

CONTRACT REQUESTS FORM (CRF)

CEC-94 (Revised 5/11)

CALIFORNIA ENERGY COMMISSION


 New Contract 500-11-030 Amendment to Existing Contract: _____ Amendment Number: _____

Division	Contract Manager:	MS-	Phone	CM Training Date
Energy Research and Development	Marla Mueller	43	916-327-1716	8/19/2002

Contractor's Legal Name	Federal ID Number
CSU Fullerton Auxiliary Services Corporation	95-2081258

Title of Project
Air Quality Issues Related to Using Biogas from Anaerobic Digestion of Food Waste

Term	Start Date	End Date	Amount
New/Original Contract	6/29/2012	3/30/2015	\$ 164,201

Line up the Amendment information as best as possible within the following table.

Amendment #	End Date (mm/dd/yy)	Amount

Business Meeting Information

Proposed Business Meeting Date	6/13/2012	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Marla Mueller	Time Needed:	5 minutes

Agenda Item Subject and Description

Possible approval of Contract 500-11-030 for \$164,201.00 with the CSU Fullerton Auxiliary Services Corporation to determine air quality affects of biogas from anaerobic digesters using treated food waste. Emissions from beneficial uses of this type of biogas will also be investigated through field sample collection and analysis. (PIER electricity funding.) Contact: Marla Mueller (5 minutes)

Business Meeting approval is not required for the following types of contracts: *Executive Director's signature is required in all cases.*

- Contracts less than \$10k (*Policy Committee's signature is also required*)
- Amendment for a no-cost time extension. Must be first extension, less than one year and original contract less than \$100k.
- Contracts less than \$25k for Expert Witness in Energy Facility licensing cases and amendments.

Purpose of Contract or Purpose of Amendment, if applicable

The goal of this agreement is to provide scientific information on air quality of biogas from anaerobic digesters treating food waste and the emissions from beneficial uses of this type of biogas through field sample collection and analysis. The field data and samples will be collected from the RP-5 Solids Handling Facility at Inland Empire Utility Agency and analyzed. The overall objectives of this proposed project are (1) to more accurately estimate emissions from anaerobic digesters that use food waste as the main feed, (2) to develop scientific information needed for conditioning/pretreatment of raw biogas, and (3) to develop the scientific information needed to support the air quality permitting process for this type of anaerobic digester in the future.

CONTRACT REQUESTS FORM (CRF)



California Environmental Quality Act (CEQA) Compliance

1. Is Contract considered a "Project" under CEQA?
 Yes: skip to question 2 No: complete the following (PRC 21065 and 14 CCR 15378):
 Explain why contract is not considered a "Project":
 Contract will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because it involves sampling and analyzing the emissions from biogas used in anaerobic digesters in a laboratory .

2. If contract is considered a "Project" under CEQA:
 a) Contract **IS** exempt. (Draft NOE required)
 Statutory Exemption. List PRC and/or CCR section number: _____
 Categorical Exemption. List CCR section number: _____
 Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why contract is exempt under the above section:

b) Contract **IS NOT** exempt. The Contract Manager needs to consult with the Energy Commission attorney assigned to their division and the Siting Office regarding a possible Initial Study.

Budgets Information								
Contract Amount Funded		Breakdown by FY			Funding Sources			
Funding Source	Amount	FY	Amount	Approved?	Funding Source	FY	Budget List No.	Amount
ARFVTF	\$	11-12	\$164,201	Yes	PIER-E	11-12	501.027J	\$164,201
ECAA	\$		\$					\$
State- ERPA	\$		\$					\$
Federal	\$		\$					\$
PIER - E	\$164,201		\$					\$
PIER - NG	\$		\$					\$
Reimbursement	\$		\$					\$
Other	\$		\$					\$
TOTAL:	\$164,201	TOTAL:	\$164,201				TOTAL:	\$164,201
Reimbursement Contract #:					Federal Agreement			

Contractor's Administrator/ Officer		Contractor's Project Manager	
Name:	Denis Bell	Name:	Denis Bell
Address:	CSU Fullerton Auxiliary Services Corporation 2600 Nutwood Ave, CP-275	Address:	CSU Fullerton Auxiliary Services Corporation 2600 Nutwood Ave, CP-275
City, State, Zip:	Fullerton, CA 92831	City, State, Zip:	Fullerton, CA 92831
Phone/ Fax:	657-278-4110 / 657-278-1185	Phone/ Fax:	657-278-4110 / 657-278-1185
E-Mail:	dbell@fullerton.edu	E-Mail:	dbell@fullerton.edu

Contractor Is

Private Company (including non-profits)
 CA State Agency (including UC and CSU)
 Government Entity (i.e. city, county, federal government, air/water/school district, joint power authorities, university from another state)

Selection Process Used

Solicitation Select Type Solicitation #: _____ # of Bids: _____ Low Bid? No Yes
 Non Competitive Bid (Attach CEC 96)
 Exempt Other Government Entity

Civil Service Considerations

Not Applicable (Contract is with a CA State Entity or a membership/co-sponsorship)
 Public Resources Code 25620, et seq., authorizes the Commission to contract for the subject work. (PIER)



- The Services Contracted:
- are not available within civil service
 - cannot be performed satisfactorily by civil service employees
 - are of such a highly specialized or technical nature that the expert knowledge, expertise, and ability are not available through the civil service system.
- The Services are of such an:
- urgent
 - temporary, or
 - occasional nature
- that the delay to implement under civil service would frustrate their very purpose.

Justification:

Contract is with a CSU.

Payment Method

- A. Reimbursement in arrears based on:
- Itemized Monthly
 - Itemized Quarterly
 - Flat Rate
 - One-time
- B. Advanced Payment
- C. Other, explain:

Retention

1. Is contract subject to retention? No Yes
- If Yes, Do you plan to release retention prior to contract termination? No Yes

Justification of Rates

The rates paid are in accordance with the established rates between the Energy Commission and the California State University.

Disabled Veteran Business Enterprise Program (DVBE)

1. Not Applicable
2. Meets DVBE Requirements DVBE Amount:\$ _____ DVBE %: _____
- Contractor is Certified DVBE
 - Contractor is Subcontracting with a DVBE: _____
3. Requesting DVBE Exemption (attach CEC 95)

Is Contractor a certified Small Business (SB), Micro Business (MB) or DVBE? No Yes

If yes, check appropriate box:

 SB MB DVBE**Is Contractor subcontracting any services?** No Yes

If yes, give company name and identify if they are a Small Business (SB), Micro Business (MB) and/or DVBE:

Miscellaneous Contract Information

1. Will there be Work Authorizations? No Yes
2. Is the Contractor providing confidential information? No Yes
3. Is the contractor going to purchase equipment? No Yes
4. Check frequency of progress reports
- Monthly
 - Quarterly
 - _____
5. Will a final report be required? No Yes
6. Is the contract, with amendments, longer than a year? If yes, why? No Yes

The Department of General Services has agreed to give the Commission blanket authority to execute multi-year contracts to support the Commission's RD&D Programs.

CONTRACT REQUESTS FORM (CRF)



The following items should be attached to this CRF			
1. Scope of Work, Attach as Exhibit A.	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached	
2. Budget Detail, Attach as Exhibit B.	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached	
3. CEC 96, NCB Request	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached	
4. CEC 30, Survey of Prior Work	<input type="checkbox"/> N/A	<input type="checkbox"/> Attached	
5. CEC 95, DVBE Exemption Request	<input checked="" type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached	
6. Draft CEQA Notice of Exemption (NOE)	<input checked="" type="checkbox"/> N/A	<input type="checkbox"/> Attached	
7. Resumes	<input type="checkbox"/> N/A	<input checked="" type="checkbox"/> Attached	
8. CEC 105, Questionnaire for Identifying Conflicts		<input checked="" type="checkbox"/> Attached	
9. CEC 106, IT Component Reporting Form		<input type="checkbox"/> Attached	

 Contract Manager Date Office Manager Date Deputy Director Date

The following signatures are only required when contract approval is delegated to the Executive Office and not approved at a Business Meeting. See Business Meeting Information Section.

 Presiding Policy Committee Date Associate Policy Committee Date Executive Director Date

Exhibit A SCOPE OF WORK

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2		Development of Experimental Plan and Sampling Protocol
3		Field Data Collection and Sample Analysis
4		Data Analysis
5		Technology Transfer Activities

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1	Jeff Kuo, California State University, Fullerton (CSUF)		
2	Jeff Kuo, CSUF		Inland Empire Utility Authority (IEUA), Environ Strategy Consultants, Inc. (ESCI)
3	Jeff Kuo, CSUF		IEUA, ESCI
4	Jeff Kuo, CSUF		

GLOSSARY

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

Acronym	Definition
CCM	Commission Contract Manager
COD	chemical oxygen demand
CPR	Critical Project Review
CSUF	California State University, Fullerton
Energy Commission	California Energy Commission
EPA	California Environmental Protection Agency
ESCI	Environ Strategy Consultants, Inc.
IC	internal combustion
ICE	Internal Combustion Engine
IEUA	Inland Empire Utility Authority
MW	megawatt
NOx	nitrogen oxide
TAC	Technical Advisory Committee
PAH	polycyclic aromatic hydrocarbons
PCDD	polychlorinated dibenzo-p-dioxins
PIER	Public Interest Energy Research
ppmV	parts per million by volume

Acronym	Definition
SCAQMD	South Coast Air Quality Management District
SHF	Solids Handling Facility
TS	total solids
VOC	volatile organic compound
VS	volatile solids

Problem Statement:

Biopower can diversify energy supply and improve energy security in California. Increases in biopower production from sustainable biomass can provide many economic and environmental benefits including the creation of green jobs, promotion of local economic stability, and minimization of adverse environmental impacts to ambient air and water resources. Increased biopower also addresses Governor Brown’s Clean Energy Jobs Plan, which calls for the state to increase renewable energy capacity by 20,000 megawatts (MW) by 2020. Biopower has the potential to provide between 2,000 and 5,000 MW of the localized renewable energy capacity needed to achieve the Governor’s goals (O’Neill and Nuffer, 2011).

One of the main energy sources for biopower generation is the biogas created from the anaerobic digestion of biomass. This biogas is produced by sources such as forests, agriculture (including dairy), municipal waste and other biogenic residues. California generates over 35 million bone-dry tons of biomass residues each year. However, the existing biomass facilities reportedly only used less than 15 percent of the total biomass residues available in 2010 (Energy Commission, 2012). On the other hand, requirements on landfill diversion of organic materials are being imposed (California Environmental Protection Agency [EPA], 2012). The CalRecycle Strategic Directive 6.1 establishes a goal to divert 50 percent of organic waste from landfills by 2020. Most of the diverted organic materials (e.g., food waste) contain high enthalpies and are readily biodegradable. Anaerobic digestion of these diverted organic wastes (to generate biogas for biopower generation) may be a good alternative to the common practice of composting.

Although a biopower project will produce renewable energy, the process of producing bioenergy should harmonize with the goal of protecting public health (Energy Commission, 2012). Most of California is in non-attainment for air quality standards of ozone and particulate matter. Emissions of nitrogen oxide (NO_x) (precursors for ozone generation) from internal combustion (IC) engines that utilize biogas are often of great concern. The NO_x emission limits can be as low as 9 parts per million by volume (ppmV) in some air pollution control districts (Drake, 2010). Since the early 2000s, 18 dairy producers installed anaerobic digesters and engines for biopower generation using public funding from the California Energy Commission (Energy Commission). Unfortunately, only a few were still in operation as of 2009 due to economic issues, including the cost of meeting air quality standards (Energy Commission, 2012). Consequently, meeting air emission requirements is paramount to the successful implementation of any biopower project.

Recently, anaerobic digestion of food waste for biogas generation has received considerable attention, mainly due to the high energy content and biodegradability of food waste (EPA, 2012). Food waste is typically co-digested with biosolids from wastewater treatment at municipal wastewater treatment plants. For example, the East Bay Municipal Utility District in Oakland, CA has been successfully practicing co-digestion of food waste for a few years (Arsova, 2010). However, full-scale facilities exclusively for anaerobic digestion of food waste in the US were not found from a recent literature search.

The Inland Empire Utilities Agency (IEUA) built a fully operational dairy waste anaerobic digestion plant in Chino, CA. The RP-5 Solids Handling Facility (SHF) was fully permitted and commissioned operations in 2002. The RP-5 SHF had treated solid wastes from local dairy farms and food processing facilities for six years. The biogas generated was fed to two on-site IC engines (1.5MW each) to provide electricity for existing wastewater treatment and ancillary operations. The IEUA decommissioned the RP-5 SHF in early 2009 and subsequently leased the facility to Environ Strategy Consultants, Inc. (ESCI) in Orange, CA for food waste digestion in 2010. The ESCI made some site improvements and recently resumed the operation of the RP-5 SHF facility. ESCI's goals are to treat up to 705 wet tons per day of food waste from local materials recovery facilities, and generate up to 3 MW of electrical power, and provide heat for anaerobic digesters from biogas derived from anaerobic digestion of food waste. Although anaerobic digestion of food waste is a viable process, the full-scale operation of this process is still new. The scientific information on air quality of biogas from this process and the air quality from use of this biogas (e.g., IC engines) is not readily available. Development of scientific information on air quality affected by this biogas is needed for determination of conditioning requirements of the biogas for beneficial uses. In addition, information on the quality of emissions from using this type of biogas (with or without conditioning) is important for the selection of energy-generating equipment and for air quality permitting for similar future projects.

Goals of the Agreement:

The goal of this agreement is to provide scientific information on air quality of biogas from anaerobic digesters treating food waste and the emissions from beneficial uses of this type of biogas through field sample collection and analysis. The field data and samples will be collected from RP-5 SHF at IEUA and analyzed.

Objectives of the Agreement:

The overall objectives of this Agreement are (1) to develop the scientific information needed to more accurately estimate emissions from anaerobic digesters that use food waste as the main feed, (2) to develop scientific information needed for conditioning/pretreatment of raw biogas, and (3) to develop the scientific information needed to support the air quality permitting process for this type of anaerobic digester in the future.

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)
- Establish the TAC (Task 1.10)
- TAC Meetings (Task 1.11)

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
- Schedule for Recruiting TAC Members

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 necessary, and, if necessary, the budget will be reallocated to cover the additional costs borne by the Contractor, but the overall contract amount will not increase.

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. I
- 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 projects. 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:

- What to do with any state-owned equipment (Options)
- Need to file UCC.1 form re: Energy Commission's interest in patented technology
- Energy Commission's request for specific "generated" data (not already provided in Agreement deliverables)
- Need to document Contractor's disclosure of "subject inventions" developed under the Agreement

- “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 Quarterly 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:

- Quarterly 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 reimbursable under this Agreement. Permits must be identified in writing before the Contractor can incur any costs related to the use of the permit(s) 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)

Task 1.10 Establish the TAC

The goal of this task is to create an advisory committee for this Agreement.

The TAC should be composed of diverse professionals. The number can vary depending on potential interest and time availability. The exact composition of the TAC may change as the need warrants. TAC members serve at the discretion of the Commission Contract Manager.

The purpose of the TAC is to:

- Provide guidance in research direction. The guidance may include scope of research; research methodologies; timing; coordination with other research. The guidance may be based on:
 - technical area expertise
 - knowledge of market applications
 - linkages between the agreement work and other past, present or future research (both public and private sectors) they are aware of in a particular area.
- Review deliverables. Provide specific suggestions and recommendations for needed adjustments, refinements, or enhancement of the deliverables.
- Evaluate tangible benefits to California of this research and provide recommendations, as needed, to enhance tangible benefits.
- Provide recommendations regarding information dissemination, market pathways or commercialization strategies relevant to the research products.

The Contractor shall:

- Prepare a draft list of potential TAC members that includes name, company, physical and electronic address, and phone number and submit it to the Commission Contract Manager at least 2 working days prior to the kick-off meeting. This list will be discussed at the kick-off meeting and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members and ensure that each individual understands the member obligations described above, as well as the meeting schedule outlined in Task 1.11.
- Prepare the final list of TAC members.
- Submit letters of acceptance or other comparable documentation of commitment for each TAC member.

Deliverables:

- Draft List of TAC Members
- Final List of TAC Members
- Letters of acceptance, or other comparable documentation of commitment for each TAC Member

Task 1.11 Conduct TAC Meetings

The goal of this task is for the TAC to provide strategic guidance to this project by participating in regular meetings or teleconferences.

The Contractor shall:

- Discuss the TAC meeting schedule at the kick-off meeting. The number of face-to-face meetings and teleconferences and the location of TAC meetings shall be determined in consultation with the Commission Contract Manager. This draft schedule shall be presented to the TAC members during recruiting and finalized at the first TAC meeting.
- Organize and lead TAC meetings in accordance with the schedule. Changes to the schedule must be pre-approved in writing by the Commission Contract Manager.
- Prepare TAC meeting agenda(s) with back-up materials for agenda items.
- Prepare TAC meeting summaries, including recommended resolution of major TAC issues.

Deliverables:

- Draft TAC Meeting Schedule
- Final TAC Meeting Schedule
- TAC Meeting Agenda(s) with Back-up Materials for Agenda Items
- Written TAC meeting summaries, including recommended resolution of major TAC issues

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 Development of Experimental Plan and Sampling Protocol

The goal of this task is to develop an experimental plan and sampling protocol for field tests and sampling.

The Contractor shall:

- Develop an Experimental Plan and a Sampling Protocol which details the approaches for:
 - Comparing a minimum of five mixtures of biomass sources and assessing the effect of mix on quality and quantity of biogas produced as well as energy production.
 - Determining method, frequency, types of samples and compounds to be monitored, locations and equipment used for liquid sampling (i.e., food waste stream).
 - Determining method, frequency, types of air pollutants to be monitored, locations and equipment used for air sampling (collecting formaldehyde, volatile organic compound [VOCs] polycyclic aromatic hydrocarbons [PAH], polychlorinated dibenzo-p-dioxins [PCDD], and particulate matter, when appropriate).
 - Measuring the quantity and quality of the biogas produced from the anaerobic digesters as a function of feed compositions and operating parameters.
 - Monitoring the methane and hydrogen sulfide concentrations in the biogas from the digesters and after the conditioning system to evaluate the energy content of the biogas as well as the performance and robustness of the conditioning system.
 - Monitoring of the effects of biogas quality (with or without conditioning) on emissions from the internal combustion engines (ICE) and boilers and on their reliabilities and efficiencies.
 - Determining the frequency of sending samples for laboratory analyses to verify the results of the portable analyzer.
 - Determining the frequency of emissions tests by the source tester to validate the results of the portable emission analyzer.
- Submit a draft of the Experimental Plan and the Sampling Protocol to the TAC for review. Incorporate comments as appropriate.
- Gain Commission Contract Manager (CCM) approval of the final Experimental Plan and the final Sampling Protocol before implementing plan in Task 3.

Deliverables:

- Draft Experimental Plan and Sampling Protocol
- Final Experimental Plan and Sampling Protocol

Task 3 Field Data Collection and Sample Analysis

The goal of this task is to collect and analyze field data and samples.

The Contractor shall:

- Conduct field visits to collect field data and samples per the approved experimental plan and sampling protocol.
- Send biogas samples for laboratory analyses periodically to verify the results of the portable analyzer.
- Communicate with a local South Coast Air Quality Management District-certified source tester, Energy Environmental Solution, Inc., who will provide necessary assistance with regards to sampling criteria pollutants from stationary sources.
- Collect and analyze laboratory-grade samples, as needed, to verify the results from the direct-read portable emission analyzer.
- Analyze field samples (in-house and/or using outside laboratories) for nitric oxide, nitrogen dioxide, carbon monoxide, carbon dioxide, oxygen, sulfur dioxide, hydrogen sulfide, hydrocarbon, formaldehyde, VOCs, PAH, PCDD, and particulate matter of the gaseous samples and total solids (TS), volatile solids (VS), chemical oxygen demand (COD) of the food waste samples.
- Analyze food waste streams (influent and effluent of the digesters), for TS, VS, COD, pH, temperature to characterize the food waste and determine the extent volatile solid reduction. The data will be used to correlate with the quality and quantity of produced biogas.
- Evaluate the impact of this process on overall greenhouse gas emissions in this study. It is expected that the data generated from this study can be used for similar facilities of various sizes.

Deliverables:

- Documentation of work performed in this task to be included in the Quarterly Progress Reports

Task 4 Data Analysis

The goal of this task is to analyze the data collected from the field tests and generate scientific information on air quality of biogas from anaerobic digesters treating food waste and the emissions from beneficial uses of this type of biogas.

The Contractor shall:

- Analyze the data collected from the field visits and tests (results from the portable analyzers as well as from the laboratory analyses) to generate scientific information on the quality and quantity of the biogas from the digesters as a function of the food waste mix and operating conditions.
- Analyze the performance of the gas conditioning system for this type of biogas.
- Analyze air emissions from ICEs and boiler using this type of biogas.

Deliverables:

- Documentation of work performed in this task to be included in the Quarterly Progress Reports and Final Report

Task 5 Technology Transfer Activities

The goal of this task is to transfer the knowledge gained, experimental results and lessons learned to key policy- and decision-makers.

The Contractor shall:

- Prepare a 1-2 page summary of the project for posting on the Energy Commission website.
- Prepare and submit a journal article to an appropriate peer reviewed journal.

Deliverables:

- Project summary
- Copy of a journal article ready for submission to an appropriate peer reviewed journal

REFERENCES

Arsova, L. (2010) “Anaerobic digestion of food waste: Current status, problems and an alternative product”, a master thesis, Department of Earth and Environmental Engineering, Columbia University.

CEC (2012) “Addressing Air Quality Issues for Biopower”, a request for research proposals from California public universities, California Energy Commission, January of 2012.

Drake, N. (2011). “CA Regulatory Arena for Dairy Based Anaerobic Digesters”, US EPA 6th Annual AgStar Conference, Boise, ID, May 10-12.

EPA (2012). “The Benefits of Anaerobic Digestion of Food Waste at Wastewater Treatment Facilities”, <http://www.epa.gov/region9/organics/ad/Why-Anaerobic-Digestion.pdf>, U.S. Environmental Protection Agency.

O’Neill, G. and Nuffer, J. (2011). “2011 Bioenergy Action Plan”, California Energy Commission, Efficiency and Renewable Division. Publication number: CEC-300-2011-001-CTF.