



ORIGINAL
Technical Proposal

**FEASIBILITY OF GEOTHERMAL ENERGY UTILIZATION FOR
ELECTRIC POWER GENERATION IN JAMAICA**

May 11th, 2011

CCCT, Torre C, Oficina C-409, Avenida Ernesto Blohm, Chuao, Caracas, Venezuela
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Feasibility of Geothermal Energy Utilization for
Electric Power Generation in Jamaica
Technical Proposal

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FORM TECH-1 TECHNICAL PROPOSAL SUBMISSION FORM

Caracas, Venezuela, May 11, 2011

To: Petroleum Corporation of Jamaica
36 Trafalgar Road, Kingston 10
Jamaica W.I.

Dear Sirs:

We, the undersigned, offer to provide the consulting services for Feasibility of Geothermal Energy Utilization for Electric Power Generation in Jamaica MEM/PCJ/2011/04/081OG in accordance with your Request for Proposal dated Thursday April 14, 2011 and our Proposal. We are hereby submitting our Proposal, which includes this Technical Proposal, and a Financial Proposal sealed under a separate envelope.

We hereby declare that all the information and statements made in this Proposal are true and accept that any misinterpretation contained in it may lead to our disqualification.

If negotiations are held during the period of validity of the Proposal, i.e., before the date indicated in Paragraph Reference 1.12 of the Data Sheet, we undertake to negotiate on the basis of the proposed staff. Our Proposal is binding upon us and subject to the modifications resulting from Contract negotiations.

We undertake, if our Proposal is accepted, to initiate the consulting services related to the assignment not later than the date indicated in Paragraph Reference 7.2 of the Data Sheet.

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signature [In full and initials]:

Name and Title of Signatory: Jose Soto Colmener - President

Name of Firm: Procesos y Negocios Integrales, C.A. (PROYNCA)

Address: CCCT, Torre C, Piso 4, Ofic. C-409, Chuao, Caracas, Venezuela

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I. INTRODUCTION

This document is being submitted to Petroleum Corporation of Jamaica, hereinafter PCJ, a company based in Kingston – Jamaica, as a **Technical Proposal** related to the “Feasibility of Geothermal Energy Utilization for Electric Power Generation in Jamaica”.

II. SCOPE OF WORK

Procesos y Negocios Integrales, C.A., hereinafter PROYNCA, is an engineering and consulting services company duly registered in Distrito Capital, Estado Miranda, Venezuela, and Petroleum Corporation of Jamaica is an energy corporation duly registered in Jamaica.

In the scope of this **Technical Proposal**, hereinafter the SERVICE, PROYNCA will develop the “Feasibility of Geothermal Energy Utilization for Electric Power Generation in Jamaica” at its offices in Venezuela, with a final visit to Jamaica to submit and present the results and final report of the study, in accordance with all terms of reference, scope and specifications set by PCJ in its invitation to tender document (**Section 5 – Terms of Reference**), and all terms and conditions set forth in the standard Lump Sum Contract provided by PCJ as part of this bidding process (**Annex II - Consultant's Services: Lump - Sum Contract**).

III. Form TECH – 3 and 3B – Comments and Suggestions


A. Form TECH – 3: On the Terms of Reference

As indicated above, PROYNCA is agree with all terms of reference, scope and specifications set by PCJ in its invitation to tender document (**Section 5 – Terms of Reference**), and all terms and conditions set forth in the standard Lump Sum Contract provided by PCJ as part of this bidding process (**Annex II - Consultant's Services: Lump - Sum Contract**).

In any case, PROYNCA prepared this proposal under the following assumptions and considerations:

PCJ will designate a focal point to coordinate the access to information and facilities associated with this study, in order that PROYNCA could run on time all activities related to the SERVICE.

PROYNCA will not be responsible for impacts on the scheduled execution time for the SERVICE, resulting from delays in the timely delivery of appropriate information under PCJ responsibility, delays in appointing the PCJ focal point for purposes of this SERVICE, and any other activity is under the responsibility of PCJ.

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B. Form TECH – 3B: On Counterpart Staff and Facilities provided by PCJ

Under the consideration that the SERVICE will be executed at the PROYNCA offices in Venezuela, it is not estimated the requirement of office support and/or materials to be supplied by PCJ, or Venezuela, or in Jamaica.

Only will be require support to access PCJ offices in Kingston - Jamaica at the end of the SERVICE, at week sixteen, for the two professionals who attend to present the results and the final report of the study.

Eventually, if the development of the SERVICE required of confidential information by any entity in Jamaica, PCJ will provide assistance and advice to PROYNCA to fill and cover all the legal requirements to deliver the information.

IV. Form TECH – 4 – SERVICE STRATEGY

C. On Methodology

a. Scheme

The SERVICE considers work at the PROYNCA Venezuela offices for five (5) days a week, from Monday to Friday, on a schedule of eight to ten hours daily.


b. Communications and reports

To ensure the objectives of the SERVICE, PROYNCA should maintain close communication and integration with the PCJ focal point in Jamaica for the coordination of the SERVICE and to answer in a timely manner the execution of the SERVICE.

PROYNCA will send a first report at 35% of the SERVICE advance (week six), a second report at the 70% (week twelve), and a final at 100% of the SERVICE advance (week sixteen).

c. Type of Installations

PROYNCA professionals will be performing their activities at the PROYNCA Venezuela offices, except during the visit to Kingston - Jamaica last week of the SERVICE, to submit and present the results and final report of the study.

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D. On Approach and Work Plan

To conduct the “Pre-Feasibility of Geothermal Energy Utilization for Electric Power Generation in Jamaica” Study, requested by Petroleum Corporation of Jamaica, our company PROYNCA will use as guideline the Terms of Reference included in the Request for Proposal delivered by The Petroleum Corporation of Jamaica to the Consultants. From this document we have identified two main objectives:

The identification and preliminary assessment of areas in Jamaica where there is a high probability of geothermal resources existence.

Identify and evaluate the type of technologies and facilities that could be suitable for the production, transportation and utilization of the geothermal resources for power generation. This option is being considered by Jamaica among other options to diversify the energy mix in this country, with the vision of reduce the dependence on liquid hydrocarbons fuels with high and growing cost.

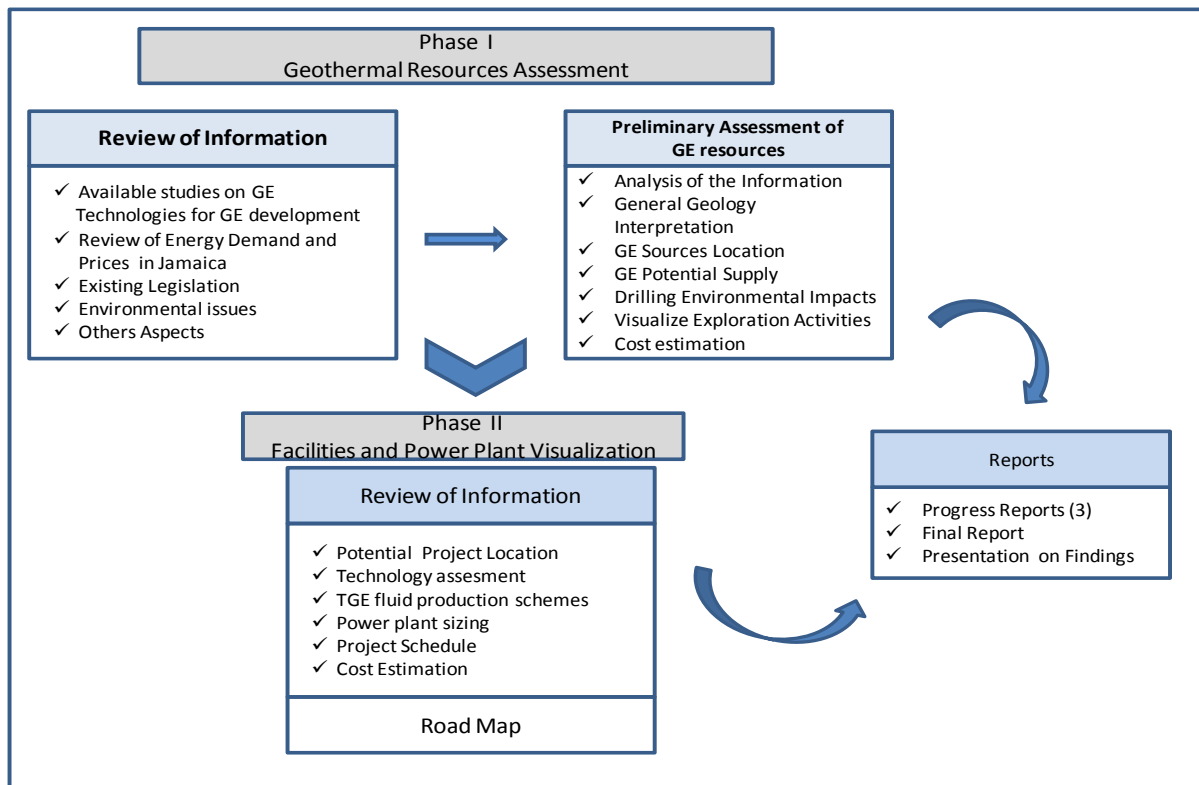
According to the terms of reference the study should be carried out under a two- phase scheme:

Phase I: Preliminary Geothermal Resources Assessment & Road Map for their development

Phase II: Assessment of the Required Geothermal Fluids Handling and Power Generation Facilities

a) Technical Approach and Methodology

Our approach and methodology for undertaking the study requested by PCJ is summarized in the next figure:



The approach and methodology to be used is similar to that applied for other similar studies performed by PROYNCA for several companies, including PCJ. This methodology is basically the recommended by the PMI for investment projects and accepted by the international Oil & Gas industry.

b) Work Plan

Main activities of the assignment are clearly described in the Terms of Reference, Section 5 of the RFP document; however, in summary the following key activities shall be the focus of the study:

Phase I: Preliminary Assessment of the Geothermal Resources.

The review of information, especially that referred to Jamaica regional geology, type of formations, and indications of geothermal fluids occurrence conditions, will be a key aspect.

The assessment of the geothermal resources will be approached by evaluation of the geological information, making emphasis in geological structures that according their characteristics, might have a high probability of being deposits of geothermal fluids.

A road map for the exploration activities that should be undertaken for developing the geothermal fluids contained in subsurface reservoirs will be proposed.

The activities included in the Phase I will be executed in an estimated period of 3 months.

Phase II: Assessment of the Geothermal Fluids Handling & Power Generation Facilities


With the findings of Phase I and partially in parallel, the Phase II is undertaken. This phase is aimed at defining technology and facilities for taking the fluids to a power plant to be designed for generating power with steam turbines.

In general the activities to be approached in this phase are listed as follows:

- Potential Sites for Power Plant
- Assessment of the environmental issues
- Technology assessment for the resources development and for the power plant
- Preliminary geothermal fluid gathering schemes
- Power Plant Sizing
- Assessment of the infrastructure and investment requirements for such a project.
- An evaluation of project challenges is included.
- Project Implementation Schedule
- Costs Estimation and Financing
- Basic road map for the whole project

c) Reports

- Progress reports are planned for submission at 35 % and 75 % of physical execution.
- A final report is planned to be issued at 100 % execution.
- A presentation on the final results and recommendations is scheduled after the revision by PCJ of the final report.

 PROYNCA Procesos y Negocios Integrales	Feasibility of Geothermal Energy Utilization for Electric Power Generation in Jamaica Technical Proposal	Proposal: 010-CCS-2011 Page: 9 of 20 Revision: 0 Date: May 11, 2011
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V. Form TECH - 5 – TEAM COMPOSITION AND TASK ASSIGNMENTS

The project team integrates the specialists shown in the next table.

It is remarked that the proposed personnel have been involved in the development of energy and oil & gas development projects.



Professional Staff				
Name of Staff	Firm	Area of Expertise	Position Assigned	Task Assigned
Gilbert Aldana	PROYNCA	Project Engineer	Coordinator	Coordination
Raymundo Ronny	NCT Energy	Geologist	Geologist	Review of Information - Regional Geology, Maps, Prospective Regions, similarities in the Caribbean Region, etc. Participation in Road Map development of Geothermal Resources
Benigno Sánchez	PROYNCA	Project Engineer	Project Engineer	Review of Information - Previous Studies, Existing and Conceptual Technologies, Electricity and non-electricity applications, among others) Road Map development of Geothermal Resources Geothermal Resources Assessment, Development Scheme, Environmental Impact Mitigation, etc Assessment of Required Geothermal Fluids Handling and Power Generation Facilities
Myrna de Cressa	PROYNCA	Project Engineer / Estimation Cost	Project Engineer / Cost Estimation	Review of Information (Previous Studies, Existing and Jamaica Energy Demand, Pricing Structure, Existing Legislation and Regulatory Frameworks, among others) Road Map development of Geothermal Resources Cost Estimation, etc. Progress, Final Report And Results Presentation
Larry Marquina	PROYNCA	Project Engineer	Project Engineer / Specialist in Integrated Management of Oil Reservoirs	Review of Information - Previous Studies, Existing and Conceptual Technologies, Electricity and non-electricity applications, among others) Road Map development of Geothermal Resources Geothermal Resources Assessment, Development Scheme, Environmental Impact Mitigation, etc Assessment of Required Geothermal Fluids Handling and Power Generation Facilities
José Plaza	PROYNCA	Drafting	Draft	Design and Modeling

VI. Form TECH - 6 – CURRICULUMS VITAE (CV)

The Curriculum Vitae (CV) for the Proposed Professional Staff project team integrates are subjected in the **Annex I** of this document.

VII. Form TECH - 7 – STAFFING SCHEDULE

N°	Name of Staff	Staff input (in the form of a bar chart) ²																Total staff-month input		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Home	Field ³	Total
Foreign																				
1	Gilberto Aldana																	1.80		1.80
2	Raimundo Ronny																	1.75		1.75
3	Benigno Sánchez																	2.25		2.25
4	Myrna de Cressa																	3.00		3.00
5	Larry Marquina																	2.55		2.55
6	José Plaza																	0.70		0.70
Local																				
1																				
n																				
											Subtotal									
											Total									

 Full time input
 Part time input

VIII. Form TECH - 8 – WORK SCHEDULE

The work plan should considering time for activities consistent with the work schedule shown below:

N°	Activity ¹	Months ²											
		1			2			3			4		
	PHASE I: PRELIMINARY GEOTHERMAL RESOURCES ASSESSMENT & ROAD MAP DEVELOPMENT												
1	Review of Information (Previous Studies, Existing and Conceptual Technologies, Jamaica Energy Demand, Pricing Structure, Electricity and non-electricity applications, Existing Legislation and Regulatory Frameworks, among others)												
2	Preliminary Assessment of the Geothermal Resources in Jamaica (Regional Geology, Maps, Prospective Regions, similarities in the Caribbean Region, etc.)												
3	Road Map development of Geothermal Resources (including Information, Exploration, Geothermal Resources Assessment, Development Scheme, Environmental Impact Mitigation, Cost Estimation, etc)												
	PHASE II: ASSESSMENT OF GEOTHERMAL FLUIDS HANDLING & POWER GENERATION FACILITIES												
4	Assessment of Required Geothermal Fluids Handling and Power Generation Facilities												
5	PROGRESS, FINAL REPORT AND RESULTS PRESENTATION												

On behalf of Procesos y Negocios Integrales, C.A.:

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