REQUEST FOR PROPOSALS

TECHNICAL ASSISTANCE FOR THE

SMART GRID UPGRADES FOR SYSTEM OPERATOR AND MARKET AGENTS IN THE DOMINICAN REPUBLIC

Submission Deadline: **5:00 PM LOCAL TIME**
SANTO DOMINGO, DOMINCAN REPUBLIC

February 16, 2015

Submission Place: Luis Julian Zuluaga Lopez
Operations Manager
Organismo Coordinador del Sistema Eléctrico Nacional Interconectado de la Republica Dominicana
Calle 3 # 3 Arroyo Hondo Primero
Santo Domingo
Dominican Republic
Telephone: 809-732-9330

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

REQUEST FOR PROPOSALS

SECTION 1: INTRODUCTION 4
1.1 BACKGROUND SUMMARY 4
1.2 OBJECTIVE 5
1.3 PROPOSALS TO BE SUBMITTED 5
1.4 CONTRACT FUNDED BY USTDA 5
SECTION 2: INSTRUCTIONS TO OFFERORS 6
2.1 PROJECT TITLE 6
2.2 DEFINITIONS 6
2.3 DEFINITIONAL MISSION REPORT 6
2.4 EXAMINATION OF DOCUMENTS 6
2.5 PROJECT FUNDING SOURCE 7
2.6 RESPONSIBILITY FOR COSTS 7
2.7 TAXES 7
2.8 CONFIDENTIALITY 7
2.9 ECONOMY OF PROPOSALS 7
2.10 OFFEROR CERTIFICATIONS 7
2.11 CONDITIONS REQUIRED FOR PARTICIPATION 7
2.12 LANGUAGE OF PROPOSAL 8
2.13 PROPOSAL SUBMISSION REQUIREMENTS 8
2.14 PACKAGING 8
2.15 OFFEROR'S AUTHORIZED NEGOTIATOR 9
2.16 AUTHORIZED SIGNATURE 9
2.17 EFFECTIVE PERIOD OF PROPOSAL 9
2.18 EXCEPTIONS 9
2.19 OFFEROR QUALIFICATIONS 9
2.20 RIGHT TO REJECT PROPOSALS 9
2.21 PRIME CONTRACTOR RESPONSIBILITY 9
2.22 AWARD 10
2.23 COMPLETE SERVICES 10
2.24 INVOICING AND PAYMENT 10
SECTION 3: PROPOSAL FORMAT AND CONTENT 11
3.1 EXECUTIVE SUMMARY 11
3.2 U.S. FIRM INFORMATION 12
3.3 ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND KEY PERSONNEL 12
3.4 TECHNICAL APPROACH AND WORK PLAN 12
3.5 EXPERIENCE AND QUALIFICATIONS 12
SECTION 4: AWARD CRITERIA 14

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

Section 1: INTRODUCTION

The U.S. Trade and Development Agency (USTDA) has provided a grant in the amount of US$573,215 to Organismo Coordinador del Sistema Eléctrico Nacional Interconectado de la República Dominicana (the "Grantee") in accordance with a grant agreement dated December 19, 2014 (the "Grant Agreement to fund technical assistance ("Technical Assistance") for the Smart Grid Upgrades for the System Operator and Market Agents Project (the "Project"). This Technical Assistance will allow the Grantee to determine the appropriate level of new smart grid and other technology upgrades needed in the Dominican Republic as well as to assess how best to integrate them into the national grid.) The Technical Assistance will evaluate a series of technologies to improve reliability, lower frequency regulation service costs, allow for real-time monitoring and control and enable greater adoption of renewable energy. OC-SENI has initiated system upgrades to implement supervisory control and data acquisition (SCADA) to approximately 40 percent of its system and requires further technical assistance to proceed with additional upgrades. The technical assistance will also assess the similar needs of all of the Dominican Republic's major generation, transmission and distribution agents. The Grant Agreement is attached at Annex 4 for reference. The Grantee is soliciting technical proposals from qualified U.S. firms to provide expert consulting services to perform the Technical Assistance.

1.1 BACKGROUND SUMMARY

OC-SENI came into existence through a resolution issued by the Secretary of State for Industry and Commerce in 1998 to coordinate the operation of generation, transmission and distribution companies that are part of the Dominican national interconnected electrical system (i.e., national grid) and the 2001 general electricity law, which ordered generation, transmission, distribution and commercialization entities to coordinate the operation of their systems through a coordinating organization. The 2002 implementing regulations for the general electricity law mandated that it must be established as a nonprofit organization. At present there are 18 members of the nonprofit that is OC-SENI, comprised of generation and distribution companies and the national transmission company.

Implementation of the Project is anticipated to reduce frequency regulation service costs, improve grid reliability and increase the amount of renewable energy that the grid can handle while maintaining stability. The applicability of the following commercially proven technologies will be assessed in this technical assistance: automatic generation control (AGC), SCADA, an energy management system with real-time monitoring and control, network fault recorders, phasor measurement units (PMUs), automatic voltage/volt-ampere reactive (VAR) control, as well as technologies related to mitigating the incorporation of renewable energy in the grid such as additional voltage controls, energy storage, peaking backup generation and demand response. OC-SENI will also require third-party site acceptance testing for applicable technologies, most notably AGC.

OC-SENI's goal is to reduce transmission system blackouts to zero. In 2012, the Dominican national grid experienced 272 fault events and in 2013 it had 250 fault events. Of these, the cause of the fault was unknown in 70 percent of the cases in 2012 and 77 percent in 2013.

Through improved wide area measurement and real-time monitoring, OC-SENI will be better able to identify the cause of faults as well as address these faults in a shorter period of time.

Investment in AGC will help OC-SENI's control the rising costs of maintaining appropriate frequency for electricity service. Frequency ancillary service costs in the Dominican Republic has increased by nearly 500 percent since 2007 and now cost the country about $7 million per year. This has been driving by rising demand, fuel costs and aging infrastructure. AGC can help automatically manage frequency and reserve, lowering the need for additional generation to maintain stable frequency and slowing the rise in frequency service costs. The Project will also help the Dominican Republic meet its regulatory target of 25 percent renewables penetration by 2025 in the most economically efficient manner possible. Without system upgrades, the grid cannot manage this level of generation by intermittent sources such as wind, biomass and solar.

Portions of a background Definitional Mission is provided for reference in Annex 2.

1.2 OBJECTIVE

The objective of the technical assistance is to determine the appropriate level of new smart grid and other technology upgrades needed in the Dominican Republic as well as to assess how best to integrate them into the national grid. The Terms of Reference (TOR) for this Technical Assistance are attached as Annex 5.

1.3 PROPOSALS TO BE SUBMITTED

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

The amount for the contract has been established by a USTDA grant of US$573,215. **The USTDA grant of US$573,215 is a fixed amount. Accordingly, COST will not be a factor in the evaluation and therefore, cost proposals should not be submitted**. Upon detailed evaluation of technical proposals, the Grantee shall select one firm for contract negotiations.

1.4 CONTRACT FUNDED BY USTDA

In accordance with the terms and conditions of the Grant Agreement, USTDA has provided a grant in the amount of US$573,215 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 Smart Grid Upgrades for System Operator and Market Agents.

2.2 DEFINITIONS

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

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

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

2.3 DEFINITIONAL MISSION REPORT

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

2.4 EXAMINATION OF DOCUMENTS

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

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 Technical Assistance.

2.5 PROJECT FUNDING SOURCE

The Technical Assistance will be funded under a grant from USTDA. The total amount of the grant is not to exceed US$573,215.

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 Spanish, with the exception of the supplementary documents requested in response to Annex 6 below that may be submitted in their original language of issuance (i.e., English or Spanish).

2.13 PROPOSAL SUBMISSION REQUIREMENTS

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

Luis Julian Zuluaga Lopez
Operations Manager
Organismo Coordinador del Sistema Eléctrico Nacional Interconectado de la República Dominicana
Calle 3 # 3 Arroyo Hondo Primero
Santo Domingo
Dominican Republic
Telephone: 809-732-9330

One original each in English and Spanish and three (3) copies of your proposal in Spanish and three (3) copies in English must be received at the above address no later than 5:00 PM (local time in Santo Domingo, Dominican Republic), on February 16, 2015.

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

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

2.14 PACKAGING

The original and each copy of the proposal must be sealed to ensure confidentiality of the information. The proposals should be individually wrapped and sealed, and labeled for content including the name of the project and designation of "original" or "copy number x." The original and six (6) copies should be collectively wrapped and sealed, and clearly labeled, including the contact name and the name of the project.

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

2.15 OFFEROR'S AUTHORIZED NEGOTIATOR

The Offeror must provide the 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.

2.16 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.

2.17 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.

2.18 EXCEPTIONS

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

2.19 OFFEROR QUALIFICATIONS

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

2.20 RIGHT TO REJECT PROPOSALS

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

2.21 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.

2.22 AWARD

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

2.23 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.

2.24 INVOICING AND PAYMENT

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

Section 3: PROPOSAL FORMAT AND CONTENT

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

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

The proposal shall consist of a technical proposal only. A cost proposal is NOT required because the amount for the contract has been established by a USTDA grant of US$573,215, which is a fixed amount.

Offerors shall submit one (1) original in English and Spanish, three (3) copies of the proposal in Spanish and three (3) copies in English. Proposals received by fax or email cannot be accepted.

Each proposal must include the following:

Transmittal Letter,
Cover/Title Page,
Table of Contents,
Executive Summary,
Firm Background Information,
Completed U.S. Firm Information Form,
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 U.S. FIRM INFORMATION

A U.S. Firm Information Form in .pdf fillable format is attached at the end of this RFP in Annex 6. The Offeror must complete the U.S. Firm Information Form and include the completed U.S. Firm Information Form with its proposal.

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 Technical Assistance. 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 Technical Assistance.

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

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

3.4 TECHNICAL APPROACH AND WORK PLAN

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

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

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

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 Technical Assistance. 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 the Technical Assistance as described in this RFP.

Section 4: AWARD CRITERIA

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

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

Firm or Consortium

- Experience with EMS/SCADA/AGC and grid projects: 15 points
- Experience with RE impact assessment: 15 points
- Experience in the Dominican Republic: 5 points

Personnel (including Grid Expert, RE Expert, Regulatory Expert, and Project Manager)

- Relevant experience related to the Project: 40 points
- Academic qualifications: 15 points
- Spanish language ability: 10 points

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

Price will not be a factor in contractor selection.

A N N E X 1

FEDBIZOPPS ANNOUNCEMENT

Luis Julian Zuluaga Lopez
Operations Manager
Organismo Coordinador del Sistema Eléctrico Nacional Interconectado de la Republica Dominicana
Calle 3 # 3 Arroyo Hondo Primero
Santo Domingo, Dominican Republic
Telephone: 809-732-9330

2015-51004A – Dominican Republic: Smart Grid Upgrades for the System Operator and Market Agents Technical Assistance

POC: Jennifer Van Renterghem, USTDA, 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901, Tel: (703) 875-4357, Fax: (703) 875-4009, Email: RFPQuestions@ustda.gov. Dominican Republic: Smart Grid Upgrades for the System Operator and Market Agents Technical Assistance.

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 provide Technical Assistance on smart grid and other potential technology upgrades in the Dominican Republic.

The objective of the technical assistance is to determine the appropriate level of new smart grid and other technology upgrades needed in the Dominican Republic as well as to assess how best to integrate them into the national grid. The technical assistance will evaluate a series of technologies to improve reliability, lower frequency regulation service costs, allow for real-time monitoring and control and enable greater adoption of renewable energy.

The Grantee is the Coordinating Organization of the National Interconnected Electrical System of the Dominican Republic (Organismo Coordinador del Sistema Eléctrico Nacional Interconectado, OC-SENI). At present there are 18 members of the nonprofit organization that is OC-SENI, comprised of generation and distribution companies and the national transmission company. OC-SENI has initiated system upgrades to implement supervisory control and data acquisition (SCADA) to approximately 40 percent of its system and requires further technical assistance to proceed with additional upgrades. The technical assistance will also assess the similar needs of all of the Dominican Republic's major generation, transmission and distribution agents.

The U.S. firm selected will be paid in U.S. dollars from a $573,215 grant to the Grantee from the U.S. Trade and Development Agency (USTDA).

A detailed Request for Proposals (RFP), which includes requirements for the Proposal, the Terms of Reference, and portions of a background definitional mission report are available from USTDA, at 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901. To request the RFP in PDF format, please go to: https://www.ustda.gov/businessopps/rfpform.asp. Requests for a mailed hardcopy version of the RFP may also be faxed to the IRC, USTDA at 703-875-4009. In the fax, please include

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

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

Interested U.S. firms should submit their Proposal in English and Spanish directly to the Grantee by 5:00 PM (local time in Santo Domingo, Dominican Republic), February 16, 2015 at the above address. Evaluation criteria for the Proposal are included in the RFP. Price will not be a factor in contractor selection, and therefore, cost proposals should NOT be submitted. The Grantee reserves the right to reject any and/or all Proposals. The Grantee also reserves the right to contract with the selected firm for subsequent work related to the project. The Grantee is not bound to pay for any costs associated with the preparation and submission of Proposals.

A N N E X 2

PORTIONS OF BACKGROUND DEFINITIONAL MISSION REPORT

Smart Grid and Renewable Energy in the Dominican Republic

Definitional Mission (DM)

Definitional Mission Report

United States Trade and Development Agency (USTDA)

10 November 2014

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.

1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901
Phone: 703-875-4357 • Fax: 703-875-1009 • Website: www.ustda.gov • email: info@ustda.gov

The U.S. Trade and Development Agency

The U.S. Trade and Development Agency (USTDA) advances economic development and U.S. commercial interests in developing and middle-income countries. The agency funds various forms of technical assistance, early investment analysis, training, orientation visits and business workshops that support the development of a modern infrastructure and a fair and open trading environment.

USTDA's strategic use of foreign assistance funds to support sound investment policy and decision-making in host countries creates an enabling environment for trade, investment, and sustainable economic development. Operating at the nexus of foreign policy and commerce, USTDA is uniquely positioned to work with U.S. firms and host countries in achieving the agency's trade and development goals. In carrying out its mission, USTDA gives emphasis to economic sectors that may benefit from U.S. exports of goods and services.

1000 Wilson Boulevard ▪ Suite 1600 ▪ Arlington, VA 22209-3901
Phone: 703-875-4357 ▪ Fax 703-875-4009 ▪ Web site: www.ustda.gov ▪ email: info@ustda.gov

Abbreviations and Acronyms

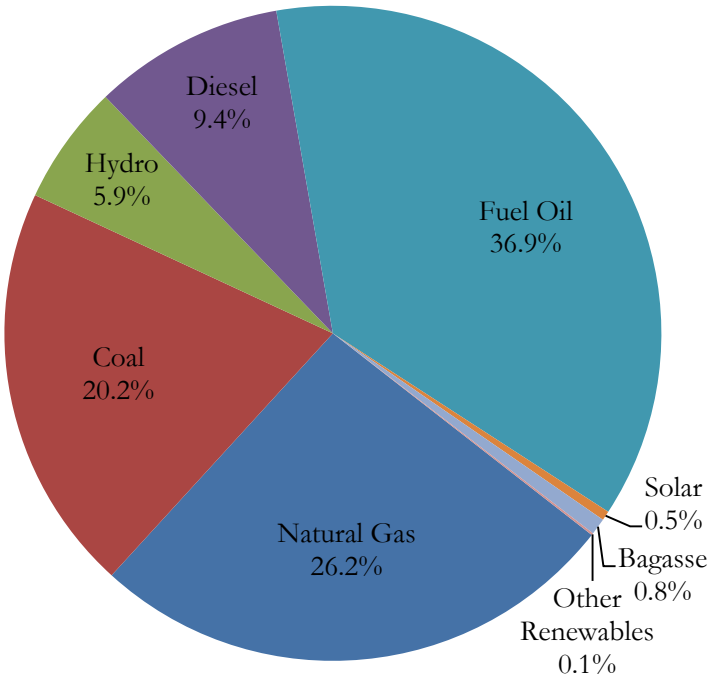
AGC	Automatic Generation Control
CDEEE	Corporación de Empresas Eléctricas Estatales (Dominican Republic) (*Corporation of State-owned Electricity Companies)*
CNE	Comisión Nacional de Energía (Dominican Republic) (*National Energy Commission*)
CO_2	Carbon dioxide
DM	Definitional Mission
EGEHID	Empresa de Generación Hidroeléctrica Dominicana (*Dominican Hydropower Generation Company*)
EMS	Energy management system
ETED	Empresa de Transmisión Eléctrica Dominicana (*Dominican Transmission Company*)
GHG	Greenhouse gas
GDP	Gross Domestic Product
GW	Gigawatt
GWh	Gigawatt hours
IRENA	International Renewable Energy Agency
IRR	Internal rate of return
ktoe	Kiloton of oil equivalent
kW	Kilowatt
kWh	Kilowatt hours
LNG	Liquefied Natural Gas
LRMC	Long-Run Marginal Cost
MEM	Ministerio de Energía y Minas (Dominican Republic) (*Ministry of Energy and Mines*)
MW	Megawatt
MWh	Megawatt hours
NCRE	Non-Conventional Renewable Energy
NPV	Net present value
OC-SENI	Organismo Coordinador del Sistema Eléctrico Nacional Interconectado (*System Operator in the Dominican Republic)*
OSI	Open Systems International, Inc.
PLC	Powerline carrier
PMU	Phasor Measurement Unit
PV	Photovoltaic
RE	Renewable Energy

RF	Radio frequency
RPS	Renewable Portfolio Standard
SCADA	Supervisory control and data acquisition
SENI	Sistema Eléctrico Nacional Interconectado (Dominican Republic) (*National Interconnected Grid)*
SIE	Superintendencia de Electricidad (Dominican Republic) (*Superintendence of Electricity*)
SPE	Special purpose entity
tCO_2e	Tons of carbon dioxide equivalents
TOR	Terms of Reference
U.S.	United States
USTDA	United States Trade and Development Agency
VAR	Volt-ampere reactive

2.2 Dominican Republic

The Dominican Republic electricity sector represents a promising opportunity for trade with U.S. companies, although it is a more challenging business environment for foreign investment than Colombia.[1] Over the past decade, the Dominican economy has grown at an annual rate of 5.5 percent.[2] Over that same period, the demand for electricity has grown by nearly 4 percent. The electricity sector is largely dependent on fossil fuels: nearly half of electricity generation comes from petroleum derivatives, with 26 percent coming from natural gas, and 20 percent generated from coal (see Figure 4.1).

Figure 4.1: Electricity Generation (ktoe) in 2011—Dominican Republic



Source: Comisión Nacional de Energía. 2013. "Balance Nacional de Energía Neta." http://www.cne.gov.do/app/do/sien_archivo.aspx (accessed 20 May 2014).

However, the Dominican government has signaled a clear national policy of supporting NCRE technologies by granting fiscal incentives (such as tax credits, exemptions, and waived import duties) as well as establishing regulatory structures (such as net metering and streamlined interconnection rules) to enable utility-scale and distributed generation. Additionally, because of the country's high rates of non-technical losses and grid reliability issues, the Dominican Republic is a prime candidate to benefit from smart grid technologies designed to address these issues.

[1] U.S. Department of State. February 2013. "2013 Investment Climate Statement: Dominican Republic." http://www.state.gov/e/eb/rls/othr/ics/2013/204633.htm (accessed 29 June 2014).

[2] The World Bank. 2014. *World Development Indicators*. http://databank.worldbank.org (accessed 29 June 2014).

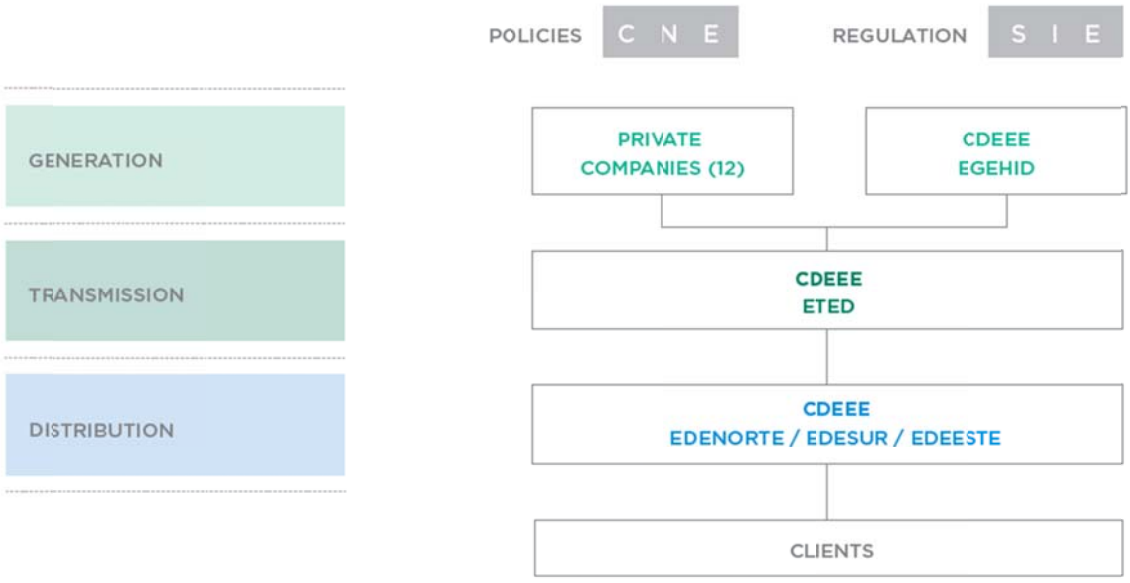
In the remainder of this section, we characterize in greater detail the context for exports of RE and smart grid technologies from the U.S. to the Dominican Republic. Our analysis includes:

- An overview of the market and the key public and private players (Section □)
- Historic and projected demand for electricity relative to historic supply (Section 2.2.2)
- A brief on electricity tariffs and costs (Section 2.2.3)
- An overview of the policy and regulatory context for smart grid and RE technologies (Section 2.2.4)
- General estimates of the viability of smart grid and RE technologies in the Dominican context (Sections 2.2.5 and 2.2.6).

2.2.1 Market overview and key players

The Dominican electricity market is characterized by competitive generation and state-owned transmission and distribution networks. Privatization of the generation and distribution segments occurred in 1999, although between 2003 and 2009, the three distribution companies were renationalized as a result of macroeconomic challenges and rising power prices. Generators may sell their electricity to distribution companies, unregulated clients, or on the spot market. Most transactions occur on the National Interconnected Electricity System (SENI), which covers 96.2 percent of the population, with only pockets of isolated areas served by microgrids, such as in Punta Cana. Distribution companies operate under public service concessions, and are responsible for providing service within their territories at regulated tariffs. Figure 4.2 illustrates the general structure of the electricity sector in the Dominican Republic. Following this diagram, we briefly describe each of the key players in the market.

Figure 4.2: Structure of the Electricity Sector, 2010—Dominican Republic



Source: Inter-American Development Bank. 2013. "Energy Dossier: the Dominican Republic." http://publications.iadb.org/handle/11319/3847 (accessed 20 May 2014).

Public entities

The main public entities in the electricity sector are the Ministry of Energy and Mines (MEM), National Energy Commission (CNE), the Superintendence of Electricity (SIE). The following are the main responsibilities of each entity:

- **MEM:** established only in late 2013, the MEM will oversee the CNE and will assume many of the energy policy responsibilities that previously were managed by CNE. Many of the functions currently carried out by the state-owned Corporation for Dominican State Electric Companies (CDEEE) will not be transferred to the MEM until 2018[3,4]
- **CNE:** historically has been responsible for setting energy policy and has been the main public body involved in the Dominican energy sector. With the formation of the MEM, the role of CNE may evolve
- **SIE:** serves as the primary regulator of the electricity sector, responsible for regulating prices and quality of service.

[3] Comisión Nacional de Energía. 2013. "Informe Anual 2013." http://www.cne.gov.do/serve/listfile_download.aspx?id=3387&num=1 (accessed 3 June 2014).

[4] Figure 4.2 does not include the MEM, as this diagram was produced just prior to the legislation establishing the MEM.

Generation

The market for generation, transmission, and distribution is highly concentrated. Table 4.1 below shows the major players in the generation market, although generation assets are divided among 15 companies in the Dominican Republic.[5]

Table 4.1: Key Players in Electricity Generation—Dominican Republic

Company	Market Share by Net Generation
AES Dominicana	15.2 percent
EGEHID	13.4 percent
EGE Haina	12.6 percent
Itabo	12.3 percent
Seaboard	9.6 percent

Source: OC-SENI. 2013. "Informe Anual de las Transacciones Económicas y Precios del Mercado Spot en el Año 2013." Page 9. http://www.oc.org.do/INFORMES/Administrativos/InformeAnual.aspx?EntryId=39678 (accessed 20 May 2014).

The largest electricity generator in the Dominican Republic is AES Dominicana, which in 2013 generated nearly 2.1TWh using combined cycle gas turbines, making up 15.2 percent of the generation market. The second largest generator is the state-owned hydropower company, EGEHID, which generated roughly 1.9TWh in 2013, composing 13.4 percent of the market. The third largest generator is the former state-owned company, EGE Haina, which in 2013 generated 1.7TWh using coal and fuel oil, taking 12.6 percent of market share.[6]

Transmission

The transmission network is owned and maintained by the state transmission company, ETED. It is a subsidiary of the state electricity holding company, the Dominican Corporation of State Electricity Companies (CDEEE), and was established as part of the privatizations in 1999. The transmission network is open to all third-party generators under an open access arrangement. It is not interconnected to neighboring Haiti.

Whereas ETED owns, constructs, and maintains the transmission network, Organismo Coordinador del Sistema Eléctrico Nacional Interconectado (OC-SENI) is an independent entity that is responsible for providing system dispatch, transmission system planning, and administration of the wholesale energy market.

Distribution

Distribution of electricity is mainly split among the three state-owned subsidiaries of CDEEE: EDE Este, EDE Sur, and EDE Norte. The only exceptions are the microgrids that exist in areas not served by the SENI, such as in Punta Cana.

---

[5] Comisión Nacional de Energía. 2013. "Listado Generadores Conectado SENI." http://www.cne.gov.do/serve/listfile_download.aspx?id=2316&num=1 (accessed 20 May 2014).

[6] OC-SENI. 2013. "Informe Anual de las Transacciones Económicas y Precios del Mercado Spot en el Año 2013." Page 9. http://www.oc.org.do/INFORMES/Administrativos/InformeAnual.aspx?EntryId=39678 (accessed 20 May 2014).

Table 4.2: Key Players in Electricity Distribution—Dominican Republic

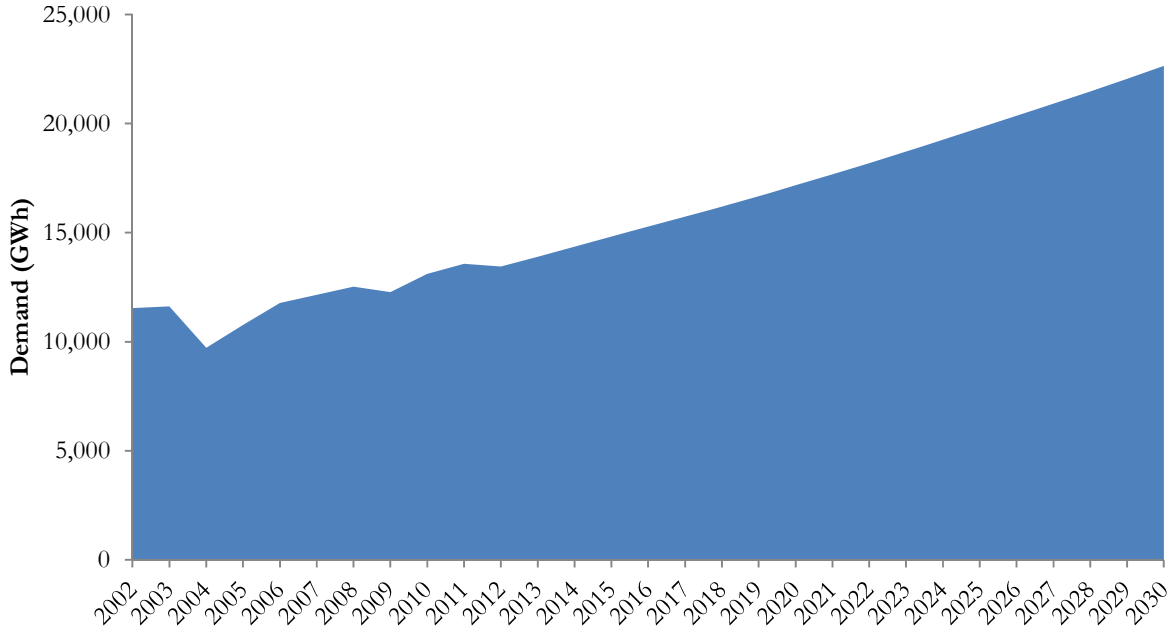
Company	Market Share by No. of Connections
EDE Norte	38.5 percent
EDE Este	31.9 percent
EDE Sur	29.6 percent

Source: Corporación Dominicana de Empresas Eléctricas Estatales (CDEEE). 2014. Informe de Desempeño—Anexo. http://transparencia.cdeee.gob.do/Informes.aspx (accessed 9 June 2014).

2.2.2 Electricity demand and supply

Electricity demand on the SENI has risen on average by nearly 4 percent annually over the past decade, growing from 9.7GWh to 14.4GWh between 2004 and 2014. The Dominican government expects demand to grow annually at a slightly slower rate of approximately 3 percent over the next decade. Figure 4.3 below shoes historic and projected growth in electricity demand.

Figure 4.3: Electricity Demand, 2002–2030—Dominican Republic

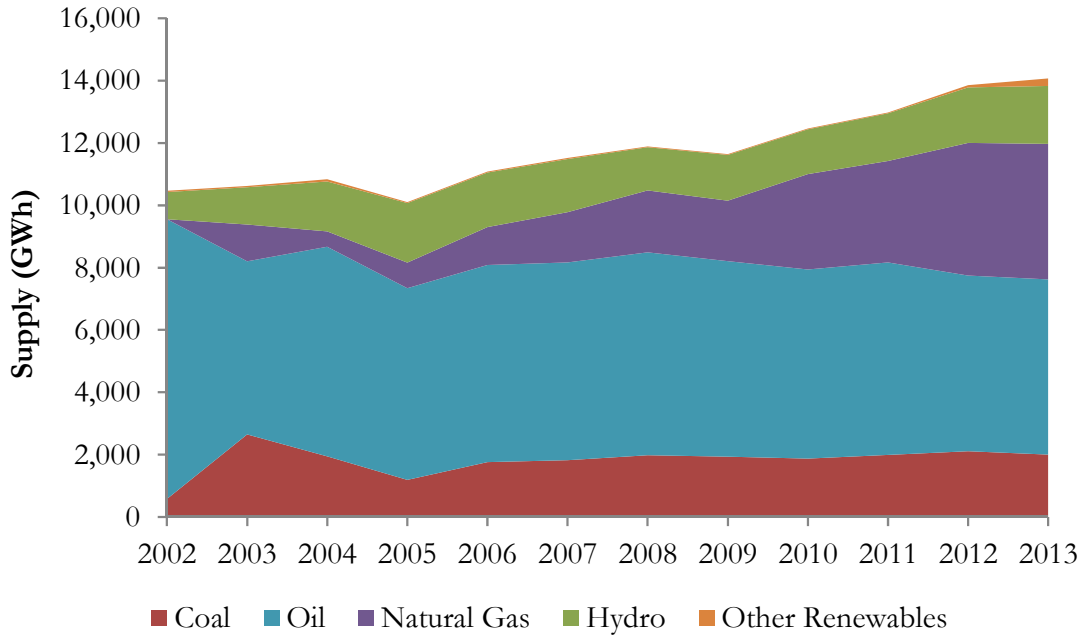


Sources: *Forecast data for 2012–2030.* Comisión Nacional de Energía. 2014. "Prospectiva de la Demanda de Energía de República Dominicana." Pages 124, 126, and 129. http://www.cne.gov.do/serve/listfile_download.aspx?id=3389&num=1 (accessed 10 June 2014).

Historic data for 2002–2011. Comisión Nacional de Energía. 2014. "Balance Energía Neta (Unidades Propias)." http://www.cne.gov.do/serve/listfile_download.aspx?id=3248&num=1 (accessed 10 June 2014).

In 2013, grid-connected generators represented a combined installed capacity of 1,954MW and delivered 28,074GWh to the SENI.[7] To meet its demand, the Dominican Republic primarily depends on oil (diesel and heavy fuel oil) and, increasingly, natural gas. In the five years between 2009 and 2013, generation from natural gas has nearly doubled from 16 percent to 31 percent. As of 2013, natural gas made up nearly 31 percent of generation, while oil composed approximately 40 percent.[8] Figure 4.4 shows the change in electricity supply by fuel source from 2002 to 2013.

Figure 4.4: Electricity Supply, 2002–2013—Dominican Republic



Sources: The World Bank. 2014. *World Development Indicators.* http://databank.worldbank.org (accessed 10 June 2014).

Corporación Dominicana de Empresas Eléctricas Estatales. 2014. "Informe de Desempeño—Febrero 2014." http://transparencia.cdeee.gob.do/wfinformes.aspx (accessed 12 June 2014).

2.2.3 Electricity tariffs and costs

Similar to Colombia, the Dominican Republic has a two-tiered electricity tariff system, which arises from deregulation and competition for generation. The system used to establish electricity tariffs depends on the type of customer:

- Non-regulated customers—those with a connected load of at least 1MW—are not subject to price regulation, and freely negotiate prices and contract supply in the wholesale market (that is, spot and contract markets) directly or through commercial entities.

[7] OC-SENI. 2013. "Informe Anual de las Transacciones Económicas y Precios del Mercado Spot en el Año 2013." Pages 16 and 21. http://www.oc.org.do/INFORMES/Administrativos/InformeAnual.aspx?EntryId=39678 (accessed 20 May 2014).

[8] Corporación Dominicana de Empresas Eléctricas Estatales. 2014. "Informe de Desempeño—Febrero 2014." http://transparencia.cdeee.gob.do/wfinformes.aspx (accessed 12 June 2014).

- Regulated customers—those with a connected load less than 1MW and which do not procure energy on the wholesale market—pay tariffs set using a disaggregated tariff formula. Customer tariffs are set equal to the unitary cost of service for each of the components in the power delivery value chain: generation, transmission, distribution, and commercialization. Tariffs vary by month, service territory (market), and the voltage level at which a customer takes service (lower costs for higher voltage levels).[9]

Tariffs for regulated customers are determined and published by the SIE. In 2013, the average cost of energy purchased by the distribution companies for delivery to end-use customers was $0.16 per kWh. Taking into account the average subsidy of $0.06 per kWh[10], the average tariff paid by end users in 2013 was $0.19 per kWh. On the wholesale market, the average spot price of electricity in 2013 was $0.18 per kWh.[11]

2.2.4 Policy and regulation for smart grid and RE generation

In 2007, the Dominican legislature passed *Ley No. 57-07* to provide a policy and regulatory framework to incentivize the development of, and investment in, RE projects. The law is widely credited with unlocking the market for RE generation, both at the utility and distributed scales. It establishes a Renewable Portfolio Standard (RPS) comprising two targets: by 2015, 10 percent of energy generated should be derived from RE sources; and 25 percent by 2025.

Key fiscal incentives under the law include:

- Exemptions from import duties on qualifying RE equipment and related goods required to interconnect to the SENI
- For the same goods, exemptions from the value-added tax (*Impuesto de Transferencia a los Bienes Industrializados y Servicios,* or ITBIS)
- A 10-year income tax holiday on energy sales derived from RE sources, available for systems commissioned through 2020
- A 5-percent reduction in the applicable tax rate on interest payments to project debtors
- An income tax credit of up to 75 percent of the installed cost of qualifying RE systems, to be granted in equal amounts over three consecutive years.

The law also establishes a regulatory framework for self-generation using RE sources. Specifically, it exempts eligible self-generators from classification as a wholesale generator (even in cases of excess production). The framework also establishes a feed-in tariff for

[9] Superintendencia de Electricidad. 2012. "Ley General de Electricidad No. 125-01 y su Reglamento de Aplicación." Artículo 108. http://www.sie.gob.do/index.php?option=com_phocadownload&view=file&id=682:ley-general-de-electricidad-125-01&Itemid=158 (accessed 12 June 2014).

[10] Based on contributions from the Fondo de Estabilización a la Tarifa Eléctrica (FETE) in 2013 of $464.4 million and billed energy sales of 7,988.9GWh.

[11] Corporación Dominicana de Empresas Eléctricas Estatales. 2014. "Informe de Desempeño—Febrero 2014." http://transparencia.cdeee.gob.do/wfinformes.aspx (accessed 12 June 2014).

excess generation equal to the marginal cost of generation plus "adders" designed to compensate for the positive externalities associated with distributed RE generation.[12]

There are no relevant regulations specifically regarding smart grid. The aforementioned renewable energy regulations will in part drive smart grid by creating need for technology to mitigate the intermittency of renewable generation. Additionally, smart grid technologies such as Voltage/Volt-ampere reactive (VAR) automation and automatic generation control could help utilities meet current voltage and frequency regulations, but the regulations do not specifically require smart grid infrastructure.

2.2.5 Viability of smart grid investments

As in Colombia, smart grid investments can be viable in the Dominican Republic based on its existing infrastructure and high costs from distribution losses and power outages.

Technical viability

Smart grid investments are technically viable in the Dominican Republic. The system operator is already in the process of deploying supervisory control and data acquisition (SCADA) to nearly half of its territory and the transmission company ETED already has a fiber optic communications network. Most homes and businesses are located in close enough proximity to use a RF wireless mesh communications network for smart metering.

Economic viability

Smart grid investments are economically viable due to high frequency service costs, high rates of outages, and high rates of distribution losses. Frequency service costs and outage rates are shown in more detail in Section 4, covering the project for smart grid investment at the Dominican Republic system operator. Smart meter investments would also be economically viable due to an astounding distribution loss rate of 32.4 percent, as of 2011.

2.2.6 Viability of renewable energy investments

As in Colombia, commercial scale RE projects in the Dominican Republic can be viable, depending on the technology.

Technical viability

Projects where primary energy resource availability is low are not technically viable. Likewise, projects that propose using technologies that are at an experimental or pilot stage are not technically viable.

Table 4.3 below shows our assessment of technical viability for various NCRE technologies in the Dominican Republic.

Table 4.3: Technical Viability of NCRE Technologies—Dominican Republic

[12] *Ley No. 57-07*. http://www.hacienda.gov.do/departamento_legal/ley_incentivos_tributarios/Ley%2057-07%20sobre%20Energia%20Renovable.pdf (accessed 13 June 2014).

NCRE Technology	Primary Resource Quality (0–2)	Commercially Proven (0–2)
Solar PV	2†	2◊
Wind	2†	2◊
Biomass	1‡	2◊
Waste-based	1Δ	1◊
Geothermal	0◊	2◊
Small hydro (<20MW)	2‡	2◊
Ocean (wave, tidal, ocean thermal energy conversion)	0‡	0◊

Sources: † Worldwatch Institute. 2011. "Roadmap to a Sustainable Energy System: Harnessing the Dominican Republic's Wind and Solar Resources." http://www.cne.gov.do/app/do/banners/ww_esp.pdf (accessed 13 June 2014).

‡ International Renewable Energy Agency. 2009. "Renewable Energy Country Profile: Dominican Republic." http://www.irena.org/REmaps/CountryProfiles/Caribbean/DominicanRepublic.pdf (accessed 13 June 2014).

Δ Rodríguez, Humberto M. 2008. "Diagnóstico y Definición de Líneas Estratégicas del Subsector Fuentes de Energía Neuvas y Renovables (FENR) y Dominicana." http://www.cne.gov.do/serve/listfile_download.aspx?id=1090&num=1 (accessed 16 June 2014).

◊ Castalia estimate.

In the table above, any NCRE technology that receives a combined score above two is considered technically viable (on a preliminary basis) in the Dominican Republic. Based on this screening, solar PV, wind, biomass, and small hydro NCRE projects can be technically viable. For waste-based technologies[13] and geothermal energy, limited information was available regarding the quality of the primary resource. Ocean energy technologies are not technically viable for two reasons: (1) the International Renewable Energy Agency (IRENA) has determined that the primary resource quality is low, and (2) existing technologies are not commercially proven. We emphasize that the viability of individual projects is highly site-specific—the primary resource intended for use must be assessed in detail to determine whether it is available in sufficiently good quantity and quality for a project to be feasible.

Economic and commercial viability

By comparing the cost of RE generation with the correct benchmark, we can assess whether a technology is economically viable, commercially viable, or both. The following are the relevant benchmarks that we will use in our analysis of any RE projects recommended under this assignment:

[13] There are various commercially proven technologies for waste-based projects; however, not all technologies exploiting waste resources have reached a stage of commercial viability comparable to other technologies—hence a score of 1 for waste technologies' commercial state.

4 Project Recommendation: OC-SENI Smart Grid Investments

We recommend that USTDA support Organismo Coordinador del Sistema Eléctrico Nacional Interconectado de la República Dominicana (OC-SENI) to develop a number of system upgrades ('the Project') by funding Technical Assistance (TA). The TA's objective is to determine the appropriate level of new technology and technology upgrades needed and to determine how best to integrate these implementations into the OC-SENI's existing system. The TA will also determine the Project's technical, economic and commercial, and environmental feasibility. The Project will be open to competitive bidding.

We are making this recommendation because:

- The Project is technically sound (Section 42.2)
- The Project sponsor is capable and committed to the Project (Section 42.3)
- The Project sponsor has demonstrated strong internal financing capacity (Section 42.4)
- The Project will have a positive effect on the U.S., offering large export potential (Section 42.5), with few market barriers (Section 42.6), and positive effects on U.S. labor (Section 42.9)
- The Project will have a positive effect on the Dominican Republic, including several development indicators (Section 42.7) and reduced emissions, creating environmental benefits (Section 0).

2.2 Project Description

OC-SENI has initiated system upgrades to implement supervisory control and data acquisition (SCADA) to approximately 40 percent of its system, and requires further TA to proceed with additional system upgrades as well as applications aimed at reducing the cost of frequency regulation and incorporating new sources of RE. The Project will also assess the similar needs of all of the Dominican Republic's generation, transmission, and distribution agents. The projected benefits of the Project will be to reduce frequency service costs, improve grid reliability, and increase the amount of RE that the grid can handle. OC-SENI and the electricity sector agents will accomplish these goals by installing and upgrading the following technologies:

- Automatic generation control (AGC)
- SCADA
- An energy management system (EMS) with real-time monitoring and control
- Network fault recorders
- Phasor measurement units (PMUs)
- Automatic voltage/VAR control
- Additional technologies resulting from a study of RE impacts, such as additional voltage controls, energy storage, peaking backup generation, and demand response.

OC-SENI and electricity sector agents will also require third-party site acceptance testing for applicable technologies, most notably AGC.

The project shows promise because:

- The technologies are commercially proven, have been studied by OC-SENI, and have already been used extensively in other countries, and in some cases in the Dominican Republic (Section 2.2.1)
- The Project addresses clear needs and is economically viable (Section 2.2.2)

Table 4.1 presents the expected timeframe in which OC-SENI would likely develop the Project. The TA is expected to begin in 2015 and would take eight months of work, spread over one year. Following bidding, full Project implementation would likely take three to four years. Therefore, the Project will be completed by the end of 2019, although as early as the end of 2018.

Table 4.1: Timeline for the OC-SENI Project

Year	2015				2016				2017				2018				2019			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Technical Assistance																				
Full Project Implementation																				

Note: Partially shaded cells indicate possible extension of the project timeline.

2.2.1 The technologies are commercially proven

All of the technologies proposed in this project have been commercially proven. OC-SENI also already has some experience with EMS and SCADA. OC-SENI is currently implementing a similar, but smaller, EMS/SCADA project with the U.S. vendor Open Systems International (OSI). Table 4.2 shows existing SCADA deployments at generation, transmission, and distribution utilities in the Dominican Republic, as of 2012.

Table 4.2: Existing SCADA Deployments in the Dominican Republic, December 2012

Company	Total
ETED	79
EDENORTE	78
EDEESTE	52
EGEHID	43
HAINA	15
ITABO	8
CDEEE	5
AES ANDES	37

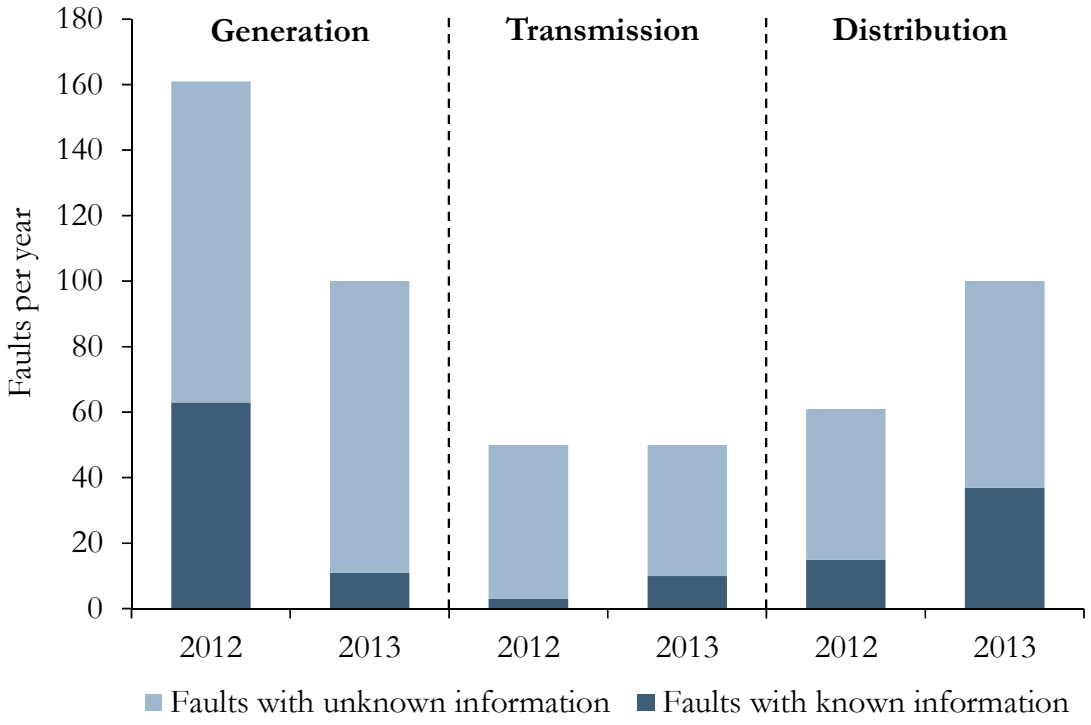
DPP	3
METALDOM	1
UNR SPOT	3
PVDC (CENTRAL M. RIO)	1
SEABOARD	9
MONTE RIO-INCA	1
EDESUR	88
CEPP	2
LAESA	4
GPLV	3
Total	**462**

Source: OC-SENI. 2013. "Memoria 2012." Page 59. http://www.oc.org.do/INFORMES/Memorias/A%C3%B1o2012.aspx (accessed 25 June 2014).

2.2.2 The Project is economically justified

The Project addresses clear needs for OC-SENI: SCADA, network fault recorders, PMUs, and EMS systems with real-time monitoring and control will all help improve grid reliability. Since 2000, the Dominican Republic has experienced 40 significant blackouts, and OC-SENI's goal is to reduce transmission system blackouts to zero. In 2012, the SENI had 272 fault events, and in 2013 it had 250 fault events. Of these, the cause of the fault was unknown in 70 percent of the cases in 2012 and 77 percent of the cases in 2013 (see Figure 4.1).

Figure 4.1: Outage Events in the Dominican Republic, 2012–2013



Source: OC-SENI. 2013. "Memoria 2012." Page 59. http://www.oc.org.do/INFORMES/Memorias/A%C3%B1o2012.aspx (accessed 25 June 2014); Additional information provided to USTDA by Julián Zuluaga, Operations Manager at OC-SENI on 23 May 2014

Through improved wide area measurement and real-time monitoring, OC-SENI will be better able to identify the cause of faults as well as address these faults in a shorter period of time. This has significant economic consequences for OC-SENI and the Dominican Republic as a whole, as every event can have thousands of dollars in costs, especially for larger customers. Table 4.3 illustrates the cost of service interruptions in the United States. While these are likely to be lower in the Dominican Republic, they are a useful benchmark. The savings realized from avoided interruptions will help pay for the cost of investment.

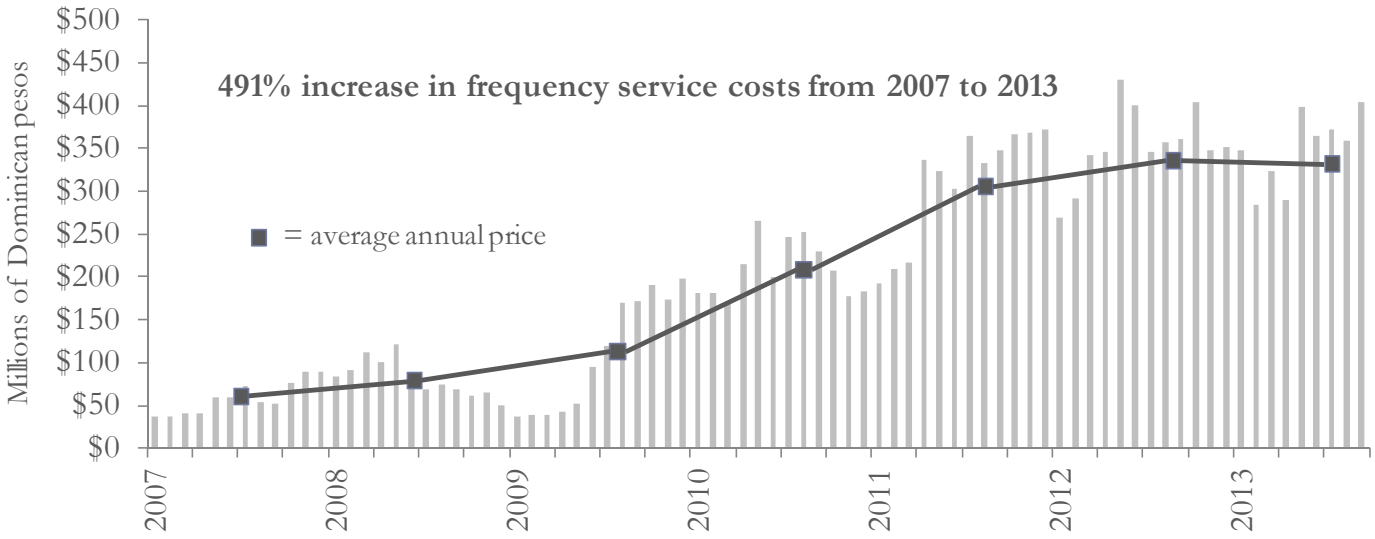
Table 4.3: Estimated Average Cost of Power Interruptions in the United States

Interruption Cost (US$)	Interruption Duration				
	Momentary	30 minutes	1 hour	4 hours	8 hours
Medium/Large Commercial and Industrial					
Cost per event	$6,558	$9,217	$12,487	$42,506	$69,280
Cost per average kW	$8.0	$11.3	$15.3	$52.1	$85.0
Cost per un-served kWh	$96.5	$22.6	$15.3	$13.0	$10.6
Small Commercial and Industrial					
Cost per event	$293	$435	$619	$2,623	$5,195
Cost per average kW	$133.7	$198.1	$282.0	$1,195.8	$2,368.6
Cost per un-served kWh	$1,604.1	$396.3	$282.0	$298.9	$296.1
Residential					
Cost per event	$2.1	$2.7	$3.3	$7.4	$10.6
Cost per average kWh	$1.4	$1.8	$2.2	$4.9	$6.9
Cost per un-served kWh	$16.8	$3.5	$2.2	$1.2	$0.9

Source: Sullivan, Michael J., et al. 2010. "How to Estimate the Value of Service Reliability Improvements." Lawrence Berkeley National Laboratory. LBNL-3529E. http://www.escholarship.org/uc/item/8gz990pz (accessed 25 June 2014).

Investment in AGC will help address OC-SENI's rising costs of maintaining appropriate frequency for transmission service. Figure 4.2 shows that since 2007, frequency service costs have risen 491 percent and now cost nearly 300 million Dominican pesos (US$7 million). This has been driven by rising demand, fuel costs, and aging infrastructure. AGC can help automatically manage frequency, lowering the need for additional generation to maintain stable frequency, and slowing the rise in frequency service costs.

Figure 4.2: Cost of Frequency Service for OC-SENI, 2007–2013



Source: OC-SENI on 6 June 2014.

The Project will also help the Dominican Republic meet its regulatory target of 25 percent penetration of RE by 2025 in the most economically efficient manner possible. Without system upgrades, the grid cannot manage this level of intermittent generation (such as from solar and wind). The SIE is currently studying the grid's current capacity to integrate intermittent RE. This Project will help the country expand that capacity. Without this Project, it may not be possible to meet the 2025 target. At a minimum, reaching that target would require extensive investment in traditional backup generation, which in the Dominican Republic frequently relies on fuel oil. Potential solutions proposed by the RE impact study—such as improved voltage controls, energy storage, flexible peaking backup generation, and demand response programs—would all likely be more economical and less polluting than traditional backup generation.

2.3 Project Sponsor's Capabilities and Commitment

As the system operator for the Dominican Republic, OC-SENI is legally responsible for coordinating operations between the generation, transmission, and distribution companies that make up the SENI. OC-SENI has demonstrated the experience and commitment to carry out this project.

OC-SENI has carried out similar projects and has the infrastructure in place to execute this project to completion. Since 2012, OC-SENI has been active in developing communications infrastructure and implementing software analytics for the increased amount of data available from the grid. This includes developing and implementing a CCE-ETED communications protocol, laying the groundwork for communications infrastructure that can aid SCADA and real-time monitoring implementations. Additionally, in 2012 members of OC-SENI completed training on Primeread software from the Colombian vendor PrimeStone. PrimeStone currently partners with U.S. firms such as Itron and Microsoft to provide data analytics for smart grid and smart metering. Finally, in 2012 OC-SENI also developed an event registration tool to aid real-time supervision, demonstrating experience with real-time

control and monitoring. Statistics reported in the 2012 annual report confirm that OC-SENI is already utilizing these technologies.

In 2013, OC-SENI accelerated its progress towards implementing smart grid solutions across its network. In September, OC-SENI created a Deliberative Committee of the Coordinating Council (*Comité Deliberativo del Consejo de Coordinación*) to study technical, economic, and regulatory needs, demonstrating the capacity to facilitate a feasibility study and technical assistance. It also began implementing smart grid projects and laying the groundwork for future projects. In October, the organization began a project with the U.S. vendor OSI for SCADA/EMS and also established a preliminary plan for implementing network fault recorders, with plans to create an official proposal by 2014 (see Table 4.4). This plan is still in the early stages and the Project could enable or at least assist in its implementation.

Table 4.4: OC-SENI's Plans for Deploying Network Fault Recorders in the SENI

Activity	Date
Inventory of all equipment capable of integrating network fault recorders	February 2014
Evaluate software and hardware requirements	2014
Evaluate the possible integration with SCADA and communications systems	2014
Establish requirements to store collected data in the Data Warehouse	2014
Establish GPS (Global Positioning System) Requirements	2014
Estimate the cost of implementing the network fault recorders	2014
Present the proposal for the *Agentes* to make a decision	November 2014

Source: OC-SENI. 2013. "Proyecto Plan Creación de Red de Registradores de Fallas."

OC-SENI has demonstrated a strong commitment to these projects and has also demonstrated sufficient managerial and technical capacity to carry out the work. Throughout the evaluation process, OC-SENI has had all necessary information readily available and has been responsive to all inquiries. The organization's overall track record and forward thinking plans will be key assets for Project implementation.

2.4 Implementation Financing

The Project will likely be financed with few hurdles. Financing is most likely to come internally, with the potential for external financing if necessary.

OC-SENI has carried out projects of similar size in the past and in the last five years has not once been denied financing from the government or electricity sector agents. OC-SENI receives funding directly from electricity sector agents (both private and public) and has a positive relationship with these actors. Electricity sector agents include private owners of thermal and RE generation, public owners of hydro generation, the transmission utility, and distribution utilities. These agents meet regularly and will be available to meet with the Project contractor if necessary to approve financing. A basic financial model including life cycle costs and quantified benefits will be sufficient for financing approval.

This project represents a small percentage of the overall budget and is likely to be approved. Among the agents, only the distribution utilities are currently facing financial challenges, and these challenges are not considered insurmountable for a project of this size.

In the case that internal financing is not sufficient, external financing could become available. OC-SENI has experience working with the World Bank on a data warehouse project and has expressed a willingness to solicit funds from multilateral lending agencies if necessary.

2.5 U.S. Export Potential

The Project is large enough to create significant U.S. export potential and U.S. firms will be well placed to bid on the Project components.

The export potential is $3 million to $30 million to install or upgrade AGC, EMS, and SCADA for all electricity sector agents and install and integrate PMUs. The budget for OC-SENI's current project with OSI is $1,505,974. The proposed Project will at least be similar in size and value for just the EMS and SCADA components. AGC, PMUs, and any voltage automation upgrades would be expected to at least add a similar amount of value, setting a minimum value of just over $3 million. However, the EMS/SCADA project for the system operator will likely be larger than the OSI project, and the overall scale of the AGC and voltage automation upgrades could potentially add over $1 million in additional value, bringing the high range of these projects to approximately $5 million in value for the system operator.

For the additional generation, transmission, and distribution agents, AGC and SCADA would be expected to add a further $1 million in value **per upgrade**. There are 25 AGC and SCADA systems that must be evaluated: 4 AGC systems and 21 SCADA systems (see Table 4.5). If all 25 systems required investment, this would raise the total Project value by $25 million. Most likely, the total export value is closer to the midpoint of these estimates, approximately $16 million.

Table 4.5: Electricity Sector Agents Needing an Evaluation of AGC and SCADA

Electricity Sector Agent	Evaluate AGC?	Evaluate SCADA?	Location
Central AES Andres	✔	✔	Bocachica
Central Barahona		✔	Barahona
Central CEPP	✔	✔	Puerto Plata
Central CESPM	✔	✔	San Pedro de Macorís
EDEESTE		✔	Santo Domingo
EDENORTE		✔	Santiago
EDESUR		✔	Santo Domingo
EGEHID		✔	Santo Domingo
Central Estrella del Mar 2		✔	Santo Domingo
Central Haina		✔	Santo Domingo
Central La Vega		✔	Santiago
Central Los Mina	✔	✔	Santo Domingo

Electricity Sector Agent	Evaluate AGC?	Evaluate SCADA?	Location
Central Los Orígenes	✔	✔	Bocachica
Monterio		✔	Barahona
Central Monterio—Inca Km 22		✔	Santo Domingo
Central Palamara	✔	✔	Santo Domingo
Central Pimentel	✔	✔	Pimentel
Central Quisqueya I y II	✔	✔	San Pedro de Macorís
Central San Felipe	✔	✔	Puerto Plata
Centro de Control ETED		✔	Santo Domingo
Central Sultana		✔	San Pedro de Macorís
TOTAL	**9**	**21**	

Source: OC-SENI on 17 September 2014.

The value of technologies needed to address the impact of RE can vary widely based on the amount of RE that the Dominican Republic implements and the mix of solutions that OC-SENI chooses to mitigate these impacts. A similar project funded by the U.S. Recovery Act to implement smart grid technologies at the grid operator in Texas, ERCOT, was valued at $27,075,457.[14] Other estimates have shown that the full cost of integrating variable sources of RE (such as solar PV and wind) range from $1 to $8 per MWh.

The Dominican Republic has plans to install 380MW of solar and wind energy by 2015, with an estimated output of 773GWh (see Table 4.6). By 2025, the Dominican Republic could be generating 4,750GWh of RE per year if current growth rates continue and the country meets its goal of generating 25 percent of its energy from renewable resources.

[14] "CCET Technology Solutions for Wind Integration," https://www.smartgrid.gov/project/ccet_technology_solutions_wind_integration (accessed 25 June 2014).

Table 4.6: Planned Solar and Wind Installations in the Dominican Republic

Year	Name	Technology	Capacity (MW)	Estimated Energy (GWh)	Capacity Factor
2014	Los Cocos 3	Wind	30	79	30%
2014	PECASA	Wind	50	103	24%
2014	GRP DOM	Wind	50	120	27%
2015	INV VIR	Wind	50	103	24%
2015	ISOFOTON	Solar PV	50	89	20%
2015	GESTAMP	Solar PV	50	95	22%
2015	WCG ENER	Solar PV	50	89	20%
2015	JRC	Solar PV	50	95	22%

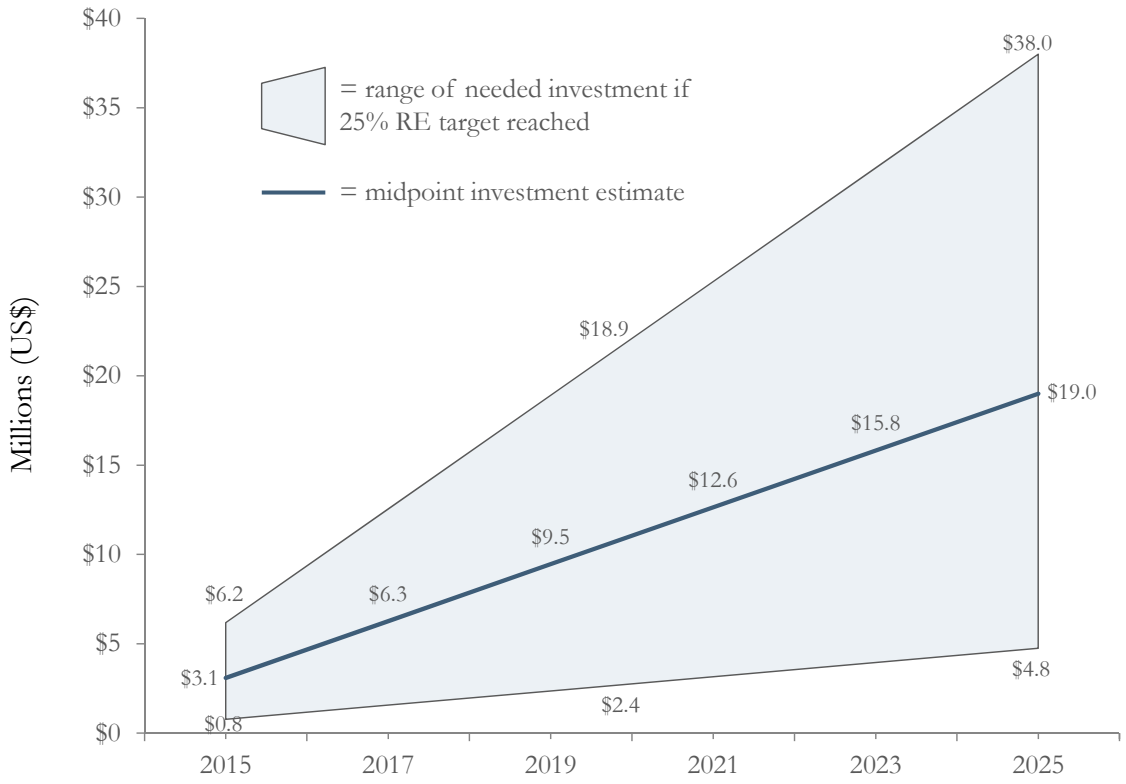
Source: Information provided to USTDA by Julián Zuluaga, Operations Manager of OC-SENI on 23 May 2014.

Figure 4.3 shows the range of investment that could be needed to address the impact of RE on the grid. The wide range reflects the significant number of variables, including:

- The amount of RE capacity installed between 2015 and 2025
- The technology choice of renewable sources of generation installed, with the key variable being the intermittency of these resources (for example, solar and wind vs. hydro)
- The solutions chosen to address these impacts, including fuel costs for peaking backup generation.

Given these variables, actual investment is likely to be in the lower range of the estimate due to the uncertainty in meeting current RE targets, the likelihood that some of the 25% target will be reached through firm renewable sources such as biomass or hydro, and potential budget constraints that could favor lower cost solutions. This still represents a significant opportunity, as even the lower range of the estimate would contribute $2 million to $9 million in export value in the medium term (that is, over the next five years).

Figure 4.3: Investment Needed by 2025 to Accommodate Increasing RE Generation



Assumptions:

- 773 GWh of renewable energy in 2015 (currently planned); Source: Information provided to USTDA by Julián Zuluaga, Operations Manager at OC-SENI on May 23, 2014
- 25 percent RE supply in 2025, with total demand growing 3 percent per year
- Grid investment range from $1 to $8 per MWh, including investments for voltage regulation, peaking backup generation, energy storage, and any other related technologies

U.S. firms are well positioned in the Dominican market. OC-SENI will have open bid procurements. Several U.S. vendors would be competitive in such bidding, and are listed in Table 4.7. OC-SENI's current project with OSI also shows the organization's comfort in working with U.S. suppliers.

Table 4.7: Potential U.S. Vendors for Each Component of the Proposed Project

Project Component	U.S. Vendors
EMS/SCADA, AGC, PMUs	ABB (US), ACS, Beckwith Electric, Cooper (Eaton), GE, Novatech, OSI, S&C Electric, Schneider Electric (US), SEL, Siemens (US)
RE integration	ABB (US), Areva (US), Cooper (Eaton), GE, Mitsubishi (US), Siemens (US)
Third-party site testing	Black & Veatch, KEMA, Quanta Technology, as well as major equipment/service providers such as ABB, GE, Schneider Electric, and Siemens

There are no significant import licensing or permit requirements that U.S. firms would need to meet in order to install their technologies.

2.6 Market Entry Issues and Foreign Competition

The Project faces few market entry issues. The Dominican Republic has no relevant legal barriers to U.S. participation in this project and representatives at OC-SENI have said they are oriented specifically toward working with U.S. companies.

A number of foreign firms could potentially compete in the Project procurements, including, but not limited to: ABB, Siemens, Schneider Electric, Survalent, and Efacet. As described in the previous section, many of these—such as ABB, Siemens, and Schneider Electric—have U.S. affiliates that would support U.S. exports.

2.7 Impact on Development

The Project will have a positive impact on development in the Dominican Republic. Table 4.8 lists ten development indicators, how the Project will positively affect them, metrics by which these effects can be measured, and preliminary projections.

Table 4.8: Estimated Development Impact of the Project in the Dominican Republic

Development Indicator	How Development Impact Occurs	Metrics	Rough projection	Calculation (for stated projection; ranges based on different variables)
Improved Output through Advanced Technology	At a minimum, PMUs and voltage/VAR automation would be new technologies for the Dominican Republic, as would likely be the versions of AGC and possibly SCADA implemented	Monetary value ($) or Yes/No	Yes, $7.28 million per year in 2014, growing throughout the decade; range of $1.3 million/year to $29.5 million/year	VVO (CVR in early stages) average: $1.3M/year; AGC average: $0.78M/year; PMU/SCADA/EMS average: $5.2M/year* *Complete calculations and assumptions below*
Temporary Jobs Created	Project implementation and testing will create temporary jobs	Number of individuals	70; range of 40 – 160	1/3 of average CAPEX for labor/services at $75,000 per job
Improved Power Delivery and Continuity of Service	Power interruptions will be identified faster, leading to shorter interruptions. Causes can be determined, allowing for preventative maintenance	kWh	28,889 MWh in 2014, growing throughout the decade; range of 2,900 MWh/year to 72,200 MWh/year	Based on historical average of 3 major outages per year and reducing these outages for 20% of customers
New Energy Capacity	The difference between the current maximum capacity of renewable energy the grid can accommodate and anticipated generation in 2025 enabled by this impact study	MW	1,751 MW by 2025; range of 1,168 MW to 2,335 MW by 2025	Half the difference between 25% of estimated total demand in 2025 and current planned RE deployments; actual difference depends on results of SIE study

New Renewable Energy Capacity	The difference between the current maximum capacity of renewable energy the grid can accommodate and anticipated generation in 2025 enabled by this impact study	MW	1,751 MW by 2025; range of 1,168 MW to 2,335 MW by 2025	Same as above
GHG Emissions Reduced or Avoided	Amount of diesel and other fossil fuel generation avoided through improved voltage control (reducing need for balancing generation) and increased use of renewable energy due to impact study	Tons per year of CO_2 equivalent	1,601,119 tons per year of CO_2 equivalent by 2025; range of 1,066,282 to 2,175,951 tons per year of CO_2 equivalent by 2025	7,200 MWh fossil fuel-based energy saved from VVO and 2,983,000 MWh fossil fuel-based energy saved from RE, with carbon intensity of 0.5355 tons/MWh in D.R. according to UNFCCC
Improved Data Management and Security	Improved reliability and security through real-time monitoring systems and PMUs	Yes/No	Yes	Qualitative

*Calculations/assumptions for averages for "Improved Output through Advanced Technology"

VVO: 0.5% reduction in energy consumption (could reach as high as 2 – 4% with full VVO, but this requires AMI metering which is not in place in large scale in Dominican Republic. CVR, similar to VVO, but not dependent on widespread real-time metering can reduce consumption by approximately 0.5%. Assumes 10% VVO/CVR penetration and current consumption rates and tariffs

AGC: Assumes frequency service costs would continue to increase 12% per year without AGC, as was the case the past three years. Assumes that costs will increase at just 2.4% per year following implementation of AGC

PMU/SCADA/EMS: Assumes historical average of 3 major outages per year. Estimates outages affect 25% of customers and last one hour. Estimates 20% of these customer outages can be reduced through PMUs/SCADA/EMS. Costs are based on existing number of residential/ commercial/ industrial customers in Dominican Republic and costs from Table 4.3 in DM deflated to account for per-capita income difference between the U.S. and Dominican Republic

2.8 Impact on the Environment

The Project will not have any notable negative impact on the environment, as implementation will take place at existing facilities. By improving the efficiency of the electric grid and enabling increased amounts of RE, the Project will reduce the amount of carbon dioxide (CO_2) emissions and other pollutants. If planned RE installations were to go forward without this study, significant levels of traditional backup generation would be needed to mitigate the variability of renewable (particularly solar and wind) resources. Traditional generation in the Dominican Republic is oil or gas fired; therefore, any avoided investment in traditional generation would result in lower emissions.

2.9 Impact on U.S. Labor

The Project will have a positive impact on U.S. labor and will be compliant with the legislative prohibitions on the use of Foreign Assistance Funds. Furthermore, the technical assistance will not fund foreign employment beyond 20 percent of the contract value.

By expanding U.S. exports, the Project will create opportunities for U.S. firms to expand operations, providing a positive impact on U.S. labor.

The Project will not provide financial incentives to any U.S. goods and services suppliers to establish manufacturing operations outside of the U.S. or replace U.S. employees with foreign ones. The sales opportunities for U.S. goods would instead encourage companies to continue manufacturing these products in the U.S. As a result, this project would encourage them to retain workers (or possibly hire new manufacturing or assembly workers).

The Project is not expected to contribute to the violation of internationally recognized workers' rights. OC-SENI plans to procure goods and services for the Project from reputable companies with no known workers' rights abuse complaints. In addition, the key goods and services providers are located in the U.S. and in the Dominican Republic. Both of these countries have ratified fundamental labor conventions, such as those on forced labor, freedom of association, rights to organize, minimum age, and hours of work. Companies located in these countries must adhere to these conventions.

2.10 Qualifications

In order to accomplish all the tasks required by the TOR, offerors will need to propose a study team with diverse skills and backgrounds. Local participation (up to 20 percent of the value of the feasibility study contract, consistent with USTDA requirements), likely in the form of local regulatory experts, will also be important to the Project's success.

Based on the tasks and sub tasks included in the TOR, at least the following key team members will be required:

- Grid Expert
- Renewable Energy Expert
- Regulatory Expert, and
- Project Manager.

The recommended tasks and responsibilities for the key team members are shown in Table 4.9 below.

Table 4.9: Tasks and Responsibilities for Each Key Team Member

Team Member	Task or Sub Task (from TOR)	Responsibilities
Grid Expert	1.1, 1.2, 2.1, 2.2, 3, 4, 5.1, 5.2, 5.3, 6, 7, 8, 9, 10	▪ Technical assessment of needs, costs, and benefits ▪ Implementation and integration of SCADA/EMS, AGC, PMUs, and network fault recorders
RE Expert	1.1, 1.2, 2.1, 2.2, 3, 4, 5.1, 5.2, 5.3, 6, 7, 8, 9, 10	▪ Technical assessment of needs, costs, and benefits ▪ Implementation and integration of solutions for addressing the impact of increased RE on the grid

Regulatory Expert	1.2, 1.2, 3, 4, 7, 8, 9, 10	▪ Regulatory assessment of requirements needed to be met for all projects
Project Manager	1.1, 1.2, 2.1, 2.2, 3, 4, 5.1, 5.2, 5.3, 5.4, 6, 7, 8, 9, 10	▪ Overall project development and implementation plan ▪ Creating financial model based on economic assessment ▪ Producing final report with findings of all tasks

The key team members should have extensive professional experience in their respective disciplines, as well as appropriate educational backgrounds. Spanish language ability and experience in the Dominican Republic is desired, but not required for team members. The preferred experience and educational background for each key team member is as follows:

- **Grid Expert**—The Grid Expert should have at least ten years of experience in EMS, SCADA, AGC, system monitoring and control, and related power automation fields. It is preferable for the Grid Expert to have a MS in a relevant engineering discipline
- **Renewable Energy Expert**—The Renewable Energy Expert should have at least ten years of experience in the implementation of intermittent renewable sources of energy to transmission and distribution grids. He or she should have extensive experience in implementing a diverse number of potential solutions for addressing intermittency issues, such as improved voltage control or integrating energy storage. It is preferable for the Renewable Energy Expert to have a MS in a relevant engineering discipline
- **Regulatory Expert**—The Regulatory Expert should have at least ten years of experience with power sector regulation in the Dominican Republic and should have knowledge of all relevant Dominican Republic laws and regulations applicable to the electricity sector. It is preferred for the Regulatory Expert to have a degree in law, policy, or a related discipline, and to be based in the Dominican Republic
- **Project Manager**—The Project Manager should have at least ten years of experience managing diverse projects in transmission and distribution systems, including financial, technical, and environmental aspects. He or she should have expertise in developing a financial model for transmission and distribution system projects. He or she should also have experience managing an interdisciplinary team and managing projects of this size. Ideally, the Project Manager should have experience managing similar projects in the Dominican Republic or elsewhere in Latin America and have a working knowledge of Spanish, but this is not necessarily a firm requirement.

2.10.1 Task Completion Schedule

Table 4.10 below presents a proposed Task Completion Schedule for the TA.

Table 4.10: Task Completion Schedule for the OC-SENI TA

Task	Task Name	Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1.0	**Document review and work plan**																																		
1.1	Document review																																		
1.2	Work plan and kickoff meeting																																		
2.0	**Technology study**																																		
2.1	Technological needs assessment																																		
2.2	Technical specifications																																		
3.0	**Regulatory assessment and compliance plan**																																		
4.0	**System integration study**																																		
5.0	**Economic analysis**																																		
5.1	Life cycle cost analysis																																		
5.2	Quantitative benefit analysis																																		
5.3	Financial model																																		
5.4	Financing mechansims assessment																																		
6.0	**U.S. sources of supply**																																		
7.0	**Environmental and social impact analysis**																																		
8.0	**Developmental impact analysis**																																		
9.0	**Implementation plan**																																		
10.0	**Final Report**																																		

T: +1 (202) 466-6790
F: +1 (202) 466-6797
1747 Pennsylvania Avenue NW
Suite 1200
WASHINGTON DC 20006
United States of America

T: +1 (646) 632-3770
F: +1 (212) 682-0278
200 Park Ave
Suite 1744
NEW YORK, NY 10166
United States of America

T: +61 (2) 9231 6862
F: +61 (2) 9231 3847
Level 1, 27-31 Macquarie Place
SYDNEY NSW 2000
Australia

T: +64 (4) 913 2800
F: +64 (4) 913 2808
Level 2, 88 The Terrace
PO Box 10-225
WELLINGTON 6143
New Zealand

T: +57 (1) 646 6626
F: +57 (1) 646 6850
Calle 100 No. 7-33
Torre 1, Piso 14
BOGOTÁ
Colombia

T: +33 (1) 45 27 24 55
F: +33 (1) 45 20 17 69
7 Rue Claude Chahu
PARIS 75116
France

---------- www.castalia-advisors.com

A N N E X 3

USTDA NATIONALITY REQUIREMENTS

U.S. TRADE AND DEVELOPMENT AGENCY
Arlington, VA 22209-3901

NATIONALITY, SOURCE, AND ORIGIN REQUIREMENTS

[As of January 17, 2014]

The purpose of USTDA's nationality, source, and origin requirements is to ensure 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, the following provisions shall govern the delivery of goods and professional services funded by USTDA under the Grant Agreement:

(a) the Contractor must be a U.S. firm;

(b) the Contractor may use U.S. subcontractors without limitation;

(c) employees of U.S. Contractor or U.S. subcontractor firms shall be U.S. citizens, non-U.S. citizens lawfully admitted for permanent residence in the United States or non-U.S. citizens lawfully admitted to work in the United States, except as provided pursuant to subpart (d) below;

(d) up to twenty percent (20%) of the USTDA Grant amount may be used to pay for services performed by (i) Host Country subcontractors, and/or (ii) Host Country nationals who are employees of the Contractor;

(e) a Host Country subcontractor may only be used for specific services from the Terms of Reference identified in the subcontract;

(f) subcontractors from countries other than the United States or Host Country may not be used;

(g) goods purchased for performance of the TA and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and

(h) goods and services incidental to TA support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions.

NATIONALITY:

1) Application

A U.S. firm that submits a proposal must meet USTDA's nationality requirements as of the date of submission of the proposal and, if selected, must continue to meet such requirements throughout the duration of the USTDA-funded activity. These nationality provisions apply to all portions of the Terms of Reference that are funded with the USTDA grant.

2) Definitions

A "U.S. firm" is a privately owned firm that 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. citizens and/or non-U.S. citizens lawfully admitted for permanent residence in the United States, 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 that is organized in the U.S., has its principal place of business in the U.S., and is more than 50% owned by U.S. citizens and/or permanent residents, qualifies as a "U.S. firm".

A nonprofit organization, such as an educational institution, foundation, or association, also qualifies as a "U.S. firm" if it is incorporated in the U.S. and managed by a governing body, a majority of whose members are U.S. citizens and/or permanent residents.

SOURCE AND ORIGIN:

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.

Version 01.17.2014

A N N E X 4

USTDA GRANT AGREEMENT, INCLUDING MANDATORY CONTRACT CLAUSES

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 the Coordinating Organization of the National Interconnected Electrical System of the Dominican Republic (Organismo Coordinador del Sistema Eléctrico Nacional Interconectado or OC-SENI) ("Grantee"). USTDA agrees to provide the Grantee under the terms of this Grant Agreement US$573,215 ("USTDA Grant") to fund the cost of goods and services required for a technical assistance ("TA") on the proposed Smart Grid Upgrades for System Operator and Market Agents ("Project") in the Dominican Republic ("Host Country").

1. USTDA Funding

The USTDA Grant 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 TA ("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 TA ("Terms of Reference") are attached as Annex I and are hereby incorporated by reference into this Grant Agreement. The TA will examine the technical, financial, environmental, and other critical aspects of the proposed Project. The Terms of Reference for the TA 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. Therefore, USTDA, the Grantee, and the Contractor shall not directly or indirectly provide, offer or promise to provide money or anything of value to any public official in violation of any United States or Host Country laws relating to corruption or bribery.

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.

5. Contract Matters and USTDA's Rights as Financier

(A) Grantee Competitive Selection Procedures

Selection of the U.S. Contractor shall be carried out by the Grantee according to its established 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's Right to Approve Contractor Selection

The Grantee shall notify USTDA at the address of record set forth in Article 16 below upon selection of the Contractor to perform the TA. USTDA then shall notify the Grantee whether or not USTDA approves the Grantee's Contractor selection. Upon USTDA approval of the Grantee's Contractor selection, the Grantee shall notify in writing the U.S. firms that submitted unsuccessful proposals to perform the TA that they were not selected. The Grantee and the Contractor then shall enter into a Contract for performance of the TA.

(C) USTDA's Right to Approve Contract Between Grantee and Contractor

(1) Contract

The Grantee and the Contractor shall enter into a Contract for performance of the TA. The Grantee (or the Contractor on the Grantee's behalf) shall transmit to USTDA, at the address set forth in Article 16 below, a photocopy of an English language version of the signed Contract or a final negotiated draft version of the Contract. USTDA then shall notify the Grantee and the Contractor whether or not USTDA approves the Contract.

(2) Amendments and Assignments

The Grantee or the Contractor may submit any proposed amendment to the Contract, including any proposed amendment to any annex thereto, or any proposed assignment of the Contract, to USTDA at the address set forth in Article 16 below. USTDA then shall notify the Grantee and the Contractor whether or not USTDA approves the proposed amendment or assignment.

(D) USTDA Not a Party to the Contract

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of the Contract and any amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any Contract funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the

foregoing approval rights, has acted solely as a financing entity to assure the proper use of U.S. 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 TA 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.

(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 control.

6. Disbursement Procedures

(A) USTDA Approval of Contract Required

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

(B) Contractor Invoice Requirements

The Grantee should request disbursement of funds by USTDA to the Contractor for performance of the TA by submitting invoices in accordance with the procedures set forth in the USTDA Mandatory Contract 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. In the event that only one signature is dated, such date shall constitute the Effective Date.

8. TA Schedule

(A) TA Completion Date

The completion date for the TA, which is May 31, 2016, is the date by which the parties estimate that the TA will have been completed.

(B) Time Limitation on Disbursement of USTDA Grant Funds

Except as USTDA may otherwise agree, (i) 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 (ii) no USTDA funds may be disbursed more than four (4) years after the Effective Date of the Grant Agreement.

9. USTDA Mandatory Contract Clauses

All contracts funded under this Grant Agreement shall include the USTDA Mandatory Contract 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 Contract Clauses, except for Clauses B(1), G, H, I, and S.

10. Use of U.S. Carriers

(A) Air

Transportation by air of persons or property funded under this 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 this 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 professional services funded by USTDA under the Grant Agreement:

(a) the Contractor must be a U.S. firm;

(b) the Contractor may use U.S. subcontractors without limitation;

(c) employees of U.S. Contractor or U.S. subcontractor firms shall be U.S. citizens, non-U.S. citizens lawfully admitted for permanent residence in the United States or non-U.S. citizens lawfully admitted to work in the United States, except as provided pursuant to subpart (d) below;

(d) up to twenty percent (20%) of the USTDA Grant amount may be used to pay for services performed by (i) Host Country subcontractors, and/or (ii) Host Country nationals who are employees of the Contractor;

(e) a Host Country subcontractor may only be used for specific services from the Terms of Reference identified in the subcontract;

(f) subcontractors from countries other than the United States or Host Country may not be used;

(g) goods purchased for performance of the TA and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and

(h) goods and services incidental to TA 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 this Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country, except for taxes of a de minimis nature imposed on local lodging, food, transportation, or airport arrivals or departures. Neither the Grantee nor the Contractor will seek reimbursement from USTDA for taxes, tariffs, duties, fees or other levies, except for taxes of a de minimis nature referenced above.

13. USTDA Project Evaluation

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. Inquiries will include, but not be limited to, whether the Final Report recommendations have been or will be used to implement the Project, anticipated Project implementation timeline, and likely source of financing. In addition, the Grantee agrees to notify USTDA any time the Grantee selects a new primary contact person for this Project during the five-year period referenced above.

14. Recordkeeping and Audit

The Grantee agrees to maintain books, records, and other documents relating to the TA and this Grant Agreement adequate to demonstrate implementation of its responsibilities under this 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 TA and the Grant Agreement.

15. Representation of Parties

For all purposes relevant to this 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 General Manager. The parties hereto may, by written notice, designate additional representatives for all purposes under this Grant Agreement.

16. 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 an electronic medium that produces a tangible record of the transmission, such as a facsimile or e-mail message, and will be deemed duly given or sent when delivered to such party at the following:

To: Operations Manager (Gerente de Operaciones)
Organismo Coordinador del Sistema Eléctrico Nacional Interconectado
Calle 3ra, No. 3 Arroyo Hondo Primero
Santo Domingo
República Dominicana

Phone: +1 809 732-9330 x240
Fax: +1 809 541-5457
E-Mail: lzuluaga@oc.org.do

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

Phone: (703) 875-4357
Fax: (703) 875-4009
E-Mail: grantnotices@ustda.gov and lac@ustda.gov and jflewelling@ustda.gov

All such communications shall be in English or Spanish, unless the parties otherwise agree in writing. In addition, the Grantee shall provide the Commercial or Economic 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.: 11 15/16 1001
Activity No.: 2015-51004A
Reservation No.: 2015033
Grant No.: GH201551033

17. Implementation Letters

To assist the Grantee in the implementation of the TA, USTDA may, from time to time, issue implementation letters that will provide additional information about matters covered by this Grant Agreement. USTDA may also issue implementation letters to (i) extend the estimated completion date set forth in Article 8(A) above, or (ii) change the fiscal data set forth in Article 16 above. The parties may also use jointly agreed upon implementation letters to confirm and record their mutual understanding of matters covered by this Grant Agreement.

18. Grant Agreement Amendments

Either party may submit to the other party at any time a proposed amendment to the Grant Agreement. A Grant Agreement amendment shall be effective only if it has been signed by both parties.

19. Termination Clause

Either party may terminate this Grant Agreement by giving the other party written notice thereof. The termination of the Grant Agreement will end any obligations of the parties to provide financial or other resources for the TA, except for payments that may be made pursuant to Clause H of the USTDA Mandatory Contract Clauses set forth in Annex II to this Grant Agreement. This article and Articles 5, 12, 13, 14, and 21 of the Grant Agreement shall survive termination of the Grant Agreement.

20. 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.

21. U.S. Technology and Equipment

By funding this TA, 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.

22. Governing Law

This Grant Agreement shall be governed by, and construed in accordance with, the applicable laws of the United States of America. In the absence of federal law, the laws of the State of New York shall apply.

23. Counterparts

This Grant Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same agreement. Counterparts

may be delivered via electronic mail or other transmission method and any counterpart so delivered shall be deemed to be valid and effective for all purposes.

[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the Government of the United States of America and Organismo Coordinador del Sistema Eléctrico Nacional Interconectado de la República Dominicana, 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: 12/19/2014

Witnessed:

By:_____

For Organismo Coordinador del Sistema Eléctrico Nacional Interconectado de la República Dominicana

By:_____

Date: 19/12/2014

Witnessed:

By:_____

Annex I -- Terms of Reference

Annex II -- USTDA Mandatory Contract 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 Organismo Coordinador del Sistema Eléctrico Nacional Interconectado ("Client"), dated _____ ("Grant Agreement"). The Client has selected _____ ("Contractor") to perform the technical assistance ("TA") for the Smart Grid Upgrades for System Operator and Market Agents project ("Project") in the Dominican Republic ("Host Country"). The Client and the Contractor are the parties to this Contract, and they hereinafter are referred to collectively as the "Contract Parties." 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 S. In addition, in the event of any inconsistency between the Grant Agreement and the Contract or any subcontract thereunder, the Grant Agreement shall be controlling.

B. USTDA as Financier

(1) USTDA Approval of Contract

This Contract, and any amendment thereto, including any amendment to any annex thereto, and any proposed assignment of this Contract, 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 conforms to modifications required by USTDA during the Contract review process and the Contract has been formally approved by USTDA. To make this review in a timely fashion, USTDA must receive from either the Client or the Contractor an English language version of a final negotiated draft Contract or a signed Contract to the attention of the General Counsel's office at USTDA's address listed in Clause M below.

(2) USTDA Not a Party to the Contract

It is understood by the Contract 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 Contract 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 TA and shall not be construed as making USTDA a party to the Contract. The Contract 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 Contract Parties or the parties to any subcontract, jointly or separately; and in consideration of USTDA's role as financier, the Contract Parties further agree that USTDA's rights may be exercised without thereby incurring any responsibility or liability, in contract, tort, or otherwise, to the Contract Parties or the parties to any subcontract. Any approval or failure to approve by USTDA shall not bar the Client or USTDA from asserting any right they might have against the Contractor, or relieve the Contractor of any liability which the Contractor might otherwise have to the Client or USTDA.

C. Nationality, Source and Origin

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and professional services funded by USTDA under the Grant Agreement:

(a) the Contractor must be a U.S. firm;

(b) the Contractor may use U.S. subcontractors without limitation;

(c) employees of U.S. Contractor or U.S. subcontractor firms shall be U.S. citizens, non-U.S. citizens lawfully admitted for permanent residence in the United States or non-U.S. citizens lawfully admitted to work in the United States, except as provided pursuant to subpart (d) below;

(d) up to twenty percent (20%) of the USTDA Grant amount may be used to pay for services performed by (i) Host Country subcontractors, and/or (ii) Host Country nationals who are employees of the Contractor;

(e) a Host Country subcontractor may only be used for specific services from the Terms of Reference identified in the subcontract;

(f) subcontractors from countries other than the United States or Host Country may not be used;

(g) goods purchased for performance of the TA and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and

(h) goods and services incidental to TA 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 period of performance of work provided for by this Contract, 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. Disbursement Procedures

(1) USTDA Approval of Contract

Disbursement of Grant funds will be made only after USTDA approval of this Contract.

(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 approval by USTDA of a Final Report that has been (i) prepared and submitted in accordance with the requirements set forth in Clause I below, and (ii) approved in writing by the Client in the manner provided for by Clause G(3)(b)(iii) 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 Contract Clauses 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 Contract Clauses 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 Contract Clauses 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 the 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 to the attention of the Finance Department at USTDA's address listed in Clause M below, or by e-mail to invoices@ustda.gov.

H. Termination

(1) Method of Termination

Either Contract Party may terminate this Contract upon giving written notice to the other party and USTDA. This notice shall be effective after either 30 days, or any other period set forth elsewhere in this Contract. Furthermore, this Contract shall terminate immediately upon notification of USTDA's termination of the Grant Agreement or the term of availability of any funds thereunder.

(2) Ramifications of Termination

In the event that this Contract is terminated prior to completion, the Contractor will be eligible, subject to USTDA approval, for payment for the value of the work performed pursuant to the terms of this Contract. 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 value of the work performed pursuant to the terms of this Contract.

(3) Survivability

Clauses B, D, G, H, N and S of the USTDA Mandatory Contract Clauses shall survive the termination of this Contract.

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 hard copy 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) hard 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) hard copy of the Public Version of the Final Report to the Commercial or 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, and USTDA's address. 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 address, 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, and e-mail address 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, and e-mail address 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.

(g) The Client, USTDA, and the Commercial and/or Economic Section(s) of the U.S. Embassy in Host Country shall have irrevocable, worldwide, royalty-free, non-exclusive rights to use and distribute the Final Report.

J. Modifications

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

K. TA Schedule

(1) TA Completion Date

The completion date for the TA, which is May 31, 2016, is the date by which the Contract Parties estimate that the TA 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) no USTDA funds may be disbursed more than four (4) years after the Effective Date of the Grant Agreement.

L. Business Practices

The Contract Parties recognize the existence of standards of conduct for public officials and commercial entities in their respective countries. Therefore, the Contract Parties shall fully comply with all United States and Host Country laws relating to corruption or bribery. For example, the Contractor and its subcontractors shall fully comply with the requirements of the Foreign Corrupt Practices Act, as amended (15 U.S.C. §§ 78dd-1 et seq.). Each Contract Party agrees that it shall require that any agent or representative hired to represent it in connection with the TA will comply with this paragraph and all laws which apply to activities and obligations of that Contract Party, including, but not limited to, those laws and obligations referenced 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.: 11 15/16 1001
Activity No.: 2015-51004A
Reservation No.: 2015033
Grant No.: GH201551033

N. 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, except for taxes of a de minimis nature imposed on local lodging, food, transportation, or airport arrivals or departures. Neither the Client nor the Contractor will seek reimbursement from USTDA for taxes, tariffs, duties, fees or other levies, except for taxes of a de minimis nature referenced above.

O. Export Licensing

The Contractor and all subcontractors are responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.

P. Contact Persons

The Client designates the following person as the contact person for matters concerning this Contract:

Name: Luis Julian Zuluaga
Title: Gerente de Operaciones
Phone: +1 809 732-9330 x240
Fax: +1 809 541-5457
E-Mail: lzuluaga@oc.org.do

The Contractor designates the following person as the contact person for matters concerning this Contract:

Name:
Title:
Phone:
Fax:
E-Mail:

If anyone designated by a Contract Party as a contact person ceases service as a contact person at any point during the ten-year period following the date of signing of this Contract, the Contract Party that had designated that contact person shall provide USTDA and the other Contract Party with the name and contact information of a replacement contact person.

Q. Liability

This Contract may include a clause that limits the liability of the Contract Parties, provided that such a clause does not (i) disclaim liability for damages that are natural, probable, and reasonably foreseeable as a result of a breach of this Contract, or (ii) limit the total amount of damages recoverable to an amount less than the total amount disbursed to the Contractor pursuant to this Contract. If any clause included by the

Contract Parties is inconsistent with either or both of these limitations, it shall be invalid and unenforceable to the extent of the inconsistency.

R. Arbitration

If the Contract Parties submit any dispute arising under this Contract for arbitration, the scope of any such arbitration shall be limited to the Contract Parties' rights and/or obligations under this Contract and may not extend to any right or obligation of USTDA. The arbitrator(s) shall not arbitrate issues directly affecting the rights or obligations of USTDA.

S. 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 TA. 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, fax number, and e-mail address. 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.

A N N E X 5

TERMS OF REFERENCE (FROM USTDA GRANT AGREEMENT)

Annex I

Terms of Reference

Purpose and Background

The purpose of this technical assistance ("TA") is to determine the viability of transmission and distribution upgrades (the "Project") at the Organismo Coordinador del Sistema Eléctrico Nacional Interconectado (Coordinating Organization of the National Interconnected Electrical System, "the Grantee"), the electric system operator in the Dominican Republic, and its member companies. The Grantee has initiated system upgrades to implement supervisory control and data acquisition (SCADA) to approximately 40 percent of its system, and requires further technical assistance to proceed with additional system upgrades as well as applications aimed at reducing the cost of frequency regulation and incorporating new sources of renewable energy. The Contractor will provide this technical assistance by completing the tasks described in this Terms of Reference.

Task 1: Document Review and Work Plan

The Contractor shall review all relevant documents provided by the Grantee and relevant electricity sector participants such as generation, distribution and transmission companies ("Agents") and develop a Work Plan to be approved during a kickoff meeting.

Sub Task 1.1: Document review

The Grantee will provide the following documents for review by the Contractor, including:

- Existing relevant regulations
- Current reliability indicators
- Current costs of transmission and distribution service
- Current and planned installations of renewable energy
- Existing studies covering SCADA, energy management systems (EMS), automatic generation control (AGC), phasor measurement units (PMUs), renewable energy, and any related technologies in the Dominican Republic
- Details of existing related projects, specifically the ongoing SCADA/EMS project with the U.S. vendor Open Systems International (OSI).

Based on information provided by the Grantee, the Contractor shall:

- Define the current scale of SCADA, including the number and percentage of transmission substations that have SCADA, as well as the SCADA systems at generation and distribution companies (GENCOs and EDEs, respectively)
- Report existing communications infrastructure, including:
  - Number of communicating sensors and/or coverage

  - Length and/or coverage of communications network
  - Communications technology (fiber optic, wireless, etc.)
  - Bandwidth and latency of existing communications and whether or not this is sufficient for proposed new projects
- Report existing analytics software
- Review all existing studies covering energy management systems and renewable energy in the Host Country, including the renewable energy study that has been commissioned by the *Superintendencia de Electricidad* (Electricity Superintendence, SIE).

Sub Task 1.2: Work Plan and Kickoff Meeting

Based on the results of the document review, the Contractor will develop a work plan, which will be reviewed with the Grantee and relevant Agents in advance of and following a kickoff meeting. During the kickoff meeting, the Contractor and Grantee may agree to alter the timetable of the TA, but not the Terms of Reference or content of the Project.

Task 1 Deliverables: The Contractor will provide the Grantee with a copy of the final Work Plan in English including all work performed as described above, as approved by the Grantee.

Task 2: Technology Needs Assessment and Specifications

The Contractor shall assess the technological needs of the Grantee and relevant Agents and detail all technical specifications necessary for the Project.

Sub Task 2.1: Technological needs assessment

The Contractor shall conduct a study that will evaluate the role of the following technologies within the Grantee's operations, including opportunities for upgrades and modernizations. The Contractor shall conduct site visits to Agents as necessary to complete the technological needs assessment. The technology study will include evaluation of the following technologies:

- AGC, including necessary third party site testing. This shall also assess the SCADA and communication needs of GENCOs to perform an AGC control from the SCADA of the Grantee
- SCADA systems for GENCOs and EDEs
- EMS with real-time monitoring and control
- Network fault recorders
- Integration of PMUs
- Automatic voltage/VAR control
- Renewable energy, including existing technology intended to address the impact of renewable energy, if any. Examples may include but are not limited to energy storage, peaking backup generation, and demand response.

The Contractor shall report all of the existing deployments in the Host Country of the above technologies, including version, scale, and vendor, as available.

Sub Task 2.2: Technical specifications

Based on information provided by the Grantee, the Contractor will delineate the specific components and standards of the technologies addressed in Sub Task 2.1 that should be upgraded or implemented. Of the existing technologies, as provided by the Grantee, the Contractor shall determine which of the following sub-components should be upgraded as part of the Project:

- Graphical User Interface
- Real-time and Historical Trending
- SCADA
- Communications Front-end Processor
- Historical Information System and Data Archiving
- Inter-control Center Communications Protocol
- Historical Recording System
- Report Management System
- Calculation & Scripting Subsystem
- Advanced Alarm Management System
- Dynamic Tabular Display Subsystem
- Data Engineering and Maintenance Subsystem
- Display Design and Maintenance Subsystem
- Electronic Operator Logging System
- Transmission Network Security Analysis
- Operator Training Simulator
- Equipment Outage Scheduling
- Transaction Management System
- Plant Management System for GENCOs, including security center, data logger and report manager, and intelligent device manager
- Control Room for GENCOs and EDEs, including SCADA server, smart wireless gateway, and controllers
- Switchyard and Revenue Metering for on-site GENCOs activities
- Remote Process Visualization Data Analysis & Reporting for GENCOs and EDEs

Of the sub-components not currently being developed by the Grantee, the Contractor shall determine which components it recommends the Grantee invest in. These may include but are not limited to:

- Common Information Model Interface
- Automatic Voltage/VAR Control
- Voltage Stability Analysis
- Inadvertent Accounting
- Short-Term Load Forecasting

The Contractor shall specify the desired benefits from the Project. These may include:

- Deferred generation, transmission, and distribution investments
- Reduced service costs
- Reduced electricity losses
- Reduced sustained outages
- Reduced major outages
- Reduced emissions and pollution
- Reduced congestion costs
- Reduced wide-scale blackouts.

The Contractor shall provide details on requirements and parameters for third party site testing, or site acceptance testing for automatic generation control, as well as any other related technologies for which the Grantee requests third party site testing.

Task 2 Deliverables: The Contractor shall submit technical specifications in English to the Grantee including all work performed as described above, including a technical description of all Project components and sub-components and all technical details required for the Grantee to subsequently prepare tender documents.

Task 3: Regulatory Assessment

Based on the results of Tasks 1-2, the Contractor shall assess all relevant Host Country laws, regulations, and standards that the Project must meet. In particular, the assessment shall take into account:

- All relevant laws that are in place that guide reliability improvements, including the required range of voltage and penalties for not meeting voltage requirements found in the following document: *Consideraciones operativas y comerciales para la valorización de la energía reactiva y compensación por regulación de tensión (OC-GG-14COCVERCRT1310-131028-V0).*
- Any relevant international standards or specifications, such as International Electrotechnical Commission (IEC) and Institute of Electrical and Electronics Engineers (IEEE) standards and North American Electric Reliability Corporation Critical Infrastructure Protection (NERC CIP) standards. The Contractor shall determine which standards the Project is required to meet and which ones are recommended.

Task 3 Deliverable: The Contractor shall present a Regulatory Assessment in English to the Grantee including all work performed as described above.

Task 4: System Integration Study

The Contractor shall develop a strategy for integrating the Project into the Grantee's existing and planned systems operations. The Integration Study shall be aimed at eliminating redundant technologies and improving the Grantee's operations by

facilitating interactions between existing communications systems, substation and transmission and distribution grid equipment, and control and monitoring software. The Integration Study will also aim to reduce redundancy between existing and planned technologies and studies being developed by the *Comisión Nacional de Energía* (National Energy Commission), the SIE, and all generation, transmission, and distribution market agents. The System Integration Study shall:

- Define existing EMS, including details of the ongoing project with OSI, as well as existing SCADA systems at relevant Agents
- Determine the extent to which the Project can complement, or build upon, existing technology and in what cases it will be replacing existing technology, as well as how Project implementation will impact the Grantee's ongoing operations
- Assess the interoperability of existing technology with proposed new technology and technology upgrades
- Based on information provided by the Grantee or other Dominican Republic government agency, the Contractor shall define existing and projected renewable energy capacity, in both MW and percentage of total capacity. This will be split into utility scale renewable energy and distributed generation
- Assess supplemental resources available to manage renewable energy variability, and its integration into the system, including but not limited to:
  - Peaking backup generation
  - Energy storage
  - Demand response programs
  - Voltage controls in case of over-supply of solar power.

Task 4 Deliverable: The Contractor shall present the Grantee with the System Integration Study in English that including all work performed as described above, in particular, the System Integration Study shall specify :

- Recommendations for interoperability between existing technology and new technologies or technology upgrades based on variance in vendor and version of existing and new technologies
- Recommendations for integration of new investments into existing software or recommendations of new software programs as needed
- Recommendations for ways that supplemental resources for addressing the impacts of renewable energy can complement existing resources without creating redundancy

Task 5: Financial and Economic Analysis

The Contractor shall conduct a Financial and Economic Analysis of the Project, including a quantification of costs and benefits, a financial model, and an assessment of potential financing channels.

Sub Task 5.1: Life Cycle Cost Analysis

The Contractor shall conduct a Life Cycle Cost Analysis (LCCA) of the Project. The LCCA shall examine the total initial capital costs to plan, design, develop, and build the Project, and also shall include a detailed analysis of the costs associated with the long-term operation of the Project, which includes maintaining the facilities, equipment, and other assets financed as part of the Project. Such costs include, but are not limited to, warranties, operation, maintenance, acquisition, installation, refurbishment, and disposal costs that could be encountered throughout the life of the Project. The Contractor will provide life cycle costs for each of the following technologies:

- Automatic generation control, including necessary third party site testing
- SCADA system for GENCOs and EDEs
- SCADA network simulator for system operator
- EMS with real-time monitoring and control
- Network fault recorders
- PMUs
- Automatic voltage/VAR control
- Technologies aimed at addressing the impact of renewable energy. Examples may include but are not limited to energy storage, peaking backup generation, and demand response.

Sub Task 5.2: Quantified Benefit Analysis

The Contractor shall conduct an economic analysis for the Project that quantifies the potential benefits the Project could achieve. The Contractor shall estimate the cost savings and increased revenues that would accrue to the Grantee and market agents as a result of the Project. Specifically, the Contractor will:

- Quantify the costs of outages in the Dominican Republic to produce a potential savings amount if the Project is successfully carried out
- Quantify the savings from the frequency cost of service due to automatic generation control
- Quantify the savings in deferred investment and maintenance costs due to improved real-time monitoring
- Quantify the potential savings from understanding the impact of renewable energy, including the following categories:
  - Overall total savings in terms of deferred investment costs, reduced congestion costs, and reduced service costs
  - Savings vs. scenario in which renewable energy is deployed without necessary impact study, such as reduced need for backup generation

Sub Task 5.3: Financial Model

The Contractor shall use the outputs of the economic analysis to prepare a detailed Financial Model (using Microsoft Excel) of the Project based on assumptions from its technical assessment and current market conditions in the Dominican Republic. The Financial Model should be flexible (allowing a clear and easy modification of key

operating and financial assumptions); and allow the assessment of different scenarios, positive and negative, that can impact Project success and profitability. The financial analysis should include profitability indicators such as net present value, internal rate of return, return on investment, and payback period based on different assumptions of variables such as the cost of transmission service, the cost of outages, alternatives to renewable energy, and the cost of backup generation or related strategies if renewable energy is implemented without a sufficient impact study. At a minimum, the Financial Model shall include the following components:

- Project development costs
  - Primary and auxiliary equipment (for example, sensors, communications equipment, PMUs, software)
  - Contingency costs of renewable energy not being implemented; the financial model shall have a variable that considers the amount of renewable energy coming online each year
  - Permitting, licensing, legal, and other professional service fees
  - Insurance during implementation
- Operating costs
  - Personnel training
  - Telecommunications services, including cellular if necessary
  - Software services
  - General and administrative costs and maintenance
  - Insurance during operations
- Financing costs
  - Interest during implementation
  - Cost of letters of credit
  - Debt service during operation
  - Any refinancing fees
- Savings/revenues
  - Savings from reduced power outages
  - Reduced frequency service costs
  - Deferred investment and maintenance costs
  - Reduced investment and service costs due to increased use of renewable energy
  - Potential revenue from renewable energy sales

Sub Task 5.4: Financing Mechanisms Assessment

The Grantee shall provide a detailed analysis of internal financing mechanisms, including a section on how the Grantee receives payment from the relevant Agents and the regulatory and/or political possibility of cost recovery from ratepayers. Given an appropriate time and place when the applicable Agents can be addressed, the Contractor will provide relevant materials on the financing of the Project to the Agents and address how these costs will be covered and/or distributed.

If deemed necessary by the Grantee, the Contractor shall consider external financing mechanisms such as development banks, which would entail:

- Detailing previous projects between the Grantee and development banks, including the Data Warehouse project funded by the World Bank
- Providing all relevant materials necessary to present to external financing sources, such as multilateral banks

Task 5 Deliverables: The Contractor shall present the Grantee with the following deliverables in English that including all work performed as described above:

- Life Cycle Cost Analysis for all technologies
- Quantitative Benefit Analysis of the Project
- Financial Model for the Project
- Financing Mechanisms Assessment

Task 6: U.S. Sources of Supply

The Contractor shall identify potential sources of equipment and services that can be procured competitively from U.S. vendors for construction of the Project using the technology identified in Task 2. The Contractor shall compile a list of such vendors and the equipment and services that they provide, as well as preliminary estimates from the vendors for the cost of their services and products relevant to the Project. This list shall comprise the Sources of Supply Report, which will include:

- U.S. equipment and service suppliers for SCADA, EMS, AGC, PMUs, Volt/VAR optimization and associated technologies, including:
  - Plant Management System for GENCOs, including security center, data logger and report manager, and intelligent device manager
  - Control Room for GENCOs and EDEs, including SCADA server, smart wireless gateway, communication front-end nodes, full graphic user interfaces, and controllers
  - Switchyard and Revenue Metering for on-site GENCOs activities
  - Remote Process Visualization Data Analysis & Reporting for GENCOs and EDEs
  - Additional operational, management, and maintenance systems necessary for SCADA/EMS at EDEs
  - Associated field equipment for EDES, including modern RTUs, programmable logic controllers, electronic meters, electronic relays, and controls on specific substation equipment, such as breakers, and regulators
  - PMUs for ETED
  - Automatic Voltage/VAR sensors, relevant regulators and capacitor banks, and associated software for optimization and stability analysis for EDES

- U.S. firms for third party site testing following implementation of automatic generation control

- U.S. firms for implementing technologies that will potentially be recommended by the renewable energy impact study, such as energy storage, peaking backup generation, or demand response.

Task 6 Deliverable: The Contractor shall present the Grantee with a comprehensive list in English of potential U.S. sources of supply available for the Project including all work performed as described above.

Task 7: Preliminary Environmental Impact Analysis

The Contractor shall conduct a preliminary environmental impact analysis of the Project. At a minimum, the Preliminary Environmental Impact Analysis shall:

- Conduct preliminary environmental impact analysis, including compliance with any local environmental requirements and the World Bank Group Environmental, Health, and Safety Guidelines
- Identify anticipated positive and negative environmental impacts of the Project
- Recommend ways to maximize positive impacts and minimize negative impacts
- Identify any actions that must be taken in advance of Project implementation to satisfy environmental impact requirements.

Task 7 Deliverable: The Contractor shall present the Grantee with the Preliminary Environmental Impact Analysis of the Project in English as described above.

Task 8: Developmental Impact Analysis

The Contractor shall assess the developmental impacts associated with the implementation of the Project as defined over the course of the TA, and the methodology for measuring those benefits or adverse impacts. The assessment shall include examples of the expected development impacts if the Project is implemented as outlined in the Final Report. The Contractor shall also develop a methodology for assessing the Project's impact over time. The Contractor shall use metrics specified below to determine the developmental impact of the Project.

Metrics to Assess Development Impact

Development Indicator	How Development Impact Occurs	Metrics
Business Relationships Established	New companies could work in the Dominican Republic, both for the technical assistance and for actual Project implementation	Number of relationships
Improved Output through Advanced Technology	At a minimum, PMUs and voltage/VAR automation would be new technologies for the Dominican Republic, as would likely be the versions of AGC and possibly SCADA implemented	Monetary value ($) or Yes/No

Temporary Jobs Created	Project implementation and testing will create temporary jobs	Number of individuals
Permanent Jobs Created	Increased uptake of renewable energy will create new permanent jobs	Number of individuals
Training and Skill Development	Employees throughout the OC-SENI will receive new training for technologies and software needed	Number of individuals
Improved Power Delivery and Continuity of Service	Power interruptions will be identified faster, leading to shorter interruptions. Causes can be determined, allowing for preventative maintenance	kWh
New Energy Capacity	The difference between the current maximum capacity of renewable energy the grid can accommodate and anticipated generation in 2025 enabled by this impact study	MW
New Renewable Energy Capacity	The difference between the current maximum capacity of renewable energy the grid can accommodate and anticipated generation in 2025 enabled by this impact study	MW
GHG Emissions Reduced or Avoided	Amount of diesel and other fossil fuel generation avoided through improved voltage control (reducing need for balancing generation) and increased use of renewable energy due to impact study	Tons per year of CO_2 equivalent
Improved Data Management and Security	Improved reliability and security through real-time monitoring systems and PMUs	Yes/No

Task 8 Deliverable: The Contractor shall present the Grantee with a Development Impact Assessment in English for the Project including all work performed as described above.

Task 9: Implementation Plan

The Contractor shall recommend an Implementation Plan to the Grantee. At a minimum, the Implementation Plan shall include a proposed roadmap for developing the following technologies:

- AGC, including necessary third party site testing
- SCADA system for GENCOs and EDEs
- SCADA network simulator for system operator
- EMS with real-time monitoring and control
- Network fault recorders
- PMUs
- Automatic voltage/VAR control

- Technologies aimed at addressing the impact of renewable energy. Examples may include but are not limited to energy storage, peaking backup generation, and demand response.

For each investment, the Contractor shall suggest a period of time needed for development and a recommended order in which the investments can be made.

Task 9 Deliverable: The Contractor shall provide the Grantee with the Implementation Plan in English including all work performed as described above.

Task 10: Final Report

Upon conclusion of the previously detailed nine tasks, the Contractor shall deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference ("Final Report"). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report will not represent new analysis by the Contractor, rather it shall be a compilation of all the analysis conducted and work performed for Tasks 1–9. The Final Report shall be submitted in English and Spanish in accordance with Clause I of Annex II of the Grant Agreement.

A N N E X 6

U.S. FIRM INFORMATION FORM

USTDA-Funded Feasibility Study, Technical Assistance, or Training Grant

U.S. Firm Information Form

This form is designed to enable the U.S. Trade and Development Agency ("USTDA") to obtain information about entities and individuals proposed for participation in USTDA-funded activities. Information in this form is used to conduct screening of entities and individuals to ensure compliance with legislative and executive branch prohibitions on providing support or resources to, or engaging in transactions with, certain individuals or entities with which USTDA must comply.

USTDA Activity Number [*To be completed by USTDA*]	2015-51004A						
Activity Type [*To be completed by USTDA*]		Feasibility Study	✔	Technical Assistance		Other (specify)	
Activity Title [*To be completed by USTDA*]	SMART GRID UPGRADES FOR SYSTEM OPERATOR AND MARKET AGENTS						
Full Legal Name of U.S. Firm							
Business Address (street address only)							
Telephone		Fax		Website			
Year Established (include any predecessor company(s) and year(s) established, if appropriate). Please attach additional pages as necessary.							
Type of Ownership		Publicly Traded Company					
		Private Company					
		Other (please specify)					
Please provide a list of directors and principal officers as detailed in Attachment A. Attached? (Not Applicable for U.S. Publicly Traded Company)		Yes					
If Private Company or Other (if applicable), provide a list of shareholders and the percentage of their ownership. In addition, for each shareholder that owns 15% or more shares in U.S. Firm, please complete Attachment B.							
Is the U.S. Firm a wholly-owned or partially owned subsidiary?		Yes					
		No					
If so, please provide the name of the U.S. Firm's parent company(ies). In addition, for any parent identified, please complete Attachment B.							
Is the U.S. Firm proposing to subcontract some of the proposed work to another firm?		Yes					
		No					
If yes, U.S. Firm shall complete Attachment C for each subcontractor. Attached?		Yes					
		Not applicable					
Project Manager							
Name		Surname					
		Given Name					
Address							
Telephone							
Fax							
Email							
Negotiation Prerequisites							
Discuss any current or anticipated commitments which may impact the ability of the U.S. Firm or its subcontractors to complete the Activity as proposed and reflect such impact within the project schedule.							
Identify any specific information which is needed from the Grantee before commencing negotiations.							

U.S. Firm may attach additional sheets, as necessary.

U.S. Firm's Representations

U.S. Firm shall certify to the following (or provide an explanation as to why any representation cannot be made):

1. U.S. Firm is a *[check one]* ☐ Corporation ☐ LLC ☐ Partnership ☐ Sole Proprietor ☐ Other:

duly organized, validly existing and in good standing under the laws of the State of: *[insert state]* .

The U.S. Firm 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 USTDA Activity. The U.S. Firm 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 U.S. Firm has included herewith, a copy of its Articles of Incorporation (or equivalent charter or document issued by a designated authority in accordance with applicable laws that provides information and authentication regarding the legal status of an entity) and a Certificate of Good Standing (or equivalent document) issued within 1 month of the date of signature below by the State of: *[insert state]* .

The U.S. Firm commits to notify USTDA and the Grantee if it becomes aware of any change in its status in the state in which it is incorporated. USTDA retains the right to request an updated certificate of good standing. **(U.S. publicly traded companies need not include Articles of Incorporation or Good Standing Certificate)**

3. Neither the U.S. Firm nor any of its directors and principal officers have, within the ten-year period preceding the submission of this proposal, 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 U.S. Firm, nor any of its directors and 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 U.S. Firm. The U.S. Firm, has not, within the three-year period preceding the submission of this proposal, been notified of any delinquent federal or state taxes in an amount that exceeds US$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 U.S. Firm has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself of its debts under any bankruptcy, insolvency or other similar law. The U.S. Firm has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

7. The U.S. Firm certifies that it complies with USTDA Nationality, Source, and Origin Requirements and shall continue to comply with such requirements throughout the duration of the USTDA-funded activity. The U.S. Firm commits to notify USTDA and the Grantee if it becomes aware of any change which might affect U.S. Firm's ability to meet the USTDA Nationality, Source, and Origin Requirements.

The U.S. Firm shall notify USTDA if any of the representations are no longer true and correct.

U.S. Firm certifies that the information provided in this form is true and correct. U.S. Firm understands and agrees that the U.S. Government may rely on the accuracy of this information in processing a request to participate in a USTDA-funded activity. If at any time USTDA has reason to believe that any person or entity has willfully and knowingly provided incorrect information or made false statements, USTDA may take action under applicable law. The undersigned represents and warrants that he/she has the requisite power and authority to sign on behalf of the U.S. Firm.

Name		Signature	
Title			
Full Legal Name of U.S. Firm		Date	

ATTACHMENT A

USTDA-Funded Feasibility Study, Technical Assistance, or Training Grant

U.S. Firm Information Form – Directors and Principal Officers

(Not Applicable for U.S. Publicly Traded Company)

Provide a list of all directors and principal officers (e.g., President, Chief Executive Officer, Vice-President(s), Secretary and Treasurer). Please provide full names including surname and given name.

USTDA Activity Number [*To be completed by USTDA*]	2015-51004A
Activity Title [*To be completed by USTDA*]	SMART GRID UPGRADES FOR SYSTEM OPERATOR AND MARKET AGENTS
Full Legal Name of Entity	

Title	Name		
(e.g., Director, President, Chief Executive Officer, Vice-President(s), Secretary, Treasurer) ***** *Please place an asterisk (*) next to the names of those principal officers who will be involved in the USTDA-funded activity*	**Surname**	**Given Name**	**Middle Name**

ATTACHMENT B

USTDA-Funded Feasibility Study, Technical Assistance, or Training Grant

U.S. Firm Information Form – Shareholder(s) and Parent Company(ies)

If applicable, U.S. Firm provided a list of shareholders and the percentage of their ownership. This form shall be completed for each shareholder that owns 15% or more shares in U.S. Firm, as well as any parent corporation of the U.S. Firm ("Shareholder"). In addition, this form shall be completed for each shareholder identified in Attachment B that owns 15% or more shares in any Shareholder, as well as any parent identified in Attachment B.

USTDA Activity Number [*To be completed by USTDA*]	2015-51004A
Activity Title [*To be completed by USTDA*]	SMART GRID UPGRADES FOR SYSTEM OPERATOR AND MARKET AGENTS
Full Legal Name of U.S. Firm	
Full Legal Name of Shareholder	
Business Address of Shareholder (street address only)	
Telephone number	Fax Number
Year Established (include any predecessor company(s) and year(s) established, if appropriate). Please attach additional pages as necessary.	
Country of Shareholder's Principal Place of Business	
Please provide a list of directors and principal officers as detailed in Attachment A. Attached?	☐ Yes
Type of Ownership	☐ Publicly Traded Company ☐ Private Company ☐ Other
If applicable, provide a list of shareholders and the percentage of their ownership. In addition, for each shareholder that owns 15% or more shares in Shareholder, please complete Attachment B.	
Is the Shareholder a wholly-owned or partially owned subsidiary?	☐ Yes ☐ No
If so, please provide the name of the Shareholder's parent(s). In addition, for any parent identified, please complete Attachment B.	

Shareholder may attach additional sheets, as necessary.

ATTACHMENT C

USTDA-Funded Feasibility Study, Technical Assistance, or Training Grant

Subcontractor Information Form

This form is designed to enable the U.S. Trade and Development Agency ("USTDA") to obtain information about entities and individuals proposed for participation in USTDA-funded activities. Information in this form is used to conduct screening of entities and individuals to ensure compliance with legislative and executive branch prohibitions on providing support or resources to, or engaging in transactions with, certain individuals or entities with which USTDA must comply.

USTDA Activity Number [*To be completed by USTDA*]	2015-51004A
Activity Title [*To be completed by USTDA*]	SMART GRID UPGRADES FOR SYSTEM OPERATOR AND MARKET AGENTS
Full Legal Name of Prime Contractor U.S. Firm ("U.S. Firm")	
Full Legal Name of Subcontractor	
Business Address of Subcontractor (street address only)	
Telephone Number	
Fax Number	
Year Established (include any predecessor company(s) and year(s) established, if appropriate). Please attach additional pages as necessary.	

Subcontractor Point of Contact

Name	Surname	
	Given Name	
Address		
Telephone		
Fax		
Email		

Subcontractor's Representations									
Subcontractor shall provide the following (or any explanation as to why any representation cannot be made), made as of the date of the proposal:									
1. Subcontractor is a *[check one]*	☐	Corporation	☐	LLC	☐	Partnership	☐	Sole Proprietor	☐	Other	
duly organized, validly existing and in good standing under the laws of:	*[insert state (if U.S.) or country]*	.									
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 U.S. Firm is selected, to execute and deliver a subcontract to the U.S. Firm for the performance of the USTDA Activity and to perform the USTDA Activity. 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 directors and principal officers have, within the ten-year period preceding the submission of the Offeror's proposal, 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 directors and 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.									
6. The Subcontractor certifies that it complies with the USTDA Nationality, Source, and Origin Requirements and shall continue to comply with such requirements throughout the duration of the USTDA-funded activity. The Subcontractor commits to notify USTDA, the Contractor, and the Grantee if it becomes aware of any change which might affect U.S. Firm's ability to meet the USTDA Nationality, Source, and Origin Requirements.									
The selected Subcontractor shall notify the U.S. Firm, Grantee and USTDA if any of the representations included in its proposal are no longer true and correct.									
Subcontractor certifies that the information provided in this form is true and correct. Subcontractor understands and agrees that the U.S. Government may rely on the accuracy of this information in processing a request to participate in a USTDA-funded activity. If at any time USTDA has reason to believe that any person or entity has willfully and knowingly provided incorrect information or made false statements, USTDA may take action under applicable law. The undersigned represents and warrants that he/she has the requisite power and authority to sign on behalf of the Subcontractor.									

Name		Signature	
Title			
Full Legal Name of Subcontractor		Date	