REQUEST FOR PROPOSALS

FEASIBILITY STUDY FOR THE

20 MW HYBRID SOLAR AND WIND PARK

Submission Deadline:	**5 PM** **LOCAL TIME (in Medellín, Colombia)** **NOVEMBER 8, 2011**
Submission Place:	**Compañía Colombiana de Inversiones S.A. E.S.P.** **Carrera 43ª No. 1ª Sur 143 Piso 5** **Medellín** **COLOMBIA** **Tel: +57 4 326 6600**

PROPOSALS SHALL BE CLEARLY MARKED AND PACKAGED AS SPECIFIED HEREIN 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

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Section 1: INTRODUCTION

The U.S. Trade and Development Agency (USTDA) has provided a grant in the amount of US$592,000 to Compañía Colombiana de Inversiones S.A. E.S.P. (the "Grantee" or "Colinversiones") in accordance with a grant agreement dated June 29, 2011 (the "Grant Agreement") and Amendment No. 1 to the Grant Agreement dated September 28, 2011 ("Amendment No. 1"). This grant funds the cost of goods and services required for the preparation of a feasibility study ("Study") on a proposed 20 MW Hybrid Solar and Wind Park ("Project") in Colombia ("Host Country"). The Grantee is soliciting technical proposals from qualified U.S. firms to provide expert consulting services to perform the Feasibility Study.

The Grant Agreement and Amendment No. 1 are attached at Annex 4 for reference. Amendment No. 1 reflects modifications to the solicitation originally posted for this Study on July 21, 2011, which was cancelled on August 24, 2011.

1.1 BACKGROUND SUMMARY

Colinversiones requested a USTDA grant for a feasibility study to determine the technical, economic, environmental, regulatory and financial viability of a 20 MW hybrid solar and wind power plant in Colombia. Colinversiones is a publicly listed utility that currently owns and operates, directly and through two affiliates – Colinversiones ZF S.A. E.S.P. (f/ka Termoflores S.A. E.S.P.)[1] and Empresa de Energía del Pacífico S.A. E.S.P.[2] – a total of 1,898 MW of electrical generating capacity, making it Colombia's second largest thermal power producer and its fourth largest power producer overall.

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

1.2 OBJECTIVE

This hybrid solar and wind plant will be sized to deliver 20 MW of net power, with approximately 16 MW of wind turbines and 4 MW of solar modules at a site that will be designated by the Grantee. The Grantee will select the technologies that offer the best combination of energy production, capital cost, operating cost, and financing. The optimization of plant output requires that the size of the solar and wind components be balanced with their expected output under the site's meteorological conditions and in accordance with their relative pricing. The wind and solar resource assessments conducted under this Study will help determine this balance, providing estimates not just of the total wind generation and solar generation but also the degree to which wind and solar outputs are complementary such that their combined output corresponds to the demand peaks and payment schedules.

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[1] Colinversiones owns 99.96% of the subscribed and paid-in capital and outstanding shares of Colinversiones ZF S.A. E.S.P.

[2] Colinversiones owns 50.01% of the subscribed and paid-in capital and outstanding shares of Empresa de Energía del Pacífico S.A. E.S.P.

The Terms of Reference (TOR) for this Feasibility Study are attached as Annex 5. Please note that modifications have been made to the TOR that was annexed to the the original solicitation of July 21, 2011.

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$592,000. **The USTDA grant of US$592,000 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$592,000 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 Hybrid Solar and Wind Park.

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 of its 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.[1] 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.

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1 Colinversiones is not responsible for the information contained in the referenced Definitional Mission report (Annex 2), which is provided as background information only and was prepared by a contractor to USTDA.

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$592,000.

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.

2.12 LANGUAGE OF PROPOSAL

All proposal documents shall be prepared and submitted in English, and only English.

2.13 PROPOSAL SUBMISSION REQUIREMENTS

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

Carlos Alberto Salazar Jiménez
Director of Innovation
Compañía Colombiana de Inversiones S.A. E.S.P.
Carrera 43ª No. 1ª Sur 143 Piso 5
Medellín, Colombia

An Original and six (6) copies of your proposal must be received at the above address no later than 5 PM on November 8, 2011.

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 marked and packaged to ensure confidentiality of the information. The proposals should be individually wrapped and packaged, and labeled for content including "original" or "copy number x"; the original and six (6) copies should be collectively wrapped and packaged, and clearly labeled.

Neither USTDA nor the Grantee will be responsible for premature opening of proposals not properly wrapped, packaged 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 Offeror that obtains the highest score, 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$592,000, which is a fixed amount.

Offerors shall submit one (1) original and eight (8) copies 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 Profile of 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).

3.2.6 Representations of each Subcontractor

If any of the following representations cannot be made, or if there are exceptions, each 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.

Each 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 each 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 Offeror that obtains the highest score based on the criteria set forth below (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 Offeror that obtains the second highest number of points based on the criteria set forth below and so forth.

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

- Experience in wind and solar energy feasibility studies of this type (30 points)
- First-hand knowledge of wind and solar system design and development (30 points)
- Experience in regulatory and environmental issues of wind and solar energy (15 points)
- Experience with the analysis of power sector projects in Latin America (10 points)
- Inclusion of bilingual (Spanish/English) individuals among key personnel (10 points)
- Experience in Colombia (5 points)

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

CARLOS ALBERTO SALAZAR JIMENEZ, DIRECTOR OF INNOVATION, COMPANIA COLOMBIANA DE INVERSIONES, CARRERA 43ª NO 1ª SUR 143, PISO 5, MEDELLÍN, COLOMBIA, TELEPHONE: +57 4 326 6600

20 MW HYBRID SOLAR AND WIND PARK

POC: Robin Yavuz, USTDA, 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901, Tel: (703) 875-4357, Fax: (703) 875-4009. 20 MW HYBRID SOLAR AND WIND PARK. 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 prepare a feasibility study for a 20 MW grid-connected, hybrid solar and wind power plant in Colombia.

The solicitation for this Study was originally posted on July 21, 2011 and cancelled on August 24, 2011. Please note that several modifications have been made to the original solicitation, as referenced in Amendment No. 1 to the Grant Agreement.

Compañía Colombiana de Inversiones, S.A. E.S.P. (Colombian Investment Company or "Colinversiones") requested a USTDA grant for a feasibility study to determine the technical, economic, environmental, regulatory and financial viability of a 20 MW hybrid solar and wind power plant in Colombia. Colinversiones is a publicly listed utility that currently owns and operates, directly and through two affiliates – Colinversiones ZF S.A. E.S.P. (f/ka Termoflores S.A. E.S.P.) and Empresa de Energía del Pacífico S.A. E.S.P. – a total of 1,898 MW of electrical generating capacity, making it Colombia's second largest thermal power producer and its fourth largest power producer overall.

This hybrid solar and wind plant will be sized to deliver 20 MW of net power, with approximately 16 MW of wind turbines and 4 MW of solar modules. The Grantee will select the technologies that offer the best combination of energy production, capital cost, operating cost, and financing. The optimization of plant output requires that the size of the solar and wind components be balanced with their expected output under the site's meteorological conditions and in accordance with their relative pricing. The wind and solar resource assessments conducted under this Study will help determine this balance, providing estimates not just of the total wind generation and solar generation but also the degree to which wind and solar outputs are complementary such that their combined output corresponds to the demand peaks and payment schedules.

The U.S. firm selected will be paid in U.S. dollars from a $592,000 grant to the Grantee from the U.S. Trade and Development Agency (USTDA), through milestone payments made by USTDA to the Contractor based on the completion of established deliverables (as set forth in the USTDA Mandatory Contract Clauses in Annex 4).

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.

This study [the "U.S. Solar Energy Trade Assessment 2010"] is a comprehensive analysis of trade flows and domestic value creation in the U.S. solar energy industry based on data from the calendar year 2009. Many sources of data and analysis focusing on solar trade balance issues exist. To date, however, most of these efforts have taken a fairly simplistic view of solar products. Most focus exclusively on individual product components, such as solar modules, analyzing what proportion of those components are manufactured domestically.

The overall trend for the clean-energy market continued to be one of growth and expansion in 2010. That year the U.S. solar industry employed 93,000 solar workers. That number is expected to grow by 26% by August 2011.

Combined global revenue for solar PV, wind power, and biofuels surged 35.2 percent over the prior year, growing from $139.1 billion to $188.1 billion, according to the Clean Energy Trends 2011 report issued by Clean Edge Inc. According to their research, the global market for solar photovoltaics (PV) has expanded from just $2.5 billion in 2000 to $71.2 billion in 2010, representing a compound annual growth rate of 39.8 percent. But, according to Reuters News, U.S. share of worldwide photovoltaic solar installations slipped to 5 percent last year from 6.5 percent in 2009 due to booming growth in Germany and Italy, where solar players enjoy generous government incentives.

In manufacturing, the United States increased its production of solar components substantially in 2010. Production of solar modules rose 62 percent, while wafer production grew 97 percent and cell manufacturing rose 81 percent.
However, stiff competition from low-cost regions such as China forced three domestic PV facilities to close last year, including a BP Solar plant in Maryland, Intel-backed SpectraWatt's New York facility, and Evergreen Solar's factory in Massachusetts.

U.S. PV-related imports in 2009 totaled $1.6 billion while exports totaled $2.3 billion, making the U.S. a net exporter of PV goods by $723 million. Key export goods included polysilicon wafers and modules, while modules and inverters were the most prominent imported goods. China and Mexico were the locations that contributed the most to imports, while Germany, Japan, and China were the most prominent export destinations.

ANNEX 2

BACKGROUND DEFINITIONAL MISSION REPORT[4]

PORTIONS OF THIS DEFINITIONAL MISSION REPORT HAVE BEEN INTENTIONALLY REDACTED.

ONLY THE RELEVANT PORTIONS OF THIS DEFINITIONAL MISSION REPORT PERTAINING TO THE 20 MW SOLAR AND WIND PARK ARE INCLUDED HEREIN.

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[4] Colinversiones is not responsible for the information contained in Annex 2, which is provided as background information only and was prepared by a contractor to USTDA, largely based on a visit to Colombia in September-October 2010.

EXECUTIVE SUMMARY

In April of 2009, U.S. President Barack Obama proposed an Energy and Climate Partnership of the Americas (ECPA). His vision is that ECPA "brings countries across the Western Hemisphere together to facilitate the acceleration of clean energy development and deployment, advance energy security, and reduce energy poverty by sharing best practices, encouraging investment, and cooperating on technology research, development and deployment." A key pillar to achieving this vision is clean energy.

In line with this mission, USTDA commissioned a "Definitional Mission: Latin America and the Caribbean: Solar Energy Projects". The countries visited included: Colombia, El Salvador and Guatemala.

Colombia

At the end of 2008, Colombia's installed electric power generation capacity reached 13,457 MW, of which 63.6 percent were hydro power plants. Thermal and co- generation facilities produced the remaining 36.4 percent (gas-fired power plants - 2,757 MW, coal-fired power plants - 967 MW, wind - 18.4 MW, other thermal - 619 MW, and cogeneration facilities - 570.3 MW)[5].

During 2008, electricity generation in Colombia reached 54,395 GWh. Hydro power plants generated approximately 80 percent of the electricity supply, due to lower generation costs thanks to the large water reserves created by the La Nina phenomenon that produced heavy rainfall, especially in the Andean and Pacific Ocean regions. The situation changed dramatically in 2009, when the lack of rainfall caused plants to switch over to thermal sources.

The Energy and Gas Regulatory Commission (CREG) enacted a "Reliability Charge" that recognizes the availability of generation assets to insure "firm generation capacity - OEF" under critical conditions. This offers a major incentive to develop new power projects in Colombia. The May and June 2008 power auctions under this new market- oriented mechanism generated new power plant commitments, mostly hydro-based plants, increasing the share of hydro-based generation to 72 percent with the incorporation of Porce III, El Quimbo, HidroSogamoso and Pescadero-Ituango, totaling more than 4,000 MW.

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[5] Doing Business in Colombia: 2010 Country Commercial Guide for U.S. Companies, U.S. Commercial Service

LIST OF ABBREVIATIONS

DISCOs	Distribution Companies
EoI	Expression of Interest
FDI	Foreign Direct Investment
GDP	Gross Development Product
GENCO	Generation Company
GWh	Giga Watt hour
IPP	Independent Power Producer
kV	KiloVolt
kW	Kilowatt (standard unit for electrical power)
kWh	kilowatt hour (one thousand Watt hours) (standard unit for electric energy)
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MMCFD	Million Cubic Feet per Day
MTDF	Medium Term Development Framework
MTOE	Million metric Tons Oil Equivalent
MW	Megawatt (one million Watt hours)
PPA	Power Purchase Agreement
PV	Photovoltaic
TCF	Trillion Cubic Feet
TOE	Tons of Oil Equivalent
TWh	Terawatt-hour (one trillion Watt hours)
USAID	United States Agency for International Development
USTDA	United States Trade and Development Agency

2.1 COLOMBIA

Geography: Colombia is located in northern South America, bordering the Caribbean Sea, between Panama and Venezuela, and bordering the North Pacific Ocean, between Ecuador and Panama.

Colombia land boundaries are distributed as follows: Brazil 1,644 km, Ecuador 590 km, Panama 225 km, Peru 1,800 km, Venezuela 2,050 km.

Economy: Colombia is the third-most populous country in Latin America, after Brazil and Mexico. Thirty cities have a population of 100,000 or more. The nine eastern lowlands departments, constituting about 54% of Colombia's area, have less than 3% of the population and a density of less than one person per square kilometer (two persons per sq. mi.). Ethnic diversity in Colombia is a result of the intermingling of indigenous peoples, Europeans, and Africans. Today, only about 3% of the people identify themselves as indigenous.

Colombia is a free market economy with major commercial and investment ties to the United States. In 1990, the administration of President Cesar Gaviria (1990-94) initiated economic liberalization or "*apertura*" with tariff reductions, financial deregulation, privatization of state-owned enterprises, and adoption of a more liberal foreign exchange rate. These policies eased import restrictions and opened most sectors to foreign investment, although agricultural products remained protected.

The Government of Colombia actively encourages foreign direct investment. In the early 1990s the country began economic liberalization reforms, which provided for national treatment of foreign investors, lifted controls on remittance of profits and capital, and allowed foreign investment in most sectors. Generally, foreign investors may participate in privatization of state-owned enterprises without restrictions. Colombia imposes the same investment restrictions on foreign investors that it does on national investors.

The challenging business climate in neighboring countries has contributed to the increase of the net Foreign Direct Investment (FDI) in Colombia. From a record USD10.6 billion in 2008, FDI decreased to USD 9 billion in 2009 reflecting the general curtailment of investment projects worldwide. The hydrocarbons and coal mining industries are principal U.S. investment interests. Major U.S. companies include: Drummond, Chicago Bridge and Iron, General Electric, General Motors, Occidental Petroleum, ChevronTexaco, ExxonMobil, Microsoft, Kimberly Clark, Johnson and Johnson, Continental Airlines, Delta Airlines, and American Airlines among others. New FDI will begin to reflect major hotel (Marriott, Hilton and Hyatt) and highway projects (Ruta del Sol). A U.S. Agency for International Development (USAID) study shows, however, that Colombian tax rates (both personal and corporate) are among the highest in Latin America. The average unemployment rate for 2009 was 12%, down from 15.7% in 2002.

Colombia's average annual economic growth rate of over 5% from 2002 to 2007 can be attributed to an increase in security, resulting in greater foreign investment; economic reforms in the oil and gas sectors; prudent monetary policy; and export growth fueled mainly by the Andean Trade Promotion and Drug Eradication Act (ATPDEA). However, GDP growth in 2008 was 2.5%, and for 2009 it was expected to be around zero, due in large part to the global economic downturn.

ATPDEA, which was extended through December 2010, plays a pivotal role in Colombia's economic growth. The signing of the U.S.-Colombia Trade Promotion Agreement (U.S.-CTPA) in November 2006 provides greater opportunity for growth if approved by the U.S. Congress and implemented.

As described in Colombia's 2010 Country Commercial Guide there are several challenges and opportunities to doing business in Colombia:

Market Challenges:

- Only firms licensed under Colombian law may provide legal services. Foreign law firms can operate in Colombia by forming a joint venture with a Colombian law firm and operating under the licenses of the Colombian lawyers in the firm.

- Economic needs tests are required when foreign providers of professional services operate temporarily; and residency requirements restrict trans-border trade of certain professional services, such as accounting, bookkeeping, auditing, architecture, engineering, urban planning, and medical and dental services.

- A commercial presence is required to provide information processing services or to bid on Colombian government contracts.

- Telecommunications barriers to entry include cross subsidies, the requirement for a commercial presence in Colombia, and an economic needs tests.

- For firms with more than ten employees, no more than 10 percent of the general workforce and 20 percent of specialists may be foreign nationals.

- International banking institutions are required to maintain a commercial presence in Colombia through subsidiary offices.

- Colombia has been on the Special 301 "Watch List" every year since 1991, reflecting ongoing challenges in the enforcement of intellectual property rights.

- Customs duties have been consolidated into four tariff levels: 0 to 5 percent on capital goods, industrial goods and raw materials not produced in Colombia, 10 percent on manufactured goods with some exemptions, and 15 to 20 percent on consumer and "sensitive" goods. A group of agricultural products is protected by a price band mechanism that offers variable duties as high as 100 percent.

  - Colombia has struggled with the requirements of the existing government procurement framework, which calls for open bidding in public tenders. Transparency, fairness, and truly competitive bidding conditions in most tenders are lacking.

Market Opportunities

- Colombia's extensive, planned infrastructure projects will require: project financing, public works subcontracting, logistics, construction equipment for public roads and airports; water treatment, water supply, electric power generation, oil and gas exploration and pollution control equipment, air navigational and port security aids, railway construction, transportation equipment, security and defense items and services, mass transit systems.

- Awarded to OPAIN in 2006, Bogotá's El Dorado International Airport still requires massive upgrades. The Medellin/Rio Negro airport upgrade is underway. Both concessionaires are seeking U.S. equipment providers.

- The United States Trade and Development Agency (USTDA) and EXIM Bank support U.S. companies as they craft solutions to development challenges and make inroads in key sectors such as oil and gas, petrochemicals, renewable energy, telecommunications, and ports. USTDA grants have resulted in big U.S. company wins at the country's two refineries. EXIM's preliminary commitment of USD 1 billion to Ecopetrol will provide a myriad of export opportunities for U.S. companies. USTDA grants for customs security and operational

enhancements at the ports in Cartagena, Buenaventura, and Puerto Salgar should also increase prospects for U.S. exporters.

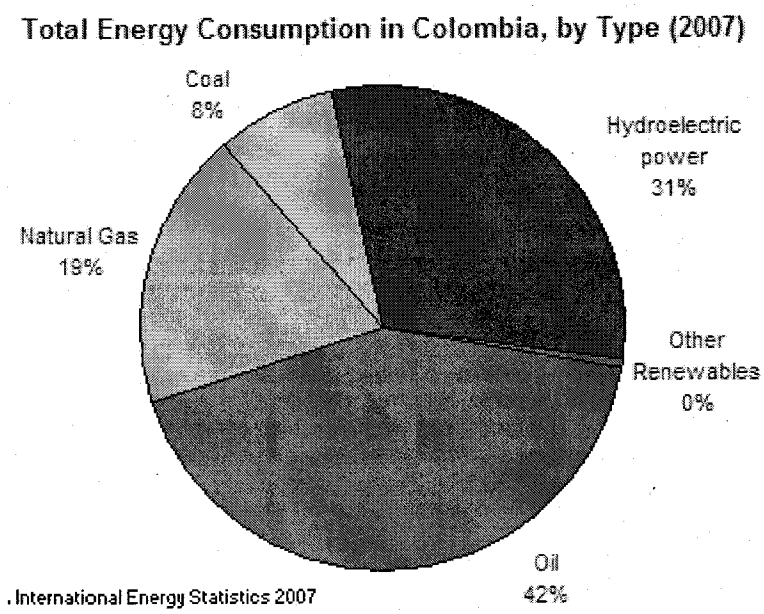
- Significant U.S. export opportunities not already mentioned include: cotton, wheat, corn soy products, automotive parts and accessories, tourism, computer hardware and software services, IT equipment and services, plastics materials and resins, electrical power systems, safety and security equipment, food and beverage processing and packaging equipment and medical equipment.

2.1.1 ENERGY SECTOR OF COLOMBIA

Colombia is a net energy exporter. Colombia's demand for energy has been increasing over the past decade and is expected to grow at an average of about 3.5 percent per year through 2020 (UPME 2009).

In 2007, Colombia consumed 1.3 quadrillion Btus of total energy. Oil constituted the largest part of this amount, followed by hydroelectricity. Colombia is a large producer of coal, but, because Colombia relies upon hydropower for the bulk of its electricity needs, it is able to export almost all of its coal production.

At the end of 2008, Colombia's installed electric power generation capacity reached 13,457 MW. During 2008, electricity generation in Colombia reached 54,395 GWh. Hydro power plants generated approximately 80 percent of the electricity supply, due to lower generation costs thanks to the large water reserves created by the La Niña phenomenon that produced heavy rainfall, especially in the Andean and Pacific Ocean regions. The situation changed dramatically in 2009, when the lack of rainfall caused plants to switch over to thermal sources.



The Electrical Power Systems market grew significantly during the last three years and represents an excellent opportunity for U.S. exports. This market was minimally affected by the global economic crisis in 2009 and grew a surprising 12.6 percent, much higher than the GDP rate. It is expected to grow 13 percent in 2010 to USD 1,025 billion due to new projects under development.

The crisis affected imported equipment, which grew two percent reaching USD $1 billion in 2009. U.S. equipment imports surged by 22 percent and by 2009 represented 40 percent of the import market. The economic crisis affected competitors across the board with all of them holding steady or registering a slight decrease in their market share. Other competitors include: China (10.0 percent), Brazil (8.2 percent), Mexico (7.2 percent), Japan, and Germany. During the last two years, Colombia imported mostly high-voltage transmission systems and equipment (the 230kV and 500 kV lines), as well as electric power generation and switching equipment.

It is important to highlight the significant growth of Chinese imports during the last five years. Chinese companies' main competitive advantage is lower cost compared to similar equipment from established vendors. However, the lower quality and reliability of Chinese equipment are

considerable disadvantages. U.S. equipment suppliers benefit from long-standing compliance with industry standards, reliability, lower shipment costs, innovation, and a favorable exchange rate. In 2009, Colombia officially adopted UL standards.

Total electricity demand grew 1.6 percent during 2008, led by increased mining and oil and gas production. Demand by the manufacturing sector dropped in 2009 as well due to the global economic crisis which reduced output. These low demand projections may be the norm for the next two years given Colombia's expected slower than normal economic growth due to the 2010 Presidential elections and continued scarcity of financial resources. If the planned major infrastructure, refinery upgrades and mining projects kick off, this may offset the declining demand. Other critical factors include:

- The lack of firm fuel supply commitments (mainly from restrictions to natural gas pipeline transport limitations), as existing alternative fuels (diesel and coal) are more expensive and have greater (negative) environmental impact;
- The identification of new gas reserves from traditional fields and from coal bed methane, with its associated infrastructure development, and
- Future development of new wind power and geothermal resources.

The Energy and Gas Regulatory Commission (CREG) enacted a "Reliability Charge" that recognizes the availability of generation assets to insure "firm generation capacity - OEF" under critical conditions. This offers a major incentive to develop new power projects in Colombia. The May and June 2008 power auctions under this new market-oriented mechanism generated new power plant commitments, mostly hydro-based plants, increasing the share of hydro-based generation to 72 percent with the incorporation of Porce III, El Quimbo, HidroSogamoso and Pescadero-Ituango, totaling more than 4,000 MW.

Several large Colombian power companies, are evaluating expansion projects to other Andean (Bolivia, Ecuador, and Perú) and Central American countries. The proposed power interconnection with Panama could lead to new power projects in Central America.

The Colombian Government is also promoting the use of renewable energy sources, especially for off-grid and isolated areas. Also under development is a regulatory framework to expand the use of energy efficient systems and create awareness for the rational use of energy, including building more cogeneration facilities. Efforts are underway to promote private ventures in the areas of solar, wind, geothermal, and small- hydro systems. If successful, these projects allow for the use of energy in sustainable community projects. Empresas Públicas de Medellín S.A. E.S.P. owns the country's only wind power plant (Jepírachi), a 19.5 MW facility.

Other electric utilities are interested in pursuing renewable energy projects (mainly wind). Another non-traditional project is the Amoyá run-of-river hydro project that is expected to produce some 80 MW of electricity and additional environmental benefits aimed at protecting the peak areas in the surrounding mountains.

On November 5, 2010, the government issued Decree 4114 that reduced import duties for a range of products, including those for the electric power generation sector, to an average of five

percent. In addition, if the US-Colombia Trade Promotion Agreement is approved, U.S. equipment exporters will be more competitive as 65 percent of products will receive immediate duty-free treatment with the remaining tariffs phased out over ten years. In addition, the ban on remanufactured products will be lifted.

Electrical U.S. power equipment opportunities include:

- Power, distribution, and specialty transformers
- Switchgear
- Motors
- Generators
- Industrial controls
- Steam, gas, and hydraulic turbines
- Turbine generator sets.

Some utilities are evaluating the development of wind, geothermal and the proposed Medellín waste-to-energy power projects that if proven feasible will generate additional opportunities for U.S. equipment manufacturers[6].

Solar Energy

In Colombia electricity from photovoltaic cells has focused on electrifying rural areas where high-energy generation costs made solar generation a more cost-effective and reliable long-term solution. (Development of Solar Energy in Colombia and its Prospects," December 2008).

- Areas of: Magdalena, La Guajira y San Andrés y Providencia: between 5 y 6 kWh/m2
- Area of: Casanare, Arauca, Guainia, Guaviare, Amazonas, Putumayo y Vaupes: between 4 y 5 kWh/m2
- Pacific costal area: with the smallest amount of radiation, below 3 kWh/m2

Colombia's interest to promote new and clean sources of energy (solar in particular) has changed in accordance with the energy crisis. Three aspects should guide the development of clean energy:

- First, the need to diversify Colombia's energy mix in order to give flexibility to the energy supply system.
- Second, the relevance of clean energy to reduce fossil fuel's environmental impact and complement fossil fuel's limited supply.
- Third, the key role solar energy plays to provide energy to isolated areas where approximately a million families lack reliable electricity services.

[6] Doing Business in Colombia: 2010 Country Commercial Guide for U.S. Companies.

Policies and Enabling Environments for Investment

1. Action Plan 2010–2015 for the Development of the Program for Rational and Efficient Use of Energy and Other Non-Conventional Energy (PROURE):

   Colombia's PROURE depends of the Ministry of Mines and Energy. The main objective of this program is to promote, organize and ensure the adoption and monitoring of rational and efficient use of energy and the promotion of non-conventional sources of energy generation.

   Specifically, Article 7o of this PROURE sets the following goals for non-conventional energy generation sources:

   Goal: Non-Conventional Sources in Interconnected System

2015	3.5%
2020	6.5%

   Goal: Non-Conventional Sources in Non-Interconnected System

2015	20%*
2020	30%

   * Current capacity amounts for 8%. The remaining 12% will be generated from wind, biomass, small hydroelectric, and solar energy

2. Other Relevant Policy/Programs/Projects

Colombia's Law 697, known as Rational Use of Energy (URE), was enacted in 2001, and Decree 3683 was issued in 2003. The law established a legal framework and the decree creates an organizational structure.

2.1.2 ENERGY SUPPLY AND CONSUMPTION

2.1.2.1 Growth Scenarios

Between 2003 – 2008, Colombia's electricity demand grew at 3.31% annually. In 2008 total electricity demand was 53, 970 GWh-year as shown in table 1:

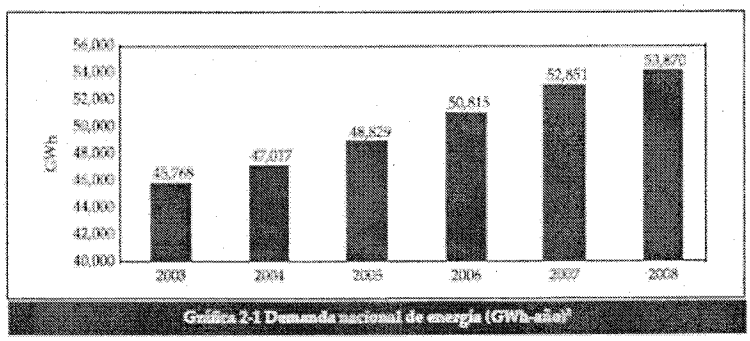


Table 1: National Electricity

Between 2003 – 2008, Colombia's electricity demand grew at 3.31% annually. In 2008 total electricity demand was 53, 970 GWh-year as shown in table 1:

At the end of 2008, Colombia's net installed electric power generation capacity reached 13,457 MW, of which 63.6 percent were hydro power plants and thermal and co-generation facilities produced the remaining 36.4 percent (gas-fired power plants - 2,757 MW, coal-fired power plants - 967 MW, wind - 18.4 MW, other thermal - 619 MW, and cogeneration facilities - 570.3 MW).

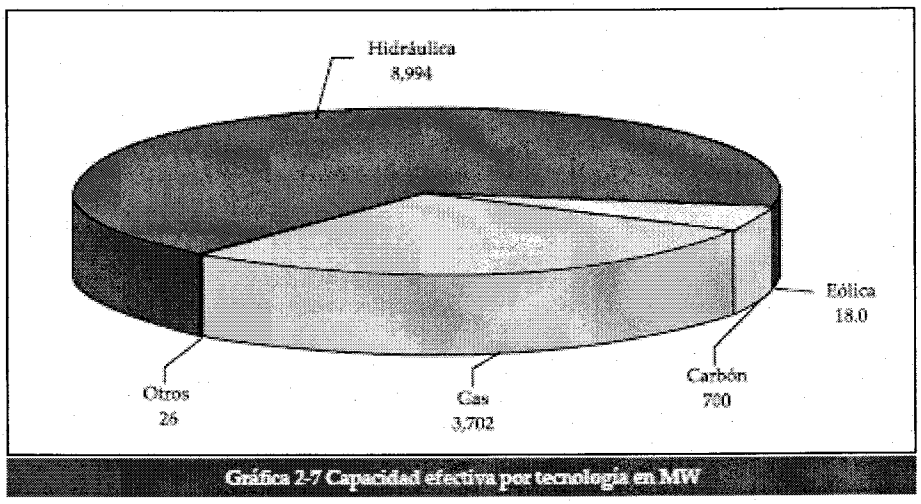


Figure 1 - Effective Capacity per Technology

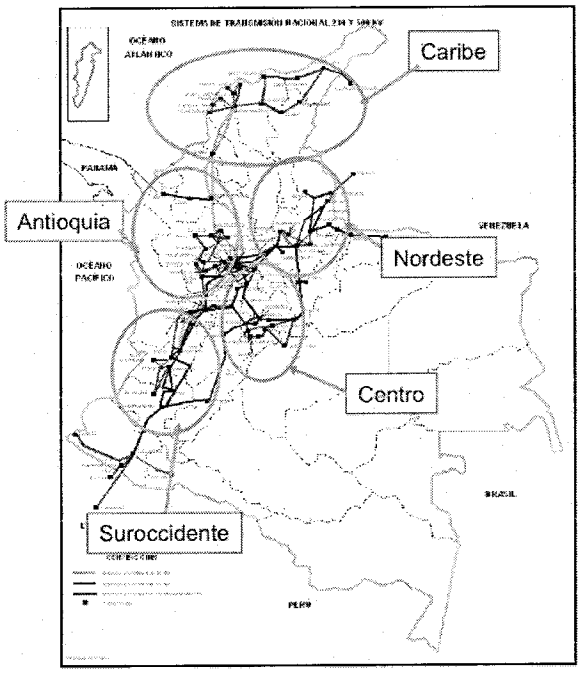
In addition, non-interconnected areas and other energy producers generated their electricity using primarily diesel. For 2009 UPME estimates that 7,074 GWh were produced this way.

Currently, Colombia has registered 13,545.8 MW capacity for new projects. Hydraulic projects account for 57% of new projects, followed by 21% from coal, 19% from natural gas, 2% fuel oil, and the remaining 1% distributed among micro-hydro, cogeneration and wind power.

2.1.2.2 Energy Consumption by Sector

Colombia's National Interconnected System reported that in 2009 the main consumer of electricity was the residential sector with 41.2%, closely followed by the industrial sector with 30.9% and tertiary sector with 25%.[7]

In addition, UPME estimates that in 2009, the electricity consumed by non-interconnected-areas (ZNI) and that self-generated amounts to 7,074 GWh.



2.1.3 TRANSMISSION

Transmission expansion in Colombia is planned by the Unidad de Planeación Minero Energética (UPME). UPME is a central agency commissioned to establish the required transmission enhancements. On an annual basis, the agency consolidates all the needs based on economic growth and the current regulation into a single plan.

Colombia's National Transmission System (STN) has over 24,109 km of transmission lines, 2,398 km are constituted by the major lines (500kV), there are 11,622 km of 230 kV lines of and the reminding 10,074 kV are of 115 kV. Is further divided into 5 different regions as shown in the transmission map.

Transmission Lines for Interconnected System as of December 31, 2010

Líneas	Longitud km
Transmisión 110 – 115 kV	10,074.3
Transmisión 138 kV	15.5
Transmisión 220 – 230 kV	11,654.6
Transmisión 500 kV	2,646.3
TOTAL SIN	24,390.7

Source: XM S.A. E.S.P., 2010

Once the transmission plan in consolidated and approved, an auction is open to potential builders in which qualified private investors, transmission owners, or public utilities can participate in the construction and operation of the required enhancements.

[7] Colombia's Energy Demand Projections, Mining and Energy Planning Unit, October 2010

2.1.4 DISTRIBUTION

There are two distribution systems in Colombia:

- Regional Transmission System – Grid-connected systems composed of regional and interregional components with electric voltage below 220 kV and that are not tied to a local distribution system.

- Local Distribution System: Composed of municipal and district level lines and substations with voltage below 220 kV.

The system is further divided by nominal voltage into 4 different categories:

Niveles de Tensión *

- Nivel IV: 57.5 kV ≤ **Tensión nominal** < 220 kV
- Nivel III: 30 kV ≤ **Tensión nominal** < 57.5 kV
- Nivel II: 1 kV ≤ **Tensión nominal** < 30 kV
- Nivel I: **Tensión nominal** < 1 kV

*Levels of Voltage (tension refers to voltage, as in high-tension power lines)

2.1.5 REGULATION

The Colombian energy market has a large diversity of public and private actors responsible for generation, transmission, distribution and comercialization. Key institutions include:

Policy	Ministry of Mines and Energy (MME) - "Ministerio de Minas y Energía	
Planning	Mines and Energy Planning Unit (UPME) - "Unidad de Planeación Minero Energética	
Regulation	Energy and Gad Regulatory Commission (CREG) - "Comisión de Regulación de Energía y Gas	
Council and Committees	National Operations Council - "Consejo Nacional de Operación"	Commercialization Advisory Committee - "Comité Asesor de Comercialización
Control and Surveillance	Public Services Superintendence - "Superintendencia de Servicios Públicos Domiciliarios SSPD"	
Market Operation and Management	XM Energy Market Experts S.A. E.S.P. - "Compañía de Expertos en Mercados S.A. E.S.P."	

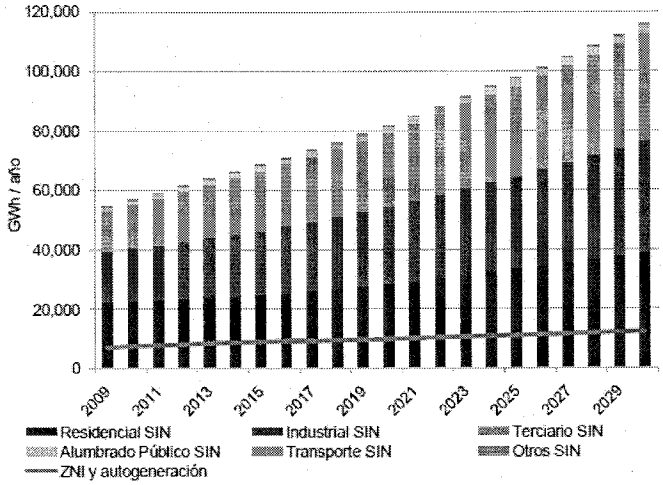
To establish the new legal frame needed to comply with the Colombia's Constitution in 1994, the government issued the Public Services Law 142 (Ley de Servicios Públicos Domiciliarios) and the Electrical Law 143. Both laws define the general criteria, policy, and procedures required to serve the population along with the mechanisms to regulate, control, and enforce them.

The Electrical Law 143 facilitates the constitutional focus and regulates generation, transmission, distribution, and commercialization activities. It also promotes a market-based approach and competencies while limiting government intervention.

In 2010, changes in regulations focused on information management, reliability payment, cogeneration activities, unified distribution changes, commercial borders delimitation, remuneration for transmission and distribution activities, and promoting competition.

2.1.6 GENERATION PLANNING

The UPME estimates that the demand for electricity will have an annual growth of 3.7% between 2009 – 2020. Analyzing this data per sector, the residential portion will grow slower (due to energy efficiency programs) at 2.2%, compared to an increase of 5.6% for service and 4.0% for industrial sectors.



Gráfica 4-8. Proyección de demanda sectorial de energía eléctrica

3.0 GLOBAL SOLAR ENERGY MARKET

The Solar Energy Industry Association (SEIA) developed a very extensive report "U.S. Solar Energy Trade Assessment 2010," The assessment analyzes the trade flows and domestic content for solar energy-related goods and services in the United States. The report is confidential; the DM Contractor reproduced, with permission from SEIA, some key areas of that report. The full version can be found at: *http://www.seia.org/galleries/default-file/Solar_Trade_Assessment.pdf.*

The SEIA information includes beakdowns of domestic and imported components of solar plant technologies. Their careful isolation of components allowed the DM Contractor to provide meaningful estimates of total capital costs and probably U.S. exports.

This study [the "U.S. Solar Energy Trade Assessment 2010"] is a comprehensive analysis of trade flows and domestic value creation in the U.S. solar energy industry based on data from the calendar year 2009. Many sources of data and analysis focusing on solar trade balance issues exist. To date, however, most of these efforts have taken a fairly simplistic view of solar products. Most focus exclusively on individual product components, such as solar modules, analyzing what proportion of those components are manufactured domestically.

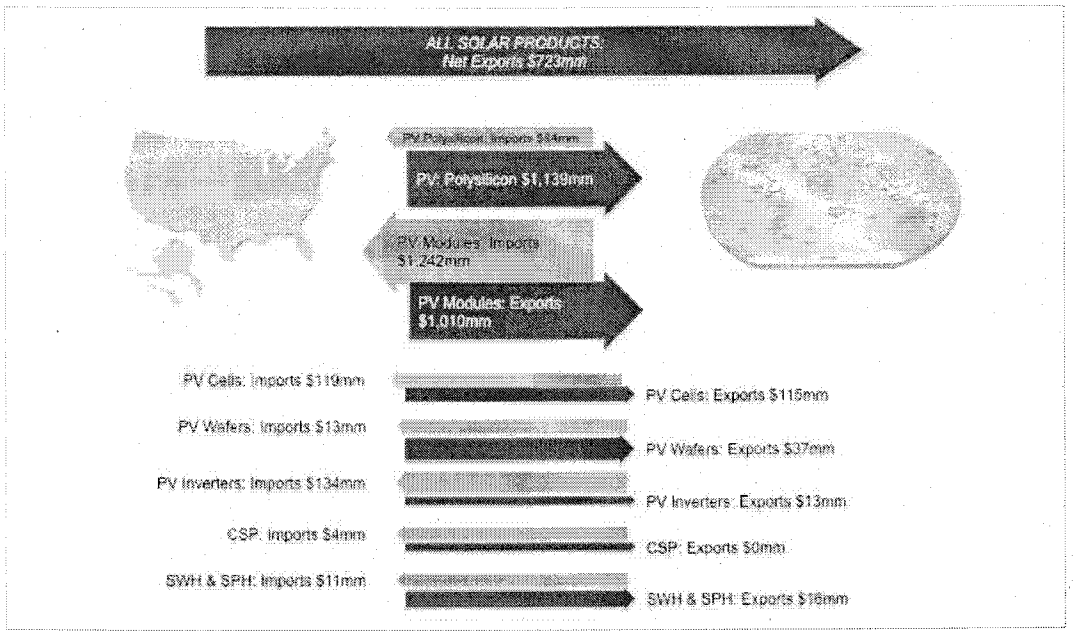
The overall trend for the clean-energy market continued to be one of growth and expansion in 2010. That year the U.S. solar industry employed 93,000 solar workers. That number is expected to grow by 26% by August 2011.

Combined global revenue for solar PV, wind power, and biofuels surged 35.2 percent over the prior year, growing from $139.1 billion to $188.1 billion, according to the Clean Energy Trends 2011 report issued by Clean Edge Inc. According to their research, the global market for solar photovoltaics (PV) has expanded from just $2.5 billion in 2000 to $71.2 billion in 2010, representing a compound annual growth rate of 39.8 percent. But, according to Reuters News, U.S. share of worldwide photovoltaic solar installations slipped to 5 percent last year from 6.5 percent in 2009 due to booming growth in Germany and Italy, where solar players enjoy generous government incentives.

In manufacturing, the United States increased its production of solar components substantially in 2010. Production of solar modules rose 62 percent, while wafer production grew 97 percent and cell manufacturing rose 81 percent.
However, stiff competition from low-cost regions such as China forced three domestic PV facilities to close last year, including a BP Solar plant in Maryland, Intel-backed SpectraWatt's New York facility, and Evergreen Solar's factory in Massachusetts.

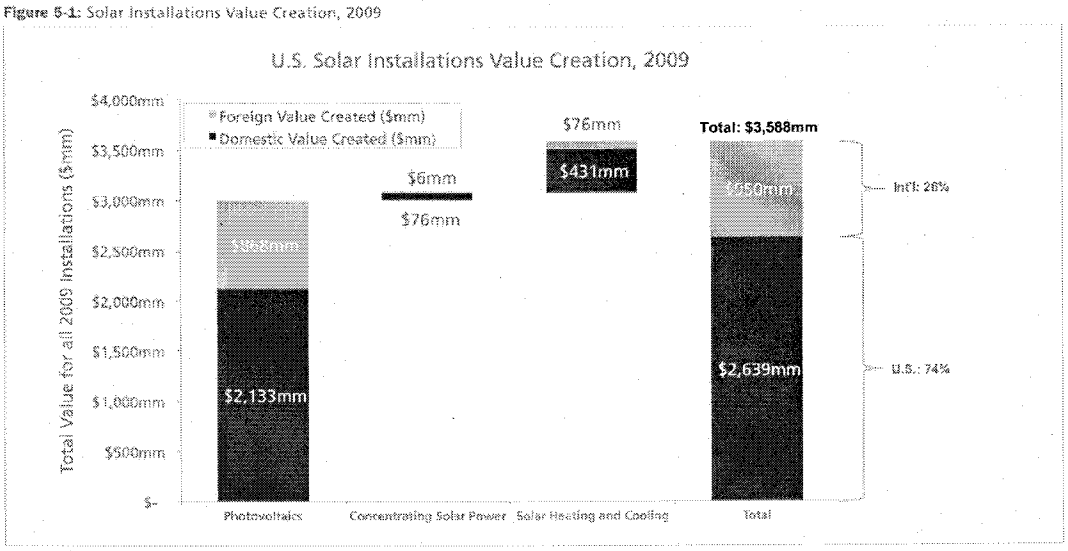
U.S. PV-related imports in 2009 totaled $1.6 billion while exports totaled $2.3 billion, making the U.S. a net exporter of PV goods by $723 million. Key export goods included polysilicon wafers and modules, while modules and inverters were the most prominent imported goods. China and Mexico were the locations that contributed the most to imports, while Germany, Japan, and China were the most prominent export destinations.

Figure 5-2: Solar Industry Trade Flows, 2009



Source: GTM Research, International Trade Commission

Figure 5-1: Solar Installations Value Creation, 2009

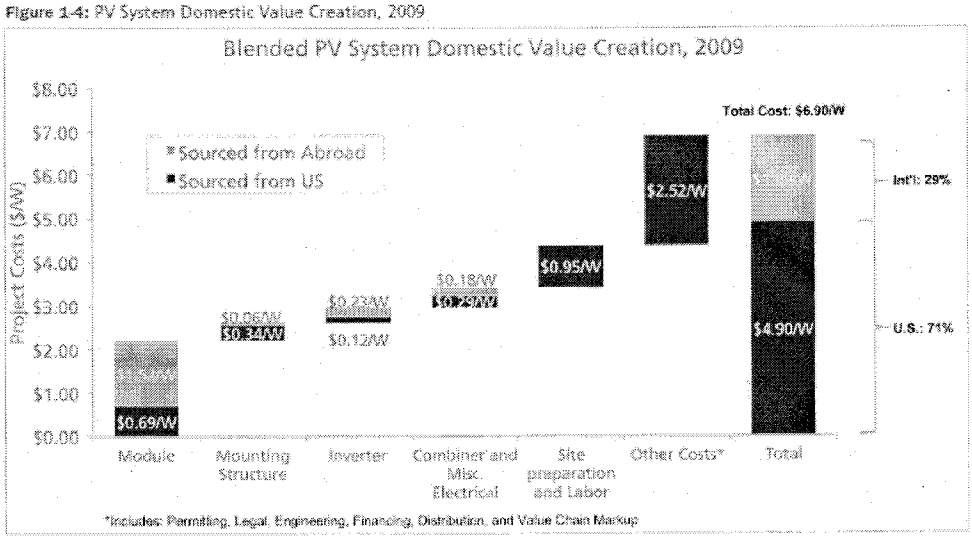


Source: GTM Research

PHOTOVOLTAICS (PV)

71% of total PV system value was created domestically in 2009. The domestic value was primarily created in the areas of module manufacturing, site preparation, labor, soft costs, and value chain markup for the module distributor and system installer.

Figure 1-4: PV System Domestic Value Creation, 2009

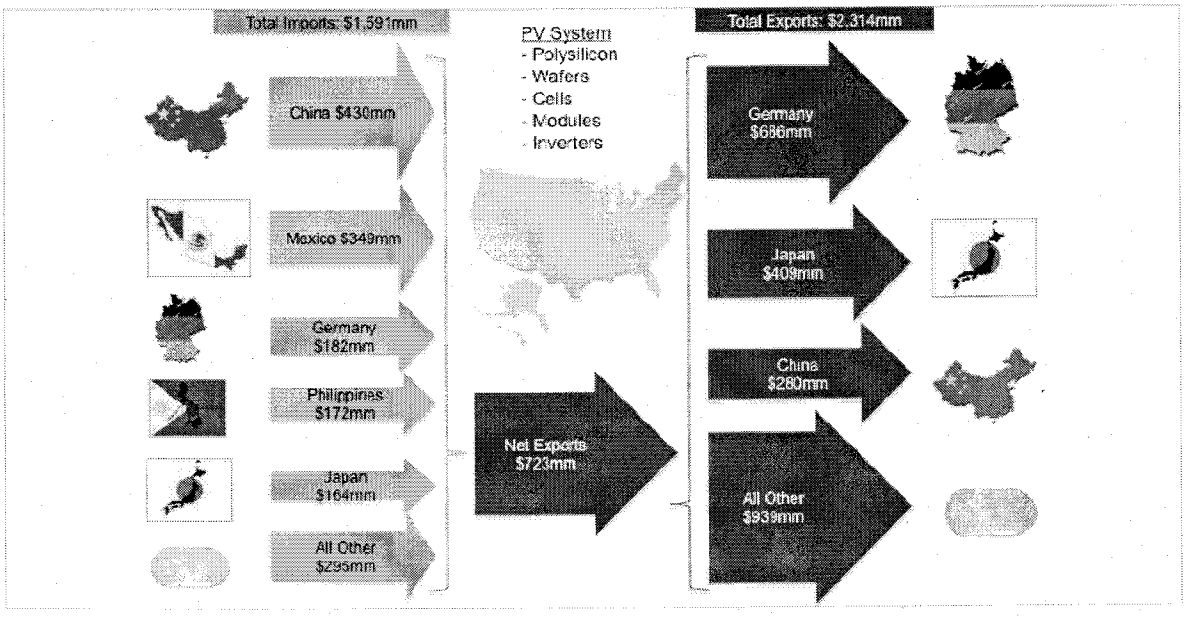


Source: GTM Research

Total PV Trade Flows

By summing trade flows for the individual components assessed, one arrives at total PV import and export volumes, which puts 2009 PV exports at $2.3 billion. This compares to imports of $1.6 billion, which yields net PV exports of $722.8 million. As shown, the primary export goods for PV in 2009 were polysilicon and modules, while inverters and modules were the main components imported. In terms of net exports, polysilicon was by far the most prominent, at $1.1 billion for 2009, while modules and inverters had the highest trade deficit, at $232.0 million and $121.0 million of net imports respectively.

Figure 1-5: PV: Imports and Exports by Source/Destination, 2009



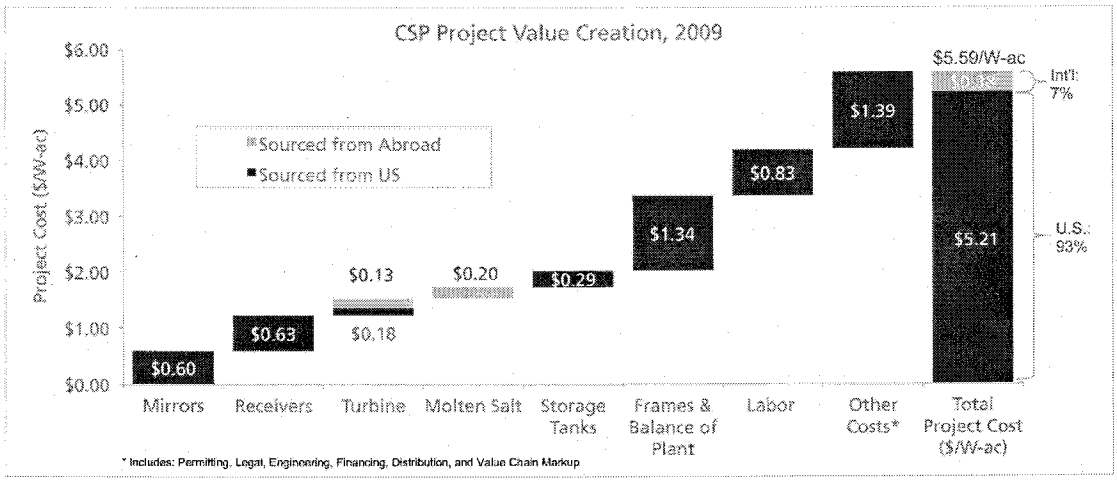
Source: GTM Research

CONCENTRATED SOLAR POWER (CSP)

93% of the total value of 2009 CSP installations in the U.S. was created domestically. Materials sourced from other countries were molten salt (used for thermal storage), and turbines.

U.S. imports of CSP-related goods totaled $3.8 million, coming from Germany. The U.S. did not export any CSP–related goods in 2009 in significant quantities. Looking forward, trade flows for CSP should remain relatively small, as many of the components are low value per pound commodities (i.e. steel, concrete, mirrors), where the economics favor domestic sourcing to avoid transport costs.

Figure 3-4: CSP Project Value Creation, 2009



Source: GTM Research

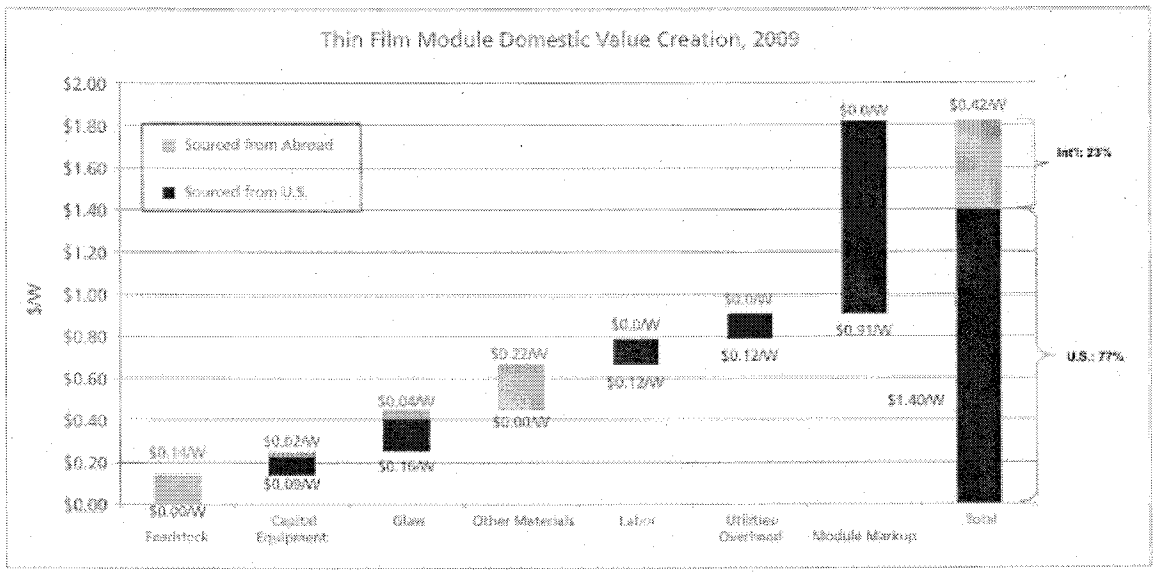
CSP Trade Flow Analysis

In 2009, the U.S. did not export any components for CSP projects in the rest of the world. The U.S. did import mirrors for the Holaniku project from Alanod Aluminium-Veredlung in Germany. Schott receiver tubes are scheduled for a 50-MW CSP project in Morocco. The effective value of the imports was estimated at $3.8 million. Overall, the dollar flows for CSP projects are miniscule compared to the trade flows from PV.

THIN FILM

Total thin film module costs (including module markup) for 2009 amount to $1.82/W; of this, the cost to the producer is estimated at $0.91/W, while the remaining $0.91/W (50%) is markup at the module level. This may seem unreasonably high; however, it is in accordance with CdTe module economics in 2009, as the dominant CdTe producer recorded gross margins in excess of 50% throughout 2009, due to a relatively high price for the alternative PV technology (crystalline Si) and an industry-leading module manufacturing cost. $1.40/W (77%) of the value in U.S.-installed thin film modules was sourced domestically, in contrast to only 24% for crystalline silicon modules.

Figure 2-8: Percentage of Value Created Domestically, U.S.-installed Thin Film Module, 2009



Source: GTM Research

The 77% domestic value of thin film modules installed in 2009, compared to only 24% for crystalline silicon, may lead one to mistakenly conclude that thin film manufacturing is inherently more U.S.-based. This is not true, and is more a function of the small sample size of prominent thin film manufacturers compared to crystalline silicon.

To illustrate this, a crystalline silicon module manufactured by a highly integrated domestic manufacturer such as Solarworld (which produces wafers, cells, and modules in the U.S.) would have domestic value on par with that of a U.S.-produced thin film module. As such, there is nothing intrinsically American about thin film manufacturing, or intrinsically foreign about crystalline silicon production; it just so happens that the landscape of manufacturers of crystalline silicon PV is distributed across the globe and is extremely competitive, while few thin film firms have thus far been able to compete with the U.S.-based leader.

COLOMBIA - COLINVERSIONES 20 MW GRID CONNECTED SOLAR/WIND PARK

DEFINITIONAL MISSION STUDY

Colinversiones is a publicly listed utility that currently owns and operates, directly and through two affiliates – Colinversiones ZF S.A. E.S.P. (f/ka Termoflores S.A. E.S.P.)[8] and Empresa de Energía del Pacífico S.A. E.S.P.[9] – a total of 1,898 MW of electrical generating capacity, making it Colombia's second largest thermal power producer and its fourth largest power producer overall.

The DM Contractor met with Colombia's Ministry of Mines and Energy and was told that there was no apparent obstacle to providing transmission upgrades to transmit power from solar and wind resource areas at this site, as the National Dispatch Center has been studying the way of incorporating renewable sources to the grid. Recent information from the Regional Power Operator revealed that a new 34.5 kV transmission line and substation with sufficient capacity are being planned, and if constructed; they may have sufficient capacity to evacuate the total output of a 20 MW generating station.

The DM Contractor suggested that a U.S. company, Infinia, has developed a CSP design that uses a collecting dish to focus light on a small Stirling heat engine. The Stirling engine has a single moving part, a reciprocating piston that drives a linear alternator to provide 3.2 KW of electric power at 24% solar efficiency. Infinia advertises that their collectors will operate for 20 years with no maintenance. The dishes can be used separately or connected in any number in large grid-connected solar parks. The proposed 4-MW solar field would require about 1,250 dishes, which is roughly the same number of mirrors that would be required in a conventional CSP plant. Infinia is scaling up for volume production using an assembly line technique similar to automotive assembly to increase production and minimize costs. Infinia recently proposed to the Government of Mexico to build a 2-MW demonstration project for $6 million, or $3,000/kw. If the same product price can be negotiated, the 4-MW solar field would cost about $12 million plus the cost of site work, substation, and controls, or about $15 million total.

The wind farm may use nine 2 MW capacity wind turbines producing 18 MW of peak power, and delivering 16 MWnet of power to the grid, allowing 2 MW for auxiliary loads and transformer and transmission losses. Other configurations and turbine sizes may be used to fit the expected net capacity of the hybrid farm. Wind turbine prices continue to fall, and are now below $2.25 per watt, so the 18-MW windfarm would cost about $40.5 million, including site work, substation, controls, and soft costs. In Colinversiones wind measurements taken near the proposed site, the reported median wind speeds at 10m were 6 m/s; the 6 m/s implies a higher median wind speed at a higher altitude. Current generations of wind turbines are mounted as high at 30 m and higher. Colinversiones will select the technology with the best combination of energy productions, capital cost, operating costs, and financing.

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[8] Colinversiones owns 99.96% of the subscribed and paid-in capital and outstanding shares of Colinversiones ZF S.A. E.S.P.

[9] Colinversiones owns 50.01% of the subscribed and paid-in capital and outstanding shares of Empresa de Energía del Pacífico S.A. E.S.P.

Revenues

The proposed hybrid plant would sell into the electricity market at the market clearing price, which runs about 80 Colombian pesos/kwh (about 4¢/kwh) during normal rainfall years and up to 300 pesos/kwh (about 16¢/kwh) during El Niño events. Even with the falling costs of solar technology, the market clearing price may not be sufficient to finance the plant.

The DM Contractor suggested another source of revenue. Under Colombia's regulatory policy, wind and solar plants do not qualify for reliability payments because they are intermittent. A study developed by the World Bank[10] points to the fact that "the wind resource along the northern coast appears to complement well the country's hydrological regime and could be part of a strategy to strengthen the climate resilience of the hydropower-based sector." However the regulatory agency CREG doesn't have the framework to evaluate the fix capacity needed for a hydro/wind-solar project to qualify for reliability charge. An initial framework was developed as part of the study mentioned above using an existing plant Jepirachi.

To ensure commercially feasibility of the plant, its output should be optimized. This requires that the size of the solar and wind components should be balanced with their expected output under the site's meteorological conditions and in accordance with their relative pricing. The wind and solar resource assessments conducted under this Feasibility Study will help optimize the balance, providing estimates not just of the total wind generation and solar generation, but also of the degree to which the two resources are complementary, how their combined output corresponds to the demand peaks and payment schedules, and how much fuel will be required at the backup thermal plant. These estimates will also affect the calculation of CDM credits.

The DM Contractor had the impression that the regulators do want to support renewable energy and diversification of capacity, but also wanted to scrupulously avoid any subsidization or policy bias that would distort the energy market pricing. The proposed combined bid may be acceptable under existing policies. The Energy and Gas Regulatory Commission will rely, presumably, on the calculations and estimates of the feasibility study and on their internal analysis to make its determination.

The Definitional Mission does not consider the project to be especially high risk. Similar projects have been financed and put into operation around the world. Fossil fuel prices are rising rapidly, with the threat of carbon penalties. Global climate change threatens the stability of the region's over-concentrated hydroelectric resource. Solar and wind prices are coming down. Some vendors may use loss leader pricing to break into the South American markets with a financially capable corporation like Colinversiones, which has the stated intent of expanding its renewable development technologies into all of South America. The project is sized smaller than

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[10] Wind Energy in Colombia: A Framework for Market Entry, World Bank, July 2010

originally discussed to reduce their financing risk, meaning that they are willing to accept a lower return or commit a large equity share in their search for diversity and business opportunity.

Finally, the Energy and Gas Regulatory Commission wishes to encourage renewable technologies without disturbing the competitive energy market by giving additional incentives to non-hydro renewable. These incentives may include price-based policy instruments such as feed-in tariff systems, valuing carbon emissions, or production tax credits; policy options guiding renewable energy output such as renewable energy targets or competitively awarded subsidies; adjustments in the regulatory systems such as exceptions for systems charges or adjustments to the reliability payment; or instruments that provide incentives other than price – property tax incentives, elimination of import duties, financing support for renewable, and grants and low-cost loans. In the view of the DM, it is entirely probable that the project can be financed without any of these incentives, but it also may fall slightly short, in which case the strength of a USTDA Feasibility Study may provide the independent legitimacy needed to encourage the Energy and Gas Regulatory Commission to approve incentives.

The plant is being proposed as a hybrid solar/wind plant. The wind resource in the site region is already well-defined and a solar resource assessment is not really required to model the production of the solar portion of the plant. However, a wind resource assessment is definitely required, as wind resource can vary surprisingly over short distance, varying terrain, and changes in altitude. If wind resource data will be collected, the incremental cost of collecting solar insolation data is minor. Also, it is possible a bank will require site-specific solar data as part of its procedures, regardless of the accuracy and correlation of several regional insolation databases.

Capabilities and Commitment of the Project Sponsor

Colinversiones that currently owns and operates, directly and through two affiliates a total of 1,898 MW of electrical generating capacity, making it Colombia's second largest thermal power producer and its fourth largest power producer overall. That means they have ample experience and resources to implement projects in the country.

Prior to USTDA's involvement, their interest for diversifying their renewable energy portfolio, especially with solar technologies, motivated them to invest their own funds on a solar market study, performed by a U.S. consultant.

Colinversiones has stated that it will provide support to a feasibility study contractor including the use of an office, administrative support, and transportation. Colinversiones through their VP of Regulatory Affairs expressed in writing their commitment to lobby with government, private sector and other stakeholders to incentivize the adoption of a friendlier regulatory framework for non-conventional sources of energy.

The information provided by this study could then provide the technical and environmental justifications to reduce barriers and expand the market for similar projects in Colombia. The stated intent of Colinversiones is to test technologies which they may expand in Colombia and introduce into all of South America, and they have the resources and experience base with which to take that lead.

As also highlighted by the World's Bank study, several incentives for the adoption of renewable energy may need to be in place in order for this project to be successful, including: (i) price-based policy instruments – feed in tariff systems, valuing carbon emissions, production tax credits; (ii) policy options guiding renewable energy output (quantity-based policy instruments) – renewable energy targets, competitively awarded subsidies; (iii) adjustments in the regulatory system – exceptions for systems charges, adjusting the reliability payment, ; and (iv) instruments that provide incentives other than price – property tax incentives, elimination of import duties, financing renewable energies, grants and low cost loans. The Grantee committed to seek such changes occurs.

Replication and Technology Transfer

While Colombia intends to approach 77% renewable energy by 2020, in the short term its need for additional solar / wind resources is not great. However, meteorological phenomena such el Niño are emphasizing the need for diversification. However, the Colinversiones business plan calls for it to expand its energy business to several other countries in Latin America, presenting an opportunity for U.S. vendors to establish themselves in partnership in a greatly enlarged market.

Potential U.S. Exports

The total U.S. export potential for the proposed hybrid wind/solar plant is estimated to be at least $27.1 million. This figure could increase by more than thirty percent, depending on the type of solar technology selected. Approximately 60 percent of the wind farm's total cost of $40.5 million, or $24.3 million, could be provided by U.S. fabricators and vendors, including the wind turbines, EPC and consulting services, controls and instrumentation, and computers. One likely vendor of the wind turbines is Gamesa Technology Corporation,[11] which has its fabrication facilities for the wind turbines, nacelles, blades, and towers in Pennsylvania, with only final assembly to be done in Colombia. Northern Windpower and Northern Power Systems are also utility-scale wind turbine original equipment manufacturers with manufacturing facilities in the US; the DM Contractor determined that their 1 - 2.3 MW units would likely fit well with this hybrid park. Other potential U.S. vendors of the wind turbines are GE and Clipper.

The United States is a net exporter of solar equipment. Key export goods included polysilicon wafers and modules, while modules and inverters were the most prominent imported goods. Based on data from the Solar Energy Industry Association (SEIA) reviewed by the DM Contractor, it appears the least expensive technology for this plant would be the CSP dish technology, with total cost of about $15 million. Of this, the U.S. export would be the dish/Sterling engine, which would cost about $12 million for this project and virtually all remaining design, site work, substation equipment, and soft costs would be contracted locally.

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[11] Gamesa Technology Corporation, of Langhorne, Pennsylvania, received the 2011 Renewable-Energy Exporter of the Year award from the Export-Import Bank of the United States (Ex-Im Bank) at the Bank's 36th Annual Conference in Washington, D.C., on March 31, 2011. The company has a total U.S. workforce of 900 employees, approximately 800 of whom work in Pennsylvania. Gamesa Technology Corporation is a subsidiary of the Spanish wind-energy company, Gamesa Corporación Tecnológica.

For a solar PV plant using silicon technology, the U.S. component exports would be more difficult to estimate, as several countries might be involved in the module production, particularly U.S. polycrystalline silicon. Using SEIA data, the U.S. sourcing for silicon PV would be approximately $0.69 per watt, or about $2.8 million. For thin-film technology, U.S. sourcing would be about $1.40 per watt, or about $5.6 million. For a PV plant, nearly all site work, labor, engineering, and design would likely be sourced domestically.

For the least likely solar technology that may be selected, CSP parabolic trough or collector field technology with a steam turbine, the total cost would be about $22.4 million. Mirrors, receivers, and steam turbines would be U.S. exports totaling about $1.54 per watt, or about $6.2 million. For the more complex work of designing the integrated solar field and steam plant, a U.S. engineering company would have a reasonable chance of winning the EPC contract, worth approximately $0.80/MW, or about $3.2 million. U.S. companies are also competitive in major components such as mirrors, receiver tubes, and steam turbines. The total U.S. exports for a CSP steam plant, then, would be approximately $9.4 million.

Some U.S. vendors may use loss leader pricing to break into the Colombian market with a financially capable corporation like Colinversiones, which has the stated intent of expanding its renewable development technologies into various countries in South America. It is worth noting that for its Flores I and II gas-fired plants, Colinversiones acquired primary and supplemental equipment from U.S. suppliers (e.g., Westinghouse Electric Corporation, Baldor, U.S. Motor, Custom Electronics, and Flowserve). The combustion turbine at the Flores III plant is from the Siemens/Westinghouse joint venture and most of the auxiliary equipment were purchased in the US. Payments for these were wired to the United States. Colinversiones also has a multi-million long-term contract for turbine parts with Florida-based Siemens Power Generation (Orlando, FL), as well as multiple service and TA contracts for operation and maintenance with U.S. service providers.

Foreign Competition

Leading foreign competitors for the wind turbines are Vestas (Denmark) and Goldwind (China), with many new companies entering this now booming marketplace. At present, there are no established foreign competitors for CSP dish technology. If that technology is selected, the hardware exports of $12 million are almost certain to be from the United States. For solar PV, a conservative assumption is that U.S. components may be about $2.8 million for PV silicon and $5.6 million for thin-film technology, even if a European or Asian vendor wins the contract. The principal foreign competitors have manufacturing in China, Malaysia and the Philippines. Conventional CSP technology would face intense foreign competition; several large plants under construction in the U.S. have foreign developers. Nonetheless, U.S. companies would still be competitive for major components and the EPC contract.

Development Impact

Primary Development Benefits

This project helps Colombia achieve its goals for diversification of its generating mix through renewable energy implementation and lessens its dependence on fossil fuels, which are now being imported.

Category Explanation

Infrastructure Though small, this project is significant because it offsets potential development of fossil fuels. With falling prices and increasing environmental pressures, this project may be a model for bulk replication. The Caribbean Coast of Colombia is economically under-developed. Clean renewable technologies may have an opportunity to form the foundation of infrastructure from the start.

Market-Oriented Reform This project will be an early application under the regulatory policies established to encourage industries and municipalities to provide their own power from renewable energy sources.

Human Capacity Building During construction, the project will provide approximately 60 jobs to local workers; during operation it is probable that local maintenance and operating crews will be employed from local workers and given training.

Technology Transfer and Productivity Improvement This project may be the first in Colombia to use the new innovative dish/Stirling CSP technology. There is huge potential for the dish/Stirling technology to be produced locally and to supply all of South and Central America.

Other The project is a trial case for two innovative concepts. First, it will try to optimize the balance between two complementary resources, solar and wind generation, to provide maximum dependable capacity. Second, it will relegate existing thermal generating capacity to a backup role to qualify for a capacity reliability payment as part of its tariffs structure.

Environmental Impact

The small solar field is expected to have essentially no negative environmental impact.

Wind turbines, in general, have problems with birds being killed in the rotors, with noise in nearby residential areas, and with electromagnetic field issues from high voltage transmission lines. Colombia now has a good example of a successful wind farm development that was able to mitigate these issues.

In general, the environmental impact of this project is extremely positive, as this plant will, in effect, back down a corresponding amount of fossil-fueled generation.

The Feasibility Study Contractor will be tasked to identify and address environmental impacts.

Impact on U.S. Labor

U.S. vendors of equipment and services are likely to win small but significant contracts from this project. This project will increase the number of U.S. jobs in equipment fabrication, consulting, and engineering design service jobs.

The Contractor will be tasked to define the equipment components with price estimates and to identify competitive U.S. companies.

Qualifications

Personnel Qualifications required to accomplish the Feasibility Study include:

- A Project Manager with at least 6 years of experience in designing wind energy projects
- A Senior Power Plant Engineer with at least 4 years of experience in designing wind energy projects
- Wind Energy Specialist with at least 4 years of experience conducting Wind Resource Assessments
- Civil Engineer(s) with at least 2 years of experience designing wind turbine sites
- Environmental Specialist with at least 6 years of experience in environmental and regulatory policy issues affecting wind energy projects
- Financial Specialist with at least 4 years of experience in financing international power plant projects, with experience preferable in financing at least one wind energy project.

Task Completion Schedule

Feasibility Study for Colinversiones 20-MW Wind/Solar Plant

TASK	Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.1	Inception Workshop															
1.2	Inception Report															
2.1	Review Existing Documentation							12-month field data collection								
2.2	Solar Resource and Site Assessment															
2.3	Comparative Analysis of Technologies															
2.4	Configuration and Conceptual Design															
2.5	Tariff Requirement															
3.1	Wind Resource Assessment															
3.2	Wind Turbine Performance Estimation															
4	Environmental Analysis															
5	U.S. Sources of Supply															
6	Financial Evaluation															
7	Project Risk Assessment															
8.1	Permits															
8.2	Tariff Filiing															
9	Developmental Impact Assessment															
10	Implementation Plan															
11	Financing Plan															
12	Final Report to Grantee and USTDA															

Definitional Mission Recommendations

Energy Markets Group recommended this project for USTDA funding based on Colinversiones' extensive track record in developing and operating hydroelectric and thermal power plants as well as its strong interest in diversifying its generation portfolio to include other forms of renewable energy. Because of its interest in diversifying its energy portfolio, Colinversiones previously performed a solar market study that was performed by a U.S. consultant. Furthermore, Colinversiones' Vice President for Regulatory Affairs sent USTDA a letter confirming the company's openness to engaging with the Ministry of Mines and Energy and other Colombian regulatory bodies to encourage the establishment of regulatory regime that stimulates to a greater extent the development of renewable energy project in Colombia. The Definitional Mission estimates there is more than $28 million in U.S. export potential for equipment and engineering services needed for implementation of this project. Furthermore, Colinversiones' business plan calls for it to expand its energy business to several other countries in Latin America, which presents an opportunity for U.S. vendors to establish themselves in a larger market.

Capital Costs Estimate

If the Feasibility Study determine that a Solar PV technology is most appropriate, the capital cost of the 20-MW would be approximately $2.3 per watt of installed capacity, or $9.2 million for solar and $40 – $60 million for wind, depending on the vendor selected and on the financing terms. This number may vary significantly depending on commercial and financing terms. However, Colombia has very good international credit, having survived the global economic recession in good standing. The total cost should not be significantly higher.

Feasibility Study

The Feasibility Study would require approximately 15 months, of which the longest task would be 12 months of field data collection to confirm the solar and wind resource at the site.

End of Definitional Mission Study

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

AMENDMENT NO. 1

TO THE

GRANT AGREEMENT
BETWEEN THE
U.S. TRADE AND DEVELOPMENT AGENCY
AND
COMPAÑÍA COLOMBIANA DE INVERSIONES S.A. E.S.P.

Re: Colombia: 20 MW Hybrid Solar and Wind Park Feasibility Study
USTDA Activity No. 2011-51026A

The Grant Agreement dated June 29, 2011 between the Government of the United States of America, acting through the U.S. Trade and Development Agency ("USTDA"), and Compañía Colombiana de Inversiones S.A. E.S.P. ("Grantee") to fund the cost of goods and services required for a feasibility study ("Study") on the 20 MW Hybrid Solar and Wind Park ("Grant Agreement") is hereby amended by this Amendment No. 1 to the Grant Agreement ("Amendment No. 1") as follows:

1) USTDA Funding

Under the Grant Agreement, USTDA agreed to provide a US$470,000 grant for the Study. USTDA hereby agrees to provide the Grantee an additional US$122,000 to fund the cost of goods and services required to perform the Study. The total USTDA funding available to the Grantee for the Study is now US$592,000.

2) Terms of Reference

Annex 1-Terms of Reference of the Grant Agreement is hereby replaced in its entirety with Annex I-Terms of Reference attached to this Amendment No.1.

3) Completion Date

The completion date in Article 8(A) and mandatory clause K(1) of the Grant Agreement is hereby extended to May 31, 2013.

4) Contract

The contract to be entered into between the Grantee and the contractor selected by the Grantee to carry out the Study shall reflect the terms of this Amendment No. 1.

5) Fiscal Data

All communication relating to this Amendment No. 1, including all invoices, shall include the following fiscal data:

Appropriation No:	1111/121001
Activity No.:	2011-51026A
Reservation No.:	2011340
Grant No.:	GH201151212

In all other respects and to the extent not amended by this Amendment No. 1, the terms of the Grant Agreement shall remain in full force and effect.

IN WITNESS WHEREOF, the U.S. Trade and Development Agency and the Compañía Colombiana de Inversiones S.A. E.S.P., each acting through its duly authorized representative, have caused this Amendment No. 1 to be signed in the English language in their names and delivered as of the day and year written below.

For the U.S. Trade and Development Agency

By: [signature]

Date: September 28, 2011

For Compañía Colombiana de Inversiones S.A. E.S.P.

By: Rafael Pérez Cordona

Date: September, 26 2011

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 Compañía Colombiana de Inversiones S.A. E.S.P. ("Grantee"). USTDA agrees to provide the Grantee under the terms of this Grant Agreement US$470,000 ("USTDA Grant") to fund the cost of goods and services required for the preparation of a feasibility study ("Study") on a proposed 20 MW Hybrid Solar and Wind Park ("Project") in Colombia ("Host Country").

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.

2. Terms of Reference

The Terms of Reference for the Study ("Terms of Reference") are attached as Annex I 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 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 for the duration of the Study. In addition, the Grantee shall assign a bilingual technical individual to interact with the Contractor and arrange meetings 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 the Contract for performance of the Study. The 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 (as defined in Clause I of the Annex II), 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 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. It is understood, however, that USTDA will act diligently and on a timely basis to prevent the Grantee from being negatively impacted by delayed payments from USTDA to the Contractor.

(E) Grant Agreement Controlling

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

(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 February 28, 2013, 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) 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, 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 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 its Legal Representative. 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: Carlos Alberto Salazar Jiménez
Director of Innovation
Compañía Colombiana de Inversiones S.A. E.S.P.
Carrera 43ª No. 1ª Sur 143 Piso 4
Medellín, Colombia

Phone: +57 4 326 6600 / +57 315 722 1928
Fax: +57 4 352 4013
Email: csalazar@colinversiones.com

CC: Rafael Pérez Cardona
Legal Representative
Compañía Colombiana de Inversiones S.A. E.S.P.
Carrera 43ª No. 1ª Sur 143 Piso 5
Medellín, Colombia

Phone: +574 3266600
Email: rperez@colinversiones.com

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

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

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.: 1111/121001
Activity No.: 2011-51026A
Reservation No.: 0011212
Grant No.: GH201151212

18. Termination

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 noncancellable 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. Severability

The parties agree that if any part, term, or provision of this Grant Agreement is found illegal or in conflict with any valid controlling law, the validity of the remaining provisions will not be affected thereby. In the event the legality of any provision of this Grant Agreement is brought into question because of a decision by a court of competent jurisdiction, either party, by written notice, may revise the provision in question or delete it entirely.

20. Jurisdiction

Any dispute, disagreement, or claim arising out of or relating to this Grant Agreement an as well as its execution and performance, shall be brought before the United States District Court for the Eastern District of Virginia or any other court having jurisdiction. Each of the parties irrevocably submits to the jurisdiction of said courts.

21. 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.

22. 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.

23. Integration

This agreement sets forth all the covenants, promises, agreements, conditions and understanding between the parties and there are no covenants, promises, agreements or conditions, either oral or written, between them other than herein set forth. No subsequent alteration, amendment, change or addition to this Grant Agreement.

24. Governing Law

This agreement shall be governed by, construed, and performed in accordance with U.S. Federal law, and in the absence of controlling Federal law, in accordance with the laws of the Commonwealth of Virginia.

25. Modifications. This agreement may not be amended, changed or modified except in writing and signed by the parties hereto.

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IN WITNESS WHEREOF, the Government of the United States of America and Compania Colombiana de Inversiones S.A. E.S.P., each acting through its duly authorized representative, have caused this Grant 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

By: _____

Date: 29/06/11

Witnessed:

By: _____

For Compañía Colombiana de Inversiones S.A. E.S.P.

By: _____

Date: 23-06-11

Witnessed:

By: _____

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 Compania Colombiana de Inversiones S.A. E.S.P. ("Client"), dated _____ ("Grant Agreement"). The Client has selected _____ ("Contractor") to perform the feasibility study ("Study") for the 20 MW Hybrid Solar and Wind Park project ("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 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. It is understood, however, that USTDA will act diligently and on a timely basis to prevent the Grantee from being negatively impacted by delayed payments from USTDA to the Contractor.

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."

(b) The inside front cover of every Final Report shall contain USTDA's logo, USTDA's mailing and delivery addresses, and USTDA's mission statement. 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 February 28, 2013, is the date by which the parties estimate that the Study will have been completed.

(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.: 1111/121001
Activity No.: 2011-51026A
Reservation No.: 0011212
Grant No.: GH201151212

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, environmental, regulatory and financial viability of a 20 MW hybrid solar and wind power plant in Colombia that will be connected to the national grid (i.e., Colombia's *Sistema Interconectado Nacional*). The Grantee, Compañía Colombiana de Inversiones, S.A. E.S.P. (Colombian Investment Company or "Colinversiones") is a publicly listed utility that currently owns and operates, directly and through two affiliates – Colinversiones ZF S.A. E.S.P. (f/ka Termoflores S.A. E.S.P.)[1] and Empresa de Energía del Pacífico S.A. E.S.P.[2] – a total of 1,898 MW of electrical generating capacity, making it Colombia's second largest thermal power producer and its fourth largest power producer overall. This hybrid plant will be sized to deliver 20 MW of net power, with approximately 16 MW of wind turbines and 4 MW of solar modules. The Grantee will select the technologies that offer the best combination of energy production, capital cost, operating cost, and financing. The optimization of plant output requires that the size of the solar and wind components be balanced with their expected output under the site's meteorological conditions and in accordance with their relative pricing. The wind and solar resource assessments conducted under this Study will help determine this balance, providing estimates not just of the total wind generation and solar generation but also the degree to which wind and solar outputs are complementary such that their combined output corresponds to the demand peaks and payment schedules.

Task 1 - Inception Workshop

Contractor shall meet with Grantee to establish working and reporting relationships, inspect the site, obtain copies of available information, and make arrangements for field data collection as needed. Grantee shall provide temporary working and meeting facilities for Contractor. To the extent available, Grantee shall provide to Contractor copies of any applicable Government of Colombia guidelines and policies for licensing of solar and wind power generating plants.

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

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[1] Colinversiones owns 99.96% of the subscribed and paid-in capital and outstanding shares of Colinversiones ZF S.A. E.S.P.

[2] Colinversiones owns 50.01% of the subscribed and paid-in capital and outstanding shares of Empresa de Energía del Pacífico S.A. E.S.P.

Task 1 Deliverable: Inception Report

Following the meeting, Contractor shall prepare an Inception Report in English and Spanish, showing attendance at the meeting, topics discussed, and any insights gained from discussions. As part of the Inception Report, Contractor shall review the available information, state additional information required, and provide details of any further studies required to be completed.

Task 2 – Technical Assessment Solar

Subtask 2.1 – Review Existing Documentation

Grantee conducted preliminary solar technology marketing studies. The Colombian Government's *Unidad de Planeación Minero Energética* (UPME, Mine and Energy Planning Unit) has developed a basic, high-level solar atlas. Contractor shall review these existing studies and available information regarding technical, economic, and environmental aspects of the Project.

Subtask 2.2 – Solar Resource Assessment

Grantee shall provide or make available to Contractor all previous solar resource assessment data gathered from the Meteonorm Global Solar Radiation Database and the UPME Solar Radiation Map. Contractor shall install and collect data from supplemental meteorological instrumentation. Contractor shall conduct supplemental solar resource assessment for a period of 12 months to verify:

1. Typical mean year data for the particular location
2. Average daily and monthly solar isolation for the selected location
3. Atmospheric pressure
4. Sun elevation angle
5. Estimate the direct normal irradiance (kWh/m^2) and the diffuse horizontal irradiance (kWh/m^2)
6. Dry-bulb temperature (°C)
7. Quantify data uncertainties

Contractor shall provide raw and processed solar resource data in support of Subtask 2.5 below.

Contractor shall provide all required data collection system components, including instruments, communications equipment, and data recording devices. Insolation instruments shall be Class One instrumentation.

Grantee shall assist Contractor to identify a properly qualified local contractor and to ensure quoted prices and terms of performance are appropriate. Contractor shall initiate data collection while verifying that all channels of the instruments, communications links, and data recording devices are in good operating order, properly calibrated, and collecting usable data. Grantee shall operate the data collection system, verify daily that

all channels are performing as expected, and conduct periodic inspections of the field equipment. Grantee shall perform any routine tests, calibrations, or preventive maintenance required by the data collection system following directions provided by Contractor. In the event of failure of any channel of instrumentation, Grantee shall notify Contractor. Grantee must have on-line access to the information gathered by the instrumentation and have safe access to the towers and instruments. Contractor shall review and error-check all collected data. Contractor shall be responsible for assuming the cost of routine field maintenance (not including any additional maintenance required as a result of actions of the Grantee, natural disasters or any other *force majeure* event) as required and shall take any corrective actions required to collect and process accurate data. Accordingly, Contractor retains responsibility for equipment performance to maintain data recovery of greater than 90 percent of the duration of the assessment period.

Subtask 2.3 – Preliminary Comparative Analysis of Various Solar Technologies

Contractor shall utilize geographical, climate, topographical, technical, and economic variables to propose the optimal technology to be utilized at the proposed site.

The comparative analysis shall include: solar photovoltaic (SPV) technology (including thin-film) and concentrated solar power (CSP) technologies (including solar thermal Dish/Stirling systems and CSP with a steam turbine generator). The technologies considered shall not include any "prototypes" or "pilot experimental" technologies that may cause extra difficulties in financing and insuring the Project.

Utilizing data generated in Task 2.2, Contractor shall estimate:

- Preliminary array size requirement per technology and land availability to maximize energy production,
- Energy production estimates per technology on an annual and monthly basis,
- Average O&M cost per technology,
- Internal rate of return (IRR) and net present value (NPV) per technology, considering local energy prices, and
- Contractor shall then suggest the optimal technology to be selected.

Subtask 2.4 – Technical Configuration and Preliminary Conceptual Design of the Solar Park

Contractor shall evaluate technical, environmental, and economic aspects of the optimal technology to determine a feasible and appropriate pre-design.

The technical analysis shall include the following:

If Contractor determines that the optimal technology is a photovoltaic array, Contractor shall:

- State under which criteria and specifications the technical design has been done. All parameters used for the design work should be delivered to Grantee;
- Determine the total solar PV power system capacity that will be installed to adequately supply 4 MW of reliable installed capacity with supporting calculations;
- Design and determine the size of the solar array, size of the battery bank, size of the charge controller, size of the inverter string, cable sizes, control and protection units, and all of the components required for the interconnection to the grid, with supporting calculations;
- Provide the minimum specifications of the Solar PV power generation system components, including but not limited to solar modules, battery bank, charge controller and inverters, cables and balance of system including solar array mounting frame, and all of the components required for the interconnection to the grid;
- Set out the general layout and arrangement of the solar PV generation unit to provide safe and reliable operation;
- Identify and list all the tools and equipment that will be required to install and operate the solar PV power generation unit;
- Develop a periodic maintenance plan; and
- Assess and determine the skills requirements of technicians who will operate the system.

If Contractor determines that the optimal technology is a concentrated solar power array, Contractor shall:

- State the criteria and specifications under which the technical design has been done. All parameters used for the design work should be delivered to Grantee;
- Determine the total solar CSP system capacity that will be installed to adequately supply 4 MW of reliable installed capacity with supporting calculations;
- Set out the general layout and arrangement of the solar CSP generation unit to provide safe and reliable operation;
- Identify and list all the tools and equipment that will be required to install and operate the concentrated solar power generation unit;
- Develop a periodic maintenance plan and;
- Assess and determine the skills requirements of technicians who will operate the system.

Depending on the optimal technology selected, one of the following may also apply:

Linear Concentrator Systems

- Provide the minimum specifications of the CSP generation system components, including but not limited to reflectors, generation turbine, control systems, and substation and interconnection equipment.

Parabolic Trough Systems

- Provide the minimum specifications of the CSP generation system components, including but not limited to: receivers, parabolic trough, thermal storage tanks, steam condensers, generation turbine, control systems, and substation and interconnection equipment.

Linear Fresnel Reflector Systems

- Provide the minimum specifications of the CSP generation system components, including but not limited to: linear Fresnel reflectors, steam condensers, generation turbine, control systems, and substation and interconnection equipment.

Dish/Engine Systems

- Provide the minimum specifications of the CSP generation system components, including but not limited to: power concentrator unit, power electronics, controls systems, and substation and interconnection equipment.

Other components that will be used at the solar facility may include, but are not limited to the following:

- Racking system
- Wiring for AC/DC systems
- Fencing for security purposes
- Metering equipment
- Construction equipment (to be determined at a later date)
- Temporary office buildings
- Temporary storage infrastructure
- Equipment access laneways on site property (gravel)
- Distribution lines to Point of Common Coupling (PCC) with the Local Distribution Company (LDC)
- Temporary laydown areas used for construction purposes

Subtask 2.5 Tariff Requirement

Contractor shall determine the necessary tariff to meet O&M costs, necessary reserves, working capital, taxes, recovery of development costs, debt service, and required return on equity, and assist Grantee in any petition process related to the Project with either the

Comisión de Regulación de Energía y Gas (CREG, Energy and Gas Regulatory Commission) or any other official entity in order to achieve favorable conditions for the viability of the Project, by providing Contractor's calculations and explanations.

Contractor shall include a carbon credits model for IRR calculation as a separate case explaining the methodology adopted for such calculations.

Contractor shall provide calculations and studies needed for Grantee to make a request with the CREG for a modification of Colombia's *energía firme* (firm energy) regulatory regime to obtain a *cargo por confiabilidad* (reliability or capacity payment, hereinafter referred to as "reliability payment") for the Project based on the complementary production of power from the wind and solar units with respect to each other and the needs of the grid, with its mix of about 67 percent hydroelectric and 27 percent natural gas. The calculations shall show the statistical relationship between the wind and solar resources, drawing on resource assessment data and the production capacity of the wind and solar components of the hybrid plant with respect to each other and the needs of the grid.

Task 2 Deliverable: Contractor shall submit an interim report in English and Spanish to Grantee, containing all documents collected, work performed, and analysis completed under Task 2.

Task 3 – Technical Assessment Wind

Subtask 3.1 Wind Resource Assessment

If available, Grantee shall provide or make available to Contractor all previous wind resource assessment data. Contractor shall review previous data, site topography, candidate wind mill technologies, and the requirement of potential lenders to the Project to determine the optimum number and height of met towers and amount instrumentation required. It should be noted that funding is being provided under this Grant Agreement for one 90-meter tower, one set of wind and solar instruments, and one data collection and redundant communications system with remote monitoring and data access. After a thorough evaluation of the site profile and other technical considerations, Contractor may recommend a tower with different specifications, consistent with the other requirements established herein. In the event that Contractor and Grantee determine with the proper support that an additional tower instruments are required, Grantee shall provide the additional tower and instrumentation in order to be installed and cover the cost of its installation.

Contractor shall conduct supplemental wind resource assessment for a period of 12 months to verify vertical profiles of the wind regime at the site and provide data for optimization of micro-siting of turbines. Contractor shall record:

a. Wind speed

b. Wind direction

c. Temperature

d. Humidity

Wind speed, direction, temperature and humidity instruments shall be Class One instrumentation.

Contractor shall provide all required physical components of the masts, foundations, anchors, and guy wires, and all required data collection system components, including instruments, communications equipment, and data recording devices. Grantee shall assist Contractor to identify a properly qualified local contractor and to ensure quoted prices and terms of performance are appropriate. Contractor shall initiate data collection while verifying that all channels of the instruments, communications link, and data recording devices are in good operating order, properly calibrated, and collecting usable data. Grantee shall operate the data collection system, verify daily that all channels are performing as expected, and conduct periodic inspections of the field equipment. Grantee shall perform any routine tests, calibrations, or preventive maintenance required by the data collection system following directions provided by Contractor. In the event of failure of any channel of instrumentation, Grantee shall notify Contractor. Grantee must have on-line access to the information gathered by the instrumentation and have safe access to the towers and instruments. Contractor shall review and error-check all collected data. Contractor shall be responsible for assuming the cost of routine field maintenance (not including any additional maintenance required as a result of actions of the Grantee, natural disasters or any other *force majeure* event) as required and shall take any corrective actions required to collect and process accurate data. Accordingly, Contractor retains responsibility for equipment performance to maintain data recovery of greater than 90 percent of the duration of the assessment period. Grantee shall be responsible for obtaining and assuming the cost of any permits required for the execution of Task 3.

Contractor shall process data and produce the following wind resource assessment products:

- A table of annual and monthly average temperature, air pressure and humidity
- Annual wind variation over a period of 20-30 years
- Wind variation of measurement station relative to wind mast
- Daily wind variation of the wind farm
- Annual wind variation of the wind farm
- Wind speed and wind power frequency distributions
- Annual wind direction rose figure
- Annual wind energy rose figure
- Monthly wind direction rose figure

- Monthly wind energy rose figures
- Daily wind speed and wind power density variation

Contractor shall provide processed wind resource data in support of Subtask 2.5 above.

Subtask 3.2 Wind Farm and Solar Field Performance Estimation
Contractor shall assist Grantee with micro-siting and performance estimation for each wind turbine, taking into consideration site topography, prevailing wind directions and velocities, vertical wind profiles, other meteorological conditions (e.g., ambient temperature) and shading of back-row wind turbines by those in front rows. Grantee shall provide findings of the geotechnical report and topographic survey for the site, including site coordinates, maps, road network, and transmission line layout.

Contractor shall discuss different turbine types, sizes, vendors, technology and their comparative performance and maintenance requirements depending on the factors mentioned above. References of selected technology around the world and comparative ratings shall be provided by Contractor. The technologies considered should not, in any instance, be considered "prototypes" or "pilot experimental" technologies that may cause extra difficulties in financing and insuring the Project.

Contractor shall also discuss other technical details including but not limited to Blade Dimensions and Inclination and analyze their effects on the turbine performance.

Contractor shall model the performance of the solar field, including such factors as cleaning of collectors and reflectors, deterioration of components over time, maintenance requirements, forced outage rates of components, and the solar resource assessment.

Contractor shall provide a formal estimate of the annual production of the wind farm and solar field, including a calculation of the Standard Deviation of the estimate, which accounts for the effects of El Niño and La Niña events and projections of the effect of global climate change to the extent that these variables may affect output of the wind farm and solar field.

Note that the intent is not to predict accurately the timing and severity of wind and solar resource variations, but to reflect the probable effects on the financial performance of the Project.

Task 3 Deliverable: Contractor shall submit an interim report in English and Spanish to Grantee, containing all documents collected, work performed, and analysis completed under Task 3.

Task 4 – Preliminary Environmental Overview

Contractor shall conduct a preliminary environmental overview of the Project. In general, environmental impact of solar fields are limited to construction and access damage caused to sensitive lands, possible ambient noise problems, and potential for spills such

as heat transfer fluid, water treatment chemicals, mineral oil from transformers, and gasoline from construction equipment and other motor vehicles. For the wind farm, environmental impact is generally limited to construction and access damage caused to sensitive lands, possible ambient noise problems, and hazard to bats and birds flying into the rotor arc.

Contractor shall ensure the Project specifications conform to global best practices for minimization of these impacts. Further, Contractor shall verify that local flora and fauna are not in Endangered Species status. The site has not yet received an environmental permit by the Government of Colombia, but Contractor shall not be required to perform an Environmental Impact Study, but shall confirm that the current Project specifications conform to the limitations of the current environmental impact regulations of the applicable Colombian authorities.

Task 4 Deliverable: Contractor shall submit an interim report to Grantee in English and Spanish, containing all documents collected, work performed, and analysis completed under Task 4.

Task 5 – U.S. Sources of Supply

Contractor shall identify potential sources of equipment and services that can be procured competitively from U.S. vendors for construction of the 20 MW hybrid wind and solar 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 hybrid wind and solar park, 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 (Task 12).

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

With reference to the wind generation component of the Project, Contractor shall evaluate the possibility of unloading the wind turbine blades direct from a ship or barge at the Project shore area.

Task 5 Deliverable: Contractor shall submit the above-detailed list of U.S. sources of supply.

Task 6 – Financial Evaluation

Contractor shall perform a detailed financial evaluation that includes investment costs, operating costs, revenues, financial analysis, and profitability analysis as detailed below.

Investment Costs

Contractor shall prepare a detailed budget estimate of the investment cost for the selected solar/wind park design. The preliminary investment costs include the following items:

- architectural and engineering design;
- primary energy equipment (solar panels, charger controller, battery, inverters, transformers, etc);
- auxiliary energy equipment;
- transformers, switchgear and other electro-technical equipment;
- automated control and communication systems;
- buildings and structures;
- plot preparations;
- connection to the *Sistema Interconectado Nacional* (SIN, National Interconnected System, i.e., national grid);
- 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, host country approval, registration with the CDM Executive Board, implementation and monitoring, verification/certification, and issuance of CERs and ultimately the sales 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 *Zona Franca* (i.e., special economic zone or free trade zone) for purposes of exemptions from certain taxes and customs duties;
- Inspections and special consultants (i.e financial, legal, environmental, insurance and technical advisors from the lender's side);
- Insurance;
- Commissioning, startup, and spare parts;
- Technical documentation, maintenance procedures, manufacturers' warranty documents, operating manuals, and training manuals for all major equipments;
- Environmental protection measurements;
- Personnel training;
- Social, General and Administrative costs (SG&A);
- Interest during construction;

- and Contingency reserve and other costs, which may be identified by Contractor

Contractor shall verify and amend this list if required.

Operating Costs
Contractor shall prepare an estimate of the projected operating costs.

Operating costs are system-specific and depend to a certain extent on decisions taken at the design and construction phase of the system. Contractor shall evaluate the fundamental O&M cost for the hybrid solar/wind park including the cost of energy for internal needs and maintenance costs, which include personnel, maintenance, and insurance costs. Contractor shall provide and substantiate estimates of downtime during maintenance. Maintenance procedures shall be clearly defined by Contractor in the report.

Revenues
Contractor shall model financial performance of the Project as a function of wholesale energy market prices, including estimations of variability due to solar irradiance, cloud cover, wind regime, diurnal and seasonal generation profiles and due to equipment performance.

Contractor shall assist the Grantee with preparation for any meeting that the Grantee schedules with CREG in order to determine if Grantee is able to obtain a modification in Colombian regulations in order to obtain a reliability payment based on the complementary aspects of the wind and solar power generation and the needs of the grid per Subtask 2.5 above. The increased revenues from the reliability payment may be required to make the plant financially feasible.

Financial Analysis
Contractor shall conduct financial analysis to determine the best combination of energy system options.

Primary assumptions for determining financial viability are (i) electricity selling prices, (ii) expected life of installed equipment, (iii) existing and new components of the electric connections infrastructure, (iv) electricity transmission costs, (v) maintenance and operation costs, (vi) insurance, (vii) taxation structure, (viii) loan terms and conditions, (ix) depreciation method, (x) operational cycle and annual hours of operation, (xi) SG&A, (xii) working capital requirements, (xiii) market costs (xiv) capital expenses, and (xv) development costs.

Profitability Analysis
Contractor shall generate and evaluate specific indices of economic performance such as profitability, return on investment, IRR, debt service coverage ratio over the full term of the debt amortization, net present value and payback period.

Contractor shall design the financial analysis to evaluate available financing scenarios, and analyze each scenario's cost effectiveness.

Task 6 Deliverable: Contractor shall submit an interim report in English and Spanish to Grantee, detailing all work performed under Task 6. Contractor shall prepare and submit to Grantee financial projections sufficient to include in the Financing Plan (Task 11) that will provide potential financiers with the information needed regarding economic and financial merits of the Project for their decision to invest in it. Contractor shall include projections in the Financing Plan (i.e., the financial model) and in the Final Report (Task 12).

Task 7 – Project Risk Assessment

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 Contractor shall include, but not be limited to the following: (i) Project implementation risks, i.e., risk of obtaining permits, licenses, and other agreements that 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 electricity production; (iii) environmental risks, i.e. risk that arise from the economic, market, regulatory or legal factors governing the Project environment; (iv) Project development risk: i.e. design supply chain, access and operational risks (machinery breakdown, operational liability and spare parts availability; and (v) hazard risks, i.e., security, natural disasters, accidents and third-party liability. Special attention shall be paid to Grantee's ability to qualify for the capacity charge by backing up the capacity of the solar/wind plant.

Contractor shall recommend risk mitigation mechanisms such as insurance, guarantees, letters of credit, etc., as may be required by lenders. Sources to contact include the U.S. Export–Import Bank, the Multilateral Investment Guarantee Agency (MIGA), the Inter-American Development Bank (IDB), the International Finance Corporation (IFC), the Andean Development Corporation (CAF), and international and local commercial banks.

Task 7 Deliverable: Contractor shall prepare a risk assessment and risk mitigation report based on the selected design and technical configuration of the hybrid solar/wind park. Contractor shall provide the interim report to Grantee in English and Spanish, and incorporate Grantee's comments into the analysis for the Final Report (Task 12).

Task 8 – Regulatory Framework

Subtask 8.1 Permits

Contractor shall confirm that the solar/wind park conforms to the requirements of existing site permits, including land use, water use, waste disposal, highway access, security, wildlife preservation, noise limits, and other such criteria as may be defined. Contractor shall provide documentation, calculations, and examples to support Grantee in filings for waivers, extensions, or new permits as may be required.

Subtask 8.2 Regulatory Request

If the Grantee decides to make a request to the CREG for a regulatory modification in order to enable hybrid solar-wind power projects to obtain reliability payments by providing documentation and calculations, Contractor shall assist Grantee to submit said request. These requirements include calculation of the benchmark firm energy production, and benchmark firm capacity of the plant, demonstration that solar generation measurement methodology meets standards, electrical efficiency of equipment, auxiliary load requirements, and calculations of load factor given O&M schedules developed in Task 5, and provides methodology comparable with other power sources currently used to determine firm energy and capacity. Contractor shall provide the economic and financial projections developed under Task 5. Grantee shall provide current copies of relevant guidelines and policies to Contractor at the Inception Workshop in Task 1.

Task 8 Deliverable: Contractor shall submit an interim report in English and Spanish to Grantee, containing all documents collected, work performed, and analysis completed under Task 8.

Task 9 – Developmental Impact Assessment

Contractor shall assess the development impacts associated with the implementation of the Project defined during the Feasibility Study and the methodology for measuring those benefits/adverse impacts. The assessment shall include examples of the development impacts that would be expected if the Project is implemented as outlined in the Final Report (Task 12). Contractor shall develop a methodology for assessing these impacts over time, and shall identify where to obtain this information in the future (e.g., Government of Colombia and other regional governmental statistics, the World Bank, etc).

Contractor shall evaluate the categories listed below to determine which are likely to result from the recommended Project. Where possible, Contractor shall include quantitative estimates. Contractor shall only list benefits in the categories that are applicable. The categories to be considered are as follows:

Infrastructure: Contractor shall estimate the expected scale of infrastructure development and improvements, i.e. what type of construction equipment is needed to carry out the Project, site access roads, interconnection capacity, and other improvements that Contractor may discern to be relevant and significant. Contractor shall determine roadbed load bearing capacity requirements and conduct a baseline survey of the existing site access roads. Contractor shall provide a transportation plan showing a feasible route for transporting solar panels, components and the site transformer to the site. Other infrastructure requirements and availability shall also be discussed by Contractor (e.g. transmission line and water requirement).

Human Capacity Building: Contractor shall estimate the number and type of jobs that would be created if the Project is implemented. Comment on any prospective training recommended (the training needed after and as a result of the Project) in the Final Report, (Task 12) including an estimate of the number of persons to be trained, type of training needed, and the desired outcome of the training.

Technology Transfer and Productivity Improvement: Contractor shall discuss potential commercial contracts for licensing new technologies that are recommended, as well as the expected productivity benefits of any such technologies. More generally, discuss the expected efficiency gains related to the recommendations, such as improved systems or processes that enhance productivity or result in a more efficient use of resources.

Market-Oriented Reform: Contractor shall discuss any market-oriented reforms that would facilitate implementation of the Project or that would result from the implementation of the Project, such as any policy changes that would result in more transparent regulatory systems and institutions or increased competition.

Other Benefits: Contractor shall discuss prospective indirect development impacts of the Project, such as enhanced public safety and economic growth (including increases in investment and indirect job creation) that are not captured in the four categories listed above.

Contractor shall include the Host Country Development Impacts Analysis in the Final Report (Task 12).

Task 9 Deliverable: Contractor shall submit an interim report to Grantee in English and Spanish, containing all documents collected, work performed, and analysis completed under Task 9.

Task 10 – Implementation Plan

Contractor shall develop an Implementation Plan including but not limited to schedules and timelines for all Project activities, contracts, agreements, staffing and training, regulatory consent, financing, and ownership and management decisions.

Specifically, Contractor shall provide a draft Power Purchase and Interconnect Agreement developed according to the regulations, policies and requirements of Colombian law.

Specifically, Contractor shall provide a package of draft bid documents that Grantee may use to initiate international competitive bidding according to Grantee's policies and to the laws of Colombia.

Contractor's Scope of Responsibility ends with completion of the draft bid documents. If Grantee requires further services for bid evaluation or subsequent design changes, Grantee must negotiate separate payment for such services.

For the avoidance of doubt, Contractor shall not be responsible for any work associated with publicizing the bid documents or evaluating proposals under any procurement related activity for this Project.

Task 10 Deliverable: Contractor shall submit an interim report in English and Spanish to Grantee, containing all documents collected, work performed, and analysis completed under Task 10.

Task 11 – Financing Plan

Contractor shall assist Grantee in preparation of a Financing Plan consistent with Grantee's financial resources and borrowing capacity, and showing probable sources of equity and debt and confirming that the Project conforms to the standards and portfolio policies of anticipated prospective lenders. The Financing Plan shall include a proposed Financial Structure of the Project financing according to the policies and requirements of the likely financing parties, including debt/equity ratio, debt coverage ratio requirements, recovery of development costs, covenants, term of loans, amortization methods, reserve requirements, closing costs, and other relevant parameters. Contractor shall prepare an associated risk matrix.

The Financing Plan should be organized in chapters that generally match the subject headings of tasks (Tasks 1 – 10) herein and include the full set of detailed financial projections prepared pursuant to Task 6 above.

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

Task 12 – Final Report

Contractor shall prepare and deliver to 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 Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement. 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 (Task 5), 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 Final Report that shall be provided to USTDA, as outlined in Clause I of Annex II of the Grant Agreement, 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 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, confidential, or privileged information.

(3) The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the public version of the Final Report and all work product that is developed under these Terms of Reference.

ANNEX 6

COMPANY INFORMATION

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 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: _____