

Exhibit A
SCOPE OF WORK

TECHNICAL TASK LIST

Task #	CPR	Task Name
1.0		Administration
2		SITE DESIGN AND LAYOUT
3		DEVELOP DEMONSTRATION TEST PROGRAM
4	X	PLANT EQUIPMENT PROCUREMENT AND INSTALLATION
5	X	EQUIPMENT START-UP, DEBUG AND COMMISSIONING
6		DEMONSTRATION PLANT OPERATION
7		ANALYZE PROCESS PRODUCTS, BYPRODUCTS AND EMISSIONS
8		ECONOMIC ANALYSIS OF B2E SYSTEM
9		PRODUCTION READINESS PLAN
10		IMPLEMENTATION PLAN

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1.0	Caroline Quinn,	Intellergy Corp.	
2	Caroline Quinn,	Intellergy Corp.	
3	Caroline Quinn,	Intellergy Corp.	
4	Caroline Quinn,	Intellergy Corp.	
5	Caroline Quinn,	Intellergy Corp.	
6	Caroline Quinn,	Intellergy Corp.	
7	Caroline Quinn,	Intellergy Corp.	
8	Caroline Quinn,	Intellergy Corp.	
9	Caroline Quinn,	Intellergy Corp.	
10	Caroline Quinn,	Intellergy Corp.	

GLOSSARY

Specific terms and acronyms used throughout this work statement are defined as follows:

Acronym	Definition
B2E	Biosolids to Energy
BAB2E	Bay Area Biosolids to Energy Coalition
BTU	British Thermal Unit
CCM	Commission Contract Manager
CPR	Critical Project Review

Acronym	Definition
CO ₂	Carbon Dioxide
DTPD	Dry Tons Per Day
EPA	United States Environmental Protection Agency
GHG	Green House Gas
GWh	Gigawatt-hours
POTW	Publicly Owned Treatment Works
PAC	Project Advisory Committee
PIER	Public Interest Energy Research
RFQ	Request for Qualifications
RPS	Renewable Portfolio Standard
SOQ	Statements of Qualifications
TBD	To Be Determined
TPD	Tons Per Day

Problem Statement

Biosolids are the by-product of wastewater treatment facilities, produced by removing the organics from municipal sewage and treating them to reuse standards. In 2009, California generated 661,000 dry metric tons of biosolids¹. The Bay Area alone generates over 158,000 dry metric tons of biosolids annually. Presently, the options for using biosolids are very limited (primarily land application and alternative daily cover in landfills) and face increasing challenges that may ultimately eliminate these options. For many Publicly Owned Treatment Works (POTWs), the present practice also involves long distance hauling of biosolids, requiring additional fuel and creating air pollution, including greenhouse gas emissions. At the same time, there is great need to expand our renewable energy resources. Progress towards meeting California's ambitious bioenergy goals has been slow, and in some cases, California is losing ground.² Electricity generated from biomass fuels decreased from 6,192 gigawatt-hour (GWh) in 2002, to 5,724 GWh in 2008; while California's total electricity generation and demand has increased.³ Meeting California's 20 percent Renewable Portfolio Standard (RPS) goal and the 2010 biopower targets would require an additional 6,562 GWh biopower generation annually assuming that total electricity consumption in 2010 will remain the same as in 2008 at 307,141 GWh.⁴ The Global Warming Solutions Act, which requires a 25% cut in the California's greenhouse gas (GHG) emissions by 2020 and an 80% cut by 2050, is another consideration supporting local sustainable renewable energy solutions.

¹ U.S. EPA Region 9

² 2009 Progress to Plan, *Bioenergy Action Plan for California*, prepared for the Bioenergy Interagency Working Group, April 2010.

³ Daryl Metz presentation at the 2009 Integrated Energy Policy Report staff workshop on Research Development and Demonstration of Advanced Generation Technologies, "California Generation Portfolio," California Energy Commission, August 10, 2009.

⁴ 2009 Progress to Plan, *Bioenergy Action Plan for California*, prepared for the Bioenergy Interagency Working Group, April 2010.

Due to the responsibility that wastewater treatment agencies bear for providing an essential public service at ratepayer expense, they have historically been slow to adopt new technologies. Still, industry awareness of the inherent energy potential in the resource they manage is growing and many wastewater agencies are interested in increasing the energy tapped from wastewater. However, barriers exist, particularly in the area of utilizing biosolids. Principle barriers to utilizing biosolids as an energy resource include: overcoming the high water content to achieve net energy production; air quality issues; negative public perception and high cost with limited funding alternatives. Municipal agencies will require guidance from successful projects to use as a foundation in their decision-making.

The Bay Area Biosolids to Energy (BAB2E) Coalition is a consortium of sixteen Bay Area public agencies seeking innovative, local, sustainable solutions to biosolids management by utilizing the latent energy contained in the material. The Coalition issued a request for qualifications (RFQ) from teams interested in developing a regional biosolids to energy facility. The RFQ also asked teams to identify proposed technologies. The resulting Statements of Qualifications (SOQ) were evaluated and screened down to the three most qualified teams with the most promising concepts. One of the concepts, while promising, involves a technology that has yet to be commercially demonstrated with biosolids. The Coalition proposes to research the viability of this technology, known as “steam/ carbon dioxide (CO₂) reforming” for converting biosolids to renewable fuels and products, mainly hydrogen. Demonstration of the steam/CO₂ reforming technology to reliably and efficiently process biosolids and produce hydrogen gas can potentially address the technical and economic barriers to the use of biosolids for energy application.

Goals of the Agreement

The overall goal of the project is to develop, demonstrate, and implement a system or systems for commercially converting biosolids to energy (B2E) that will maximize the energy production from the biosolids and minimize the solid and liquid waste disposal requirements while meeting California’s environmental standards including air emission limits. Specific studies will investigate comprehensive aspects of biosolids conversion ranging from fuel supply characterization, site suitability issues, economics, and environmental impacts. An implementation plan that will guide the succeeding phases such as design, installation, and operation of a biosolids to energy facility will also be developed. Beneficial use alternatives for the residual material will also be determined.

Objectives of the Agreement

The objectives of this Agreement are to:

- Design and construct a conversion facility to process approximately 7 dry tons per day (DTPD) biosolids;
- Demonstrate that this process can reliably convert biosolids to hydrogen gas for electrical power production or as alternative fuel;
- Demonstrate electrical power generation using the fuel generated by conversion

- of biosolids,
- Analyze the process emissions to verify that all applicable California environmental standards can be met;
 - Estimate the net energy available from the process;
 - Assess capital and operational costs and economic performance of the process;
 - Make available technical data for use by agencies interested in developing a biosolids to energy program.

TASK 1.0 ADMINISTRATION

MEETINGS

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

The Contractor shall:

- Attend a “kick-off” meeting with the Commission Contract Manager, the Contracts Officer, and a representative of the Accounting Office. The Contractor shall bring their Project Manager, Contracts Administrator, Accounting Officer, and others designated by the Commission Contract Manager to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Contract Manager will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Terms and conditions of the Agreement
- CPRs (Task 1.2)
- Match fund documentation (Task 1.7)
- Permit documentation (Task 1.8)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Contract Manager’s expectations for accomplishing tasks described in the Scope of Work;
- An updated Schedule of Deliverables
- Progress Reports (Task 1.4)
- Technical Deliverables (Task 1.5)
- Final Report (Task 1.6)

The Commission Contract Manager shall designate the date and location of this meeting.

Contractor Deliverables:

- An Updated Schedule of Deliverables
- An Updated List of Match Funds
- An Updated List of Permits

Commission Contract Manager Deliverables:

- Final Report Instructions

Task 1.2 CPR Meetings

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and if it should, are there any modifications that need to be made to the tasks, deliverables, schedule or budget.

CPRs provide the opportunity for frank discussions between the Energy Commission and the Contractor. CPRs generally take place at key, predetermined points in the Agreement, as determined by the Commission Contract Manager and as shown in the Technical Task List above and in the Schedule of Deliverables. However, the Commission Contract Manager may schedule additional CPRs as reasonably necessary, and any additional costs will be borne by the Contractor.

Participants include the Commission Contract Manager and the Contractor, and may include the Commission Contracts Officer, the PIER Program Team Lead, other Energy Commission staff and Management as well as other individuals selected by the Commission Contract Manager to provide support to the Energy Commission.

The Commission Contract Manager shall:

- Determine the location, date and time of each CPR meeting with the Contractor. These meetings generally take place at the Energy Commission, but they may take place at another location.
- Send the Contractor the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not to modify the tasks, schedule, deliverables and budget for the remainder of the Agreement, including not proceeding with one or more tasks. If the Commission Contract Manager concludes that satisfactory progress is not being made, this conclusion will be referred to the Energy Commission's Research, Development and Demonstration Policy Committee for its concurrence.

- Provide the Contractor with a written determination in accordance with the schedule. The written response may include a requirement for the Contractor to revise one or more deliverable(s) that were included in the CPR.

The Contractor shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the project. This report shall be submitted along with any other deliverables identified in this Scope of Work. Submit these documents to the Commission Contract Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Contractor Deliverables:

- CPR Report(s)
- CPR deliverables identified in the Scope of Work

Commission Contract Manager Deliverables:

- Agenda and a List of Expected Participants
- Schedule for Written Determination
- Written Determination

Task 1.3 Final Meeting

The goal of this task is to closeout this Agreement.

The Contractor shall:

- Meet with the Energy Commission to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Contractor, the Commission Contracts Officer, and the Commission Contract Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Contract Manager.

The technical portion of the meeting shall present findings, conclusions, and recommended next steps (if any) for the Agreement. The Commission Contract Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Contract Manager and the Contracts Officer about the following Agreement closeout items:

- Energy Commission's request for specific "generated" data (not already provided in Agreement deliverables)
- "Surviving" Agreement provisions, such as repayment provisions and confidential deliverables
- Final invoicing and release of retention
- Prepare a schedule for completing the closeout activities for this Agreement.

Deliverables:

- Written documentation of meeting agreements and all pertinent information
- Schedule for completing closeout activities

REPORTING

See Exhibit D, Reports/Deliverables/Records.

Task 1.4 Monthly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement.

The Contractor shall:

- Prepare progress reports which summarize all Agreement activities conducted by the Contractor for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Contract Manager within 10 working days after the end of the reporting period. Attachment A-2, Progress Report Format, provides the recommended specifications.

Deliverables:

- Monthly Progress Reports

Task 1.5 Test Plans, Technical Reports and Interim Deliverables

The goal of this task is to set forth the general requirements for submitting test plans, technical reports and other interim deliverables, unless described differently in the Technical Tasks. When creating these deliverables, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/index.html>

The Contractor shall:

- Unless otherwise directed in this Scope of Work, submit a draft of each deliverable listed in the Technical Tasks to the Commission Contract Manager for review and comment in accordance with the approved Schedule of Deliverables. The Commission Contract Manager will provide written comments back to the Contractor on the draft deliverable within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final deliverable to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final deliverable within 5 working days of receipt. Key elements from this deliverable shall be included in the Final Report for this project.

Task 1.6 Final Report

The goal of this task is to prepare a comprehensive written Final Report that describes the original purpose, approach, results and conclusions of the work done under this Agreement. The Commission Contract Manager will review and approve the Final Report. The Final Report must be completed on or before the termination date of the Agreement. When creating these deliverables, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Contract Manager, the latest version of the PIER Style Manual published on the Energy Commission's web site:

<http://www.energy.ca.gov/contracts/pier/contractors/index.html>

The Final Report shall be a public document. If the Contractor has obtained confidential status from the Energy Commission and will be preparing a confidential version of the Final Report as well, the Contractor shall perform the following subtasks for both the public and confidential versions of the Final Report.

Task 1.6.1 Final Report Outline

The Contractor shall:

- Prepare a draft outline of the Final Report.
- Submit the draft outline of Final Report to the Commission Contract Manager for review and approval. The Commission Contract Manager will provide written comments back to the Contractor on the draft outline within 10 working days of receipt. Once agreement has been reached on the draft, the Contractor shall submit the final outline to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final outline within 5 working days of receipt.

Deliverables:

- Draft Outline of the Final Report
- Final Outline of the Final Report

Task 1.6.2 Final Report

The Contractor shall:

- Prepare the draft Final Report for this Agreement in accordance with the approved outline.
- Submit the draft Final Report to the Commission Contract Manager for review and comment. The Commission Contract Manager will provide written comments within 10 working days of receipt.
- Once agreement on the draft Final Report has been reached, the Commission Contract Manager shall forward the electronic version of this report for Energy Commission internal approval. Once the approval is given, the Commission Contract Manager shall provide written approval to the Contractor within 5 working days.
- Submit one bound copy of the Final Report with the final invoice.

Deliverables:

- Draft Final Report
- Final Report

MATCH FUNDS, PERMITS, AND ELECTRONIC FILE FORMAT

Task 1.7 Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. While the PIER budget for this task will be zero dollars, the Contractor may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds during the term of this Agreement. Match funds must be identified in writing, and the associated commitments obtained before the Contractor can incur any costs for which the Contractor will request reimbursement.

The Contractor shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:
 1. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the

time this Agreement starts, then state such in the letter.

2. If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:
 - A list of the match funds that identifies the:
 - Amount of each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied.
 - Amount of each in-kind contribution, a description, documented market or book value, and its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Contractor shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located.
 - A copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured.
 - Discuss match funds and the implications to the Agreement if they are significantly reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
 - Provide the appropriate information to the Commission Contract Manager if during the course of the Agreement additional match funds are received.
 - Notify the Commission Contract Manager within 10 working days if during the course of the Agreement existing match funds are reduced. Reduction in match funds may trigger an additional CPR.

Deliverables:

- A letter regarding Match Funds or stating that no Match Funds are provided
- Letter(s) for New Match Funds
- A copy of each Match Fund commitment letter
- Letter that Match Funds were Reduced (if applicable)

Task 1.8 Identify and Obtain Required Permits

The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. While the PIER budget for this task will be zero dollars, the Contractor shall show match funds for this task. Permits must be identified in writing and obtained before the Contractor can incur any costs related to the use of the permits for which the Contractor will request reimbursement.

The Contractor shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting:
 1. If there are no permits required at the start of this Agreement, then state such in the letter.
 2. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
 - A list of the permits that identifies the:
 - Type of permit
 - Name, address and telephone number of the permitting jurisdictions or lead agencies
 - Schedule the Contractor will follow in applying for and obtaining these permits.
- The list of permits and the schedule for obtaining them will be discussed at the kick-off meeting, and a timetable for submitting the updated list, schedule and the copies of the permits will be developed. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the appropriate information on each permit and an updated schedule to the Commission Contract Manager.
- As permits are obtained, send a copy of each approved permit to the Commission Contract Manager.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Contract Manager within 5 working days. Either of these events may trigger an additional CPR.

Deliverables:

- A letter documenting the Permits or stating that no Permits are required
- Updated list of Permits as they change during the Term of the Agreement

- Updated schedule for acquiring Permits as it changes during the Term of the Agreement
- A copy of each approved Permit

Task 1.9 Electronic File Format

The goal of this task is to unify the formats of electronic data and documents provided to the Energy Commission as contract deliverables. Another goal is to establish the computer platforms, operating systems and software that will be required to review and approve all software deliverables.

The Contractor shall:

- Deliver documents to the Commission Contract Manager in the following formats:
 - Data sets shall be in Microsoft (MS) Access or MS Excel file format.
 - PC-based text documents shall be in MS Word file format.
 - Documents intended for public distribution shall be in PDF file format, with the native file format provided as well.
 - Project management documents shall be in MS Project file format.
- Request exemptions to the electronic file format in writing at least 90 days before the deliverable is submitted.

Deliverables:

- A letter requesting exemption from the Electronic File Format (if applicable)

TECHNICAL TASKS

The Contractor shall prepare all deliverables in accordance with the requirements in Task 1.5. Deliverables not requiring a draft version are indicated by marking “(no draft)” after the deliverable name.

TASK 2 SITE DESIGN AND LAYOUT

The goals of this task are to prepare a set of construction plans and specifications as required for the fabrication and installation of the Intellergy system for processing up to 7 DTPD with power generation component. The project will be located at a site that is approved by the CCM.

The Contractor shall:

- Prepare design drawings for biosolids conversion and power generation facility with an approximate capacity of 7 DTPD
- Prepare Final Equipment and Site Modification Specifications
- Prepare and submit task report that includes generalized diagrams and description of design, plans and specifications

Deliverables:

- Task 2 Report (no draft)

TASK 3 DEVELOP DEMONSTRATION TEST PROGRAM

The goal of this task is to develop a demonstration test program.

The Contractor shall:

- Prepare the draft Demonstration Test Program which shall include, but is not limited to, the parameters to be measured, number of hours of operation, type of monitoring, a site security plan, and the manner in which the data will be validated, analyzed, and reported. Parameters that may be continuously measured include, but may not be limited to: processed volume, input flow (biosolids), output flows (hydrogen, air emissions, and solid residuals), operational parameters throughout the production units, and electric and heating usage. Power generation parameters, such as fuel cell performance will also be monitored.
- Conduct three (3) site visits and three (3) demonstration team meetings and prepare and submit meeting minutes.
- Review test plan internally and submit the Draft Demonstration Test Plan. The document shall include, but not be limited to: a description of the process to be tested; rationale for required tests; test objectives and technical approach; a description of facilities, equipment, and instrumentation required to conduct the tests; a description of test procedures, including parameters to be controlled and control methods; parameters to be measured and instrumentation to measure them, calibration procedures to be used, recommended calibration interval, and maintenance of the test log; description of data analysis procedures; description of quality assurance procedures; and contingency measures to be considered if test objectives are not met.
- Prepare and submit the Final Demonstration Test Plan. Key elements from this document shall be included in the Final Report.
- Prepare and submit meeting minutes to CCM.

Deliverables:

- Demonstration Test Program
- Minutes of demonstration team meetings (no draft)

TASK 4 PLANT EQUIPMENT PROCUREMENT AND INSTALLATION

The goal of this task is to install a fully functioning biosolids to energy conversion and power generation plant with an approximate capacity of 7 DTPD, ready for start-up.

The Contractor shall:

- Solicit bids for select system components based on Final Equipment and Site Modification Specifications.
- Purchase select equipment and system components.
- Prepare site for assembly and installation of system and equipment
- Install the biosolids to energy conversion and power generation system and

equipment

- Prepare and submit a letter documenting completion of plant installation
- Document and provide photographs of installation
- Participate in CPR per Task 1.2.

Deliverables:

- Letter of Completion (no draft)
- Photographs of installation
- CPR Report

TASK 5 EQUIPMENT START-UP, DEBUG, AND COMMISSIONING

The goals of this task are to commission the facility, test the equipment, bring the Intellergy biosolids conversion facility to the point that the Test Program developed under Task 2.2. Successful completion of this task will be measured by consistent and reliable operation of the demonstration plant at full output for seven days.

The Contractor shall:

- Conduct preliminary start-up testing of the biosolids conversion facilities to ensure that all equipment and data acquisition are working properly
- Prepare and Submit Monthly Start-Up and Debug Activity Reports, integrated with the regular monthly progress reports
- Calibrate test equipment and install data acquisition system.
- Prepare Outline of Start-Up Activities and Field Notes
- Provide written notification to the CCM certifying readiness to operate for Test Program
- Participate in CPR per Task 1.2

Deliverables:

- Written Notification Certifying Readiness to Operate (no draft)
- CPR Report

TASK 6 DEMONSTRATION PLANT OPERATION AND EVALUATION

The goal of this task is to successfully complete a minimum 6-month demonstration operation of the Intellergy steam/CO₂ reforming process on biosolids. Successful completion of this task will be measured by collection of data and operating experience. Other measures of success will be demonstrating that consistent product quality can be achieved at various throughput rates and that energy recovery from demonstration plant waste streams can be accomplished by WWTP operations.

The Contractor shall:

- Operate the demonstration unit as continuously as possible
- Conduct routine operations and maintenance of the demonstration plant including daily status checks

- Conduct preventive maintenance procedures on a regular basis
- Conduct an on-site plant inspection on a daily basis and make non-routine repairs
- Conduct all routine monitoring and special testing and inspections per approved test plan
- Develop and study performance trends
- Troubleshoot performance and reliability problems
- Prepare and submit monthly performance summary reports indicating the performance parameters identified in the test plan
- Coordinate staffing, material delivery, and product export
- Monitor and record information for energy and mass balance evaluations
- Monitor and record consumable usage
- Coordinate sampling and testing of inputs and outputs
- Prepare and refine energy and mass balance for the facility, comparing to simulation results
- Prepare and submit a Task report that includes documentation of operations (electrical power generation, net energy produced, process emissions, etc.), key results and lessons from the monthly performance report

Deliverables:

- Monthly Performance Summary Reports (no draft)
- Task 6 report

TASK 7 ANALYZE PROCESS PRODUCTS, BY-PRODUCTS AND EMISSIONS

The goal of this task is to evaluate the process products and waste streams, including solid, liquid and air emissions, and identify the corresponding handling and management requirements.

The Contractor shall:

- Determine potential physical and operational issues, including technological deficiencies
- Develop a refined mass and energy balance for Intellergy technology
- Measure the volume and characterize (e.g. identify and quantify constituents) and analyze the management needs of solid, liquid and gaseous products and by-products, including the wastewater from the dryer
- Analyze air emissions, identifying and measuring constituents, including GHG and criteria pollutants; perform air modeling and risk assessment; compare emissions to state and local air quality management district air quality regulations and evaluate emission control needs and alternatives
- Determine a range of system performance criteria including identifying product quality control, and identifying and measuring energy generation and waste residual management and emissions
- Determine electricity production from fuel cells
- Prepare and submit a task report containing data, analyses and results

Deliverables:

- Task 7 report

TASK 8 ECONOMIC ANALYSIS OF B2E SYSTEM

The goal of this task is to assess the costs associated with the installation and operation of the Intellergy system as it relates to biosolids processing.

The Contractor shall:

- Provide cost to operate and maintain a facility based on a dry and wet ton basis. This should be both total annual costs and total life cycle costs
- Provide power costs to operate facility
- Document electrical production from installed fuel cell
- Provide hydrogen production analysis
- Estimate costs to transport biosolids and potential to reduce hauling distances
- Provide cost estimates for regional and sub-regional Intellergy facilities
- Prepare and submit report on the economic analysis of the biosolids to energy conversion and power generation system, based on the Intellergy technology

Deliverables:

- Economics of the B2E System Report

TASK 9 PRODUCTION READINESS PLAN

The goal of this task is to determine the steps that will lead to the mass manufacturing of the modular process skid-mounted plants developed in this project.

The Contractor shall

- Prepare a Production Readiness Plan. The degree of detail in the Production Readiness Plan discussion should be proportional to the complexity of producing the proposed product and its state of development. The plan shall include as appropriate but not be limited to:
 - Identification of critical production processes, equipment, facilities, personnel resources, and support systems that will be needed to produce a commercially viable product
 - Internal manufacturing facilities, as well as supplier technologies, capacity constraints imposed by the design under consideration, identification of design critical elements and the use of hazardous or non-recyclable materials. The product manufacturing effort may include "proof of production processes"
 - A projected estimated cost for the equipment when in full production
 - The expected investment threshold to launch the commercial product
 - An implementation plan to ramp up to full production

- Prepare and submit the draft and final Production Readiness Plan

Deliverables:

- Production Readiness Plan

TASK 10 IMPLEMENTATION PLAN

The goal of this task is to generate a comprehensive plan for procurement, parts quality control, skid fabrication and installation, and operation of the selected B2E system. The BAB2E Coalition will use the information gathered in this process to assess the Intellergy technology and determine whether it meets the Coalition's needs for producing energy from biosolids. The Coalition will also be able to determine whether it is economically feasible to utilize the technology at its individual wastewater treatment facilities or on a regional basis with larger Intellergy facilities.

The Contractor shall:

- Prepare an Implementation Plan utilizing the information gathered during the demonstration project. Prepare a site analysis report to determine potential locations for regional or sub-regional full scale biosolids processing facilities
- Conduct an equipment cost analysis
- Conduct an operating cost analysis
- Conduct an analysis of potential environmental impacts
- Prepare and submit an analysis report integrating the results of equipment cost, operating cost, and potential environmental impacts analyses

Deliverables:

- Implementation Plan
- Analysis Report (no draft)