Sizing
Types of feedstock: MSW; could also process wood waste, tires, sludge, FOG (fats, oil, grease), and auto shredder residue.
Unacceptable wastes: Specific materials not identified; less than 1% of incoming waste.
Proposed processing capacity to serve Planning Unit: Facility would have two, 500 tpd boilers for a design capacity of 365,000 tpy (1,000 tpd).
Site acreage required: 10 acres in an industrial zone or 15 acres for a stand-alone facility.
Alternate size for larger or optimally-sized facility: Depending on opportunities to import MSW, a larger facility could be accommodated.
Minimum feasible facility size: 500 tpd.

Costs of Ownership and Operation
Energy Answers proposes a private ownership model, whereby the Planning Unit would pay a fixed tip fee for MSW delivered to the facility, and Energy Answers would assume full operational and financial risk for the ultimate disposal of the waste.

Initial capital cost: Information not provided.
Operating cost: Approximately $50/ton.
Tipping fee: Information not provided.
Electric revenues: Assuming a purchase agreement of $0.10/KWh, electric revenue would be $59.20/ton of incoming MSW.

Environmental Impacts
Greenhouse gas emissions: 67% of CO_2 emissions are biogenic, and 33% are anthropogenic. Anthropogenic CO_2 emissions are offset by the avoided emissions that would be produced by fossil fuel powered electric generation, avoided methane emissions that would otherwise be generated by landfill disposal, and by the recovery of metal materials. Using these assumptions, Energy Answers states that the WTE facility would produce electricity at a negative net CO_2 emission rate of -3,636 lbs. CO_2/MWh. For every ton of MSW processed, approximately 1 ton of CO_2 equivalents would be eliminated.
Criteria pollutant emissions: Energy Answers has provided a table with recorded average emissions recorded at its SEMASS facility in April 2004, November 2005 and July 2006, for the following pollutants: particulates, SO_2, HCL, NO_x, CO, Cd, Pb, Hg and PCDD/F. The reference facility meets its permit limits and USEPA Maximum Achievable Control Technology (MACT) standards for emissions of these pollutants.
Air pollution control equipment and odor control: The gases generated by the combustion of MSW are passed through air quality control equipment consisting of: urea injection to remove nitrogen oxides, activated carbon injection to remove mercury, dioxins and furans, spray dryer absorbers using lime to neutralize any acids forming during the combustion process, and a fabric filter system (bag house) to capture particles in the gas.
Process water consumption: The WTE facility could utilize either an air-cooled condenser or a cooling tower. With an air-cooled condenser, industrial and water usage would be about 21,000 gallons/day based on a facility capacity of 1,000 tpd. Water usage for a cooling tower would be ten times greater. Hower, if adequate water supply is available, cooling towers are less expensive than air-cooled condensers and can operate on secondary treated effluent from a wastewater treatment facility.
Wastewater discharge: Aside from sanitary wastewater, there would be no discharge of water into the sewers.
Electrical consumption: Gross electric generation 696 kwh/ton; 104 kwh/ton internal usage; net electric generation 592 kwh/ton.
Natural gas requirements: No natural gas requirements.

Readiness and Reliability
Maturity and suitability for permitting: The Energy Answers PRF technology has been used in large-scale commercial operations at the SEMASS and other WTE facilities since 1989. The technology has been upgraded over the years.
Construction and performance guarantees: Energy Answers can:

- design, construct, test for acceptance, own, operate and maintain the proposed facility
- comply with all contract, federal, state and local laws, regulations and policies

- comply with Good Industry Practice and Good and Accepted Construction Practice
- be responsible for obtaining local construction permits.

Timeframes:

Total timeframe: 24 months

Beneficial Reuse of MSW Byproducts

Energy generation: Net 592 kWh/ton of MSW.

Solid or gaseous byproducts: Bottom ash (aggregate material) 10% by weight of waste fed; ferrous metal 4% of waste fed; nonferrous metal 0.4% of waste fed.

Residue Requiring Landfill Disposal

Percent residue requiring landfill disposal: 10% of incoming waste.

Anticipated hazardous waste characterization: No anticipated hazardous waste characterization.

Company Name: Green Conversion Systems (GCS)
Technology Category: WTE

GCS is a European company with existing operations in Germany; GCS has created a Delaware Limited Liability Company created for the purpose of purpose of pursuing WTE opportunities in the U.S. Morgan Stanley Biomass LLC, a subsidiary of the Morgan Stanley investment banking firm, owns the majority of the equity in GCS. The company has an exclusive license with Fisia Babcock Environment GmbH (FBE) to promote its WTE technology.

The GCS process has been proven to exceed environmental standards in the EU. Existing GCS facilities do not need to pre-process MSW prior to combustion, thereby eliminating the costs and risks associated with additional pre-processing measures. In addition to generating steam/electricity, the process byproducts include processed and size-classified aggregate, ferrous and non-ferrous metals, technical grade hydrochloric acid, gypsum, and salts suitable for industrial use.

GCS responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: GCS has provided information for two reference facilities located in Germany. The more recent facility, the 1,100 tpd (350,000 tpy) Muellverwertung Rugenberger Damm (MVR) waste treatment facility in Hamburg, Germany, has processed MSW in commercial operations since 1999. Emissions from the MVR facility surpass all EU environmental standards.

Facility Sizing
Types of feedstock: MSW
Unacceptable wastes: Oversized materials, C&D wastes, hazardous materials.
Proposed processing capacity to serve Planning Unit: 230,000 tpy (700 tpd) of MSW.
Site acreage required: Approximately 8 acres
Alternate size for larger or optimally-sized facility: For an annual capacity of more than 250 tpy, GCS would propose 2 lines with total 300,000 tpy capacity; this alternate facility would require an 11 acre site.
Minimum feasible facility size: Information not provided.

Costs of Ownership and Operation

Initial capital cost: Approximately $300 million U.S. Based on the 700 tpd design capacity, CHA estimates an initial capital cost of $429,000/tpd of design capacity.
Operating cost: Initial cost to operate and maintain the facility is approximately $75/ton including labor, maintenance materials, consumables, auxiliary fuel, selling of marketable byproducts, residual disposal, utilities, repair and replacement of equipment, bonds and insurance. Cost is anticipated to decrease to approximately $60/ton after the market for specially treated bottom ash for use as an aggregate has been established.
Tipping fee: Tipping fee at the existing MVR facility is approximately $159 U.S./ton.

Electric revenues: The proposed 700 tpd facility would generate 16-17 MW of net electrical power with a value of $50-60/ton of MSW.

Environmental Impacts

Greenhouse gas emissions: CO_2 emissions would be approximately 1 to 1.2 ton CO_2 per ton MSW. About 60% of the carbon contained in MSW is biogenic, and the CO_2 emitted to the atmosphere from this portion of the waste is CO_2 neutral.

Criteria pollutant emissions: GSC has provided a table with recorded average emissions recorded at its MVR facility from 1999-2007, for the following pollutants: NO_x, CO, particulates, C_{total}, HCL, SO_2, HF, Cd, Th, Hg, Pb and PCDD/F. Emission values exceed USEPA 40CFR60 Subpart Eb regulations for these pollutants.

Air pollution control equipment and odor control: Tipping floor is located inside the facility, and a negative pressure system is used to contain odor, dust and debris within the facility. NO_x emissions are reduced by spraying aqueous ammonia into the combustion chamber at several levels in the furnace. An adsorbent material is added to the flue gas leaving the boiler, thereby separating any heavy metals and organic pollutants. The flue gas is routed through a 2-stage HCl-scrubber where process water is added to separate any readily soluble halogen compounds. Sulfur oxides are separated by a neutral single-stage scrubber. A second baghouse filter is applied to ensure minimal emissions of heavy metals and organic pollutants.

Process water consumption: Process water (50 kgal/day) does not have to be potable water; grey water from a water pollution control plant or water taken from a river or groundwater would be sufficient. Water required for the process would be filtered and stored before process use. Most process water would be evaporated in the wet scrubbers of the flue gas treatment system and released into the atmosphere as water vapor.

Wastewater discharge: Aside from sanitary waste (2,000 gpd), there would be no discharge of water into the sewers. Measures would be taken to minimize stormwater runoff, possibly including green roofs on some buildings.

Electrical consumption: Gross electric generation 680 kWh/ton; 95 kWh/ton internal usage; net electric generation 585 kWh/ton.

Natural gas requirements: 64,000 decatherms/year.

Readiness and Reliability

Maturity and suitability for permitting: The mass burn technology offered by GCS is manufactured by FBE, and there are over 500 facilities worldwide that use FBE proprietary technology. Existing GCS facilities using these technologies exceed the emissions standards set by New York State, and are expected to be suitable for permitting.

Construction and performance guarantees: The contractual obligations under the service agreement would be first guaranteed by the construction contractor, and upon startup of the facility and acceptance, this guarantee would be replaced by a guarantee from the operator.

Timeframes:

Facility design: 12 to 15 months

Facility "permitting": 8 to 10 months

Facility construction: 24 to 26 months

Start-up and acceptance testing: 6 to 9 months
Total timeframe: 50 to 60 months

Beneficial Reuse of MSW Byproducts
Energy generation: Net 585 kWh/ton of MSW.
Solid or gaseous byproducts: Bottom ash (aggregate material) 22% by weight of waste fed; ferrous metal 2.3% of waste fed; nonferrous metal 0.2% of waste fed; HCl 1.5% of waste fed; gypsum 0.3% of waste fed.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: 2% of incoming waste.
Anticipated hazardous waste characterization: No anticipated hazardous waste characterization.

Company Name: Nature's Fuel
Technology Category: Pyrolysis; Biofuel Production

Nature's Fuel (NF) was founded in 2005 and is an Indiana Corporation; the company is owned by private equity investors. Shaw Environmental is identified as a consulting party that would be involved in the development of a NF facility for the Planning Unit. NF owns and operates one commercial facility in Atwood, Indiana, and is developing a second commercial facility in Huntington, Indiana.

The NF process uses a pyrolysis process to generate electricity, bio-oil, bio-char, and bio-gas. Bio-char residue can be used as a soil amendment or high-grade source of activated carbon. Bio-oil can be sold to blenders and used to reduce the sulfur content and viscosity of #6 heating oil.

Nature's Fuel responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: NF operates an 86,000 tpy facility in Atwood, Indiana – this plant began as a solid fuel R&D facility and was converted into a full-production pyrolyzation operation in 2007. The Atwood facility accepts wood waste, C&D waste, and other waste streams (plastics, waste oils, etc.) to produce sulfur-free bio-oil, high quality bio-char, and will begin to generate electricity later in 2009.

NF is in the process of developing a new facility in Huntington, Indiana. The facility will have an anticipated waste throughput of 200,000 tpy in Year 1, and will increase to 400,000 tpy by Year 3. Air permit approval is anticipated in July 2009.

Facility Sizing
Types of feedstock: MSW, C&D wastes, tires, ASR, oil sludge and tank ottoms, non-hazardous industrial wastes and sludges, yard and tree waste, computer waste except for CRTs, carpeting, and white goods that do not contain freon.
Unacceptable wastes: Medical and hazardous wastes.
Proposed processing capacity to serve Planning Unit: The Albany market meets NF's throughput requirements. CHA assumes that a facility designed to serve the Planning Unit would have a capacity of 300,000 tpy (970 tpd).
Site acreage required: 15 acres; sites offering 25-30 acres allow space for potential expansion. Ideal sites are located near electric infrastructure such as a power substation.
Alternate size for larger or optimally-sized facility: A modular system allows NF to expand capacity in increments of 100,000 tpy.
Minimum feasible facility size: Information not provided; NF's preferred market is approximately 300,000 tpy.

Costs of Ownership and Operation
NF investors would assume all costs of ownership and operation. If desired, NF would give the municipality the option to purchase the plant and license it the intellectual property after 15 years.

Initial capital cost: Information not provided. The 400,000 tpy Huntington, Indiana facility will cost an anticipated $38 million with no electric generation. CHA estimates an initial capital cost of $52,713/tpd of design capacity. Power generation equipment may be added at a cost of approximately $30 million.
Operating cost: Information not provided.
Tipping fee: Information not provided.
Electric revenues: Information not provided.

Environmental Impacts
Greenhouse gas emissions: Information not provided.
Criteria pollutant emissions: Air permit applications for the Atwood and Huntington facilities demonstrate that the NF facilities' "PTE (potential to emit) is extremely low as measured before our environmental controls."
Process water consumption: The process utilizes water in a clean, closed-loop cooling mode. A retention pond may be considered as a source of cooling water, as would rain water. Other water usage would include restroom water and for cleaning of the tipping room floor.
Wastewater discharge: Drainage systems would capture wastewater in the building and tip room floors. Water would be treated by a triple trap and either discharged into municipal sanitary sewers or taken to a permitted facility for disposal. Wastewater discharge volume would be similar to that of a similarly sized transfer station.
Electrical consumption: Facility could generate its own electricity, but would prefer to purchase 1 to 3 MW from the local power utility.
Natural gas requirements: Natural gas would be used to start the process, and CHA estimates natural gas consumption at 100 btu-hr/ton of MSW.

Readiness and Reliability
Maturity and suitability for permitting: Pyrolysis technology has been used for decades in Europe, but its implementation is not as widespread in the U.S. NF has met permitting requirements for its Atwood facility, and expects approval for its Huntington facility later in 2009.
Construction and performance guarantees: NF and its investors would assume financial risk for the proposed facility.
Timeframes: Information not provided.

Beneficial Reuse of MSW Byproducts
Energy generation: The proposed facility could be used to generate electricity. The Huntington facility could potentially generate up to 40 MW of electricity from 400,000 tpy throughput.
Solid or gaseous byproducts: Bio-oil and bio-char are generated by the process. Quantity information is not provided.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: As little as 0% landfill disposal is possible, depending on the market for products. Less than 10% is likely.

Anticipated hazardous waste characterization: Information not provided.

Company Name: Norterra Organics
Technology Category: Composting

Norterra New York is a joint venture between Norterra (a fully owned subsidiary of Scott Environmental of Kingston, Ontario, Canada) and Nextek GBL, Inc. of Macedon, NY. Norterra currently operates a compost facility near Kingston, Ontario.

Norterra proposes a composting system that features the Gore Cover System as an operating platform. The system uses a membrane laminate technology similar to that of the well-known Gore-Tex fabrics. The system shields process materials from vectors and can achieve 99% microbe reduction. Operating costs are reduced because the system allows operators to use prositive pressure air. The system is considered an in-vessel technology by many regulatory authorities because the cover encapsulates all process materials.

Organic material spends six weeks under the Gore covers, followed by an additional two weeks of curing on an aerated pad. After the eight weeks of composting, the material is ready to be screened and stockpiled for further aging, and is then ready for sale.

Norterra responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: Norterra of Canada has a commercial compost facility located in Joyceville, Ontario, Canada, just east of Kingston. This facility is owned and was developed by the Scott Environmental Group. Construction of the facility began in Summer 2008 and operations began in Fall 2008. The Joyceville facility's initial capacity is 20,000 tpy, and Norterra plans to double this initial capacity before the end of 2009. The company has not developed any facilities in the U.S.

Facility Sizing
Types of feedstock: Organic materials, including: yard waste, institutional and restaurant food waste, food processing wastes, manures, low-grade papers, greases and oils, waxed corrugated cardboard, woody or other lignocellulosic wastes.
Unacceptable wastes: Information not provided.
Proposed processing capacity to serve Planning Unit: Assuming that approximately 30% of the baseline waste quantity could be compostable, and this entire fraction can be captured, a facility for the Planning Unit would require a 75,000 tpy capacity. Norterra would develop a modular system with initial 20,000 tpy capacity which can be expanded in 10,000 tpy increments to meet demand. At the initial 20,000 tpy design capacity, CHA estimates a daily design capacity of 75 tpd.
Site acreage required: Minimum 6 acres for 20,000 tpy module. 20 acres required for 75,000 tpy capacity.
Alternate size for larger or optimally-sized facility: Modular system allows for expansion.
Minimum feasible facility size: 20,000 tpy initial module.

Costs of Ownership and Operation
Initial capital cost: $3 million U.S. initial startup cost for Joyceville facility (20,000 tpy). CHA estimates an initial capital cost of $40,000/tpd of design capacity.
Operating cost: Information not provided.
Tipping fee: $65/ton U.S. for Joycetown facility.
Electric revenues: NA

Environmental Impacts
Greenhouse gas emissions: Information not provided.
Criteria pollutant emissions: Information not provided.
Air pollution control equipment and odor control: Potential odors are minimized by the Gore Cover System. The facility will include a leachate containment and recirculation system, and will be designed to withstand a 100-year flood event.
Process water consumption: Information not provided.
Wastewater discharge: Leachate collected during the composting process is recirculated.
Electrical consumption: Information not provided.
Natural gas requirements: Information not provided.

Readiness and Reliability
Maturity and suitability for permitting: Norterra operates one commercial facility in Canada, none in the U.S. The Gore Cover System has been installed in more than 170 plants in 26 countries worldwide.
Construction and performance guarantees: Information not provided.
Timeframes: Reference facility construction began in Summer 2008 and facility operations began in Fall 2008.

Beneficial Reuse of MSW Byproducts
Energy generation: NA
Solid or gaseous byproducts: Organic compost product.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: "Negligible" landfill disposal.
Anticipated hazardous waste characterization: Information not provided.

Company Name: Organic Waste Remediation, LLC
Technology Category: Recycling/Pyrolysis

Organic Waste Remediation, LLC (OWR) is based in Orlando, FL and offers the OWR Process for disposal of MSW. The OWR Process combines single-stream recycling and pyrolysis technologies, and includes three modules.

The *Recycling Module* separates non-organic material into ferrous, aluminum, other non-ferrous metals and clear, green and amber glass, washed and delabeled with ceramics removed. Unrecycled organic material is shredded, dried and fed to the Remediation Module.

The *Remediation Module* uses a pyrolysis process to break organic materials down into a relatively consistent synfuel. Synfuel products are conveyed to the Power Module.

The *Power Module* uses generic fluid bed burner/steam generation equipment to drive a steam turbine electric generator.

OWR responses to the evaluation criteria include the following:

Experience of Project Sponsor:
OWR is a startup company that has been established for over two years, and has patents pending for its pyrolitic breakdown process, recycling process and the use of its recycling process in combination with other disposal methods such as incineration and plasma. To date, OWR has not fully constructed or operated a MSW processing facility.

Experience with similar projects: OWR has commenced the approval process to construct and operate a commercial facility in Bozrah, CT. This facility will have a proposed 250 tpd (~90,000 tpy) maximum capacity, and contractual arrangements have been made to secure a 1,500 tpw supply of MSW feedstock. An electric sales agreement has been made with the local electric authority. The facility will cost an anticipated $30 million and will be located on a 25-acre property in a Heavy Industrial district. OWR has commenced the formal approval process in the State of Connecticut, and once initiated, construction of the facility is expected to take 10-16 months with tentative commencement of operations in mid-2010.

Facility Sizing
Types of feedstock: Curbside recyclables, MSW, yard waste
Unacceptable wastes: C&D
Proposed processing capacity to serve Planning Unit: OWR would propose a facility to accommodate the Planning Unit's 227,000 tpy baseline waste quantity plus curbside recycling. CHA estimates a daily design capacity of 900 tpd.
Site acreage required: Less than 12 acres.
Alternate size for larger or optimally-sized facility: As proposed, the facility can accommodate additional capacity up to 1,100 tpd without design adjustments.
Minimum feasible facility size: 250 tpd or 63,750 tpy.

Costs of Ownership and Operation
OWR proposes to finance and own the operation, operate the facility, pay all bills and collect the revenues from tipping fees, electric sales and sales of recycled materials.
Initial capital cost: Approximately $60 million. Based on the assumed 900 tpd design capacity, CHA estimates an initial capital cost of $66,700/tpd of design capacity.
Operating cost: approximately $19.20/ton.
Tipping fee: approximately $55/ton.
Electric revenues: estimated $64/input ton of MSW.

Environmental Impacts
Greenhouse gas emissions: "similar to that of an incinerator".
Criteria pollutant emissions: Anticipated reduction of mercury, heavy metals and dioxins/furan emissions.
Air pollution control equipment and odor control: Typical scrubbing equipment is being included in the CT facility. Ventilation system draws outside air in when doors are opened to control odors.
Process water consumption: 36,000 gpd for 140 tpd facility. Assuming a linear relationship between daily capacity and water consumption, CHA estimates that a 900 tpd facility would consume 230,000 gpd.
Wastewater discharge: Process waste water is collected and recycled; approximately 90% is reused for process water feed.
Electrical consumption: 197 tpd of dry organics generates 7.8 MWh electricity; 1.9 MWh consumed; net generation of 5.9 MWh. Based on this information, CHA estimates electric consumption of approximately 100 kWh/ton.
Natural gas requirements: None.

Readiness and Reliability
Maturity and suitability for permitting: Anticipated to exceed all NYS requirements; approval process is currently underway for CT facility.
Construction and performance guarantees: OWR to finance and operate facility, so municipal bodies have no financial investment.
Timeframes:
- *Facility design:* Less than 2 months
- *Facility "permitting":* 2 months to 2 ½ years
- *Facility construction:* 18 months
- *Start-up and acceptance testing:* Information not provided.
- *Total timeframe:* Anticipated 2 years.

Beneficial Reuse of MSW Byproducts
Energy generation: For 1,500 tpw, electric generation would range between 350-950 MWh/week, depending on the percentage of MSW diverted for recycling. Using the value of 350 MWh/week, CHA estimates gross electric generation of 233 kWh/ton and net electric generation of 223 kWh/ton.

Solid or gaseous byproducts: Recycling system will always recycle glass and metals; flexible process can adjust diversion of paper and plastic. 2% of input is inorganic solid material that can be used as aggregate material.

Residue Requiring Landfill Disposal

Percent residue requiring landfill disposal: Response claims no landfill disposal, assuming marketability of all solid byproducts. 2% residue if inorganic slag material is landfilled.

Anticipated hazardous waste characterization: No anticipated hazardous waste characterization.

Company Name: Plasco Energy Group Inc.
Technology Category: Plasma

Plasco is an Ottawa, Canada based company that offers a system based on plasma arc technology. The company currently operates a commercial-scale demonstration facility in Ottawa.

Plasco's waste conversion process begins with any materials with high reclamation value being removed from the waste stream and collected for recycling. MSW is shredded and enters a conversion chamber where it is converted into a crude syngas using recycled heat; this crude syngas flows to a refinement chamber and is refined using plasma torches to create a fuel called PlascoSyngas. The PlascoSyngas is cleaned and used to generate electricity. Waste heat is recovered and used to produce steam, which can be used to generate additional electricity or for industrial purposes.

Solid residue from the conversion chamber is sent to a separate high-temperature Carbon Recovery Vessel, where plasma heat is used to stabilize the solids and convert any remaining volatile compounds and fixed carbon into syngas. Remaining solids are cooled into small slag pellets. The process also yields other products including commercial salt, agricultural sulfur and water.

Plasco responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: Plasco has built a 110 tpd commercial-scale demonstration facility in Ottawa, Canada. This demonstration facility uses MSW from the city as feedstock, and has been in operation since January 2008. Discussions for commercial facilities are in progress in Canada, the U.S, Europe and Asia.

Facility Sizing
Types of feedstock: MSW
Unacceptable wastes: Information not provided.
Proposed processing capacity to serve Planning Unit: 440 tpd (160,000 tpy) facility consisting of four 110 tpd lines.
Site acreage required: 8 acres.
Alternate size for larger or optimally-sized facility: Additional 110 tpd modules could be added to the facility.
Minimum feasible facility size: Information not provided.

Costs of Ownership and Operation
Plasco uses a build, own and operate model. The company would assume all financial responsibility and risk with regard to the construction, commissioning, and ongoing operation of the facility.
Initial capital cost: Information not provided.
Operating cost: Information not provided.
Tipping fee: Information not provided.

Electric revenues: Information not provided.

Environmental Impacts
Greenhouse gas emissions: Emissions of 0.6 tons CO_2 equivalent per ton of MSW.
Criteria pollutant emissions: Plasco provides an emissions profile for the production of electricity, including the following pollutants: particulate matter, organic matter (CH_4), HCl, SO_2, NO_x, Hg, Cd, Pb, dioxins and furans. The company provides guaranteed "Plasco Regulated Limit" and more stringent "Plasco Target" emission values for these pollutants, and the company is committed to achieving these limits.
Air pollution control equipment and odor control: Information not provided.
Process water consumption: Information not provided.
Wastewater discharge: Information not provided.
Electrical consumption: Gross electric generation 27 MW; internal usage 6 MW; net electric generation 21 MW. CHA calculates this internal usage as 300 kWh/ton of MSW.
Natural gas requirements: Information not provided.

Readiness and Reliability
Maturity and suitability for permitting: To date, Plasco does not operate any commercial facilities. Its commercial-scale demonstration facility in Ottawa has been operating since January 2008.
Construction and performance guarantees: Plasco would assume all financial risk for the development and operation of the facility. As a performance guarantee, Plasco offers the following: If a facility does not meet its "Plasco Regulated Limit" for emissions, the company will remove the plant at no cost and return the land to its original state, and end the supply agreement without penalty.
Timeframes: Plasco would develop an operational facility within 18 months of acquiring permits.

Beneficial Reuse of MSW Byproducts
Energy generation: Net 1.1 MWh/ton.
Solid or gaseous byproducts: Materials recovered from 1 ton of waste include the following: 330 lbs. slag; 10-20 lbs. salt, 10 lbs. sulfur, 80 gallons potable quality water, 15-35 lbs. recyclable metals.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: The response claims that less than 1% of incoming waste (3 lbs./ton) would require landfill disposal. This residual waste consists of the segregated heavy metals caught by filter media. If slag is landfilled, then 17% residue.
Anticipated hazardous waste characterization: Information not provided.

Company Name: Powers Energy of America
Technology Category: Gasification, Biofuel Production

Powers Energy is a national firm headquartered in Evansville, Indiana, and presents a process to produce biofuels and electricity from MSW. Two Powers Energy operating companies are established: Powers Energy One of Indiana has been established to develop an MSW facility in Lake County, Indiana, and Powers Energy Two of Kentucky, LLK has been established to develop a facility in northwestern Kentucky. INEOS Bio and Kellog Brown and Root (KBR) provide technical, design and construction support for Powers Energy facilities.

MSW feedstock would be delivered, handled and contained within the indoor facility. Carbon-based MSW/feedstock materials are mixed, crushed or shredded and fed into a gasification plant for bioethanol production. Feedstock materials are converted to a syngas product in the gasifiers by heating the materials in to different stages to temperatures in excess of 2,000 degrees Fahrenheit. Heat recovered from the gasifier is used to generate steam and electricity. Syngas leaving the gasifier is refined, cooled and passed through the biological fermenter, where 70-90% of the gas will be converted to bioethanol through microbial activity. Off-gas from the fermenter is routed for use in steam generation. Bioethanol products are go through a refining process and market for use as a fuel. Ash from the gasifier is sent to a landfill for disposal.

Powers Energy responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects:
Powers Energy is involved in a project in Lake County, Indiana that involves, to date, the financing, site evaluation and engineering of a gasification/biofuel production facility with a minimum capacity of 2,000 tpd. The facility is anticipated to generate 36 million gallons of bioethanol fuel, 42,600 tons of recyclable metals and 20 MW of power on annual basis, and may continue to expand in response to future market demand. Powers Energy is also pursuing agreements for development of a facility in northwestern Kentucky, and has begun design and permitting for this facility.

Facility Sizing
Types of feedstock: MSW, food waste, paper, textiles, wood, yard waste, plastics, leather, rubber, oil-derived materials, agricultural residues, tires, coal, organic sludge.
Unacceptable wastes: Hazardous materials, C&D debris.
Proposed processing capacity to serve Planning Unit: Modular gasification units are designed to process 150 tpd of feedstock. Accounting for the recovery of recyclable materials and moisture content, this equates to approximately 450 tpd per two gasifiers. Powers energy would install four gasifiers (~900 tpd capacity) to process waste for the Planning Unit.
Site requirements: 60 acres to accommodate facility and space for potential future expansion. 100-150 acres for a site with rail service.

Alternate size for larger or optimally-sized facility: A larger facility could be designed if needed; the company realizes little gain beyond 2,000 tpd.
Minimum feasible facility size: 4 gasifiers/200,000 tpy, such as needed for the Planning Unit.

Costs of Ownership and Operation
Initial capital cost: Approximately $100 million.
Operating cost: $72.23/ton; includes costs of facility maintenance, labor, landfill and recyclables hauling, and landfill disposal. Additional expenses including insurance, depreciation, interest, technology licensing, municipal and county host fees, management fee, administration, contractual and contingency costs represent a total $71.02.
Tipping fee: Information not provided.
Electric and other revenues: Ethanol sales would be approximately 13 million gallons at 211,000 tpy. Total projected revenue from all sources (recovered materials, ethanol biofuels, electric sales) is estimated at $189/gross ton of feedstock.

Environmental Impacts
Greenhouse gas emissions: Greenhouse gas emissions of 0.54 tons CO_2 equivalent per ton of MSW.
Criteria pollutant emissions: Air and water emissions data are provided for a Powers Energy pilot facility. Information is provided for airborne emissions of particulate matter, CO, NOx, SO_2, VOC, Pb, Hg, Cd, HCl, PCB and CDD/CDF. Emissions would meet all EPA and state requirements.
Air pollution control equipment and odor control: Odors and emissions from MSW off-loading will be contained within the waste handling facility. The handling floor will be designed to capture any leakage from incoming feedstock. A dry gas cleaning system injects lime and activated carbon into syngas products to capture HCl and any volatile metals. Bag filtering is used to capture solid particulates. The biological fermenter provides additional scrubbing, and off-gas passes through further cleaning measures to remove any remaining contaminants.

Process water consumption: Fresh water consumption is approximately 1.5 gallons per gallon of ethanol produced. Approximately 13 million gpy of water would be required to process 211,000 tons MSW. This equates to about 62 gallons per ton of MSW processed. Process water is reused.
Wastewater discharge: Wastewater is treated onsite and reused. Volume of discharge not provided.
Electrical consumption: Approximately 1/3 of electricity generated will be sold; presumably, this means that 2/3 of this electricity would be used by the facility. Gross and net generation information not provided; a 2,000 tpd facility has 20 MW output. Based on this information, CHA estimates gross output of 240 kWh/ton, internal consumption of 160 kWh/ton and net generation of 80 kWh/ton.
Natural gas requirements: A small amount of natural gas is required for startup.

Readiness and Reliability

Maturity and suitability for permitting: INEOS Bio is identified as a partner and has operated a pilot plant for over 5 years. The proposed facility would use equipment, materials and technology that is currently available to the chemical and petroleum industries. All technologies are proven, and Powers Energy anticipates no risks associated with a scaled-up facility relative to the pilot facility. All equipment will be field tested prior to commercial production of the facility. Overall system reliability is expected to be 95% or higher.
Timeframes:

Information not provided.

Beneficial Reuse of MSW Byproducts
Energy generation: 2,000 tpd facility has 20 MW electrical output. A 211,000 tpy facility would generate 13 million gpy of bioethanol.
Solid or gaseous byproducts: Recovered materials, including ferrous and non-ferrous metals, would be sold on the commodities market.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: Maximum 10% of the raw MSW feedstock.
Anticipated hazardous waste characterization: TCLP analysis from the pilot facility shows metal concentrations below EPA standards.

Company Name: Startech Environmental Corp.
Technology Category: Plasma Technology

Startech is a Wilton, Connecticut based public company that offers a plasma processing technology for MSW disposal. The company was founded in 1993 and was established in 1995 as a public company. Startech has built and delivered two small (5-7 tpd) units to customers in the U.S. and Japan, and operates a 5 tpd system at its Bristol location. The company has a 30,000 sf manufacturing facility where its systems are built, and is in the process of developing several facilities in overseas markets.

The Plasma Converter System utilizes plasma – an electrically charged, ionized gas – to process waste materials at extremely high temperatures. Organic components of the incoming waste are used to create a plasma-converted syngas, which in turn can be used to produce electricity, recover hydrogen, and to make industrial materials. Outputs include a Plasma Converted Gas (PCG) fuel consisting of primarily hydrogen and carbon monoxide, and a glassy black obsidianite material. PCG can be reused or recycled as a fuel or as a synthesis gas to produce electricity, recover hydrogen, or to make industrial products. The Startech technology can be used to process a variety of hazardous and non-hazardous waste materials.

Startech responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: In 1996-1997 Startech built and delivered a 7 tpd system to the U.S. Army's Aberdeen Proving Ground in Maryland. In 2001, the company opened a facility in Bristol, Connecticut which houses a 5 tpd system used for customer training, marketing and demonstration purposes. In 2001 Startech delivered a 5 tpd system to Japan for the processing of PCBs and hazardous incinerator ash.

To date, Startech has no full-scale commercial MSW facilities in operation. The company has signed contracts for two 300 tpd MSW facilities in Europe with additional orders pending for MSW facilities in Panama (200 and 350 tpd) and Europe (100 tpd). Startech is currently manufacturing multiple systems for Puerto Rico and Poland.

Facility Sizing
Types of feedstock: The Plasma Converter can process virtually any waste materials. Following is a partial list of materials: MSW, PCBs, asbestos, municipal sludge, biomedical waste, spent pot linings from aluminum smelters, solvents and paints, contaminated soils, waste oil, filters, insect/pesticides, explosives, munitions, spent activated charcoal, hazardous incinerator ash, electronic waste, petroleum sludge, confiscated drugs, tires, C&D materials.
Unacceptable wastes: None listed.
Proposed processing capacity to serve Planning Unit: The facility would accommodate the baseline 227,000 tpd waste quantity.
Site acreage required: Minimum 5 acres.

Alternate size for larger or optimally-sized facility: Modular design allows for future expansion.
Minimum feasible facility size: Information not provided.

Costs of Ownership and Operation
Initial capital cost: Information not provided.
Operating cost: Information not provided.
Tipping fee: Information not provided.
Electric revenues: Information not provided.

Environmental Impacts
Greenhouse gas emissions: Information not provided.
Criteria pollutant emissions: "The Startech system's environmental performance is safer than the United States EPA standards and regulations."
Air pollution control equipment and odor control: Information not provided.
Process water consumption: Information not provided.
Wastewater discharge: Information not provided.
Electrical consumption: Depending on the wastes or feedstocks being processed, the converter will produce more energy than it uses.
Natural gas requirements: Information not provided.

Readiness and Reliability
Maturity and suitability for permitting: Startech does not identify any full-scale commercial MSW processing facilities operating in the U.S. or abroad.

The company indicates that "There are many Startech Plasma Converter projects both in the United States and abroad that have had their environmental impact assessments and permit applications approved by the regulating authorities for operations".

Construction and performance guarantees: Because the system is electrically driven, its operation is easily controlled and therefore safe. Typically, individual chambers will be shut down for routine maintenance for one half hour of every 300 hours of operation.
Timeframes:
Information not provided.

Beneficial Reuse of MSW Byproducts
Energy generation: Information not provided.
Solid or gaseous byproducts: Component materials of feedstock can be recovered in from one to three distinct phases: Synthesis gas, inorganic glasslike silicates, and liquid metallic elements which collect and are discharged at the base of the vessel.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: Information not provided.
Anticipated hazardous waste characterization: The solid obsidianite product is inert and non-leachable when subjected to Toxicity Characteristic Leachate Procedures (TCLP) protocols.

Company Name: Taylor Biomass Energy
Technology Category: Gasification

Taylor Biomass Energy (TBE) is headquartered in Montgomery, NY and currently operates a C&D sorting and recycling process in the Town of Montgomery. TBE plans to expand this existing system and couple it with biomass gasification.

Sorted feedstock is fed into the gasification reactor, where it undergoes a rapid thermal breakdown to produce a syngas product. The syngas is conditioned and used to generate electricity. A combustion reactor is used to further process char products, and final ash products are disposed of at a landfill.

Taylor Biomass Energy responses to the evaluation criteria include the following:

Experience of Project Sponsor:
Experience with similar projects: TBE owns and operates a C&D sorting and recycling facility in Montgomery, NY, which opened in 1989. This facility produces approximately 300 tpd (dry basis) of a biomass mix that would be appropriate for gasification feedstock. The process also removes various non-biomass materials for recycling or disposal. 97% of the incoming material is converted into useful products.

TBE has a project underway to couple a gasification process with the existing sorting and recycling process at the Montgomery facility. Permitting is currently underway for this action; all permitting documents have been submitted to DEC for review, and action on the final Part 360 permit document was expected within 3 to 6 months of TBE's March 2009 response date.

Facility Sizing
Types of feedstock: MSW, C&D waste, wood.
Unacceptable wastes: Painted and pressure-treated lumber, PVC plastics, hazardous or radioactive materials including lead-based paints and solvents, tires, batteries, electronics, electrical motors/transformers/ballasts, asbestos-containing materials.
Proposed processing capacity to serve Planning Unit: The facility would accommodate the Planning Unit's 227,000 tpy baseline waste quantity, and CHA estimates a design capacity of 750 tpd. .
Site acreage required: 8-12 acres; a compact 5-6 acre layout could potentially be implemented. TBE anticipates that the proposed facility could be located at the Rapp Road Landfill.
Alternate size for larger or optimally-sized facility: Information not provided.
Minimum feasible facility size: Information not provided.

Costs of Ownership and Operation
Initial capital cost: Approximately $100 million including engineering, equipment purchase and installation for the sorting and separating, gasification, power, electric interconnection and initial site preparation. Based on the assumed 750 tpd design capacity, CHA estimates an initial capital cost of $133,000/tpd of design capacity.

Operating cost: Approximately $15 million annually ($137/dry ton): $5.5 million for sorting and separation, $4.8 million for gasification, $4.7 million for power production. These costs include labor, maintenance and ash disposal. Based on this information, CHA calculates a total operating cost of $66/ton.
Tipping fee: Information not provided.
Electric revenues: TBE expects to be cost-competitive with current avoided costs in the Albany region. The company would expect to execute a long-term power purchase agreement using a front-end-loaded, levelized avoided cost basis.

Environmental Impacts
Greenhouse gas emissions: The process is CO_2 neutral, meaning that all CO_2 discharged by the system is consumed in the production of new fuel for the system. The gasification based system has an overall efficiency of 40%, which compares favorably to the efficiency of a combustion-based power system. VOC emissions are eliminated from the stack. CO_2 emissions would be reduced by approximately 47% relative to direct combustion, on a lb/MW basis. Approximately 2.5 tons/MW of CO_2 equivalent emissions are avoided by eliminating the need for biomass landfilling.
Criteria pollutant emissions: NO_x emissions approximately 0.5 lb/MW; CO emissions approximately 0.2 lb/MW; particulate emissions less than 0.1 lb/MW; SO_2, hydrocarbon emissions near zero.
Air pollution control equipment and odor control: Nitrogen oxides are controlled by the use of SCRs in the turbine exhaust as well as in the process combustor. CO levels are kept low by the use of oxidation catalysts in the exhaust streams.
Process water consumption: Use of a water-cooled condenser would require 187,000 gpd. If water supplies are restricted, this requirement could be virtually eliminated by using an air-cooled condenser.
Wastewater discharge: Approximately 10 gallons/minute or 14,400 gpd. Discharged water will be treated by filtration and active charcoal to remove contaminants.
Electrical consumption: Gross electric generation 0.85 MW/ton; internal usage 0.15 MW/ton; net electric generation 0.7 MW/ton.
Natural gas requirements: Natural gas is used for startup of the gasification process and gas turbine. Startup period is approximately 12 hours in duration and will occur once or twice annually during normal operations.

Readiness and Reliability
Maturity and suitability for permitting: A number of technologies utilizing this gasifier technology are under development; these include the FICFB gasifier in Gussig, Austria, the SilvaGas facility in Burlington, Vermont, the ENSYN pyrolysis process, the Thremochem process and other processes being developed in Europe and China. TBE is awaiting permit approval for the application of a similar process in Montgomery, NY.
Construction and performance guarantees: Performance guarantees and any potential risks will be addressed in the same manner as in Montgomery, NY. An efficacy insurance policy will be acquired to provide sufficient resources to cover these issues.
Timeframes:
Facility design: 6 months
Facility "permitting": 9 to 12 months (parallel activity)

Facility construction: 12 to 18 months
Start-up and acceptance testing: 6 months
Total timeframe: 30 months

Beneficial Reuse of MSW Byproducts
Energy generation: Net 0.7 MW/ton of raw MSW.
Solid or gaseous byproducts: Potential reuse of ash as an ingredient in concrete manufacturing or as a component of alternative daily cover at landfills.

Residue Requiring Landfill Disposal
Percent residue requiring landfill disposal: 15-20% of incoming waste as ash requiring landfill disposal.
Anticipated hazardous waste characterization: Based on experimental data, process ash will be non-leachable and readily disposed of at a standard landfill.