

REQUEST FOR PROPOSALS

FEASIBILITY STUDY FOR THE

20 MW WASTE-TO-ENERGY PLANT AT EL GUACAL LANDFILL

Submission Deadline: **5 PM**

LOCAL TIME (Medellín, Colombia)

DECEMBER 7, 2010

Submission Place: Instituto para el Desarrollo de Antioquia (IDEA)
Calle 42 N° 52-259
Medellín, Colombia
Phone: +57 4 381 91 29

SEALED PROPOSALS SHALL BE CLEARLY MARKED AND RECEIVED PRIOR TO THE TIME AND DATE SPECIFIED ABOVE. PROPOSALS RECEIVED AFTER SAID TIME AND DATE WILL NOT BE ACCEPTED OR CONSIDERED.

REQUEST FOR PROPOSALS

SECTION 1:	INTRODUCTION	4
1.1	BACKGROUND SUMMARY	4
1.2	OBJECTIVE	4
1.3	PROPOSALS TO BE SUBMITTED	5
1.4	CONTRACT FUNDED BY USTDA	5
SECTION 2:	INSTRUCTIONS TO OFFERORS	6
2.1	PROJECT TITLE.....	6
2.2	DEFINITIONS.....	6
2.3	DEFINITIONAL MISSION REPORT	6
2.4	EXAMINATION OF DOCUMENTS	6
2.5	PROJECT FUNDING SOURCE.....	7
2.6	RESPONSIBILITY FOR COSTS	7
2.7	TAXES.....	7
2.8	CONFIDENTIALITY.....	7
2.9	ECONOMY OF PROPOSALS	7
2.10	OFFEROR CERTIFICATIONS	7
2.11	CONDITIONS REQUIRED FOR PARTICIPATION	7
2.12	LANGUAGE OF PROPOSAL.....	8
2.13	PROPOSAL SUBMISSION REQUIREMENTS	8
2.14	PACKAGING.....	8
2.15	AUTHORIZED SIGNATURE	9
2.16	EFFECTIVE PERIOD OF PROPOSAL	9
2.17	EXCEPTIONS	9
2.18	OFFEROR QUALIFICATIONS	9
2.19	RIGHT TO REJECT PROPOSALS	9
2.20	PRIME CONTRACTOR RESPONSIBILITY	9
2.21	AWARD	9
2.22	COMPLETE SERVICES	10
2.23	INVOICING AND PAYMENT	10
SECTION 3:	PROPOSAL FORMAT AND CONTENT	11
3.1	EXECUTIVE SUMMARY	11
3.2	COMPANY INFORMATION.....	12
3.2.1	COMPANY PROFILE	12
3.2.2	OFFEROR'S AUTHORIZED NEGOTIATOR.....	12
3.2.3	NEGOTIATION PREREQUISITES	12
3.3	ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND KEY PERSONNEL	15
3.4	TECHNICAL APPROACH AND WORK PLAN	15
3.5	EXPERIENCE AND QUALIFICATIONS	16
SECTION 4:	AWARD CRITERIA	16

ANNEX 1	FEDBIZOPPS ANNOUNCEMENT
ANNEX 2	BACKGROUND DEFINITIONAL MISSION REPORT
ANNEX 3	USTDA NATIONALITY REQUIREMENTS
ANNEX 4	USTDA GRANT AGREEMENT, INCLUDING MANDATORY CONTRACT CLAUSES
ANNEX 5	TERMS OF REFERENCE (FROM USTDA GRANT AGREEMENT)
ANNEX 6	COMPANY INFORMATION

Section 1: INTRODUCTION

The U.S. Trade and Development Agency (USTDA) has provided a grant in the amount of US\$573,039 to Instituto para el Desarrollo de Antioquia (the "Grantee") in accordance with a grant agreement dated September 9, 2010 (the "Grant Agreement"). This grant funds the cost of goods and services required for a feasibility study ("Study") on the proposed 20 MW Waste-to-Energy Plant at El Guacal Landfill ("Project") in Colombia ("Host Country"). The Grant Agreement is attached at Annex 4 for reference. The Grantee is soliciting technical proposals from qualified U.S. firms to provide expert consulting services to perform the Feasibility Study.

1.1 BACKGROUND SUMMARY

The Instituto para el Desarrollo de Antioquia, the Institute for the Development of Antioquia (IDEA), requested a USTDA grant for a feasibility study to determine the technical, economic and financial viability of a 20 MW waste-to-energy plant near the city of Medellín in the Colombian department of Antioquia. IDEA is the autonomous regional development institution in Antioquia and has participated in the development of numerous energy, infrastructure, mining and reforestation projects.

A background Definitional Mission report is provided for reference in Annex 2.

1.2 OBJECTIVE

The WTE plant would be fueled by the collected urban and industrial wastes from five municipalities south of Medellín that are currently deposited at the "El Guacal" landfill in the Municipality of Heliconia, about 25 km from Medellín. The WTE plant is anticipated to be sited on the property of the El Guacal landfill, which is owned and operated by EVAS Enviambientales, S.A. E.S.P. (EVAS). EVAS is responsible for the treatment and final disposition of solid waste at the El Guacal landfill and is licensed for 24 years to receive, select and process ordinary and special solid waste and mud. EVAS is a sanitary and landfill operator company in Colombia, fully owned by the Municipality of Envigado, but which serves much of the southern Aburrá Valley area in Antioquia.

The waste processing and power generation facility will input the roughly 650 tons per day of municipal solid waste (MSW) presently deposited at the EVAS landfill and convert it to roughly 400 tons of refuse-derived fuel for the generation of approximately 20 MW of electricity. With collection and landfill deposits well managed by EVAS, these wastes have been studied and classified, confirming a sufficient calorific value with a steady and continuous daily flow. The owner and operator for the proposed WTE plant is presently anticipated to be a joint venture (JV) between IDEA, the Municipality of Envigado, and possibly a private sector engineering firm with which the Grantee has a history of working. The Grantee and the Government of Antioquia each hold a 37.5 percent ownership interest in *Empresa Generadora de Energía de Antioquia* (Energy Generating Company of Antioquia or "EMGEA"), which sells power from the generation facilities in which IDEA has invested. Through EMGEA, IDEA -- as a tax-exempt entity -- is able to market and sell power produced by its majority-owned power plants directly to industrial users, without having to incur the 20 percent federal excise tax. It is anticipated that EMGEA will sell the power onwards to regional industrial companies. The referenced tax

exemption would allow for the sale of power generated from the WTE plants at a lower end-use price, thereby also fulfilling the Grantee's economic development mission.

The Terms of Reference (TOR) for this Feasibility Study are attached as Annex 5.

1.3 PROPOSALS TO BE SUBMITTED

Technical proposals are solicited from interested and qualified U.S. firms. The administrative and technical requirements as detailed throughout the Request for Proposals (RFP) will apply. Specific proposal format and content requirements are detailed in Section 3.

The amount for the contract has been established by a USTDA grant of US\$573,039. **The USTDA grant of US\$573,039 is a fixed amount. Accordingly, COST will not be a factor in the evaluation and therefore, cost proposals should not be submitted.** Upon detailed evaluation of technical proposals, the Grantee shall select one firm for contract negotiations.

1.4 CONTRACT FUNDED BY USTDA

In accordance with the terms and conditions of the Grant Agreement, USTDA has provided a grant in the amount of US\$573,039 to the Grantee. The funding provided under the Grant Agreement shall be used to fund the costs of the contract between the Grantee and the U.S. firm selected by the Grantee to perform the TOR. The contract must include certain USTDA Mandatory Contract Clauses relating to nationality, taxes, payment, reporting, and other matters. The USTDA nationality requirements and the USTDA Mandatory Contract Clauses are attached at Annexes 3 and 4, respectively, for reference.

Section 2: INSTRUCTIONS TO OFFERORS

2.1 PROJECT TITLE

The project is called 20 MW Waste-to-Energy Plant at El Guacal Landfill.

2.2 DEFINITIONS

Please note the following definitions of terms as used in this RFP.

The term "Request for Proposals" means this solicitation of a formal technical proposal, including qualifications statement.

The term "Offeror" means the U.S. firm, including any and all subcontractors, which responds to the RFP and submits a formal proposal and which may or may not be successful in being awarded this procurement.

2.3 DEFINITIONAL MISSION REPORT

USTDA sponsored a Definitional Mission to address technical, financial, sociopolitical, environmental and other aspects of the proposed project. A copy of the report is attached at Annex 2 for background information only. Please note that the TOR referenced in the report are included in this RFP as Annex 5.

2.4 EXAMINATION OF DOCUMENTS

Offerors should carefully examine this RFP. It will be assumed that Offerors have done such inspection and that through examinations, inquiries and investigation they have become familiarized with local conditions and the nature of problems to be solved during the execution of the Feasibility Study.

Offerors shall address all items as specified in this RFP. Failure to adhere to this format may disqualify an Offeror from further consideration.

Submission of a proposal shall constitute evidence that the Offeror has made all the above mentioned examinations and investigations, and is free of any uncertainty with respect to conditions which would affect the execution and completion of the Feasibility Study.

2.5 PROJECT FUNDING SOURCE

The Feasibility Study will be funded under a grant from USTDA. The total amount of the grant is not to exceed US\$573,039.

2.6 RESPONSIBILITY FOR COSTS

Offeror shall be fully responsible for all costs incurred in the development and submission of the proposal. Neither USTDA nor the Grantee assumes any obligation as a result of the issuance of this RFP, the preparation or submission of a proposal by an Offeror, the evaluation of proposals, final selection or negotiation of a contract.

2.7 TAXES

Offerors should submit proposals that note that in accordance with the USTDA Mandatory Contract Clauses, USTDA grant funds shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in the Host Country.

2.8 CONFIDENTIALITY

The Grantee will preserve the confidentiality of any business proprietary or confidential information submitted by the Offeror, which is clearly designated as such by the Offeror, to the extent permitted by the laws of the Host Country.

2.9 ECONOMY OF PROPOSALS

Proposal documents should be prepared simply and economically, providing a comprehensive yet concise description of the Offeror's capabilities to satisfy the requirements of the RFP. Emphasis should be placed on completeness and clarity of content.

2.10 OFFEROR CERTIFICATIONS

The Offeror shall certify (a) that its proposal is genuine and is not made in the interest of, or on behalf of, any undisclosed person, firm, or corporation, and is not submitted in conformity with, and agreement of, any undisclosed group, association, organization, or corporation; (b) that it has not directly or indirectly induced or solicited any other Offeror to put in a false proposal; (c) that it has not solicited or induced any other person, firm, or corporation to refrain from submitting a proposal; and (d) that it has not sought by collusion to obtain for itself any advantage over any other Offeror or over the Grantee or USTDA or any employee thereof.

2.11 CONDITIONS REQUIRED FOR PARTICIPATION

Only U.S. firms are eligible to participate in this tender. However, U.S. firms may utilize subcontractors from the Host Country for up to 20 percent of the amount of the USTDA grant for

specific services from the TOR identified in the subcontract. USTDA's nationality requirements, including definitions, are detailed in Annex 3.

Offerors will not be precluded from future related work with IDEA as a result of participating in this tender.

2.12 LANGUAGE OF PROPOSAL

All proposal documents shall be prepared and submitted in English and Spanish, with the exception of the supplementary documents requested in response to §3.2.4 (Offeror's Representations) and §3.2.6 (Subcontractor's Representations) below that may be submitted in their original language of issuance (i.e., English or Spanish).

2.13 PROPOSAL SUBMISSION REQUIREMENTS

The **Cover Letter** in the proposal must be addressed to:

Santiago Piedrahita Tabares
Director for International Cooperation and Business
Instituto para el Desarrollo de Antioquia (IDEA)
Calle 42 N° 52-259
Medellín, Colombia

Phone: +57 4 381 9129

An original in English, an original in Spanish, and eight (8) copies of your proposal in Spanish must be received at the above address no later than 5 PM on December 7, 2010.

Proposals may be either sent by mail, overnight courier, or hand-delivered. Whether the proposal is sent by mail, courier or hand-delivered, the Offeror shall be responsible for actual delivery of the proposal to the above address before the deadline. Any proposal received after the deadline will be returned unopened. The Grantee will promptly notify any Offeror if its proposal was received late.

Upon timely receipt, all proposals become the property of the Grantee.

2.14 PACKAGING

The original and each copy of the proposal must be sealed to ensure confidentiality of the information. The proposals should be individually wrapped and sealed, and labeled for content including "original" or "copy number x"; the original in English, the original in Spanish, and eight (8) copies in Spanish should be collectively wrapped and sealed, and clearly labeled.

Neither USTDA nor the Grantee will be responsible for premature opening of proposals not properly wrapped, sealed and labeled.

2.15 AUTHORIZED SIGNATURE

The proposal must contain the signature of a duly authorized officer or agent of the Offeror empowered with the right to bind the Offeror.

2.16 EFFECTIVE PERIOD OF PROPOSAL

The proposal shall be binding upon the Offeror for NINETY (90) days after the proposal due date, and Offeror may withdraw or modify this proposal at any time prior to the due date upon written request, signed in the same manner and by the same person who signed the original proposal.

2.17 EXCEPTIONS

All Offerors agree by their response to this RFP announcement to abide by the procedures set forth herein. No exceptions shall be permitted.

2.18 OFFEROR QUALIFICATIONS

As provided in Section 3, Offerors shall submit evidence that they have relevant past experience and have previously delivered advisory, feasibility study and/or other services similar to those required in the TOR, as applicable.

2.19 RIGHT TO REJECT PROPOSALS

The Grantee reserves the right to reject any and all proposals.

2.20 PRIME CONTRACTOR RESPONSIBILITY

Offerors have the option of subcontracting parts of the services they propose. The Offeror's proposal must include a description of any anticipated subcontracting arrangements, including the name, address, and qualifications of any subcontractors. USTDA nationality provisions apply to the use of subcontractors and are set forth in detail in Annex 3. The successful Offeror shall cause appropriate provisions of its contract, including all of the applicable USTDA Mandatory Contract Clauses, to be inserted in any subcontract funded or partially funded by USTDA grant funds.

2.21 AWARD

The Grantee shall make an award resulting from this RFP to the best qualified Offeror, on the basis of the evaluation factors set forth herein. The Grantee reserves the right to reject any and all

proposals received and, in all cases, the Grantee will be the judge as to whether a proposal has or has not satisfactorily met the requirements of this RFP.

2.22 COMPLETE SERVICES

The successful Offeror shall be required to (a) provide local transportation, office space and secretarial support required to perform the TOR if such support is not provided by the Grantee; (b) provide and perform all necessary labor, supervision and services; and (c) in accordance with best technical and business practice, and in accordance with the requirements, stipulations, provisions and conditions of this RFP and the resultant contract, execute and complete the TOR to the satisfaction of the Grantee and USTDA.

2.23 INVOICING AND PAYMENT

Deliverables under the contract shall be delivered on a schedule to be agreed upon in a contract with the Grantee. The Contractor may submit invoices to the designated Grantee Project Director in accordance with a schedule to be negotiated and included in the contract. After the Grantee's approval of each invoice, the Grantee will forward the invoice to USTDA. If all of the requirements of USTDA's Mandatory Contract Clauses are met, USTDA shall make its respective disbursement of the grant funds directly to the U.S. firm in the United States. All payments by USTDA under the Grant Agreement will be made in U.S. currency. Detailed provisions with respect to invoicing and disbursement of grant funds are set forth in the USTDA Mandatory Contract Clauses attached in Annex 4.

Section 3: PROPOSAL FORMAT AND CONTENT

To expedite proposal review and evaluation, and to assure that each proposal receives the same orderly review, all proposals must follow the format described in this section.

Proposal sections and pages shall be appropriately numbered and the proposal shall include a Table of Contents. Offerors are encouraged to submit concise and clear responses to the RFP. Proposals shall contain all elements of information requested without exception. Instructions regarding the required scope and content are given in this section. The Grantee reserves the right to include any part of the selected proposal in the final contract.

The proposal shall consist of a technical proposal only. A cost proposal is NOT required because the amount for the contract has been established by a USTDA grant of US\$573,039, which is a fixed amount.

Offerors shall submit one original in English, one original in Spanish and eight (8) copies in Spanish of the proposal. Proposals received by fax cannot be accepted.

Each proposal must include the following:

- Transmittal Letter,
- Cover/Title Page,
- Table of Contents,
- Executive Summary,
- Company Information,
- Organizational Structure, Management Plan, and Key Personnel,
- Technical Approach and Work Plan, and
- Experience and Qualifications.

Detailed requirements and directions for the preparation of the proposal are presented below.

3.1 EXECUTIVE SUMMARY

An Executive Summary should be prepared describing the major elements of the proposal, including any conclusions, assumptions, and general recommendations the Offeror desires to make. Offerors are requested to make every effort to limit the length of the Executive Summary to no more than five (5) pages.

3.2 COMPANY INFORMATION

For convenience, the information required in this Section 3.2 may be submitted in the form attached in Annex 6 hereto.

3.2.1 Company Profile

Provide the information listed below relative to the Offeror's firm. If the Offeror is proposing to subcontract some of the proposed work to another firm(s), the information requested in sections 3.2.5 and 3.2.6 below must be provided for each subcontractor.

1. Name of firm and business address (street address only), including telephone and fax numbers.
2. Year established (include predecessor companies and year(s) established, if appropriate).
3. Type of ownership (e.g. public, private or closely held).
4. If private or closely held company, provide list of shareholders and the percentage of their ownership.
5. List of directors and principal officers (President, Chief Executive Officer, Vice-President(s), Secretary and Treasurer; provide full names including first, middle and last). Please place an asterisk (*) next to the names of those principal officers who will be involved in the Feasibility Study.
6. If Offeror is a subsidiary, indicate if Offeror is a wholly-owned or partially-owned subsidiary. Provide the information requested in items 1 through 5 above for the Offeror's parent(s).
7. Project Manager's name, address, telephone number, e-mail address and fax number.

3.2.2 Offeror's Authorized Negotiator

Provide name, title, address, telephone number, e-mail address and fax number of the Offeror's authorized negotiator. The person cited shall be empowered to make binding commitments for the Offeror and its subcontractors, if any.

3.2.3 Negotiation Prerequisites

1. Discuss any current or anticipated commitments which may impact the ability of the Offeror or its subcontractors to complete the Feasibility Study as proposed and reflect such impact within the project schedule.
2. Identify any specific information which is needed from the Grantee before commencing contract negotiations.

3.2.4 Offeror's Representations

If any of the following representations cannot be made, or if there are exceptions, the Offeror must provide an explanation.

1. Offeror is a corporation [*insert applicable type of entity if not a corporation*] duly organized, validly existing and in good standing under the laws of the State of _____. The Offeror has all the requisite corporate power and authority to conduct its business as presently conducted, to submit this proposal, and if selected, to execute and deliver a contract to the Grantee for the performance of the Feasibility Study. The Offeror is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment, or ineligible for the award of contracts by any federal or state governmental agency or authority.
2. The Offeror has included, with this proposal, a certified copy of its Articles of Incorporation, and a certificate of good standing issued within one month of the date of its proposal by the State of _____. The Offeror commits to notify USTDA and the Grantee if they become aware of any change in their status in the state in which they are incorporated. USTDA retains the right to request an updated certificate of good standing.
3. Neither the Offeror nor any of its principal officers have, within the three-year period preceding this RFP, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.
4. Neither the Offeror, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 3 above.
5. There are no federal or state tax liens pending against the assets, property or business of the Offeror. The Offeror, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.
6. The Offeror has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any bankruptcy, insolvency or other similar law. The Offeror has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

The selected Offeror shall notify the Grantee and USTDA if any of the representations included in its proposal are no longer true and correct at the time of its entry into a contract with the Grantee.

3.2.5 Subcontractor Profile

1. Name of firm and business address (street address only), including telephone and fax numbers.
2. Year established (include predecessor companies and year(s) established, if appropriate).

3.2.6 Subcontractor's Representations

If any of the following representations cannot be made, or if there are exceptions, the Subcontractor must provide an explanation.

1. Subcontractor is a corporation [*insert applicable type of entity if not a corporation*] duly organized, validly existing and in good standing under the laws of the State of _____ . The subcontractor has all the requisite corporate power and authority to conduct its business as presently conducted, to participate in this proposal, and if the Offeror is selected, to execute and deliver a subcontract to the Offeror for the performance of the Feasibility Study and to perform the Feasibility Study. The subcontractor is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment or ineligible for the award of contracts by any federal or state governmental agency or authority.
2. Neither the subcontractor nor any of its principal officers have, within the three-year period preceding this RFP, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.
3. Neither the subcontractor, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 2 above.
4. There are no federal or state tax liens pending against the assets, property or business of the subcontractor. The subcontractor, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.

5. The subcontractor has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any bankruptcy, insolvency or other similar law. The subcontractor has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

The selected subcontractor shall notify the Offeror, Grantee and USTDA if any of the representations included in this proposal are no longer true and correct at the time of the Offeror's entry into a contract with the Grantee.

3.3 ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND KEY PERSONNEL

Describe the Offeror's proposed project organizational structure. Discuss how the project will be managed including the principal and key staff assignments for this Feasibility Study. Identify the Project Manager who will be the individual responsible for this project. The Project Manager shall have the responsibility and authority to act on behalf of the Offeror in all matters related to the Feasibility Study.

Provide a listing of personnel (including subcontractors) to be engaged in the project, including both U.S. and local subcontractors, with the following information for key staff: position in the project; pertinent experience, curriculum vitae; other relevant information. If subcontractors are to be used, the Offeror shall describe the organizational relationship, if any, between the Offeror and the subcontractor.

A manpower schedule and the level of effort for the project period, by activities and tasks, as detailed under the Technical Approach and Work Plan shall be submitted. A statement confirming the availability of the proposed project manager and key staff over the duration of the project must be included in the proposal.

3.4 TECHNICAL APPROACH AND WORK PLAN

Describe in detail the proposed Technical Approach and Work Plan (the "Work Plan"). Discuss the Offeror's methodology for completing the project requirements. Include a brief narrative of the Offeror's methodology for completing the tasks within each activity series. Begin with the information gathering phase and continue through delivery and approval of all required reports.

Prepare a detailed schedule of performance that describes all activities and tasks within the Work Plan, including periodic reporting or review points, incremental delivery dates, and other project milestones.

Based on the Work Plan, and previous project experience, describe any support that the Offeror will require from the Grantee. Detail the amount of staff time required by the Grantee or other participating agencies and any work space or facilities needed to complete the Feasibility Study.

3.5 EXPERIENCE AND QUALIFICATIONS

Provide a discussion of the Offeror's experience and qualifications that are relevant to the objectives and TOR for the Feasibility Study. If a subcontractor(s) is being used, similar information must be provided for the prime and each subcontractor firm proposed for the project. The Offeror shall provide information with respect to relevant experience and qualifications of key staff proposed. The Offeror shall include letters of commitment from the individuals proposed confirming their availability for contract performance.

As many as possible but not more than six (6) relevant and verifiable project references must be provided for each of the Offeror and any subcontractor, including the following information:

- Project name,
- Name and address of client (indicate if joint venture),
- Client contact person (name/ position/ current phone and fax numbers),
- Period of Contract,
- Description of services provided,
- Dollar amount of Contract, and
- Status and comments.

Offerors are strongly encouraged to include in their experience summary primarily those projects that are similar to or larger in scope than the Feasibility Study as described in this RFP.

Section 4: AWARD CRITERIA

Individual proposals will be initially evaluated by a Procurement Selection Committee of representatives from the Grantee. The Committee will then conduct a final evaluation and completion of ranking of qualified Offerors. The Grantee will notify USTDA of the best qualified Offeror, and upon receipt of USTDA's no-objection letter, the Grantee shall promptly notify all Offerors of the award and negotiate a contract with the best qualified Offeror. If a satisfactory contract cannot be negotiated with the best qualified Offeror, negotiations will be formally terminated. Negotiations may then be undertaken with the second most qualified Offeror and so forth.

The selection of the Contractor will be based on the following criteria:

- Experience with fully detailed design engineering of a Waste-to-Energy power plant (30%)
- Experience in preparing detailed financial projections suitable for the negotiation of project financing (20%)
- Experience in the structuring of long-term contracts for fuel supply and power off-take contracts (10%)

- Performance of power plant project risk assessments and preparation of risk mitigation plans (10%)
- Experience with the analysis of power sector projects in Latin America (10%)
- Inclusion of bilingual (Spanish/English) individuals among key personnel (10%)
- Experience preparing preliminary environmental impact analyses (10%)

Proposals that do not include all requested information may be considered non-responsive.

Price will not be a factor in contractor selection.

ANNEX 1

FEDBIZOPPS ANNOUNCEMENT

SANTIAGO PIEDRAHITA TABARES, DIRECTOR FOR INTERNATIONAL COOPERATION AND BUSINESS, INSTITUTO PARA EL DESARROLLO DE ANTIOQUIA (IDEA), CALLE 42 NO. 52-259, MEDELLIN, COLOMBIA, PHONE: +57 4 381 9129

20 MW WASTE-TO-ENERGY PLANT AT EL GUACAL LANDFILL

POC: Nina Patel, USTDA, 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901, Tel: (703) 875-4357, Fax: (703) 875-4009. 20 MW WASTE-TO-ENERGY PLANT AT EL GUACAL LANDFILL. The Grantee invites submission of qualifications and proposal data (collectively referred to as the "Proposal") from interested U.S. firms that are qualified on the basis of experience and capability to develop a feasibility study to determine the technical, economic and financial viability of a 20 MW waste-to-energy plant near the city of Medellín in the Colombian department of Antioquia.

The Instituto para el Desarrollo de Antioquia, the Institute for the Development of Antioquia (IDEA), requested a USTDA grant for a feasibility study to determine the technical, economic and financial viability of a 20 MW waste-to-energy plant near the city of Medellín in the Colombian department of Antioquia. IDEA is the autonomous regional development institution in Antioquia and has participated in the development of numerous energy, infrastructure, mining and reforestation projects.

The WTE plant would be fueled by the collected urban and industrial wastes from five municipalities south of Medellín that are currently deposited at the "El Guacal" landfill in the Municipality of Heliconia, about 25 km from Medellín. The WTE plant is anticipated to be sited on the property of the El Guacal landfill, which is owned and operated by EVAS Enviambientales, S.A. E.S.P. (EVAS). EVAS is responsible for the treatment and final disposition of solid waste at the El Guacal landfill and is licensed for 24 years to receive, select and process ordinary and special solid waste and mud. EVAS is a sanitary and landfill operator company in Colombia, fully owned by the Municipality of Envigado, but which serves much of the southern Aburrá Valley area in Antioquia.

The waste processing and power generation facility will input the roughly 650 tons per day of municipal solid waste (MSW) presently deposited at the EVAS landfill and convert it to roughly 400 tons of refuse-derived fuel for the generation of approximately 20 MW of electricity. With collection and landfill deposits well managed by EVAS, these wastes have been studied and classified, confirming a sufficient calorific value with a steady and continuous daily flow. The owner and operator for the proposed WTE plant is presently anticipated to be a joint venture (JV) between IDEA, the Municipality of Envigado, and possibly a private sector engineering firm.

The U.S. firm selected will be paid in U.S. dollars from a \$573,039 grant to the Grantee from the U.S. Trade and Development Agency (USTDA).

A detailed Request for Proposals (RFP), which includes requirements for the Proposal, the Terms of Reference, and a background definitional mission report, is available from USTDA, at 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901.

To request the RFP in PDF format, please go to:

<https://www.ustda.gov/businessopps/rfpform.asp>. Requests for a mailed hardcopy version of the RFP may also be faxed to the IRC, USTDA at 703-875-4009. In the fax, please include your firm's name, contact person, address, and telephone number. Some firms have found that RFP materials sent by U.S. mail do not reach them in time for preparation of an adequate response. Firms that want USTDA to use an overnight delivery service should include the name of the delivery service and your firm's account number in the request for the RFP. Firms that want to send a courier to USTDA to retrieve the RFP should allow one hour after faxing the request to USTDA before scheduling a pick-up. Please note that no telephone requests for the RFP will be honored. Please check your internal fax verification receipt. Because of the large number of RFP requests, USTDA cannot respond to requests for fax verification. Requests for RFPs received before 4:00 PM will be mailed the same day. Requests received after 4:00 PM will be mailed the following day. Please check with your courier and/or mail room before calling USTDA.

Only U.S. firms and individuals may bid on this USTDA financed activity. Interested firms, their subcontractors and employees of all participants must qualify under USTDA's nationality requirements as of the due date for submission of qualifications and proposals and, if selected to carry out the USTDA-financed activity, must continue to meet such requirements throughout the duration of the USTDA-financed activity. All goods and services to be provided by the selected firm shall have their nationality, source and origin in the U.S. or host country. The U.S. firm may use subcontractors from the host country for up to 20 percent of the USTDA grant amount. Details of USTDA's nationality requirements and mandatory contract clauses are also included in the RFP.

Interested U.S. firms should submit their Proposal in English and Spanish directly to the Grantee by 5 pm, December 7, 2010 at the above address. Evaluation criteria for the Proposal are included in the RFP. Price will not be a factor in contractor selection, and therefore, cost proposals should NOT be submitted. The Grantee reserves the right to reject any and/or all Proposals. The Grantee also reserves the right to contract with the selected firm for subsequent work related to the project. The Grantee is not bound to pay for any costs associated with the preparation and submission of Proposals.

A N N E X 2

BACKGROUND DEFINITIONAL MISSION REPORT

PORTIONS OF THIS DEFINITIONAL MISSION REPORT HAVE BEEN
INTENTIONALLY REDACTED.

ONLY THE RELEVANT PORTIONS OF THIS DEFINITIONAL MISSION REPORT
PERTAINING TO THE 20 MW WTE PLANT AT EL GUACAL LANDFILL
ARE INCLUDED HEREIN.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

I. Executive Summary

GreenMax Capital Advisors (GreenMax) was selected by the U.S. Trade and Development Agency (USTDA) to carry out a Definitional Mission to consider Waste to Energy projects in Colombia and Chile on behalf of the Agency. The principal objective of this mission was to review projects in the Waste to Energy sectors and provide an independent recommendation to USTDA as to whether such projects meet USTDA's funding criteria.

This report addresses the Colombia portion of the Definitional Mission.

GreenMax Principal, Clifford J. Aron, traveled to Medellín and Bogotá, Colombia during January 2010.

Prior to GreenMax's mission, the USTDA had received formal requests for assistance from a proposed joint venture of Empresas Publicas de Medellín (EPM) and Empresas Varias de Medellín (EVM) for a Waste to Energy project at the Pradera Landfill near Medellín.

In addition to an assessment of the above project, GreenMax was tasked with identifying other projects that satisfy the USTDA funding requirements. Before, during and after our mission we have met and had contacts with government officials, NGOs, private investors, multi-lateral development banks and donors to review the current energy project priorities of these islands. As a result, GreenMax was able to reach a general consensus with key stakeholders on the best options for USTDA intervention and therefore we are proposing the following project in Colombia to be considered for funding by USTDA.

Colombia: IDEA Pilot Waste to Energy Project at El Guacal Landfill.

A review of this project is included in this report, as well as an overview of other projects reviewed but not recommended at this time.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

2. Definitional Mission Background, Overview and Objectives

2.A. The Definitional Mission

USTDA retained the services of GreenMax to travel to Colombia and Chile to review projects in the environmental and energy sector on the agency's behalf. The purpose of this review was to provide an independent recommendation to USTDA whether any of the reviewed projects met USTDA's funding criteria and to recommend and prepare projects for potential grants. GreenMax Principal, Clifford J. Aron, traveled to Colombia between January 14th and January 23, 2010 to conduct the mission together with GreenMax's Country Manager for Colombia, Carlos Velasquez.

USTDA provides grant funding for two primary purposes: for feasibility studies and technical assistance that forward the implementation of infrastructure projects and for technical assistance to support the development of regulatory bodies or other institutions that help create a positive climate for private sector investment in infrastructure. USTDA's funding criteria include: (1) the contribution of the project to economic, social and environmental development objectives, (2) the commitment of the project sponsor to implementing the project; (3) the relative priority of the project; (4) project size and potential U.S. export opportunity; and (5) the likelihood of the project attracting implementation financing.

2.B. Colombia Country Overview

Republic of Colombia (*República de Colombia*), is a constitutional republic in northwestern South America. Colombia is bordered to the east by Venezuela and Brazil; to the south by Ecuador and Peru; to the north by the Caribbean Sea; to the northwest by Panama; to the west by the Pacific Ocean; and to the east by Venezuela. Colombia also shares maritime borders with Venezuela, Jamaica, Haiti, the Dominican Republic, Honduras, Nicaragua and Costa Rica. With a population of over 45 million people, Colombia has the 29th largest population in the world and the second largest in South America, after Brazil.

Colombia is a standing middle power with the fourth largest economy in Latin America, although income inequality is prevalent and wealth is badly redistributed.

In spite of the difficulties presented by serious internal armed conflict, Colombia's economy grew steadily in the latter part of the twentieth century, with gross domestic product (GDP) increasing at an average rate of over 4% per year between 1970 and 1998. The country suffered a recession in 1999 (the first full year of negative growth since the Great Depression), and the recovery from that recession was long and painful. However, in



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

recent years growth has been impressive, reaching 8.2% in 2007, one of the highest rates of growth in Latin America. Meanwhile the Colombian stock exchange climbed from 1,000 points at its creation in July 2001 to over 7,300 points by November 2008.

According to International Monetary Fund estimates, in 2007 Colombia's nominal GDP was US\$202.6 billion (37th in the world and fourth in South America). Adjusted for purchasing power parity, GDP per capita stands at \$7,968, placing Colombia 82nd in the world. However, in practice this is relatively unevenly distributed among the population, and, in common with much of Latin America, Colombia scores poorly according to the Gini coefficient, with UN figures placing it 119th out of 126 countries. In 2003 the richest 20% of the population had a 62.7% share of income/consumption and the poorest 20% just 2.5%, and 17.8% of Colombians live on less than \$2 a day.

Government spending is 37.9% of GDP.¹²¹ Almost a quarter of this goes towards servicing the country's relatively high government debt, estimated at 52.8% of GDP in 2007. Other problems facing the economy include weak domestic and foreign demand, the funding of the country's pension system, and unemployment (10.8% in November 2008). Inflation has remained relatively low in recent years, standing at 5.5% in 2007.

Historically an agrarian economy, Colombia urbanized rapidly in the twentieth century, by the end of which just 22.7% of the workforce were employed in agriculture, generating just 11.5% of GDP. 18.7% of the workforce are employed in industry and 58.5% in services, responsible for 36% and 52.5% of GDP respectively. Colombia is rich in natural resources, and its main exports include petroleum, coal, coffee and other agricultural produce, and gold. Colombia is also known as the world's leading source of emeralds, while over 70% of cut flowers imported by the United States are Colombian. Principal trading partners are the United States (a controversial free trade agreement with the United States is currently awaiting approval by the United States Congress), Venezuela and China. All imports, exports, and the overall balance of trade are at record levels, and the inflow of export dollars has resulted in a substantial re-valuation of the Colombian peso.

Economic performance has been aided by liberal reforms introduced in the early 1990s and continued during the current presidency of Álvaro Uribe, whose policies include measures designed to bring the public sector deficit below 2.5% of GDP. In 2008, the Heritage Foundation assessed the Colombian economy to be 61.9% free, an increase of 2.3% since 2007, placing it 67th in the world and 15th out of 29 countries within the region.

Meanwhile the improvements in security resulting from President Uribe's controversial "democratic security" strategy have engendered an increased sense of confidence in the economy. Colombia's economy has improved in recent years. Investment



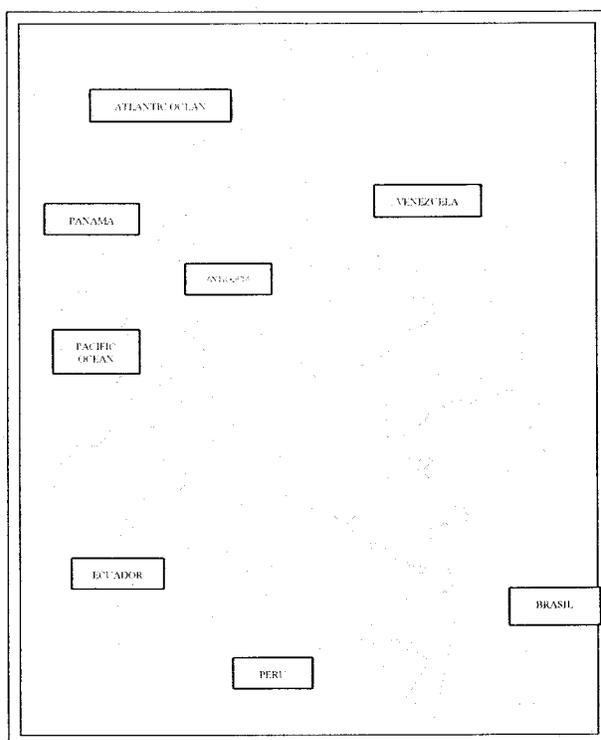
DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

soared, from 15% of GDP in 2002 to 26% in 2008. private business has retooled. However unemployment at 12% and the poverty rate at 46% in 2009 are above the regional average.

The majority of the urban centres are located in the highlands of the Andes mountains, but Colombian territory also encompasses Amazon rainforest, tropical grassland and both Caribbean and Pacific coastlines. Ecologically, Colombia is one of the world's 17 megadiverse countries (the most biodiverse per unit area).

Figure A-1 Map of Colombia





DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

3. Framework for Waste to Energy in Colombia

3.A. Waste Overview

Across the world, local authorities are under increasing pressure from the community and from governments to incorporate ecological, social and economic considerations into their day-to-day operations. Sustainability is rapidly becoming a guiding principle underpinning all decision-making.

Local authorities with responsibility for waste streams are seeing costs escalate, traditional options diminish, and social and budgetary pressures mount. Decision-makers and planners can no longer assume that past practices will reliably guide them into the future. Senior Management now face complex strategic issues regarding the implementation of new or proven waste management technologies, whilst minimizing economic and environmental risks to the organization and coping with increasing social accountability.

Local Authorities can view the waste-to-energy opportunity in a number of ways ranging from indifference to proactive enthusiasm. Three possible approaches have been identified.

1. **Is energy production simply a by-product of a solution to a critical waste problem?** In this case the organization may give energy matters a lower weighting in its decision-making, focusing instead on the waste handling and disposal features of proposed applications.
2. **Does energy from waste provide the organization with opportunities to satisfy social and environmental expectations and obligations regarding sustainability, with waste stream considerations being only one part of the overall issue?** In this case the organization would benefit from a comprehensive local energy strategy so that all stakeholders can clearly understand the significance of the project.
3. **Is the organization seeking to expand operational options, which may include adding a major new business venture to its operations?** In this case the organization will need to invest additional resources into acquiring a greater understanding of the energy and renewable market and the technology options and risks.

Throughout the world, waste streams that various local authorities have responsibility for, or may have access to, can take many forms. Typically these include landfill projects currently operating. These waste streams may be suitable as renewable



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

(such as biomass or sewage) or non-renewable fuels (such as fossil fuel waste streams from industry) for energy production.

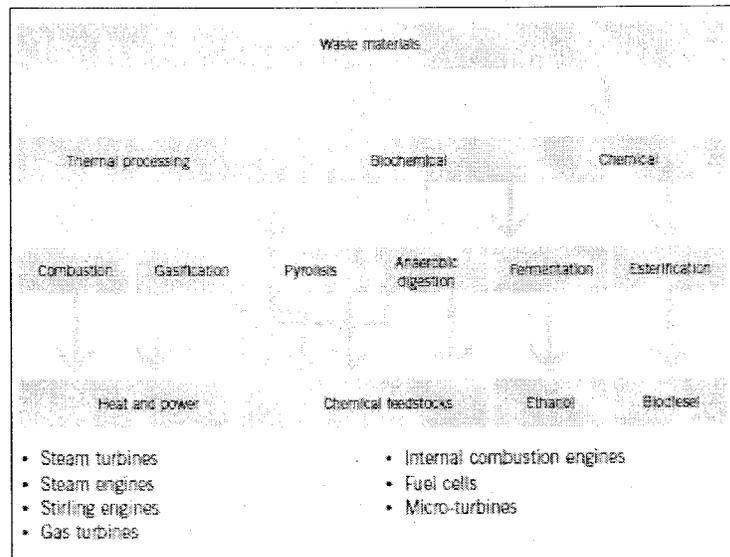
Waste resources can offer a number of benefits when used to produce energy, other than mitigation of greenhouse gas emissions.

- The cost of the 'fuel' to a power generation facility is usually low due to the preexisting need to collect and manage waste. Costs may even be negative.
- The current cost of disposing of waste is increasing (for example, 'full cost' landfill pricing is now being considered more widely by governments as a policy measure) and can be associated with environmental problems.
- Local energy production results in reduced electricity network losses, and can improve energy security and reliability for the local area.
- Such projects create regional employment opportunities.

Available technology

There are a number of approaches for obtaining energy from waste.

Figure A-2 General Flow Chart for Waste To Energy Process

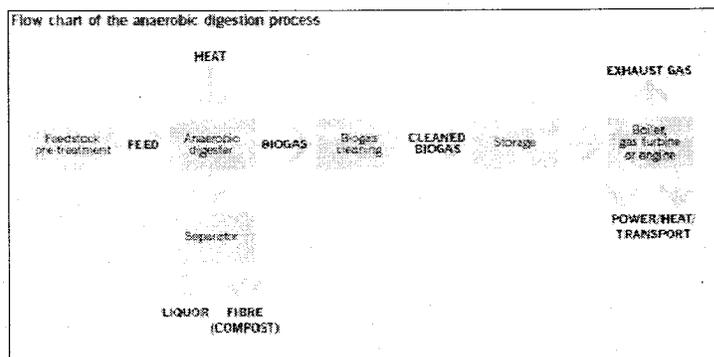
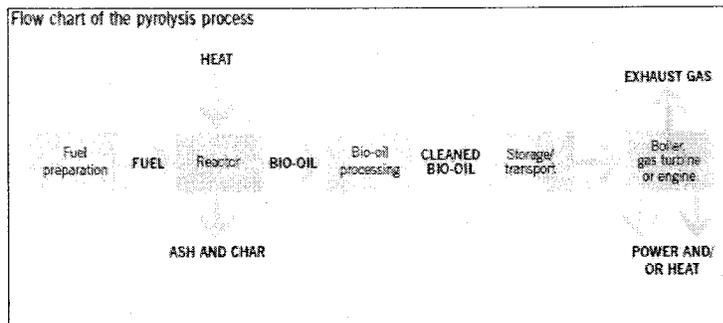
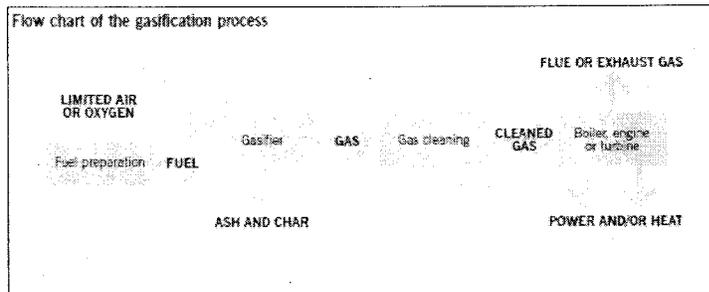
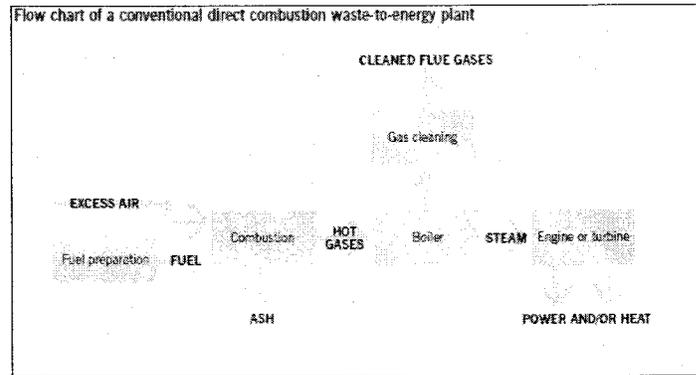




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COLOMBIA REPORT

Figure A-3 Variety of Technologies for Waste To Energy





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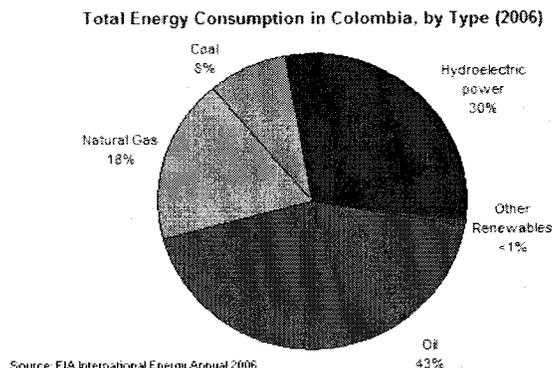
COLOMBIA REPORT

3.B. Colombia's Energy Resources

Fossil Fuel Reserves¹

In 2006, Colombia consumed 1.3 quadrillion btus of total energy. Oil constituted the largest part of this amount, followed by hydroelectricity. Colombia is also an important producer of high quality coal. As Colombia relies upon hydropower for the bulk of its electricity needs, it is able to export almost all of its coal production, making it one of the world's largest coal exporters.

Figure A-4



According to Oil and Gas Journal (OGJ), Colombia had 1.36 billion barrels of proven crude oil reserves in 2009, the fifth-largest in South America. The country produced 600,000 barrels per day (bbl/d) of oil in 2008, an increase above the 540,000 bbl/d in 2007. Before the increase in production in 2008 Colombia's oil production had remained largely flat, following a period of steady declines (in 1999, Colombia's oil production peaked at 830,000 bbl/d). The principle cause of the falling oil production was natural declines at its existing oil fields and a lack of sizable new reserve discoveries. However, a combination of changes to the regulatory framework and an improved security situation contributed to increasing investment in the country. With oil consumption reaching an estimated 267,000 bbl/d in 2007, Colombia exports about half of its oil production; the bulk of those exports (155,000 bbl/d) to the United States in 2007. Much of Colombia's crude oil is lighter and sweeter than other major Latin American oil producers.

OGJ reported that Colombia had proven natural gas reserves of 3.7 trillion cubic feet (Tcf) in 2009. The country produced and consumed 255 billion cubic feet (Bcf) in 2006, both slightly higher than 2005. Colombia has natural gas reserves spread across 18 basins, seven of which have active production. The bulk of Colombia's natural gas reserves are located in

¹ EIA



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

the Llanos basin, although the Guajira basin accounts for most of current production. According to a Colombian natural gas industry group, the country has sufficient production and reserves to meet domestic demand through at least 2018.

Colombia had 7,670 million short tons (MMst) of recoverable coal reserves in 2006, consisting largely of bituminous coal and a small amount of metallurgical coal. The country has the second-largest coal reserves in South America, slightly behind Brazil, with most of those reserves concentrated in the Guajira peninsula in the north and the Andean foothills. Colombia's coal is relatively clean-burning, with a sulfur content of less than 1 percent. Over the past decade, production has more than doubled, reaching 70.2 MMst in 2006. It is likely that Colombia's coal production will continue to increase in coming years, as exploration and profitable developments continue throughout the north and interior of the country. Colombia's coal consumption was 4.4 MMst in 2006, leaving most of the country's production available for export.

Coal bed methane (CBM) is a gaseous hydrocarbon that occurs along with coal reserves. It is similar to natural gas and can be added to natural gas pipelines without any special treatment. In 2008, media reports indicate that Drummond had made a discovery of 2.3 Tcf of CBM at its mines in Colombia. CBM has the potential to dramatically increase Colombia's proven natural gas reserves, facilitate greater domestic production, and potentially allow additional exports to neighboring countries.

Renewable Energy Potential²

Colombia has 28.1 MW of installed capacity of renewable energy (excluding large hydropower), consisting mainly of wind power. The country has significant small hydro, wind, and solar resources that remain largely unexploited. According to a study by the World Bank's Energy Sector Management Assistance Program, exploitation of the country's significant wind potential alone could cover more than the country's current total energy needs.

Hydropower

With 70 percent of the country's power generation, hydropower is a very important national energy source. The total large hydropower potential for Colombia is estimated at 93GW, with an additional 25GW of small hydropower (<20MW). However, the potential for large hydropower faces difficulties as the best sites have already been developed; also due to the escalating environmental and social costs associated with large dams, and the likely impacts of climate change and climate variability on the hydrological regime of the country (drastic increases in surface temperature in the Andes, changes in precipitation patterns, and increases in the intensity and frequency of El Nino-Southern Oscillation (ENSO) signals driving prolonged periods of drought).

² ESMAP



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

The large hydropower plants to be built in Colombia up to 2010 are listed below:

- Calderas: 26MW
- Transvase Guarino
- Amoya river: 80MW
- Manso river: 27 MW
- Porce III: 660MW
- Quimbo: 400 MW

Wind

The wind regime in Colombia is among the best in South America. Offshore regions of the northern part of Colombia, such as in the Guajira Peninsula, have been classified with class 7 winds (over 10 meters per second). The only other region in Latin America with such high wind power classification is the Patagonia region of Chile and Argentina.

Colombia has an estimated theoretical wind power potential of 21 GW just in the Guajira Peninsula, enough to generate sufficient power to meet the national demand almost twice over. However, the country only has an installed capacity of 19.5 MW of wind energy, tapping only 0.4% of its theoretical wind potential. This capacity is concentrated in a single project, the Jepirachi Wind Project, developed by Empresas Publicas de Medellin (EPM) under a Carbon Finance mechanism arranged by the World Bank. . There are several projects under consideration, including a 200 MW project in Ipapure.

Solar

Colombia has significant solar power resources because of its location in the equatorial zone, but the country sits in a complex region of the Andes where climatic conditions vary. The daily average radiation is 4.5 kWh/m², and the area with the best solar resource is the Guajira Peninsula, with 6 kWh/m² of radiation. Of the 6 MW of solar power installed in Colombia, 57 percent is distributed in rural applications and 43 percent in communication towers and road signaling. Solar systems can be very suitable for applications in rural areas, where energy demands are dispersed and modest and grid connection is often more costly.

Geothermal

The former Colombian Institute of Electrical Energy, today IPSE, and the Latin American Energy Organization have identified three areas with geothermal power potential:

- Azufral, in Narino Department, where the Azufral Volcano is located;
- Cerro Negro-Tufino, also in Narino Department, near the Chiles Volcano; and
- Paipa, located in the Cordillera Oriental in Boyaca Department.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

3.C. Colombia's Solid Waste Issues

Solid municipal waste³

A significant proportion of solid waste in Colombia is disposed inadequately. Colombia's 1,129 municipalities produce approximately 28,800 tons of solid waste per day. Approximately 35 percent – or approximately 10,000 tons/day – of this waste is generated in Bogotá, Cali, Medellín and Barranquilla, while medium-sized cities and smaller municipalities generate the remaining 65 percent or 18,800 tons/day. It is estimated that a large proportion of this waste is being disposed inadequately in open-air dumps, bodies of water, “enterramientos” and other environmentally unsustainable sites. Inadequate disposal results in environmental and health problems including surface and groundwater contamination, air pollution, and increased transmission of illness by vectors including flies and rodents. Approximately 45 percent of all municipalities, accounting for 18 percent of all waste generated, currently dispose solid waste in open-air dumps or other inadequate sites. Since 2005, these figures have been reduced significantly from 61 percent of all municipalities and 43 percent of all waste due to efforts of the Ministry of Environment, Housing and Territorial Development (MAVDT).

Numerous existing landfills will reach capacity over the next five years. MAVDT currently estimates that approximately 8-10 existing landfills serving important urban areas will reach capacity prior to 2012 – including those for Bogotá, Barranquilla, Valledupar, Bucaramanga, Villavicencio and Pereira which combined accommodate approximately 7,056 tons/day. Efforts are currently underway to expand capacity in these facilities to accommodate additional waste in the short-term while arrangements to design, develop and construct new regional facilities are put in place. Considerable effort will be required to ensure that these new facilities are designed as regional systems with the potential use of transfer stations.

The landfills in the four main cities in Colombia are estimated to have the potential to provide for an installed capacity of 47 MW (0.3% of current installed capacity).

Biomass

Colombia has a great biomass power potential from agricultural residues. Its annual biomass power potential is estimated to be over 16 GWh, which is still less than 0.1% of current electricity production. The potential is distributed as follows:

- 11,828 MWh/yr from agriculture residues,
- 2,640 MWh/yr from bioethanol,
- 698 MWh/yr from natural forest residues.
- 658 MWh/yr from biodiesel, and
- 442 MWh/yr from planted forest residues.

³ World Bank



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

The region of Uraba in the north of the Department of Antioquia has approximately 19,000 hectares of banana plantations, producing more than 1 million tons annually. It has also been estimated that approximately 85,000 TOE/yr could be produced from the 190 million m³/yr of biogas generated from coffee plantations, equivalent to 995,000 MWh.

4. Legal Framework for Waste to Energy Projects

The report, "UNA PROPUESTA PARA LA GENERACIÓN DE ENERGÍA ELÉCTRICA EN COLOMBIA UTILIZANDO LA CO-COMBUSTION", lays out the general legal framework for WtE projects.

Within the current regulatory framework applicable to the electricity sector, the provisions most relevant to the case of WtE projects are related to the activity of Cogeneration, whose regulation was initiated primarily from the issuance of the 085 resolution 1996 of the Energy Regulatory Commission and Gas (CREG), which was revised by resolution 107 of 1998 and amended by resolution 039 of 2001.

The definitions associated with the activity of Cogeneration, taken from the above resolutions are:

- **Cogeneration:** combined process of electric power and thermal energy, which makes part of a productive activity, for both own consumption or third parties and for industrial or commercial.
- **Cogenerator:** is that natural or legal person that produces energy using a cogeneration process and that may or may not be the owner of the cogeneration system.

From these definitions, and other activity specific to Cogeneration, the current regulatory framework enables the active participation of a proposed WtE as an agent of the Colombian electricity market, subject to special rules depending on the specific electricity production of each case considered, and covering any size of electricity generation project.

For solid waste it is necessary to take into account the standards set in environmental regulations, including the following:

Law 9 of 1979: Sanitary Code, whereby health measures are dictated, in addition to environmental regulation and management of natural waste.

- ACT 99 OF 1993: By which lays the foundations of the Colombian Environmental Policy.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

- LAW 142 11 JULY 1994: For which sets the rules for Public Services at home like cleaning service, among others.
- ACT 632 of 2000 by which amends Act 142 of 1994.
- ACT 689 of 2001 amending Law 142 of 1994.
- 430 LAW JANUARY 1998: By issuing rules prohibitive environmental, relating to hazardous wastes and other provisions.
- ACT 491 of 1999: By which creates environmental insurance as a mechanism to cover the quantifiable economic harm to specific persons, as part or as a result of damage to the environment and natural resources.
- Decree 2811 of 1974: In its articles 34 to 38 regulates matters related to solid waste management.
- Decree 1541 of 1978: Water Concession
- Decree 02 of 1982: The air quality standards.
- Decree 948 of 1995: Protection and control of air quality.
- Decree 1753, 1994: In which there is scope for the Environmental Licenses, explains its nature, methods and effects.
- 0605 DECREE OF 27 MARCH 1996: Regulating the law 142 of 1994, in connection with the provision of public service house cleaning.
- CRA RESOLUTION 151, January 2001: On the existing general regulation of the Regulation Committee Water and Sanitation. Establishing measures for the promotion of skills, procedures and conditions are set in the selection of contractors and other powers are exercised in contractual matters in the field of drinking water and basic sanitation.
- RESOLUTION 2309 OF 1986: Through which regulates what is related to special waste, being these pathogens, toxic, combustible, flammable, radioactive or volatilize and everything related to packaging and packaging waste containing such
- TECHNICAL REGULATION IN THE FIELD OF WATER SUPPLY AND BASIC SANITATION - RAS. Resolution 1096 of 2000, Ministry of Economic Development. Residential Public Services Division.

5. Justification for USTDA Involvement

USTDA can play an important role in the environmental and energy sectors development of Colombia and for the South American region. The growing solid waste management problem in Colombia is the main justification for USTDA intervention. USTDA's planning and technical assistance can play a large role in properly guiding the allocation of resources and ensuring that investments in the Waste to Energy sector proceed quickly, but soundly.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

USTDA support would also allow U.S. technology to gain an important foothold in a newly established WTE industry for Colombia. There could be potentially dozens of similar cogeneration projects in this size range in the coming several years and those equipment suppliers that implement the early installations will surely have an advantage in competing for market share.

The project that GreenMax recommends herein will have significant development impacts including on infrastructure development; market-oriented reforms; technology transfer and human capacity building.

6. Projects Reviewed But Not Recommended for USTDA Participation

In addition to the recommended project for grant funding with IDEA, the GreenMax team reviewed the proposed project from Empresas Publicas de Medellin (EPM) and Empresas Varias de Medellin (EVM). This project was determined by the project proponents, during the course of the mission to be not economically feasible as originally planned.

1. EVM – EPM Waste to Energy Project at La Pradera Landfill

Empresas Publicas de Medellin (EPM) is an integrated state-owned utility company that currently operates 26 electricity generation plants, of which 24 are hydro plants, 1 is thermo (460MW) and 1 uses wind (19.5MW). They also have 60,255 km of network lines. Moody's has recently assigned a Baa3 local and foreign currency issuer rating to EPM, based on relatively stable cash flows expected under the predictable and transparent regulatory environment under which it operates.

In conjunction with the state owned utility (and municipal waste collector), Empresas Varias de Medellin (EVM), EPM was interested in developing a waste-to-energy project, which would have continued on with their strategy of introducing innovative new projects, including wind and other CDM projects.

In Medellin, 1,600 Tons of waste is collected daily using 120 trucks in 424 collection routes. The average trip is 134 km. The final disposal is done in the La Pradera Landfill located 57 kilometers north of the production of waste from the city of Medellin. This site receives 1855 tons daily, 86% from Medellin and 14% from 16 other surrounding municipalities. Each household in Medellin is estimated to generate 5.33 kg/month, of which 65% is organic (thus making the garbage relatively wet).

EVM engaged the Universidad de Medellín to conduct a study, "ESTUDIO DE PRODUCCIÓN Y CARACTERIZACIÓN DE RESIDUOS SÓLIDOS GENERADOS EN EL SECTOR RESIDENCIAL Y POR ESTRATO SOCIOECONÓMICO DE LA CIUDAD



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

DE MEDELLÍN Y SUS CINCO CORREGIMIENTOS”, which produced the following results regarding the composition of solid waste in Medellín.

Physical composition of solid residuals generated by the residential sector of Medellín and its five precincts (May 2009):

Table A-1

COMPONENT	Medellin	Average
	%	%
Organic Material	50,11	53,76
Food waste	49,24	47,14
Garden waste	0,87	6,25
Wood	0,00	0,37
PAPER	2,31	3,23
Recyclable	1,44	1,49
Contaminated	0,87	1,74
CARDBOARD	1,78	2,10
Recyclable	1,39	1,19
Contaminated	0,39	0,92
PLASTIC	8,09	6,73
PET (1)	0,96	1,00
PEAD (2)	2,78	2,05
PVC (3)	0,00	0,05
PEBD (4)	1,52	1,11
PP (5)	1,35	1,45
PS (6)	0,61	0,44
Other (7)	0,87	0,63
Glass	2,13	2,08
Recyclable	2,13	2,08
METAL	0,57	0,76
Ferrous	0,00	0,26
Non ferrous	0,57	0,50
TETRAPACK	0,74	0,29
TEXTILES	1,35	2,14
DEBRIS	0,83	1,92
ELECTRONICS	0,22	0,46
OTHER	30,67	25,34



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

COMPONENT	Medellin	Average
	%	%
Toilet paper, towels, nappies etc.	9,40	10,91
Non recyclable paper	0,17	0,23
Non recyclable cardboard	0,00	0,18
Non recyclable glass	0,00	0,46
Plastic aluminized	0,78	0,52
Styrofoam	0,65	0,36
Rubber	0,70	0,05
Leather	0,00	0,07
Other	18,96	12,57
DANGEROUS	1,22	1,19
WEIGHT:	100,0	100,0

EPM and EVM submitted a Grant request last year to USTDA to carry out a feasibility study for the implementation of a WTE plant, using the waste from "La Pradera". Around the same time, since this project was endorsed by the Mayor's Office of Medellin, the Mayor himself ordered pre-feasibility studies from the University of Maryland through a US consulting company, JTM Consulting, in cooperation with Covanta, the Maryland based Waste to Energy company as a potential project developer-operator.

The pre-feasibility study, which was reportedly completed by the time the GreenMax team arrived to Medellin, was requested by GreenMax repeatedly before, during and after the mission team met with officials representing EVM, EPM and the Mayor in Medellin, but according to EVM, as per a confidentiality and non-circumvention agreement, the study could not be delivered to us.

However, in the aforementioned meeting, Mr. Sergio Montoya from EPM and Mr. Luis Cardenas, the official in charge of the project from EVM, expressed that the preliminary conclusions were not positive about the economic feasibility of the project and for this reason we were informed that Covanta had declined to continue further with promotion and development of the project. Several emails to Covanta on this topic went unanswered. , with many gaps to be solved, It was also reported at this meeting that EVM has an agreement with the European company, Green Gas to flare off the methane gas generated in the landfill until 2012 and, by then, they expect to find some options for use of the gases.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

The key variable in determining that the WTE at La Pradera is not economically attractive at this time is the price at which the generated electricity may be sold for. EPM's Mr. Montoya explained that EPM cannot pay a wholesale price more than UDS \$ 0.04 – 0.06 / Kwh since significant hydro projects are being built.

EPM and EVM did provide to GreenMax with the basic information available to complete an assessment, similar to part of the data provided to JTM Consulting, University of Maryland and Covanta. We concur with the reported conclusions of Covanta that this project is not viable as envisioned.

From GreenMax's detailed review of the EPM-EVM project information it was clear that unless a system can be devised for increasing projected revenues (i.e. by increasing the electricity price) WTE projects will remain not viable. This in turn led to our further discussions with the Ministries of Energy, Environment and ultimately with IDEA, resulting in the project GreenMax has recommended for grant funding, which provides a model to achieve a higher electricity sales price.

2. AUGURA – Banana Growers Waste to Energy

The Association of Banana Growers of Colombia (Asociación de Bananeros de Colombia) – AUGURA, has begun to study ways to use the waste from the harvesting and processing of bananas to generate heat and electricity energy to be used primarily in the processing and packaging plants.

AUGURA is at the early stages of trying to determine the appropriate technology to produce energy from the rejected waste products of the banana and plantain fruit harvest and processing – consisting mainly of stalks, stems and leaves.

Additionally, to increase the biomass volume, Augura has proposed to utilize urban waste from other close municipalities such Apartado, Carepa, Turbo, Chigorodó and Dabeiba, helping to mitigate the environmental problem that the region is facing.

Given the magnitude and estimated calorific values of the wastes it is estimated that construction of a 5MW capacity power plant will be justified.

AUGURA was born from the necessity to maintain a permanent technological center for banana and plantain producers in 1966, in order to open international markets, help farmers to increase competitiveness and research activities; its main objective is to assure exports. 95% of the total area (32,500 hectares) growing these products, belong to AUGURA members.



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

The GreenMax team was told that the AUGURA studies were at too early stage to warrant additional investment from USTDA in developing the project. The initial project, estimated at no larger than 5MW is likely to be too small for USTDA to support in and of itself but due to its significant potential to promote the conversion of banana wastes throughout Colombia and the region as a whole to useful energy, it may be a project worthy of USTDA intervention in the future.

7. List of Meetings Conducted

COLOMBIA	Contact/Topic	Company
1	Sergio Saldarriaga President	EVAS S.A.
	Review and collection of information for WTE project. Site visit at "El Guacal" landfill, potential site for plant.	
2	Sergio Montoya Head Energy research and Development Department Juan Pablo Restrepo V. Research and Development Department	Empresas Publicas de Medellin -EPM
	Discussion and review of Grant request to USTDA in conjunction with Empresas Varias de Medellin	
3	Luis Oliverio Cárdenas Director of Planning	Empresas Varias de Medellin - EVM
	Discussion and review of Grant request to USTDA in conjunction with EPM. Site visit at "La Pradera" landfill	
4	Clara Zapata Business Representative of Mayor Office of Medellin	Alcaldia de Medellin
	Discussion and review of Grant request to USTDA by EPM and EVM	
5	Alvaro Vasquez President Alejandro Garcia Financial Department	Instituto para el Desarrollo de Antioquia - IDEA
	Structuring and commitment assurance as Sponsor and Grantee for the proposed WTE project	
6	Henry Madrid President	Grupo Monarca
	Review of company's profile and projects.	



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

	Jose V. Guzman Director of Planning and Projects	Colinversiones
7	As the 3 rd largest energy generator of Colombia, went over projects, long term vision, and investment criteria.	
8	Marco Calvo President's Assistant Discussion about potential use of agricultural waste for a WTW Project.	AUGURA
9	Felipe Calle President Review of industry and WTE Project opportunities	Green Mountain Energy
10	Alberto Acero Subdirector Environment Control Review of actual waste management situation and regulation in Bogota.	Departamento del Medio Ambiente de Bogota
11	Carlos Valles Henry Zapata Renewable Energy and non-traditional sources Review of regulatory frameworks and Industry's information systems.	Unidad de Planeacion Minero Energetica - UPME
12	Andres Taboada Vice Minister of Energy Review of regulation and structure of sector	Ministerio de Minas y Energia
13	Camilo Rojas Special Projects Investments Review involvement on WTE project investments in Colombia.	CAF
14	Erika Predraza Carolina Marin Advisor Review of tariffs, transport and waste treatment policies and regulation.	Comision Reguladora Agua potable - CRA
15	Alejandro Castaneda Subdirector of Energy Helena Castaneda Pilar Tejada Water and Sanitation Department	Departamento de Planeacion Nacional



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

Review of government objectives and creation of policies regarding WTE projects.

16	Juber Hernandez Director Assistant	Unidad Administrativa Especial de Servicios Publicos de Bogota
	Review of current situation and plans of „Dona Juana“ landfill.	
17	Maria Guarin Special Projects Financing	IFC
	Review of current products, involvement in renewable energy in Colombia, and industry assessment.	
18	Camilo Torres Advisor	Comision Reguladora Energia y Gas - CREG
	Review of policies and regulatory frameworks on energy sector.	
19	Maria Concha Advisor sustainable development	Ministerio de Ambiente, Vivienda y Desarrollo Territorial
	Review and analysis of impact of WTE projects and current support activities.	

8. List of Contacts

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**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

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**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

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**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

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DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

9. Colombia Project Recommended for USTDA Funding

Project #1: IDEA Pilot Waste to Energy Projects

9.A. Project Description

Project Summary	
Host Country	Colombia
Project Name	Instituto para el Desarrollo de Antioquia (The Antioquia Region Economic Development Institute – IDEA) Pilot Waste to Energy Projects Construction of a 20MW Waste to Energy Plant at ENVIASEO – EL GUACAL Landfill
Sector	Environment and Energy
Region	Latin America
Location	Antioquia Region
Capital Required	USD \$ 64,000,000
Direct US Export Potential from Pilot Projects	USD \$ 41,220,000
Indirect Export Potential from a Possible 20% Market Share of Projected Future Investment in Colombia WTE	USD \$ 164,880,000
Recommended USTDA grant amount	USD \$ 573,039
Project Grantee	Instituto para el Desarrollo de Antioquia – IDEA



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

9.A.1 Introduction

Instituto para el Desarrollo de Antioquia (The Antioquia Region Economic Development Institute – IDEA) proposes to take a leadership role in the development of the Waste to Energy sector in Colombia by developing and implementing a project using primarily municipal wastes.

Colombia is nearing a waste management crisis. Much of municipal solid wastes are deposited to landfills that are either running out of space, far distances from the points of waste generation or both. Some landfills are causing environmental degradation from seeping of hazardous leachates into the soil, groundwater and rivers. Other landfills are encroaching on habitable areas. The Bogota landfill, situated on sloping hills at one end of the city actually collapsed in an avalanche some years ago destroying many homes! Disposal of industrial waste are not properly regulated. Many high pollutants are simply dumped into rivers. The Medellin River, running from Medellin is visibly filled with white foam from chemicals. Colombia's environmental sustainability, its pristine natural beauty, and its burgeoning tourism are all threatened by this waste management crisis.

At the national and regional levels, government has begun to recognize these dangers. Increasing attention has been placed on the security and sealing of existing landfill sites, new measures for disposal of municipal and industrial wastes are being examined and incentives for recycling and processing of wastes are being considered. One important option for sustainable waste management is the processing of the organics and other non recycle-able materials into energy. In Colombia, however, the current regulatory framework in the energy and waste management sectors do not encourage waste to energy conversion.

Colombia's energy sector is among the best managed in Latin America. With an abundance of hydropower delivering roughly 70% of its electricity needs and well run thermal power plants for peaking and back-up, Colombia has kept wholesale energy prices relatively low and maintained a high level of security of supply. Long term contracts for power supply to the system from independent power producers are priced today between \$0.04 - \$0.06/kwh. Although prices on the spot market may reach as high as \$0.08 - \$0.09 in the next few years as new power plant construction catches up with Colombia's high economic growth rates, the foundations for new power generation have already been put in place with much investment underway. Therefore the long term contracts likely do reflect the long term pricing forecast. To be economically viable, however, Waste to Energy plants, depending on the technology deployed and other income streams possible, will generally need to receive at least \$0.07 – 0.09/kwh for produced electricity. With the market being flooded in the future with low cost hydro power now under construction, selling on the spot market as a merchant plant would not bring durable income streams at the required level. Nor would a long term PPA at \$0.06/kwh provide sufficient returns.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

Waste to Energy plants also generally need to receive attractive income streams from “tipping fees” for receiving the waste, from the sale of carbon credits and recycled materials, and wherever possible from the sale of thermal energy. For example, waste to energy developers usually look for tipping fees at the level of \$20-25/ton. In Colombia however high waste disposal tariffs are mainly earned by haulers (at the level of \$40.00 – 56.00/ton, whereas the tariffs for accepting wastes deposits at landfills is only in the range of \$ 11.00 – 13.00/ton.

The difficult economics for WTE plants in Colombia were underscored by the long term PPA at pricing starting as low as \$0,04 and escalating only to 0,06/kwh which was offered by the regional utility company, EMPRESAS PUBLICAS DE MEDELLIN (EPM) for power to be generated at a proposed Waste to Energy plant in Medellin. This recently led the project sponsors, a consortium of the US Company Covanta with the regional waste management and public utilities companies INTERASEO and EMPRESAS VARIAS DE MEDELLIN (EVM), to abandon plans for the project.

The GreenMax team held discussions with national and regional policymakers to explore how Waste to Energy investments could be profitably organized on a pilot basis, to demonstrate benefits and encourage policy changes. A willing partner and a workable scheme were both found with IDEA.

IDEA has broad responsibilities for engendering economic and social development within Antioquia and has become a major investor in infrastructure projects throughout Colombia. IDEA is already today a significant investor in the energy sector with controlling stakes taken in the hydroelectric projects such as Pescadero Ituango, Encimadas Canaveral, and the Electric Company EMGEA. Due to its energy sector involvement, IDEA has become the majority share holder of EMGEA (Empresa Generadora de Energia de Antioquia) an entity specialized in energy trade, in order to sell the output of IDEA’s invested power generation facilities. Although the wholesale energy price in Colombia is as mentioned above, the retail price for industrial users is as high as \$ 0.13- 0.15/kwh. A major component of this tariff is comprised of various taxes including a 20% Federal excise tax. IDEA, as a tax exempt entity is able to market and sell power through EMGEA from its the power production facilities in which it has a controlling interest, directly to industrial users, with avoidance of the excise tax. It means that a Waste to Energy facility, if controlled by IDEA, could sell wholesale power in the range of \$0.08-0.09/kwh to EMGEA for further retail sale to industrial users at a price still discounted from the normal industrial tariff due to IDEA’s tax exemptions.

The GreenMax team discussed the use of tax exemptions with the Ministry of Energy and the National Energetic and Mineral Planning Unit (UPME – Unidad de Planeacion Minero Energetica), and both were encouraging about a pilot project to demonstrate this mechanism as a means to promote investments in Waste to Energy. Their



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

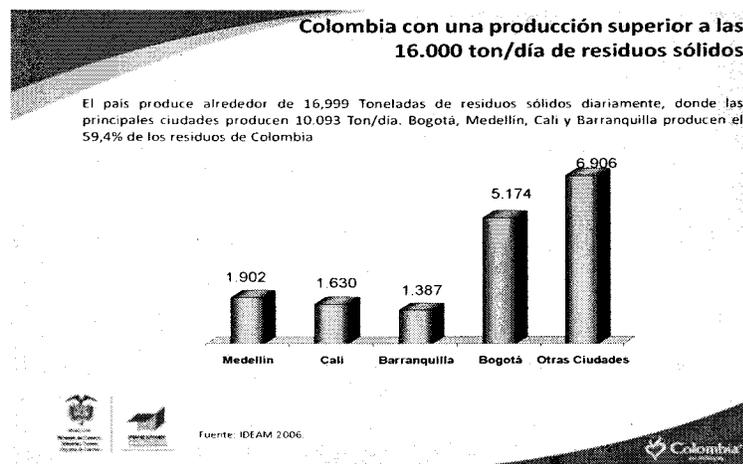
view is that tax exemptions for power produced from wastes could be an acceptable means of providing proper incentives that allow investors to sell such energy profitably.

As a result of these discussions, the GreenMax team focused the definitional mission on developing a pilot project to be implemented with IDEA following the scheme described above. IDEA's involvement as project sponsor also ensures that the proposed pilot waste to energy projects will have a strong equity partner with access to concessional credits. IDEA proposed one pilot project in order to demonstrate waste to energy utilization of both municipal and industrial wastes. The pilot project is proposed for USTDA support under a grant to IDEA.

The Pilot Project, to be undertaken on the terrain of the private landfill operator EVAS Enviambientales S.A. E.S.P, proposes the conversion to energy of the collected urban and industrial wastes currently deposited to the landfill of El Guacal near the city of Envigado to result in construction and operation of a 20MW integrated waste processing and WTE power plant.

The Pilot Project is meant to demonstrate the viability of WTE technology and a workable model for project organization in order to promote the development of the sector in Colombia. In Colombia more than 16,000 tons of solid waste per day are deposited to landfills, with more than 10,000 tons out of this total accounted for in the four major metropolitan areas of Bogota, Medellin, Cali and Barranquilla (see Figure 1). Using the rough data collected from El Guacal and our calculation of WTE potential there, GreenMax estimates that the potential for converting MSW to electrical energy from the country's total landfill deposits could be on the order of 500MW. Perhaps twice that electrical capacity again might be produced from Colombia's agricultural wastes which are presently not deposited to landfills and simply discarded throughout the countryside.

Figure 1 Magnitude of Municipal Solid Waste Deposited to Landfills in Colombia





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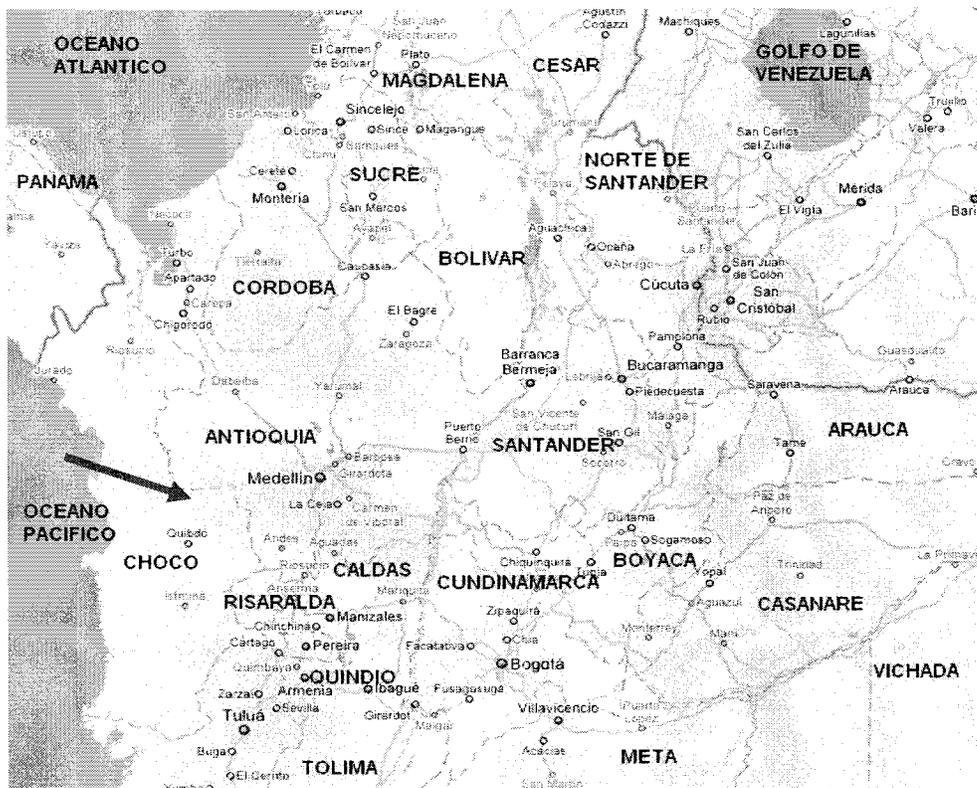
COLOMBIA REPORT

9.A.2. The Project Site

The project envisions the development and construction of one Waste to Energy plant, technology to be determined, located in Municipality of Heliconia in Antioquia Department at the landfill, “El Guacal”, operated by “EVAS”, just outside of Envigado and 25 km from Medellin,

EVAS ENVIAMBIENTALES S.A. E.S.P, is a sanitary and landfill operator company in Colombia, owned 100% by the Municipality of Envigado. EVAS is based in the South of Aburra Valley, providing services of treatment and final disposition of the solid waste in the “South Industrial Center EL GUACAL”. “EL GUACAL” is licensed for 24 years to receive, select and process ordinary and special solid waste and mud. El Guacal Landfill appears to have sufficient transport, electric and sanitation infrastructure to support a WTE Project.

Figure 2 – Location of El Guacal Landfill





DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

9.A.3. Project Background

The conceptual basis of the project is the utilization of municipal and industrial waste of five municipalities south of Medellín for power generation. The waste processing and power generation facility will input the roughly 650 tons per day of Municipal Solid Waste (MSW) presently deposited at the EVAS landfill and convert it to roughly 400 tons of refuse derived fuel for generation of roughly 20MW of electricity. With collection and landfill deposits well managed by EVAS, these wastes have been studied and classified to show a high calorific value with a steady and continuous daily flow. The technology utilized will likely be a form of gasification which will be finally determined during the feasibility study.

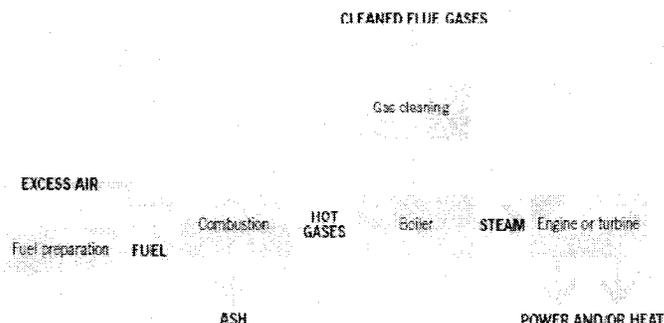
The objective of the project is that by utilizing these wastes to produce electrical energy, the project will contribute to reduced greenhouse gas emissions produced by landfills and, at the same time, avoid the collateral detrimental effects of current disposal practices of this waste.

9.A.4. Technical Description of the Project

The purpose of the proposed Feasibility Study to be funded by USTDA would be to select the appropriate technology and bring the project to conceptual design phase. Given the Municipal Solid Waste (MSW) characteristics of deposits to El Guacal landfill and its high humidity level, a direct combustion technology for heat and steam production such as illustrated by Figure 3 below is unlikely to be most efficient given the low calorific power in humid condition of the MSW. However, the far lower cost of such systems would have to be taken into account in any analysis.

Figure 3

Flow chart of a conventional direct combustion waste-to-energy plant





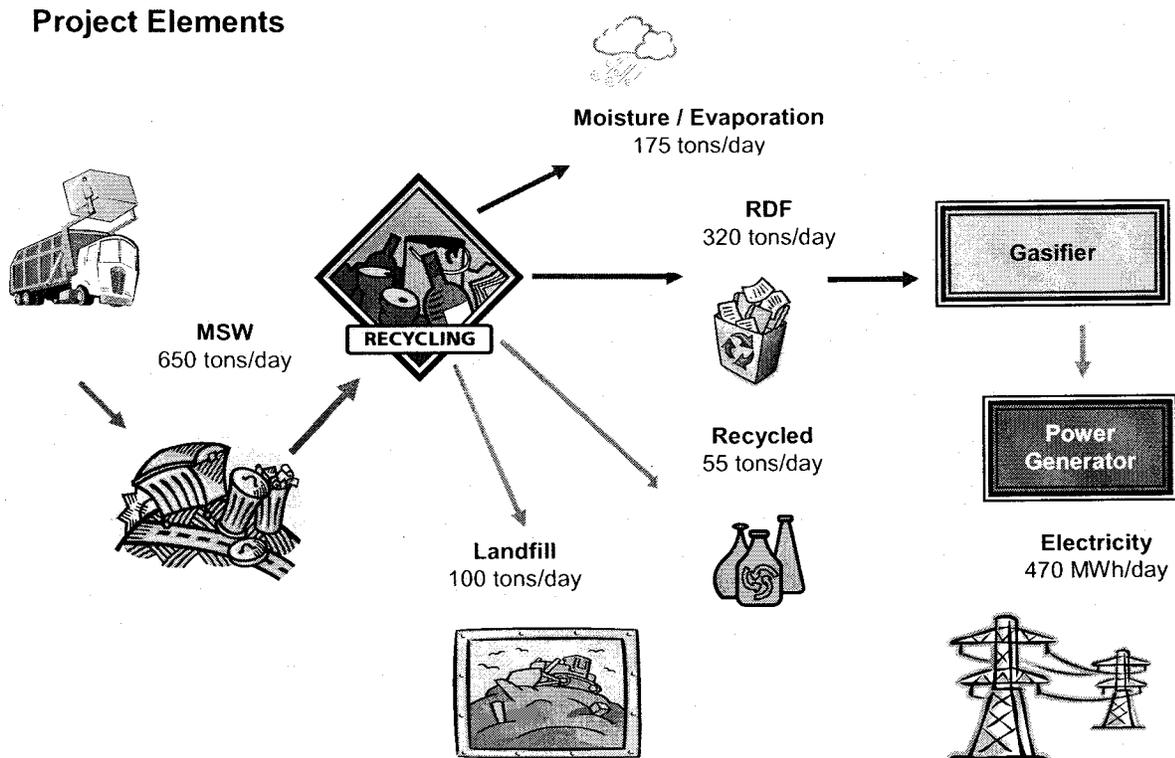
DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

9.A.5. Project Cost

As the technology selection will be one of main goals of the feasibility study, GreenMax has used as a proxy for developing the cost estimate, the MSW gasification system promoted by the US company Norcon International of Rome, Georgia. Using the Norcon system parameters we have estimated the size of the EVAS Pilot Project WTE plant at 20MW, producing roughly 470MWh/day of electricity, based on the total current deposits of 650 tons/day at the EVAS landfill site. The assumptions about the disposition of the waste stream to produce energy are shown in Figure 5 below.

Figure 5



BASED ON NORCON SYSTEM RATED ESTIMATED POWER:
MSW TO BE PROCESSED TO ENERGY:

20.0 MW
400 Ton/day



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

Table 1

CAPEX ESTIMATION FOR EVAS WTE BASED ON NORCON GASIFICATION SYSTEM

Buildings	\$ 8,000,000
Startup & Construction Mgmt	400,000
Separation & RDF Equipment	8,000,000
Gasifier	22,800,000
Gas + Steam Turbines	16,000,000
Gas Compressors, Pumps, Valves	2,000,000
Electrical transformers, cables, controls	4,000,000
Civil & Site Dev / Permitting	800,000
Computers/Furniture & Fixtures	40,000
Rolling Stock	120,000
Project Engineering	1,560,000
	\$ 64,000,000

9.A.6. Project Structure

The planned business model is to create a joint venture (JV) between IDEA, Municipality of Envigado, and lastly Grupo Monarca, as the development entity for the group. The JV will be registered in the City of Envigado; it will own, operate and maintain the new WTE plant. The JV would grant a profit sharing to the Municipality of Envigado, as owner of EVAS and El Guacal landfill. If the JV determines that foreign investment is desirable, participation based on equity will be determined.

A similar structure is already being implemented by IDEA and Grupo Monarca on the installation of a Biodiesel Plant in Antioquia, which utilizes waste from coffee growing activities. Grupo Monarca is an engineering company intensively involved in several construction projects in the region.

The new plant will be built within a 2 year period with a planned operating life of at least 25 years.

The JV will enter into a 25 year agreement with EVAS as the El Guacal landfill operator, for rental of the space for location of the new WTE plant and for processing of all appropriate MSW delivered to El Guacal by the WTE plant.

Pre-agreement between the Municipality of Envigado, IDEA and Grupo Monarca has already been reached and confirmed by the GreenMax team during individual meetings with each. Envigado's participation secures the rights to the WTE plant site at El Guacal and to the MSW that will fuel the new plant.



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

9.A.7. Fuel Supply

The raw material to be used in the Project is the urban waste collected and transported to the landfill. Table 2 shows the composition of the waste stream at the El Guacal landfill totaling 650 tons/day. Of this amount, 415 tons/day will be made available to the planned WTE plant.

Table 2

EL GUACAL RAW MATERIAL		
	%	Ton/day
ORGANIC	55,00	357,5
PAPER	10,00	65,0
PLASTIC	14,00	91,0
METAL	2,00	13,0
UNUSABLE	15,00	97,5
OTHERS	4,00	26,0
TOTAL	100,00	650,0
WATER CONTENT	73,63	
WET CALORIC POWER	483,10 - 944,61	Kcal/kg
DRY CALORIC POWER	4.021,30	Kcal/kg
TIPPING FEE	11,00	USD/ton
TRANSPORT	0,19	USD/km
DISTANCE	25,00	KM

9.A.8. Legal and Regulatory Framework

9.A.8.1. Electricity Sector

One of the concrete results of the 1991 Constitution was the modernization of the Colombian electricity sector by opening it to private participation, a process that took place after the restructuring of the sector based on the enactment of laws 142 and 143 1994 (Residential Public Services Act and Electricity Act, respectively), which define the legal framework governing the rules and conditions for its development, to be determined by free market competition.

These laws established the Wholesale Energy Market (or MEM) and the regulatory framework for the same which has been developed by the Energy Regulatory Commission



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

for Electricity and Gas (CREG). Compliance monitoring has been assigned to the Superintendence of Domestic Public Services (SSPD).

The launching of the new trading scheme took place in 20 July 1995, with the formal initiation of the Stock Exchange of energy price manipulation.

The Wholesale Energy Market is comprised of: generating agents (those who produce energy) and traders (agents who represent the demand of users in this market), the National Transmission System (STN), (to which all agents have free access that allows them to conduct transactions with one another through the payment of charges for the use of connection) and the power exchange, (which after the price bids and the declaration of availability of each resource, establishes the Central Dispatch for all generation plants and determines stock price for power transactions). Together with the long-term contracts, the Wholesale Energy Market is thus the basis for settlement of all trade between the different market agents.

9.A.8.2. Waste Management Sector

Regulation of solid waste management has its origins in Decree 2811 of 1974 and Act 9 of 1979 (National Health Code). In this first stage legislation stands the State's concern for technical regulations and environmental aspects with an explicit preference to promote recycling processes and changing patterns of production and consumption of goods to minimize the generation of solid waste.

With the issuance of the 1991 Constitution and Law 99 of 1993 and 142 in 1994, an institutional framework for business development of public sanitation was established, in order to ensure efficient provision under the responsibility of municipalities and districts.

Additionally, it raised the need for a national policy on solid waste management, based on the integrated management and provision of sanitation services in a planned way. Thus, a strategy for the development of policy instruments was designed, established in Decree 1713 of 2002, which articulates the environmental component of solid waste management through the provision of public sanitation services, especially include the following:

- Establish minimum environmental conditions that must be met in each of the components of public waste disposal.
- Establish a sector planning tool, called "Regional and Local Solid Waste Management - PGIRS", whereby local authorities should develop strategies, programs and projects sustainable in the short, medium and long term.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

This Act has been amended in part by the 2003 Decree MAVDT 1140, regarding the regulation of landfills, and Decree 1505 of 2003 MAVDT regarding the development of Plans for Integrated Solid Waste Management - PGIRS. Under Resolution 1045 MAVDT 2003 the government further adopted a methodology for the development and implementation of PGIRS and MAVDT Resolution 477 of 2004 set deadlines for this.

Additionally, Decree 838 of 2005 MAVDT also amended the Decree 1713 of 2002, defining the mechanisms for planning, construction and operation of systems for solid waste disposal to landfills, and Resolution 1390 of 2005 MAVDT established guidelines and standards for closure, decommissioning and restoration or transformation of landfill sites.

Finally, Law 1151, 2007 National Development Plan 2006-2010: "Community State: Development for All", provides in Article 91 for establishment of "Departmental Plans for Business Management of Water and Sanitation Services", which channels National Government investment for potable water and basic sanitation under coordination of the regions. Likewise, section 101 created an incentive for municipalities to locate a regional landfill in its territory, this article was regulated by Resolution 429 of 2007 assigning responsibilities to the Regulatory Commission of Drinking Water - CRA.

Through the application of all of the above mandates, standards are defined to govern the sites technically selected, designed and operated for the controlled disposal of solid wastes.

However, despite this framework, in Colombia, according to information reported to the Single Information System - SUI, there is still a significant percentage of waste being handled improperly.

9.A.9. Economic Fundamentals

The Project is estimated to have an Internal Rate of Return of 16.26% under the following fundamentals:

- The initial pilot unit will generate 23.75 MW/h using 470 ton/day of MSW.
- The installation of the pilot project will take 2 years.
- The CAPEX needed is presented above for each part of the process.
- The energy sale price it is taken on a USD \$0,09 kwh basis , with increases of 2% per year until 2019.
- The CER certificates are projected to be placed at USD \$ 6.00/tCO₂.



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

Project Cash flow projections are shown below.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

Financial Projection EVAS Waste to Energy Project

Figures in US\$ million	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030		
(+) Revenues	0.0	0.0	16.3	16.5	16.8	17.4	17.7	18.0	18.3	18.6	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	
Electricity sales	0.0	0.0	13.4	13.7	13.9	14.5	14.8	15.1	15.4	15.7	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6
Other revenues	0.0	0.0	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
(-) Expenses	30.6	30.6	4.1	4.2	4.2	4.3	4.3	4.4	4.4	4.5	4.6	4.6	4.6	4.6	4.6	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.8
Operational	0.0	0.0	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Equipment	30.6	30.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variable costs	0.0	0.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6
Fixed costs	0.6	0.6	2.9	0.3	0.3	3.0	3.1	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.3
(=) EBITDA	-30.6	-30.6	12.2	-12.4	12.6	12.8	13.0	13.3	13.5	13.8	14.0	13.9	13.9	13.9	13.9	13.9	13.8	13.8	13.8	13.8	13.8	13.8	13.7
(-) Depreciation	0.0	0.0	4.2	4.1	3.9	3.7	3.5	3.3	3.1	3.0	2.8	2.6	2.4	2.2	2.0	1.8	1.7	1.5	1.3	1.1	0.9	0.9	0.9
(=) EBIT	-30.6	-30.6	7.9	8.3	8.7	9.1	9.5	10.0	10.4	10.8	11.2	11.3	11.5	11.7	11.8	12.0	12.2	12.3	12.5	12.7	12.7	12.8	12.8
(-) Interest Expense	0.0	0.0	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
(+) Interest Income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(+) Other Non-Operational	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(=) EBT	-30.6	-30.6	4.3	-4.7	5.1	5.5	5.9	6.4	6.8	7.2	7.7	7.7	7.9	8.1	8.2	8.4	8.6	8.7	8.9	9.1	9.1	9.2	9.2
Losses Carry-Forward	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Royalty to Municipality	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
(-) Income Taxes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(=) Net Income	-30.6	-30.6	4.0	4.4	4.8	5.2	5.6	6.0	6.4	6.8	7.3	7.4	7.5	7.7	7.9	8.0	8.2	8.4	8.5	8.7	8.7	8.9	8.9

IRR 8.6%



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

Power sales are contemplated under a long term PPA via IDEA and EMGEA. The Project also will generate Certified Emission Reductions (CER's) through the Clean Development Mechanism (CDM) which will be sold in the international market.

9.A.10. Project Development Timetable

The estimated project development and implementation timeframe is 30 months. The initial 6 months will be dedicated to performing the technical feasibility studies and the obtaining of environmental permits. The next 24 months will be used for the project to be put out to tender, contract awarding, erection and commissioning processes.

Feasibility Phase

This phase is proposed to be undertaken as quickly as possible and includes the steps below. The USTDA grant funding would support points a-j.

- (a) The detailed characterization of the waste that will be used as fuel in the project, to determine its volume, availability, its chemical and physical composition and origin.
- (b) The investigation of the state-of-the-art power generation technologies appropriate to this project
- (c) The negotiation of the final long-term contract to secure the constant MSW feedstock.
- (d) The selection of an adequate location to install the projected power plant that complies with the necessary requirements such as, precise placement inside the landfill site, grid connection details, water availability required for the plant's operation, and other necessary infrastructure.
- (e) Preliminary Environmental Impact Study. The environmental base line will be measured at this stage (air quality) and the project environmental impacts will be assessed on a preliminary basis to elaborate the required documentation, to apply for the environmental approval of the project in compliance with the Colombian regulation. For clarification, this would not be a the environmental impact study necessary to meet statutory requirements, only a preliminary review to flag key issues and to prepare the scope of work for the full environmental studies. The full environmental studies should be undertaken separately by the Grantee.

Points a-e will take approximately 6 months to complete.

- (f) Electrical Interconnection Study
- (g) Transmission Line Advanced Basic Design
- (h) Site Studies (Geo-technical, topography, water resources etc.)



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

- (i) Logistics Design Study
- (j) Advanced Technical - Economic Feasibility Study -- This study includes all the basic engineering, with a sufficient detail level to have final investment estimates and all the documentation needed to call for an international bid for the supply, erection and commissioning of the plant and the final economic evaluation to start the project financing phase.

The time required to execute the studies in points f-j about 4 months which can occur co-terminus with the studies in points a - g.

- (k) Tender offer for the supply of main equipment and erection and commissioning contract.
- (l) Once the Advanced Technical - Economical Feasibility Study is finished, the qualified main equipment suppliers will be selected (boiler and associated equipment, steam turbine -electrical generator set) with the purpose of putting out a tender for these items among companies with recognized experience in their respective fields and especially to those who have supplied the equipment for similar projects in the past. (Foster Wheeler, Babcock Wilcox, General Electric Company, Siemens- Westinghouse, Posco, Mitsubishi, Ansaldo Energia SpA, Detroit Stoker Inc. Aalborg Boilers A/S, NEI-Allen, Detroit Stoker, Hamon, Fuji Electric, GEA Cooling Technologies).
- (m) In parallel, the contracts to perform the detailed engineering, civil works and seismic engineering, owner's engineering and Balance of Plant (BOP) equipment procurement, and erection and commissioning contracts, will be put out to tender.
- (n) To supply the Owner's engineering services the JV (IDEA, Municipality of Envigado, Grupo Monarca) will invite a set of first-class companies. However, the company that developed the Technical - Economical Feasibility Study will have a preferential right. The erection and commissioning contract will be awarded to a local company with vast experience in the development of thermal plant projects.

The tender process in points k-n will take an estimated 4 months and should be finished simultaneously with the obtaining of the environmental permit.

Execution Phase

The project execution will be managed directly by Grupo Monarca with an experienced team in the erection of thermal plants, and will have the responsibility to coordinate all the project's suppliers and contractors.

The traditional suppliers for the main equipment (boiler, gas turbine/gas engine-electrical generator set, combustion flue gas cleaning system, Instrumentation and Control Systems) are companies with manufacturing facilities in the U.S. (Babcock & Wilcox, GE, Siemens-Westinghouse, Solar Turbines, Caterpillar, Cummins, Waukesha etc) with competition coming from European and Asian based producers (Foster Wheeler, Mitsui Babcock, Ahlstrom, ABB, GE Jenbacher, Mitsubishi, Hitachi,).



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

9.B. About the Grantee

The IDEA – Institute for the Development of Antioquia – is the autonomous regional public institution in Antioquia focused on economic development projects. It is funded by Antioquia Departmental Ordinance No 13 of 1964, in addition to the Ordinance No 14 of 1996 and by decree 321 of 1984 which enabled IDEA to increase its services and activities.

IDEA's social objective is to foster economic, cultural and social development of communities by providing loan credits, direct investments and other financial services directed to the construction of public infrastructure in the country. While its priority is initiatives taken at the Regional level, especially those involving cooperation among various municipalities, IDEA also acts on a national level outside of Antioquia and has become today the dominant economic development agency in all of Colombia.

Towards its purpose to promote development, the IDEA provides financing services, resources management, consulting, financial and budget training, as well as project identification and structuring, combining under one organization everything included both in the main purposes which fall traditionally separately under the services of a regional economic development agency and an economic development bank. IDEA works in four strategic: Energy, Infrastructure, Mining and Reforestation. Some key projects under IDEA's management and investment include:

Energy: Pescadero Ituango Hydroelectric Central, Electric Mini-centrals, Encimadas and Cañaveral Hydroelectric Project.

Infrastructure: Mountain Highways, Civic Center of Plaza de La Libertad, Antioquia Railway, New Palace of Justice in Antioquia, Manantiales Technological Park, Uraba Port, East Tunnel.

Mining: Coal, Mining Exploitation, Commercial missions

Reforestation: Coffee Wood Pilot Plant

Inside the INFIS group (Institutes of Encouraging, Investment, Promotion and Development of the Territorial Entities) operating in Colombia, the IDEA is the most important one according to assets, income and institutional development.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

9.C. Development Impact

The project address one of the most pressing challenges for the regional and national levels of government in Colombia today – improving forms of sustainable waste management. The project has the potential to increase recycling, decrease deposits of waste to unsustainable landfills, deliver clean and renewable energy, and create well-paying jobs.

The proposed project is expected to ensure reliable and cost-efficient energy to existing industrial users in the area and to reduce greenhouse gas emissions by decreasing methane released from landfills.

The new energy plant will employ an estimated direct workforce of 150 people during its construction and operation. Additionally, it is estimated that the project, when operational, will create 85 new indirect jobs.

The WTE plant may also serve as model for implementation in other different areas out of Antioquia across the country, strengthening the position of US producers of equipment and services for this industry.

9.D. Project Sponsor Commitment

IDEA with its enormous background in the energy sector and its commitment with the development of the Antioquia region, make it fully capable to successfully develop the project. The Grantee has an outstanding record of promotion and development of big and small hydroelectric projects; IDEA is a major shareholder of EMGEA, the local electric company, actually designing and promoting 36 hydro plants of less than 20MW and two more significant projects, Encimadas Canaveral and Pescadero Ituango, of 162 MW and 2.400 MW respectively.

During the meeting of the GreenMax team, Alvaro Vasquez, President of IDEA, has confirmed their strong interest in cooperation with EVAS, AUGURA and Monarca.

The Grantee is willing to provide its equity resources for the project, and the GreenMax team is also confident about the financial stability of the institution.



DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS IN COLOMBIA & CHILE

COLOMBIA REPORT

9.E. Implementation Financing

The feasibility phase funding is foreseen to be covered by the USTDA grant.

The equity required to execute the project (20% of total investment, about USD \$12 million) is planned to be completed through private share placements organized by IDEA.

IDEA has done this before to develop other projects and its partners have experience in articulating these types of operations.

Since the project is aligned with the governmental interest of promoting the development of renewable energy resources, and given that its characteristics comply with the requirements to have access to soft loans administrated by MAVDT (Environmental, Housing and Development Ministry), the plan is to provide debt for finance the projects through these credit lines, plus commercial credit lines provided by IDEA in order to reach the total investment amount required.

9.F. US Export Potential

The direct export potential from equipment that is manufactured in the US and from engineering services that can be supplied by US firms is estimated at roughly 41 million dollars US. This total reflects most of the major plant equipment, comprised primarily of fuel treatment and handling components, power generation, and controls as shown in Table 5 below.

US export potential is related mostly to the primary energy equipment (gasifiers, gas and steam turbines, generators, etc.), and the waste to fuel handling and processing equipment, while the construction, engineering and other ancillary equipment will be provided mostly from local sources. The ultimate selection of equipment, and therefore US Export potential will essentially depend upon conclusions of the feasibility study concerning the technology of the WTE plants.

The indirect US export potential is estimated very roughly at USD 164 million. This total is based on a total potential investment in WTE plants throughout Colombia over the next 10 years of 500MW. We further assume a 20% US market share and that US export potential is in the same ratio as that for the Pilot Project. It is difficult to provide a more precise prognosis without conducting a complete market analysis which is beyond the scope of this assignment.

Some of the potential U.S. vendors of the export equipment and services are identified in Table 6 below.



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

Table 5

EL GUACAL LANDFILL - CAPEX AND US EXPORTS

Equipment and Labor	\$ Approximate Total Cost	US Exports %	\$ US Exports
Buildings	8,000,000	0%	0
Startup & Construction Mgmt	400,000	0%	0
Separation & RDF Equipment	8,000,000	80%	6,400,000
Gasifier	22,800,000	80%	18,240,000
Gas + Steam Turbines	16,000,000	80%	12,800,000
Gas Compressors, Pumps, Valves	2,000,000	50%	1,000,000
Electrical transformers, cables, controls	4,000,000	50%	2,000,000
Civil & Site Dev / Permitting	800,000	0%	0
Computers/Furniture & Fixtures	40,000	0%	0
Rolling Stock	120,000	0%	0
Project Engineering	1,560,000	50%	780,000
	\$ 64,000,000		\$ 41,220,000

Table 6

Primary U.S. Suppliers

Gasification boiler for MSW	Bechtel 50 Beale Street San Francisco, CA 94105 415-768-1234 http://www.bechtel.com/home.html
	Phoenix Solutions Co. 3324 Winpark Drive Minneapolis, MN 55427 763-544-2721 http://www.phoenixsolutionsco.com/index.html
	George K. Moss Co., Inc. P.O. Box 380156 Birmingham, AL 35238 205-408-2929 http://www.gkmoss.com/
	Norcon International, Inc PO Box 92 Rome, GA 30162-0092 706-235-9531 http://norconinternational.com/Index.htm
	Diversified Energy 2020 W. Guadalupe Road, Suite 5



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

Gilbert, AZ 85233-2804
480-507-0297
<http://www.diversified-energy.com/index.cfm>

DKRW Advanced Fuels
Two Riverway, Suite 1780
Houston, Texas 77056 USA
713-425-6520
<http://www.dkrwaf.com/fw/main/Home-37.html>

Eastman Chemical Company
PO Box 431
Kingsport, TN 37662
423 229-2000
<http://www.eastman.com/Pages/Home.aspx>

Emerson
P.O. Box 4100
8000 West Florissant Avenue
St. Luis MO 63136
314- 553- 2000
<http://www.emerson.com/en-US/Pages/Home.aspx>

General Electric
One River Rd.
Schenectady, NY 12345
518-385-4593
www.gepower.com/

Haldor Topsoe, Inc.
17629 El Camino Real
Houston, TX 77058
<http://www.topsoe.com/> 281-228-5000

KBR
601 Jefferson Street Suite 3400
Houston, TX 77002
713-753-3011
<http://www.kbr.com/>

Praxair, Inc.
Worldwide Headquarters
39 Old Ridgebury Road
Danbury, CT 06810
800-772-8247
<http://www.praxair.com/praxair.nsf>

BQPES
20 Jon Barrett Road
Patterson, NY 12563
845-228-3460
<http://www.bqpes.com/index.php>



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

	<p>Rentech 10877 Wilshire Blvd. Suite 600, Los Angeles, CA 90024 310-571-9800 http://www.rentechinc.com/index.php</p>
<p>Waste Separation Systems</p>	<p>Garb Oil & Power Corporation 1588 South Main Street Suite 200 Salt Lake City, Utah 84115 801-832-9865 http://www.garbop.com/index.html</p> <p>Lundell Enterprises, Inc. 5134 Hwy. 3 Cherokee, IA 51012 800-831-4841 http://www.lundellent.com/recycling.php</p> <p>Advanced Metal and Welding 6721 Discovery Blvd, Suite 200 Mableton, GA 30126 404-876-1522 http://www.advancedmetal.biz/index.html</p> <p>Komar Industries 4425 Marketing Place Groveport, OH 43125 614-836-2366 http://www.komarindustries.com/index.cfm</p> <p>Eriez 2200 Asbury Road Erie, PA 16506 814-835-6000 http://www.eriez.com/Products/Markets/Recycling/</p> <p>Sweco Headquarters 8029 US Highway 25 Florence, KY 41042 859-371-4360 http://www.sweco.com/index.html</p> <p>ROTEX 1230 Knowlton Street Cincinnati, OH 45223 513-541-1236 http://www.rotex.com/Default.aspx</p> <p>MSS, Inc.</p>



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

	<p>3738 Keystone Av. Nashville, TN 37211 615-781-2669 http://www.magsep.com/</p> <p>CDS Manufacturing 1133 Mount Read Boulevard Rochester, New York 14606 800-724-6735 <a href="http://www.cdsmanufacturing.com/store.asp?pid=8798&c
atid=19686">http://www.cdsmanufacturing.com/store.asp?pid=8798&c atid=19686</p>
<p>Gas and Steam Turbines</p>	<p>Siemens Westinghouse 4400 Alafaya Trail Orlando, FL 32826 407-736-2000 www.powergeneration.siemens.com/</p> <p>General Electric One River Rd. Schenectady, NY 12345 518-385-4593 www.gepower.com/</p> <p>Dresser Rand West8 Tower, Suite 1000 10205 Westheimer Road Houston, Texas 77042 713-354-6100 www.dresser-rand.com/</p> <p>Caterpillar Inc. 100 North East Adams Street Peoria, Illinois 61629 309-675-1000 www.cat.com</p> <p>Elliott Company 901 N. Fourth Street Jeannette, PA 15644 724-527-2811 www.elliott-turbo.com/</p> <p>Skinner Power Systems 8214 Edinboro Road Erie, Pennsylvania 16509 814-868-8500 www.skinnerpowersystems.net/</p> <p>Stork H&E Turbo Blading (Blades)</p>



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

	<p>697-277-4968 www.he-machinery.com/</p>
Heat Recovery Steam Generators and Boilers	<p>Deltak, L.L.C 13330 12th Ave. North Plymouth, MN 55441 763-557-7440 www.deltak.com</p> <p>Vogt Power (Babcock Power Inc.) 4000 DuPont Circle Louisville, KY 40207 502-899-4699 www.vogtpower.com www.babcockpower.com</p> <p>Nooter Ericksen 1509 Ocello Drive Fenton, MO 63026 636-651-1000 www.ne.com</p> <p>Hurst Boiler & Welding Company 21971 U.S. Hwy. 319 N., P.O. Drawer 530 Coolidge, GA 31738-0530 229-346-3545 www.hurstboiler.com</p> <p>Rentech Boiler Systems Inc. 5025 East Business 20 Abilene, TX 79601 325-672-3400 www.rentechboilers.com</p> <p>C-B Energy Recovery Inc. 6940 Cornhusker Lincoln, NE 68507 402-434-2000 www.hrsg.com</p>
Biomass & Ash Handling Systems	<p>United Conveyor Corporation 847-473-5900 www.unitedconveyor.com</p> <p>Advanced Filtration Concepts, Inc. 323-832-8316 www.advfiltration.com</p> <p>Alden Research Laboratory, Inc. 508-829-6000 www.aldenlab.com</p> <p>Jeffrey Rader Corporation</p>



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

	<p>864-476-7523 http://www.jeffreyrader.com/</p>
<p>Pipes, Comp-ressors, Valves, Pumps,</p>	<p>Berg Pipe http://www.bergpipe.com/ 713-465-1600</p> <p>Ameron International http://www.ameron.com 626-683-4000</p> <p>Gould Crane ITT Industries http://www.goulds.com/ 315-568-7123</p> <p>Electric Machinery http://www.electricmachinery.com/ 612-378-8000</p> <p>Caterpillar http://www.cat.com 309-675-1000</p> <p>Dresser http://www.dresser.com 972-391-9800</p>
<p>Electrical, Switch- gear & Controls</p>	<p>Rockwell Automation http://www.rockwellautomation.com/ 414-382-2000</p> <p>Emerson Process Mgmt http://www.emersonprocess.com 847-956-8020</p> <p>Honeywell http://www.honeywell.com/ 973-455-2000</p> <p>Foxboro http://www.foxboro.com 866-746-6477</p> <p>EMSCO</p>



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

	<p>http://www.emscomn.com 800-328-1842</p> <p>General Electric http://www.ge.com 713-803-0446</p> <p>Enercon http://www.enercon.com/ 918-665-7693</p> <p>Chromalox 412-967-3828 http://www.chromalox.com/</p> <p>Optek-Danulat, Inc 800-371-4288 http://www.optek.com/</p>
Engineering & Services	<p>Black & Veatch http://www.bv.com/ 913-458-2000</p> <p>MWH Global http://www.mwhglobal.com/ 303-533-1900</p> <p>Fluor http://www.fluor.com/ 469-398-7000</p> <p>Bechtel http://www.bechtel.com/ 415-768-1234</p> <p>Foster Wheeler http://www.fwc.com 908-730-4000</p> <p>B.F. Shaw http://www.shawgrp.com 864-682-4000</p> <p>Energy Products of Idaho www.energyproducts.com/ 208-765-1611</p>



**DEFINITIONAL MISSION FOR WASTE TO ENERGY PROJECTS
IN COLOMBIA & CHILE**

COLOMBIA REPORT

9.G. Foreign Competition

U.S. gasification boiler, steam and gas turbine suppliers and producers of waste separation equipment can all be considered highly competitive for both equipment and service on an international level. Nevertheless, there is strong evidence that US exports will face significant foreign competition in the Latin American market.

Foreign companies from Germany, France, Sweden, Denmark, Italy, Czech Republic and Japan are also highly competitive

By funding this feasibility study, USTDA will provide a platform for U.S. equipment and service suppliers to this project, and with that, also provide them with an entrance into the market at this important time in energy sector development in Latin America.

Table 7

Principal Foreign Competition	
Product/Service	Company
Gasification boilers for MSW	EnviroPower Equipment Marketing Inc. Canada Alter NRG Canada TAKUMA CO.,LTD Japan Foster Wheeler Finland, Poland ENVIROTHERM GmbH Germany Alstom Power France Uhde GmbH Germany
Waste Separation Systems	Shred-Tech Canada Forsberg Agritech India Private Limited India mbs Maschinenbau Sörgel Germany



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IN COLOMBIA & CHILE**

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	<p>Kee Environmental Engineering Ltd United Kingdom</p> <p>COGELME S.a.s. Italy</p> <p>TITECH AS Norway - HQ Norway</p> <p>Delta Neu Limited United Kingdom</p>
Steam and Gas Turbines	<p>Siemens Germany</p> <p>Alstom France</p> <p>Kvaerner Denmark</p> <p>Hitachi Japan</p> <p>Mitsubishi Japan</p>
Biomass-Handling Equipment	<p>Bioenergy Technology Ltd. UK</p> <p>Mactenn Systems Ltd. UK</p>



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COLOMBIA REPORT

Electrical & Controls	Axsia Howmar, UK; Amot Controls, UK; ABB, Germany; Fortum Engineering, Finland; Siemens, Germany; Yokogawa, Japan ABB Automation Switzerland
-----------------------	--

9.H. Environmental Impact

The WTE plant will have as its chief environmental benefit the reduction of wastes presently either deposited to landfills or simply disposed of in public or private areas without attention to ecological impacts. Landfills are not considered a long term sustainable practice for waste management and disposal. The release of hazardous leachates into the soil and groundwater creates serious health and environmental dangers. Methane emissions from the landfill deposits are major contributors of greenhouse gases. And, in Colombia, pristine land in magnificent ecological areas is often dedicated to landfills and these areas, as well as the surrounding communities are deluged by traffic and pollutants from hundreds of waste hauling trucks.

The pilot project, by demonstrating the efficacy of WTE solutions, will allow WTE to become one of the cornerstones of Colombia's more sustainable solid waste management plans for the future.

The project will also produce electricity that will reduce the consumption of fossil fuels and will reduce greenhouse gas releases into the atmosphere, through three different operations:

- The methane that would have been generated from depositing the solid waste to the landfill will be completely avoided.
- For every megawatt of electricity generated through the combustion of solid waste, roughly 30% of a megawatt of electricity from conventional thermal power plants fired by coal or natural gas (70% of Colombia's power is produced from hydroelectric sources) is avoided creating a net savings of emissions of greenhouse gases.



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COLOMBIA REPORT

- The new waste to energy facility separates ferrous and/or nonferrous metals for recycling. This is more energy efficient than mining virgin materials for the production of new metals such as steel. As a result, there is a significant energy savings and an additional avoidance of greenhouse gas emissions.

The lack of a regulatory framework and the continuous growth of industrial and urban waste have been recognized as a huge environmental problem for the Colombian Government at all levels; the project represents a very effective tool to mitigate such situation.

There will not be any negative environmental consequences of this project as the produced energy will help to mitigate the country's waste management crisis.

9.1. Impact on US Labor

GreenMax confirms that this project will have no negative impact on U.S. labor. In fact, we expect that the project will have a positive impact on US labor due to the potential export of US equipment as well as further opportunities for US energy equipment producers to increase the share of the Colombia's energy market.

Specifically, implementation of the underlying project will in no way create:

- A. Financial incentive to any business enterprise currently located in the United States for the purpose of inducing such an enterprise to relocate outside the United States if such incentive or inducement is likely to reduce the number of employees of such business enterprise in the United States because United States production is being replaced by such enterprise outside the United States;
- B. Assistance for the purpose of establishing or developing in a foreign country any export processing zone or designated area in which the tax, tariff, labor, environment, and safety laws of that country do not apply, in part or in whole, to activities carried out within that zone or area;
- C. Assistance for any project or activity that contributes to the violation of internationally recognized workers rights;
- D. Direct assistance for establishing or expanding production of any commodity for export by any country other than the United States, if the commodity is likely to be in surplus on world markets at the time the resulting productive capacity is expected to become operative and if the assistance will cause substantial injury to United States producers of the same, similar, or competing commodity.



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COLOMBIA REPORT

9.J. Justification

The waste management crisis in Colombia is increasing every day. Waste to Energy should be one of the main pillars, along with recycling and reduction of waste generation of a sustainable waste management strategy. Unfortunately, to date, there are no WTE plants of any sort operating in Colombia. Demonstrating the efficacy of WTE technologies and piloting a model system for economically selling the generated electricity would be landmark accomplishments for this project.

USTDA would play an instrumental role in bringing this about by providing support for development of the pilot project.

Moreover, support for this project would help build IDEAS's capacity as one of the most competent regional energy project developers. It would also allow U.S. technology to gain an important foothold in a newly established WTE industry for Colombia. There could be potentially dozens of similar cogeneration projects in this size range in the coming several years and those equipment suppliers that implement the early installations will surely have an advantage in competing for market share.

Implementation of the project is consistent with USTDA's mission to not only expand US exports, but to contribute to the improvement and security of the physical, financial and social infrastructure of the targeted developing countries.

Implementation of the project will also introduce modern energy technologies, as well as instrumentation and controls that save energy and money and meet international energy efficiency, renewable energy, and water conservation goals. Management information systems and process technologies will also create greater economic productivity and more efficient use of resources.

9.N. Recommendation

GreenMax is recommending that USTDA approve a grant to support preparation of a Feasibility Study for the projects: 1- "Construction of a Waste to Energy Plant at ENVIASEO – EL GUACAL Landfill"

The Grantee for this project would be IDEA. The total study cost is: \$573,039.

ANNEX 3

USTDA NATIONALITY REQUIREMENTS



**U.S. TRADE AND DEVELOPMENT AGENCY
Arlington, VA 22209-2131**

NATIONALITY, SOURCE, AND ORIGIN REQUIREMENTS

The purpose of USTDA's nationality, source, and origin requirements is to assure the maximum practicable participation of American contractors, technology, equipment and materials in the prefeasibility, feasibility, and implementation stages of a project.

USTDA STANDARD RULE (GRANT AGREEMENT STANDARD LANGUAGE):

Except as USTDA may otherwise agree, each of the following provisions shall apply to the delivery of goods and services funded by USTDA under this Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from host country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for implementation of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in host country are not subject to the above restrictions. USTDA will make available further details concerning these standards of eligibility upon request.

NATIONALITY:

1) Rule

Except as USTDA may otherwise agree, the Contractor for USTDA funded activities must be either a U.S. firm or a U.S. individual. Prime contractors may utilize U.S.

subcontractors without limitation, but the use of host country subcontractors is limited to 20% of the USTDA grant amount.

2) Application

Accordingly, only a U.S. firm or U.S. individual may submit proposals on USTDA funded activities. Although those proposals may include subcontracting arrangements with host country firms or individuals for up to 20% of the USTDA grant amount, they may not include subcontracts with third country entities. U.S. firms submitting proposals must ensure that the professional services funded by the USTDA grant, to the extent not subcontracted to host country entities, are supplied by employees of the firm or employees of U.S. subcontractor firms who are U.S. individuals.

Interested U.S. firms and consultants who submit proposals must meet USTDA nationality requirements as of the due date for the submission of proposals and, if selected, must continue to meet such requirements throughout the duration of the USTDA-financed activity. These nationality provisions apply to whatever portion of the Terms of Reference is funded with the USTDA grant.

3) Definitions

A "U.S. individual" is (a) a U.S. citizen, or (b) a non-U.S. citizen lawfully admitted for permanent residence in the U.S. (a green card holder).

A "U.S. firm" is a privately owned firm which is incorporated in the U.S., with its principal place of business in the U.S., and which is either (a) more than 50% owned by U.S. individuals, or (b) has been incorporated in the U.S. for more than three (3) years prior to the issuance date of the request for proposals; has performed similar services in the U.S. for that three (3) year period; employs U.S. citizens in more than half of its permanent full-time positions in the U.S.; and has the existing capability in the U.S. to perform the work in question.

A partnership, organized in the U.S. with its principal place of business in the U.S., may also qualify as a "U.S. firm" as would a joint venture organized or incorporated in the United States consisting entirely of U.S. firms and/or U.S. individuals.

A nonprofit organization, such as an educational institution, foundation, or association may also qualify as a "U.S. firm" if it is incorporated in the United States and managed by a governing body, a majority of whose members are U.S. individuals.

SOURCE AND ORIGIN:

1) Rule

In addition to the nationality requirement stated above, any goods (e.g., equipment and materials) and services related to their shipment (e.g., international transportation and insurance) funded under the USTDA Grant Agreement must have their source and origin in the United States, unless USTDA otherwise agrees. However, necessary purchases of goods and project support services which are unavailable from a U.S. source (e.g., local food, housing and transportation) are eligible without specific USTDA approval.

2) Application

Accordingly, the prime contractor must be able to demonstrate that all goods and services purchased in the host country to carry out the Terms of Reference for a USTDA Grant Agreement that were not of U.S. source and origin were unavailable in the United States.

3) Definitions

“Source” means the country from which shipment is made.

“Origin” means the place of production, through manufacturing, assembly or otherwise.

Questions regarding these nationality, source and origin requirements may be addressed to the USTDA Office of General Counsel.

ANNEX 4

**USTDA GRANT AGREEMENT,
INCLUDING MANDATORY CONTRACT CLAUSES**



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Colombia 2010-51036

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U.S. TRADE AND DEVELOPMENT AGENCY	

GRANT AGREEMENT

This Grant Agreement is entered into between the Government of the United States of America, acting through the U.S. Trade and Development Agency ("USTDA") and Instituto para el Desarrollo de Antioquia ("Grantee"). USTDA agrees to provide the Grantee under the terms of this Agreement US\$573,039 ("USTDA Grant") to fund the cost of goods and services required for a feasibility study ("Study") on the proposed 20 MW Waste-to-Energy Plant at El Guacal Landfill ("Project") in Colombia ("Host Country").

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1. USTDA Funding

The funding to be provided under this Grant Agreement shall be used to fund the costs of a contract between the Grantee and the U.S. firm selected by the Grantee ("Contractor") under which the Contractor will perform the Study ("Contract"). Payment to the Contractor will be made directly by USTDA on behalf of the Grantee with the USTDA Grant funds provided under this Grant Agreement.

L2
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2. Terms of Reference

The Terms of Reference for the Study ("Terms of Reference") are attached as Annex 1 and are hereby made a part of this Grant Agreement. The Study will examine the technical, financial, environmental, and other critical aspects of the proposed Project. The Terms of Reference for the Study shall also be included in the Contract.

3. Standards of Conduct

USTDA and the Grantee recognize the existence of standards of conduct for public officials, and commercial entities, in their respective countries. The parties to this Grant Agreement and the Contractor shall observe these standards, which include not accepting payment of money or anything of value, directly or indirectly, from any person for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the Study.

4. Grantee Responsibilities

The Grantee shall undertake its best efforts to provide reasonable support for the Contractor, such as local transportation, office space, and secretarial support. In addition, the Grantee shall assign a bilingual project manager to interact with the Contractor throughout the duration of the Study.



5. USTDA as Financier

(A) USTDA Approval of Competitive Selection Procedures

Selection of the U.S. Contractor for this fixed price Study shall be carried out by a Procurement Selection Committee of representatives from the Grantee according to internationally acceptable procedures for the competitive selection of contractors with advance notice of the procurement published online through *Federal Business Opportunities* (www.fedbizopps.gov). Upon request, the Grantee will submit these contracting procedures and related documents to USTDA for information and/or approval.

(B) USTDA Approval of Contractor Selection

The Grantee shall notify USTDA at the address of record set forth in Article 17 below upon selection of the Contractor to perform the Study. Upon approval of this selection by USTDA, the Grantee and the Contractor shall then enter into a contract for performance of the Study. The Grantee shall notify in writing the U.S. firms that submitted unsuccessful proposals to perform the Study that they were not selected.

(C) USTDA Approval of Contract Between Grantee and Contractor

The Grantee and the Contractor shall enter into a contract for performance of the Study. This contract, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing. To expedite this approval, the Grantee (or the Contractor on the Grantee's behalf) shall transmit to USTDA, at the address set forth in Article 17 below, a photocopy of an English language version of the signed contract or a final negotiated draft version of the contract.

(D) USTDA Not a Party to the Contract

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of the contract and any amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any contract funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of funding the Study and



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shall not be construed as making USTDA a party to the contract. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the contract or any subcontract, jointly or separately, without thereby incurring any responsibility or liability to such parties. Any approval or failure to approve by USTDA shall not bar the Grantee or USTDA from asserting any right they might have against the Contractor, or relieve the Contractor of any liability which the Contractor might otherwise have to the Grantee or USTDA.

(E) Grant Agreement Controlling

Regardless of USTDA approval, the rights and obligations of any party to the contract or subcontract thereunder must be consistent with this Grant Agreement. In the event of any inconsistency between the Grant Agreement and any contract or subcontract funded by the Grant Agreement, the Grant Agreement shall be controlling.

6. Disbursement Procedures

(A) USTDA Approval of Contract Required

USTDA will make disbursements of Grant funds directly to the Contractor only after USTDA approves the Grantee's contract with the Contractor.

(B) Contractor Invoice Requirements

The Grantee should request disbursement of funds by USTDA to the Contractor for performance of the Study by submitting invoices in accordance with the procedures set forth in the USTDA Mandatory Clauses in Annex II.

7. Effective Date

The effective date of this Grant Agreement ("Effective Date") shall be the date of signature by both parties or, if the parties sign on different dates, the date of the last signature.

8. Study Schedule

(A) Study Completion Date



The completion date for the Study, which is December 31, 2011, is the date by which the parties estimate that the Study will have been completed. This completion date may be modified by means of an Implementation Letter from USTDA to the Grantee, pursuant to the time limitation on disbursement of USTDA grant funds established in §8(B) below.

(B) Time Limitation on Disbursement of USTDA Grant Funds

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this Grant Agreement for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date of the Grant Agreement.

9. USTDA Mandatory Clauses

All contracts funded under this Grant Agreement shall include the USTDA mandatory clauses set forth in Annex II to this Grant Agreement. All subcontracts funded or partially funded with USTDA Grant funds shall include the USTDA mandatory clauses, except for clauses B(1), G, H, I, and J.

10. Use of U.S. Carriers

(A) Air

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

(B) Marine

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

11. Nationality, Source and Origin

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b)



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the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

12. Taxes

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Grantee nor the Contractor will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

13. Cooperation Between Parties and Follow-Up

The parties will cooperate to assure that the purposes of the Grant Agreement are accomplished. For five (5) years following receipt by USTDA of the Final Report (as defined in Clause I of Annex II), the Grantee agrees to respond to any reasonable inquiries from USTDA about the status of the Project.

14. Implementation Letters

To assist the Grantee in the implementation of the Study, USTDA may, from time to time, issue implementation letters that will provide additional information about matters covered by the Grant Agreement. The parties may also use jointly agreed upon implementation letters to confirm and record their mutual understanding of matters covered by the Grant Agreement.

15. Recordkeeping and Audit

The Grantee agrees to maintain books, records, and other documents relating to the Study and the Grant Agreement adequate to demonstrate implementation of its responsibilities under the Grant Agreement, including the selection of contractors, receipt and approval of contract deliverables, and approval or disapproval of contractor



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invoices for payment by USTDA. Such books, records, and other documents shall be separately maintained for three (3) years after the date of the final disbursement by USTDA. The Grantee shall afford USTDA or its authorized representatives the opportunity at reasonable times to review books, records, and other documents relating to the Study and the Grant Agreement.

16. Representation of Parties

For all purposes relevant to the Grant Agreement, the Government of the United States of America will be represented by the U. S. Ambassador to Host Country or USTDA and Grantee will be represented by the Director for International Cooperation and Business. The parties hereto may, by written notice, designate additional representatives for all purposes under the Grant Agreement.

17. Addresses of Record for Parties

Any notice, request, document, or other communication submitted by either party to the other under the Grant Agreement shall be in writing or through a wire or electronic medium which produces a tangible record of the transmission, such as a telegram, cable or facsimile, and will be deemed duly given or sent when delivered to such party at the following:

To: Santiago Piedrahita Tabares
Director for International Cooperation and Business
Instituto para el Desarrollo de Antioquia (IDEA)
Calle 42 N° 52-259
Medellin, Colombia

Phone: +57 4 381 9129
Fax: +57 4 381 0658
Email: santiagopt@idea.gov.co

To: U.S. Trade and Development Agency
1000 Wilson Boulevard, Suite 1600
Arlington, Virginia 22209-3901
USA

Phone: (703) 875-4357
Fax: (703) 875-4009
Email: grupolac@ustda.gov; jflewelling@ustda.gov; frontdesk@ustda.gov



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All formal communications shall be in English, unless the parties otherwise agree in writing. Any informal communications may be in English or Spanish. In addition, the Grantee shall provide the Commercial Section of the U.S. Embassy in Host Country with a copy of each communication sent to USTDA.

Any communication relating to this Grant Agreement shall include the following fiscal data:

Appropriation No.: 1110/111001
Activity No.: 2010-51036A
Reservation No.: 2010510042
Grant No.: GH2010510011

18. Termination Clause

Either party may terminate the Grant Agreement by giving the other party thirty (30) days advance written notice. The termination of the Grant Agreement will end any obligations of the parties to provide financial or other resources for the Study (for the Grantee, as defined by §4. Grantee Responsibilities) except for payments which they are committed to make pursuant to non-cancellable commitments entered into with third parties prior to the written notice of termination. In the event of termination, the Grantee shall not be responsible for providing any funding to the Contractor or any third party for the cost of any goods and/or services required for the Study under this Grant Agreement.

19. Non-waiver of Rights and Remedies

No delay in exercising any right or remedy accruing to either party in connection with the Grant Agreement shall be construed as a waiver of such right or remedy.

20. U.S. Technology and Equipment

By funding this Study, USTDA seeks to promote the project objectives of the Host Country through the use of U.S. technology, goods, and services. In recognition of this purpose, the Grantee agrees that it will allow U.S. suppliers to compete in the procurement of technology, goods and services needed for Project implementation.

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IN WITNESS WHEREOF, the Government of the United States of America and the Instituto para el Desarrollo de Antioquia, each acting through its duly authorized representative, have caused this Agreement to be signed in the English language in their names and delivered as of the day and year written below. In the event that this Grant Agreement is signed in more than one language, the English language version shall govern.

For the Government of the United States of America

For Instituto para el Desarrollo de Antioquia

By: *[Signature]*

By: *[Signature]*

Date: 09/09/10

Date: 07/09/2010

Witnessed:

Witnessed:

By: *[Signature]*

By: *[Signature]*

Annex I -- Terms of Reference

Annex II -- USTDA Mandatory Clauses



Annex II

USTDA Mandatory Contract Clauses

A. USTDA Mandatory Clauses Controlling

The parties to this contract acknowledge that this contract is funded in whole or in part by the U.S. Trade and Development Agency ("USTDA") under the Grant Agreement between the Government of the United States of America acting through USTDA and Instituto para el Desarrollo de Antioquia ("Client"), dated _____ ("Grant Agreement"). The Client has selected _____ ("Contractor") to perform the feasibility study ("Study") for the 20 MW Waste-to-Energy Plant at El Guacal Landfill ("Project") in Colombia ("Host Country"). Notwithstanding any other provisions of this contract, the following USTDA mandatory contract clauses shall govern. All subcontracts entered into by Contractor funded or partially funded with USTDA Grant funds shall include these USTDA mandatory contract clauses, except for clauses B(1), G, H, I, and J. In addition, in the event of any inconsistency between the Grant Agreement and any contract or subcontract thereunder, the Grant Agreement shall be controlling.

B. USTDA as Financier

(1) USTDA Approval of Contract

All contracts funded under the Grant Agreement, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing in order to be effective with respect to the expenditure of USTDA Grant funds. USTDA will not authorize the disbursement of USTDA Grant funds until the contract has been formally approved by USTDA or until the contract conforms to modifications required by USTDA during the contract review process.

(2) USTDA Not a Party to the Contract

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of this contract and amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any contract funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these



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approval rights shall be made as a financier in the course of financing the Study and shall not be construed as making USTDA a party to the contract. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the contract or any subcontract, jointly or separately, without thereby incurring any responsibility or liability to such parties. Any approval or failure to approve by USTDA shall not bar the Client or USTDA from asserting any right they might have against the Contractor, or relieve the Contractor of any liability which the Contractor might otherwise have to the Client or USTDA.

C. Nationality, Source and Origin

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

D. Recordkeeping and Audit

The Contractor and subcontractors funded under the Grant Agreement shall maintain, in accordance with generally accepted accounting procedures, books, records, and other documents, sufficient to reflect properly all transactions under or in connection with the contract. These books, records, and other documents shall clearly identify and track the use and expenditure of USTDA funds, separately from other funding sources. Such books, records, and documents shall be maintained during the contract term and for a period of three (3) years after final disbursement by USTDA. The Contractor and subcontractors shall afford USTDA, or its authorized representatives, the opportunity at reasonable times for inspection and audit of such books, records, and other documentation.



E.U.S. Carriers

(1) Air

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

(2) Marine

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

F. Workman's Compensation Insurance

The Contractor shall provide adequate Workman's Compensation Insurance coverage for work performed under this Contract.

G. Reporting Requirements

The Contractor shall advise USTDA by letter as to the status of the Project on March 1st annually for a period of two (2) years after completion of the Study. In addition, if at any time the Contractor receives follow-on work from the Client, the Contractor shall so notify USTDA and designate the Contractor's contact point including name, telephone, and fax number. Since this information may be made publicly available by USTDA, any information which is confidential shall be designated as such by the Contractor and provided separately to USTDA. USTDA will maintain the confidentiality of such information in accordance with applicable law.

H. Disbursement Procedures

(1) USTDA Approval of Contract

Disbursement of Grant funds will be made only after USTDA approval of this contract. To make this review in a timely fashion, USTDA must receive from either the Client or the Contractor a photocopy of an English language version of a signed contract or a final negotiated draft version to the attention of the General Counsel's office at USTDA's address listed in Clause M below.



(2) Payment Schedule Requirements

A payment schedule for disbursement of Grant funds to the Contractor shall be included in this Contract. Such payment schedule must conform to the following USTDA requirements: (1) up to twenty percent (20%) of the total USTDA Grant amount may be used as a mobilization payment; (2) all other payments, with the exception of the final payment, shall be based upon contract performance milestones; and (3) the final payment may be no less than fifteen percent (15%) of the total USTDA Grant amount, payable upon receipt by USTDA of an approved Final Report in accordance with the specifications and quantities set forth in Clause I below. Invoicing procedures for all payments are described below.

(3) Contractor Invoice Requirements

USTDA will make all disbursements of USTDA Grant funds directly to the Contractor. The Contractor must provide USTDA with an ACH Vendor Enrollment Form (available from USTDA) with the first invoice. The Client shall request disbursement of funds by USTDA to the Contractor for performance of the contract by submitting the following to USTDA:

(a) Contractor's Invoice

The Contractor's invoice shall include reference to an item listed in the Contract payment schedule, the requested payment amount, and an appropriate certification by the Contractor, as follows:

(i) For a mobilization payment (if any):

"As a condition for this mobilization payment, the Contractor certifies that it will perform all work in accordance with the terms of its Contract with the Client. To the extent that the Contractor does not comply with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA. "

(ii) For contract performance milestone payments:

"The Contractor has performed the work described in this invoice in accordance with the terms of its contract with the Client and is entitled to payment thereunder. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA mandatory provisions



contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

(iii) For final payment:

"The Contractor has performed the work described in this invoice in accordance with the terms of its contract with the Client and is entitled to payment thereunder. Specifically, the Contractor has submitted the Final Report to the Client, as required by the Contract, and received the Client's approval of the Final Report. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

(b) Client's Approval of the Contractor's Invoice

(i) The invoice for a mobilization payment must be approved in writing by the Client.

(ii) For contract performance milestone payments, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and the terms and conditions of the USTDA Grant Agreement."

(iii) For final payment, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and terms and conditions of the USTDA Grant Agreement. The Final Report submitted by the Contractor has been reviewed and approved by the Client. "

(c) USTDA Address for Disbursement Requests

Requests for disbursement shall be submitted by courier or mail to the attention of the Finance Department at USTDA's address listed in Clause M below.



(4) Termination

In the event that the Contract is terminated prior to completion, the Contractor will be eligible, subject to USTDA approval, for reasonable and documented costs which have been incurred in performing the Terms of Reference prior to termination, as well as reasonable wind down expenses. Reimbursement for such costs shall not exceed the total amount of undisbursed Grant funds. Likewise, in the event of such termination, USTDA is entitled to receive from the Contractor all USTDA Grant funds previously disbursed to the Contractor (including but not limited to mobilization payments) which exceed the reasonable and documented costs incurred in performing the Terms of Reference prior to termination.

I. USTDA Final Report

(1) Definition

"Final Report" shall mean the Final Report described in the attached Annex I Terms of Reference or, if no such "Final Report" is described therein, "Final Report" shall mean a substantive and comprehensive report of work performed in accordance with the attached Annex I Terms of Reference, including any documents delivered to the Client.

(2) Final Report Submission Requirements

The Contractor shall provide the following to USTDA:

- (a)** One (1) complete version of the Final Report for USTDA's records. This version shall have been approved by the Client in writing and must be in the English language. It is the responsibility of the Contractor to ensure that confidential information, if any, contained in this version be clearly marked. USTDA will maintain the confidentiality of such information in accordance with applicable law.

and

- (b)** One (1) copy of the Final Report suitable for public distribution ("Public Version"). The Public Version shall have been approved by the Client in writing and must be in the English language. As this version will be available for public distribution, it must not contain any confidential information. If the report in (a) above contains no confidential information, it may be used as the Public Version.



In any event, the Public Version must be informative and contain sufficient Project detail to be useful to prospective equipment and service providers.

and

- (c) Two (2) CD-ROMs, each containing a complete copy of the Public Version of the Final Report. The electronic files on the CD-ROMs shall be submitted in a commonly accessible read-only format. As these CD-ROMs will be available for public distribution, they must not contain any confidential information. It is the responsibility of the Contractor to ensure that no confidential information is contained on the CD-ROMs.

The Contractor shall also provide one (1) copy of the Public Version of the Final Report to the Foreign Commercial Service Officer or the Economic Section of the U.S. Embassy in Host Country for informational purposes.

(3) Final Report Presentation

All Final Reports submitted to USTDA must be paginated and include the following:

- (a) The front cover of every Final Report shall contain the name of the Client, the name of the Contractor who prepared the report, a report title, USTDA's logo, USTDA's mailing and delivery addresses. If the complete version of the Final Report contains confidential information, the Contractor shall be responsible for labeling the front cover of that version of the Final Report with the term "Confidential Version." The Contractor shall be responsible for labeling the front cover of the Public Version of the Final Report with the term "Public Version." The front cover of every Final Report shall also contain the following disclaimer:

"This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U. S. Government. The opinions, findings, conclusions or recommendations expressed in this document are those of the author(s) and do not necessarily represent the official position or policies of USTDA. USTDA makes no representation about, nor does it accept responsibility for, the accuracy or completeness of the information contained in this report."

- (c) The inside front cover of every Final Report shall contain USTDA's logo, USTDA's mailing and delivery addresses, and USTDA's mission statement.



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Camera-ready copy of USTDA Final Report specifications will be available from USTDA upon request.

(c) The Contractor shall affix to the front of the CD-ROM a label identifying the Host Country, USTDA Activity Number, the name of the Client, the name of the Contractor who prepared the report, a report title, and the following language:

“The Contractor certifies that this CD-ROM contains the Public Version of the Final Report and that all contents are suitable for public distribution.”

(d) The Contractor and any subcontractors that perform work pursuant to the Grant Agreement must be clearly identified in the Final Report. Business name, point of contact, address, telephone and fax numbers shall be included for Contractor and each subcontractor.

(e) The Final Report, while aiming at optimum specifications and characteristics for the Project, shall identify the availability of prospective U.S. sources of supply. Business name, point of contact, address, telephone and fax numbers shall be included for each commercial source.

(f) The Final Report shall be accompanied by a letter or other notation by the Client which states that the Client approves the Final Report. A certification by the Client to this effect provided on or with the invoice for final payment will meet this requirement.

J. Modifications

All changes, modifications, assignments or amendments to this contract, including the appendices, shall be made only by written agreement by the parties hereto, subject to written USTDA approval.

K. Study Schedule

(1) Study Completion Date

The completion date for the Study, which is December 31, 2011, is the date by which the parties estimate that the Study will have been completed.



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(2) Time Limitation on Disbursement of USTDA Grant Funds

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this contract for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date of the Grant Agreement.

L. Business Practices

The Contractor agrees not to pay, promise to pay, or authorize the payment of any money or anything of value, directly or indirectly, to any person (whether a governmental official or private individual) for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the Study. The Client agrees not to receive any such payment. The Contractor and the Client agree that each will require that any agent or representative hired to represent them in connection with the Study will comply with this paragraph and all laws which apply to activities and obligations of each party under this Contract, including but not limited to those laws and obligations dealing with improper payments as described above.

M. USTDA Address and Fiscal Data

Any communication with USTDA regarding this Contract shall be sent to the following address and include the fiscal data listed below:

U.S. Trade and Development Agency
1000 Wilson Boulevard, Suite 1600
Arlington, Virginia 22209-3901
USA

Phone: (703) 875-4357
Fax: (703) 875-4009

Fiscal Data:

Appropriation No.: 1110/111001
Activity No.: 2010-51036A
Reservation No.: 2010510042
Grant No.: GH2010510011



N. Definitions

All capitalized terms not otherwise defined herein shall have the meaning set forth in the Grant Agreement.

O. Taxes

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Client nor the Contractor will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

ANNEX 5

TERMS OF REFERENCE (FROM USTDA GRANT AGREEMENT)



Annex I

Terms of Reference

Purpose and Background

The purpose of this Study is to determine the technical, economic and financial viability of a 20 MW integrated waste processing and waste-to-energy (WTE) plant in the Colombian department of Antioquia, the project sponsor of which is the *Instituto para el Desarrollo de Antioquia* (IDEA), the autonomous regional development institution in Antioquia. The WTE plant would be fueled by the collected urban and industrial wastes from five municipalities south of Medellín that are currently deposited at the "El Guacal" landfill in the Municipality of Heliconia, about 25 km from Medellín; the WTE plant is anticipated to be sited on the property of the El Guacal landfill, which is owned and operated by EVAS Enviambientales, S.A. E.S.P. (EVAS). EVAS is responsible for the treatment and final disposition of solid waste at the El Guacal landfill and is licensed for 24 years to receive, select and process ordinary and special solid waste and mud. EVAS is a sanitary and landfill operator company in Colombia, fully owned by the Municipality of Envigado, but which serves much of the southern Aburra Valley area in Antioquia.

The waste processing and power generation facility will input the roughly 650 tons per day of municipal solid waste (MSW) presently deposited at the EVAS landfill and convert it to roughly 400 tons of refuse-derived fuel for the generation of approximately 20 MW of electricity. With collection and landfill deposits well managed by EVAS, these wastes have been studied and classified, confirming a sufficient calorific value with a steady and continuous daily flow. The owner and operator for the proposed WTE plant is presently anticipated to be a joint venture (JV) between IDEA, the Municipality of Envigado, and possibly a private sector engineering firm with which the Grantee has a history of working. The Grantee and the Government of Antioquia each hold a 37.5 percent ownership interest in *Empresa Generadora de Energía de Antioquia* (Energy Generating Company of Antioquia or "EMGEA"), which sells power from the generation facilities in which IDEA has invested. Through EMGEA, IDEA -- as a tax-exempt entity -- is able to market and sell power produced by its majority-owned power plants directly to industrial users, without having to incur the 20 percent federal excise tax. It is anticipated that EMGEA will sell the power onwards to regional industrial companies. The referenced tax exemption would allow for the sale of power generated from the WTE plants at a lower end-use price, thereby also fulfilling the Grantee's economic development mission.



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The Contractor shall communicate primarily via the Grantee and, where appropriate, with the EVAS during the course of the Study. These interactions shall be scheduled as appropriate to yield the desired deliverables. Some meetings will occur during the conduct of a specific task or after submittal of a deliverable. All reports and designs shall be provided by the Contractor to the Grantee in English and Spanish. These shall be submitted in six (6) paper copies and in electronic form, using Microsoft Office 2007 and Adobe Portable Document Format (PDF).

For purposes of all tasks under this Terms of Reference, the Contractor shall be responsible for supplying either bilingual personnel or an interpreter for meetings and for covering the cost of miscellaneous translation of documents.

Task 1 – Infrastructure Assessment

The Contractor shall assess the existing infrastructure at the designated Project site at the El Guacal landfill, and collect and analyze data related to the national electricity transmission grid (i.e., the *Sistema Interconectado Nacional* or “SIN”), water supply, sewage and waste-water treatment, and other infrastructure for the purpose of confirming the selected site as a suitable location for the new WTE plant from economical, ecological and technical standpoints.

The Grantee shall facilitate access to all facilities pertinent to the Study. The Grantee shall also provide or make available all existing documentation, drawings, diagrams, and specifications relevant for the Study.

The Contractor shall consider the operational state and characteristics of the existing local electrical transmission network and its elements. The Contractor shall perform several site visits early in the Study to determine whether these elements can be used as they are; whether they require upgrading; or whether they require complete overhaul or partial replacement.

The Contractor shall collect general data related to the existing transportation infrastructure in the area of the proposed site at the El Guacal landfill in order to confirm the preliminary transport and logistics plan for fuel delivery to the site. The Contractor shall also review any previous reports covering any prior investigations of the local waste management, electrical transmission facilities, and environmental conditions.

Deliverable: The Contractor shall submit an interim report in English and Spanish to the Grantee, containing all documents collected, work performed, and analyses completed under Task 1.

Task 2 – Power Demand and Electricity Market



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Contractor shall support the Grantee's development of a power sales strategy for the Project, as detailed below. In Colombia all independent power producer (IPP) plants have priority right to sell to the wholesale electricity ("spot") market. IPPs also have the right to sell power directly to end users at a negotiated tariff also to be approved by the *Comisión Reguladora de Energía y Gas* (Energy and Gas Regulatory Commission or "CREG"). Since wholesale grid prices in Colombia are not likely sufficient to make most WTE plants economically viable, the Grantee has proposed a specific approach to deliver power to industrial users in the Antioquia region. The power may be sold through direct bilateral contracts or through EMGEA, the above-referenced energy generation company in which the Grantee and the Government of Antioquia own a controlling interest. In the latter case, the power may be delivered to the industrial end users free of certain excise taxes, due to IDEA's tax exempt status. Contractor's analysis shall take into account the unique structure of Colombia's wholesale electricity market (i.e., *Mercado de Energía Mayorista*), including the reliability charge (i.e., *Obligaciones de Energía Firme* or "OEF"), which CREG instituted in December 2006.

The Grantee shall arrange and coordinate any meetings required with national and state regulatory bodies and other authorities, electrical network operators, and the existing operator(s) of the local and regional electrical distribution and transmission networks.

The Contractor shall work closely with the Grantee to determine a viable mix of bilateral sale agreements and tax exempt sales wheeled through EMGEA. The goal should be to arrive at an approach that balances profitability for the Project with cost savings to the industrial end users. Specifically, the Contractor shall analyze the tariffs likely to be achieved and the costs associated with supplying specific individual customers vs. wheeling power via the Grantee or EMGEA. It will be the responsibility of the Grantee to identify the potential industrial end users.

The result shall be a load forecast showing monthly retail and wholesale sales at peak and off-peak periods. The Contractor shall establish forecast power purchase prices and the projected monthly off-take from the new WTE facility for at least ten years.

The Contractor shall determine what needs may exist under various conditions to purchase power from the local power distribution company to run the WTE facility.

The Contractor shall estimate the future development of electricity sales and total Project revenues and earnings based on the current and projected tariffs. Based on the above analysis and the other findings of this Study, the Contractor shall also determine generation cost including capital recovery per kilowatt hour (kWh).

Deliverable: The Contractor shall provide an interim report in English and Spanish on findings from this task, including on electricity tariff and demand projections. The





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Contractor shall incorporate the Grantee's comments on this report into the analysis for the Final Report.

Task 3 – Fuel Supply and Ash Disposal Strategies

The Contractor shall assess the available MSW, biomass and agricultural waste production, prepare a detailed waste stream composition analysis and review all reliability, handling, transportation and other logistics.

The Grantee shall arrange and coordinate any meetings required with national and state regulatory bodies and other authorities, waste generators, and waste transporters.

In undertaking the waste stream composition analysis, the Contractor shall provide the Grantee with a clear set of parameters for a defined trial period of sorting and classifying of the wastes of the targeted waste stream sources in the vicinity of Heliconia and Envigado. It shall be the responsibility of the Grantee to organize the sorting and classifying of the wastes during the trial period in order to deliver reliable data to the Contractor concerning quantities in each waste classification. The set-up of this process shall be supervised and monitored on site by the Contractor. The Contractor shall be responsible for collecting samples of each waste classification from each of the targeted sources and analyzing such samples for calorific values, moisture content, all other relevant chemical properties and physical characteristics.

In undertaking the reliability and logistics analysis for the targeted source, the Contractor shall:

- identify main local suppliers;
- analyze current prices including cost of transportation and their trends;
- prepare at least 10-year price forecast for each category of waste;
- analyze the abilities of the identified suppliers to supply required amounts of corresponding waste on a constant basis during the next 20 years;
- analyze transportation infrastructure in terms of its ability to handle required volumes of wastes
- analyze transportation, handling and storage issues and costs
- propose an adequate fuel-handling and logistics plan that should cover such issues as transportation, loading, metering, storage, and preparation of fuel.

In addition to the above analysis of the main targeted source for the waste feedstock, the Contractor shall also conduct a review of other MSW and industrial wastes in the area





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of Heliconia and Envigado in order to determine whether there are viable back up or expansion fuel sources for the Project.

The Contractor shall also review regulatory issues pertaining to the waste management sector in Colombia which may impact on the utilization or costs of utilization of the available wastes.

Finally the Contractor shall evaluate ash demand for agricultural and other purposes, its current prices and price trends and estimate potential benefits from ash supply to local farmers and other customers in Colombia for the period of 10 years. The Contractor shall also select an appropriate location for ash storage of the Project and recommend the optimum solution for ash-handling system.

Deliverable: The Contractor shall provide an interim report in English and Spanish detailing all findings from this task, analysis of the primary targeted source for the waste feedstock, and recommendations on appropriate fuel-handling and, if needed, ash-handling systems and strategies. The Contractor shall incorporate the Grantee's comments on this report into the analysis for the Final Report.

Task 4 - Technical Configuration and Preliminary Conceptual Design of the New WTE Facility

The Contractor shall investigate and evaluate technical, environmental and economic aspects of different lay-outs to determine a feasible and appropriate pre-design of the new WTE facility as described below. The Contractor shall meet with the Grantee on a regular basis to establish the exact plant configurations to be studied further.

- i. On the basis of the assessment of local infrastructure, waste resources, electricity tariffs, development plans of the municipality and regional authorities as well as other economic, technical and environmental factors, the Contractor shall recommend the precise optimal location for the new WTE plant on the terrain of the El Guacal landfill. Siting shall take into account the potential for future plant expansion.
- ii. The Contractor shall determine interface points for connection of the new WTE plant with the existing power grid (SIN). The selection of interface points will take into consideration plans for the overall development of the regional and local power networks.
- iii. The Contractor shall use all data collected to determine the fuel/waste requirements, heat rejection, and electrical capacity of the new WTE plant.





iv. The selection of the primary energy equipment for the new WTE plant will be based upon economic performance, energy efficiency, reduced emissions and other performance measures, including the ability of the new WTE plant to function on a completely commercial basis. The Contractor shall define all the major requirements to the primary energy equipment; develop main technological process flowchart, time schedules and procurement plans for the primary energy equipment.

v. The Contractor shall develop the electro-mechanical technical configuration of the new WTE plant, including the requirements for specialized waste and agriculture waste processing.

vi. The Contractor shall determine and prepare a fuel-handling (transportation, loading, storage, and preparation) system design and configuration, suggest equipment, provide preliminary budgets and procurement plans. The type and design of the fuel-handling system will be based on the comprehensive analysis of possible fuel strategies, which include among other things physical characteristics, fuel price, fuel delivery, fuel storage and fuel availability assessment.

vii. The Contractor shall prepare preliminary civil, mechanical and electrical conceptual designs for all facility systems including but not limited to structures, waste-to-fuel intake and processing, boilers, steam and power generation, heat rejection, plant safety, communication, automated control, water-treatment and water-supply systems, sewerage, fire prevention system, emission controls, and ash management

viii. On the basis of all analyzed data, the Contractor shall prepare a general plot plan with preliminary drawings for the building(s) and structures of the new WTE plant outline main utility and other requirements to the building(s).

ix. The Contractor shall prepare construction schedules of at least two levels in the work breakdown structure.

All designs, drawings, charts, calculations, schedules and other documentation must be prepared in compliance with the local and international construction norms and rules, environmental requirements, fuel handling regulations, as well as other requirements stipulated by the effective legislation of Colombia for waste-processing and power plants.

The Contractor shall analyze the proposed configuration(s) according to the following criteria: (i) electricity output in megawatt hours per year (MWh/year), (ii) fuel inputs (tons/year) (iii) investment costs, and (iv) operating costs. The Contractor shall compile



energy and economic performance data and assess economic and environmental benefits.

Deliverable: The Contractor shall submit an interim report in English and Spanish to the Grantee, detailing all work performed under Task 4. The Contractor shall define location(s), determine interface points with the existing power grid (SIN), waste transport routes, water and sewer services, and provide preliminary design and technical configuration for the new WTE plant with a detailed description of the WTE plant's systems. The Contractor shall also provide construction schedules of at least two levels in the work breakdown structure and main procurement plans. The Contractor shall provide a copy of this interim report in English and Spanish to the Grantee and incorporate the Grantee's comments into the analysis for the Final Report.

Task 5 - Preliminary Cost Estimates

Taking into consideration the selected design and technical configuration of the new WTE plant, the Contractor shall develop preliminary cost estimates (plus or minus 15 percent) in U.S. dollars and Colombian pesos:

The capital cost estimates shall include, but not be limited to the following:

- architectural and engineering design;
- primary energy equipment (boilers, turbines, and gas piston engines with generator sets);
- Auxiliary energy equipment;
- Transformers, switchgear and other electro-technical equipment;
- Fuel-handling system and ash disposal system (for biological fuel);
- Automated control and communication systems;
- Water-treatment, water-supply and sewage systems;
- Fire-protection system;
- Buildings and structures;
- Plot preparation;
- Connection to the local district heating (DH) network and pipelines;
- Upgrading the local DH network;
- Connection to the national electricity grid (SIN)
- Permitting and licensing fees;
- Financing costs including, but not limited to interest during construction, bank and other creditors' fees and commissions, currency conversion costs;
- Costs associated with the series of steps necessary to develop certified emissions reductions (CERs) under the Clean Development Mechanism (CDM) of the



Kyoto Protocol, including project validation, including project validation, host country approval, registration with the CDM Executive Board, implementation and monitoring, verification/certification and issuance CERs, and ultimately the sale of CERs;

- Real estate, concession and easement costs, if any;
- Legal fees;
- Applicable value-added tax (VAT), excise tax, customs duties and other obligatory payments;
- Costs associated with obtaining the approval of the Colombian national government for the establishment of a special economic zone (i.e., *zona franca*) for purposes of exemptions from certain taxes and customs duties;
- Inspections and special consultants;
- Insurance;
- Commissioning, startup, and spare parts;
- Environment protection measures;
- Personnel training, and
- Contingency reserve and other costs, which may be identified by the Contractor.

The capital cost estimates for all equipment and materials shall include delivery, installation and verification costs.

The operating cost estimates shall include, but not be limited to the following:

- Operations and maintenance for the WTE plant;
- Fuel, including delivery, storage, preparation and ash disposal for biological fuels;
- Administrative and management fees;
- Concession, rent and leasing payments (if any);
- Regular environmental protection measures;
- Depreciation and amortization;
- Interest; and
- Taxes, fees and obligatory payments.

Deliverable: The Contractor shall provide capital cost estimates and operating cost estimates based on the selected design and technical configuration. The Contractor shall provide a copy of this Task 6 report in English and Spanish to the Grantee and incorporate the Grantee's comments into the analysis for the Final Report.

Task 6 – Preliminary Environmental Analysis



The Contractor shall prepare a preliminary environmental analysis for the Project. The preliminary environmental analysis shall be undertaken in compliance with the requirements of the governing Colombian regulations. This analysis, which is preliminary in nature and not intended to replace a full Environmental Impact Assessment that may be required for the Project, shall identify potential negative impacts, discuss the extent to which they can be mitigated, and develop plans for a full environmental impact assessment if, and when the Project moves forward to implementation stage.

Based on the proposed WTE capacity and design, the Contractor shall also evaluate greenhouse gases reductions as a result of the new WTE plant construction and assess possible usage of the Kyoto Protocol joint implementation (JI) mechanism and the emerging Green Investment Scheme, which is expected to replace the JI mechanism.

In addition the Contractor shall identify mitigation measures and associated one-time and annual costs (within plus or minus 15 percent) required, if any, to meet the applicable guidelines and regulations.

Deliverable: The Contractor shall provide a preliminary environmental impact analysis based on the selected design and technical configuration of the new WTE plant. The Contractor shall provide a copy of interim report to the Grantee in English and Spanish, and incorporate the Grantee's comments into the analysis for the Final Report.

Task 7 – U.S. Sources of Supply

The Contractor shall identify potential sources of equipment and services that can be procured competitively from U.S. vendors for construction of the new WTE plant and provide the list of such vendors with identification of corresponding equipment they produce and services they render. Based on the selected technical configuration of the WTE plant, the Contractor shall obtain preliminary cost estimates for the equipment and services from the identified U.S. vendors, which shall be included in the Final Report.

Contractor shall provide the name of the company, contact person, telephone, fax and email contact information, and descriptions of equipment and services provided.

Deliverable: The Contractor shall submit an interim report to the Grantee in English and Spanish, containing all documents collected, work performed, and analyses completed under Task 7.



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Task 8 - Financial Evaluation

The Contractor shall perform a detailed financial evaluation that shall include:

Investment Cost

The Contractor shall make a detailed budget estimate (plus or minus 15 percent) of the investment costs for the selected WTE plant design. The preliminary investment costs composition is stipulated in the Task 6 of this Terms of Reference. The Contractor shall verify and amend this list if required.

Operating Cost

The Contractor shall prepare an estimation (plus or minus 15 percent) of the projected Operating Costs.

The Contractor shall pay special attention to the economic analysis of fuel costs, including fuel delivery costs, storage, preparation, and fuel waste disposal. The fuel costs are crucial for determining whether the Project is financially viable. The Contractor shall estimate the annual fuel costs based on monthly electricity load fluctuations and operational cycles of the major fuel suppliers.

Like investment costs, operation and maintenance ("O&M") costs are system-specific and depend to a certain extent on decisions taken at the design and construction phase of the system. The Contractor shall evaluate such fundamental O&M costs for the new WTE plant as cost of energy for internal needs and maintenance costs, which include personnel, maintenance, and insurance costs. The Contractor shall estimate the annual energy costs for operation of the new WTE plant based on monthly electricity load fluctuations.

The Contractor shall evaluate maintenance costs based on such factors as type of equipment used, operational cycles, operating environment, the existing condition of the local waste handling and electrical distribution, and the terms of any maintenance contracts. The Contractor shall also take into account the cost of insurance, the equipment and electrical infrastructure performance history, and the system design and operating mode.

The other operating costs, which the Contractor shall consider, include administrative and management fees, regular environmental protection measures, taxes, and interest.



IDEA
INSTITUTO PARA EL DESARROLLO DE ANTIOQUIA

The Contractor shall consider personnel costs, which will depend on the size of the system and the degree of automation.

The Contractor's cost analysis shall also include equipment and building lease, concession and rent payments (if any).

The Contractor shall evaluate additional costs which may be incurred under certain financing arrangements.

Revenues

The Contractor shall make an accurate estimate of the projected revenues. Collected electricity payments are expected to be the primary revenues of the Project.

The Contractor shall interview potential electricity buyers, analyze the history of the current electricity payment collections, and consult with the Colombian authorities regarding applicable tariffs.

The Contractor shall also assess the potential revenues from tipping fees from waste haulers or the waste generators and sale of ash to local farmers and other clients.

Cash Flow

The Contractor shall conduct cash flow analyses to determine the best combination of energy system options.

The cash flow model shall be based on assumptions of the opening balance sheet of a new Special Purpose Company (SPC) to be registered for the Project and shall include projections of the likely financial performance of the SPC over at least 10 years. This period can be extended by the Contractor by additional 10 years. Only actual payments or receipts shall be included in the cash-flow calculation. The cost streams shall include all the costs incurred and shall be quantified with reference to the cash impact of (i) the working capital requirements including VAT funding, (ii) the cash impact of depreciation and amortization on the capital assets, (iii) applicable profit tax, and (iv) the project's capital expenditures.

Primary assumptions for determining annual net cash flow due to the investment are (i) electricity selling prices, (ii) *expected life of installed components* of the new WTE plant, (iii) existing and new components of the electric connection infrastructure, (iv) net waste/fuel costs, (v) electricity transmission costs, (vi) maintenance and operation costs for the new WTE plant, including waste-to-fuel processing facility, (vii) insurance,



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INSTITUTO PARA EL DESARROLLO DE ANTIOQUIA

(viii) taxation structure, (ix) loan terms and conditions, (x) depreciation method, and (xi) operational cycle and annual hours of operation.

Profitability Analysis

The Contractor shall generate and evaluate specific indices of economic performance such as profitability, return on investment, internal rate of return, debt service coverage ratio and net present value. The Contractor shall design the financial analysis to evaluate available financing scenarios, analyze each scenario's cost effectiveness, and compare each scenario's improvement in relation to the situation at the time of the Study preparation. In addition to conservative assessments of routine operating and investment costs, the profitability and financial analysis shall compare costs of financing, for example, interest on bank credits, and other banking charges.

i. The Contractor shall assess the potential profitability of a project variant based on conservative estimates of system-specific items such as heat and electricity revenues, fuel costs, production levels, energy savings, and other elements of a cost/benefit analysis. A project variant may be recommended for financing so long as the estimates demonstrate that the Project is able to generate sufficient cash flow to fund operations and repay debts. No project variant that cannot pay for itself, or that would require any additional external subsidies shall be recommended (including investment and financing costs). The Contractor shall calculate other scenarios, such as best and worst case projections for the Project's performance.

ii. The Contractor shall develop a viable Financing Plan for the Project. In this process, the Contractor shall consider and evaluate sources of funds to cover the capital expenditures, and how the free cash flows shall be used to cover the projected debt service. In order to evaluate the potential sources of financing, the Contractor shall contact local and international long-term debt financing sources to discuss their requirements for, and interest in, the Project. Sources to contact include the U.S. Export-Import Bank, Inter-American Development Bank, the International Finance Corporation (IFC), the Andean Development Corporation (CAF), as well as other international financial institutions and local commercial banks that might be interested in providing long-term financing for the Project.

The Contractor shall obtain indicative term sheets from potential lenders, and include them in the Final Report.

The Contractor shall develop a financing plan taking into account the comments and requirements of the aforementioned institutions. The financing plan should include indicative capital structure, covenants, terms and conditions for borrowings. It should



IDEA
INSTITUTO PARA EL DESARROLLO DE ANTIQUIA

address interest rate and currency hedging, duties and taxes, and foreign exchange availability.

In addition to the projected economic analysis, the available sources of financing and proposed Financing Plan will be used to assess the projected financial viability of the Project.

iii. The Contractor shall also prepare pro forma or projected income statements and balance sheets, and shall conduct and report on a sensitivity analysis to demonstrate the range of conditions under which the Project will be profitable and the extent, to which the projections are dependent on uncontrollable conditions or factors. The pro forma financial statements will consist of the Income Statement (Profit and Loss Account), the Balance Sheet, Statement of Cash Flows and Financial Ratios that include profitability calculations and cash flow projections. The Contractor shall provide advice on how to make the Project most bankable including providing risk minimization strategies to the extent that they are within control of the Grantee and shall anticipate and address risk and return criteria of the most likely sources of bank loan financing.

iv. The Contractor shall calculate projected reductions of greenhouse emissions from the Project and shall consider financing alternatives based on the CDM under the Kyoto Protocol and/or emerging international frameworks, agreements and mechanisms which may replace the Kyoto Protocol and the CDM.

Deliverable: The Contractor shall submit an interim report in English and Spanish to the Grantee, detailing all work performed under Task 8. The Contractor shall prepare and submit to the Grantee financial projections sufficient to include in an investment memorandum that will provide potential financiers with the information needed regarding the economic and financial merits of the Project for their decision to invest in it. These projections will be included in the Investment Memorandum outlined in Task 14 and in the Final Report.

Task 9 - Project Risk Assessment

The Contractor shall perform a risk assessment to identify risks, minimize the identified risks where possible, and recommend a reasonable allocation of remaining risks. The primary risk categories to be considered by the Contractor shall include, but not be limited to the following: (i) project implementation risks, i.e., the risks of obtaining consents, permits, licenses, concession rights and other agreements and covenants necessary for financial closure, (ii) technical risks, i.e., construction delays, cost overruns, higher-than-expected costs related to the upgrade of the existing electrical infrastructure, and lower-than-expected production, waste/fuel shortage and waste



IDEA
INSTITUTO PARA EL DESARROLLO DE ANTIOQUIA

delivery risks, and (iii) Project environment risks, i.e., risks that arise from the economic, market, regulatory or legal factors governing the Project environment. Special

attention shall be paid to the risks connected with waste/fuel supply fluctuations, electricity tariff determination policies, revenue collections and technical condition of the existing electrical infrastructure.

The Contractor shall recommend a number of risk mitigation mechanisms that are legally enforceable. Sources to contact include the U.S. Export-Import Bank, the Multilateral Investment Guarantee Agency (MIGA), the Inter-American Development Bank, and international and local commercial banks.

Deliverable: The Contractor shall prepare a risk assessment and risk mitigation report based on the selected design and technical configuration of the new WTE plant and identified waste/fuel suppliers. The Contractor shall provide this interim report to the Grantee in English and Spanish, and incorporate the Grantee's comments into the analysis for the Final Report.

Task 10 – Regulatory Framework

The Contractor shall present the details of all consents, approvals, permits, licenses and ability of the Project to meet likely future constraints and limits on regulatory matters. The Contractor shall review the present organizational structure, applicable legislation and government policies for market-based independent power producer electricity generation and supply.

The Contractor shall analyze how the most significant energy sector, waste management sector and environmental sector regulations of the national government of Colombia and the departmental government of Antioquia may affect the implementation of the Project. Issues such as but not necessarily limited to the regulation of licensing of power plants, sale of wholesale electricity, energy tariffs, collection, transportation and depositing of different waste classifications and restrictions on air emissions, should all be closely examined.

Deliverable: The Contractor shall prepare a memorandum detailing the key legal and regulatory issues that will affect the Project and provide a copy of this memorandum to the Grantee in English and Spanish. The memorandum with comments of the Grantee shall also be included in the Final Report.

Task 11 – Developmental Impact



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INSTITUTO PARA EL DESARROLLO DE ANTIOQUIA

The Contractor shall report on the potential development impact of the Project in the Host Country. The Contractor shall focus on what the economic development outcomes will be if the Project is implemented according to the Study recommendations. While specific focus should be paid to the immediate impact of the Project, the Contractor shall include, where appropriate, any additional developmental benefits to the Project, including spin-off and demonstration effects. The Contractor's analysis of potential benefits should be as concrete and detailed as possible. The development impact factors are intended to provide the Project's decision-makers and interested parties with a broader view of the Project's potential effects on the Host Country. The Contractor shall provide estimates of the Project's potential benefits in the following areas:

- (a) *Infrastructure.* The Contractor shall provide a statement on the infrastructure impact giving a brief synopsis.
- (b) *Market-Oriented Reforms.* The Contractor shall provide a description of any regulation, laws, or institutional changes that are recommended and the effect they would have if implemented.
- (c) *Human Capacity Building.* The Contractor shall address the number and type of positions that would be needed to construct and operate the proposed Project as well as the number of people who will receive training and a brief description of the training program.
- (d) *Technology Transfer and Productivity Enhancement.* The Contractor shall provide a description of any advanced technologies that will be implemented as a result of the Project and a quantitative description of any efficiency that will be gained.
- (e) *Social Benefits.* The Contractor shall identify social benefits of the Project that arise from improved municipal, industrial and agricultural waste management in the areas of Heliconia and Envigado in Antioquia, Colombia.
- (f) *Other.* The Contractor shall identify any other developmental benefits of the Project, including any spin-off or demonstration effects.

Deliverable: The Contractor shall submit an interim report to the Grantee in English and Spanish, containing all documents collected, work performed, and analyses completed under Task 11.

Task 12 – Off-Take Agreements



The Contractor shall prepare an advisory memorandum detailing all key issues regarding the content and approval of off-take agreement(s) for the sale of electricity according to the arrangements established by the Grantee and consistent with the provisions of Colombian Laws 142 and 143 of 1994, which define the legal framework for the generation, transmission, distribution and sale of electricity and provide for a free market

competition through a wholesale energy market (the aforementioned *Mercado de Energía Mayorista*). This advisory memorandum shall identify all necessary procedures, approvals and potential obstacles to the proposed power sales arrangements and/ consummation of necessary power purchase agreements. The Contractor shall not be responsible for negotiating or preparing Power Purchase Agreements.

Deliverable: The Contractor shall prepare and deliver to the Grantee the advisory memoranda outlined in Task 12 above to the Grantee in English and Spanish in order to assist the Grantee with establishing the power sales arrangements.

Task 13 – Implementation Plan

The Contractor shall prepare a detailed Implementation Plan designed to provide for implementation of the Project in a timely manner and in a cost-effective way. The Implementation Plan will establish sequence of tasks, assign responsibility for each process and task, and determine corresponding time limits for their implementation. The Implementation Plan should be presented in standard Gantt Chart format typical for construction management of complex engineering projects, detailing all tasks and subtasks and providing the critical path timetable.

Deliverable: The Contractor shall provide a copy of the Implementation Plan to the Grantee in English and Spanish, and incorporate any feedback from the Grantee into the Plan for inclusion of the final version in the Final Report.

Task 14 – Investment Memorandum

The Contractor shall prepare an Investment Memorandum, suitable for presentation to the investment community, and for the purpose of structuring and obtaining financing for the implementation of the Project, based on the findings of Tasks 1-13 herein. The Investment Memorandum should be organized in chapters that generally match the subject headings of Tasks 1-13 herein and include the full set of detailed financial projections prepared pursuant to Task 8 above.

Deliverable: The Contractor shall prepare an Investment Memorandum in English and Spanish as outlined in Task 14 above. This Memorandum shall be provided to the



IDEA
INSTITUTO PARA EL DESARROLLO DE ANTIOQUIA

Grantee upon finalization in an electronic form and with three (3) hard copies, and shall be included in the Final Report.

Task 15 - Final Report

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference ("Final Report"). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement. The Contractor shall also prepare an executive summary discussing the Project, the key findings of the Study, and the recommendations for further development of the Project, to be included in the Final Report.

The Final Report shall also include a comprehensive list of suppliers, including potential sources of U.S. equipment and services relevant to the implementation of each component of the Project as outlined in the Study.

In addition to the copies of the Report that shall be provided to USTDA, as outlined in Clause I of Annex II of the Grant Agreement, the Contractor shall provide six (6) copies of the public version of the Final Report (three in English and three in Spanish), six (6) copies of the Confidential Version (three in English and three in Spanish), and all of their annexes to the Grantee. One copy of the public report in English shall be provided to the U.S. Embassy in Bogotá.

Notes:

- (1) The Contractor is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.**
- (2) The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.**
- (3) The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report and all work product that is developed under these Terms of Reference.**

ANNEX 6

COMPANY INFORMATION

A. Company Profile

Provide the information listed below relative to the Offeror's firm. If the Offeror is proposing to subcontract some of the proposed work to another firm(s), the information requested in sections E and F below must be provided for each subcontractor.

1. Name of firm and business address (street address only), including telephone and fax numbers:
2. Year established (include predecessor companies and year(s) established, if appropriate).
3. Type of ownership (e.g. public, private or closely held).
4. If private or closely held company, provide list of shareholders and the percentage of their ownership.
5. List of directors and principal officers (President, Chief Executive Officer, Vice-President(s), Secretary and Treasurer; provide full names including first, middle and last). Please place an asterisk (*) next to the names of those principal officers who will be involved in the Feasibility Study.
6. If Offeror is a subsidiary, indicate if Offeror is a wholly-owned or partially-owned subsidiary. Provide the information requested in items 1 through 5 above for the Offeror's parent(s).
7. Project Manager's name, address, telephone number, e-mail address and fax number.

B. Offeror's Authorized Negotiator

Provide name, title, address, telephone number, e-mail address and fax number of the Offeror's authorized negotiator. The person cited shall be empowered to make binding commitments for the Offeror and its subcontractors, if any.

C. Negotiation Prerequisites

1. Discuss any current or anticipated commitments which may impact the ability of the Offeror or its subcontractors to complete the Feasibility Study as proposed and reflect such impact within the project schedule.
2. Identify any specific information which is needed from the Grantee before commencing contract negotiations.

D. Offeror's Representations

Please provide exceptions and/or explanations in the event that any of the following representations cannot be made:

1. Offeror is a corporation [*insert applicable type of entity if not a corporation*] duly organized, validly existing and in good standing under the laws of the State of _____. The Offeror has all the requisite corporate power and authority to conduct its business as presently conducted, to submit this proposal, and if selected, to execute and deliver a contract to the Grantee for the performance of the Feasibility Study. The Offeror is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment, or ineligible for the award of contracts by any federal or state governmental agency or authority.
2. The Offeror has included, with this proposal, a certified copy of its Articles of Incorporation, and a certificate of good standing issued within one month of the date of its proposal by the State of _____. The Offeror commits to notify USTDA and the Grantee if they become aware of any change in their status in the state in which they are incorporated. USTDA retains the right to request an updated certificate of good standing.
3. Neither the Offeror nor any of its principal officers have, within the three-year period preceding this RFP, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.
4. Neither the Offeror, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 3 above.
5. There are no federal or state tax liens pending against the assets, property or business of the Offeror. The Offeror, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.
6. The Offeror has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any bankruptcy, insolvency or other similar law. The Offeror has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

The selected Offeror shall notify the Grantee and USTDA if any of the representations included in its proposal are no longer true and correct at the time of its entry into a contract with the Grantee.

Signed: _____
(Authorized Representative)

Print Name: _____

Title: _____

Date: _____

E. Subcontractor Profile

1. Name of firm and business address (street address only), including telephone and fax numbers.
2. Year established (include predecessor companies and year(s) established, if appropriate).

F. Subcontractor's Representations

If any of the following representations cannot be made, or if there are exceptions, the subcontractor must provide an explanation.

1. Subcontractor is a corporation [*insert applicable type of entity if not a corporation*] duly organized, validly existing and in good standing under the laws of the State of _____ . The subcontractor has all the requisite corporate power and authority to conduct its business as presently conducted, to participate in this proposal, and if the Offeror is selected, to execute and deliver a subcontract to the Offeror for the performance of the Feasibility Study and to perform the Feasibility Study. The subcontractor is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment or ineligible for the award of contracts by any federal or state governmental agency or authority.
2. Neither the subcontractor nor any of its principal officers have, within the three-year period preceding this RFP, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.
3. Neither the subcontractor, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 2 above.
4. There are no federal or state tax liens pending against the assets, property or business of the subcontractor. The subcontractor, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.
5. The subcontractor has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any

bankruptcy, insolvency or other similar law. The subcontractor has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

The selected subcontractor shall notify the Offeror, Grantee and USTDA if any of the representations included in this proposal are no longer true and correct at the time of the Offeror's entry into a contract with the Grantee.

Signed: _____
(Authorized Representative)

Print Name: _____

Title: _____

Date: _____