

EXPRESSIONS OF INTEREST AND FINANCIAL PROPOSAL FOR CONSULTING SERVICES FOR PHASE I FIELD DEVELOPMENT OF THE CHACHIMBIRO GEOTHERMAL PROJECT, ECUADOR

SCOPE OF SERVICES

INTRODUCTION

The public electric power service is a strategic basic service. CELEC EP oversees the generation, transmission, distribution, commercialization, import and export of electric power, for which it is empowered to carry out all related activities. The Chachimbiro Geothermal Project is an infrastructure project for electricity generation with renewable energy.

Among the aforementioned activities, and with the objective of contributing to the reduction of fossil fuel consumption in electricity generation, CELEC EP has been preparing for some years, and in coordination with the Japan International Cooperation Agency (JICA), the pre-feasibility study of the Chachimbiro geothermal project located in the province of Imbabura in northern Ecuador. For this reason, the execution of the field development phase of the project and the preparation of the subsequent construction of the geothermal energy plant are considered of utmost importance.

To fulfill this objective, it is essential to hire a consultant to carry out the support and counseling activities related to the contracting of drilling works, their supervision and monitoring, as well as the evaluation of the reservoir and basic designs of the geothermal plant.

SERVICES REQUESTED FROM THE CONSULTANT/AUDITOR

Support CELEC EP (Ecuadorian Electric Corporation), which will review the project's documentation; prepare the Terms of Reference for the procurement of materials and drilling services; support the process for hiring the company that will lead the drilling services, supervision/inspection of the drilling job, and tests and trials in the wells; design and construction of the wellhead plant of maximum 5 MW; basic design of the 50 MW plant; environment effect investigation, and environmental management plan, among other activities that include the corresponding knowledge transfer.

PROJECT BACKGROUND

Current Status – Chachimbiro Geothermal Project

Initial Pre-feasibility Study

During 2011 and 2012, geoscientific studies were conducted in the zone of the project. As a result, temperature indicators of 225°C to 235°C in the reservoir were obtained. Temperature is the most important verification parameter in the zone, followed by permeability and the existence of fluid, which lead to a proposal for building an exploratory well to intercept fault zones as a following step.

Preparation Study

To confirm the existence of the geothermal reservoir, to identify the existence of temperatures equal or above 200°C, presence of permeable rock, and the characterization of the reservoir's fluids, complementary geoscientific studies were carried out, as well as an exploratory well 2000m deep (PEC1).

Once the drilling of PEC1 well and its tests were concluded, the results were integrated to a concept model that concluded the existence of a geothermal reservoir in the studied zone. As a result, it was proposed to continue with a following phase focused on the extraction of geothermal fluids to analyze their characteristics and design the geothermal plant to be built.

The project consists of two phases:

- **Phase I Field Development:** E/S Loan (Engineering Services): Consulting service for Field Development Study with drilling of 5 wells (4 producing wells and 1 for reinjection) and the construction of a wellhead energy generation plant (test plant, maximum 5MW).
- **Phase II:** Implementation Loan: Construction of additional needed wells, steam hauling system, geothermal power plant (50MW), and Consulting Service.

This scope for consulting services stipulates the activities for Phase I.

Consulting services for the works of the Chachimbiro geothermal plant construction project. Phase I: Field Development

The Ecuadorian Government will obtain a loan from the Japan International Cooperation Agency (JICA) to finance the Construction Project of the Geothermal Plant in Chachimbiro, which aims to stabilize the Ecuadorian electrical system through renewable sources.

Phase I Field Development includes the drilling of five geothermal wells, which will be evaluated to establish the parameters under which the wellhead power plant will be constructed and operated and also under which geothermal generation plant (50MW) must be designed and the parameters under which it will operate.

Consulting Services Description

The following services must be carried out in close coordination with CELEC EP. As the Executing Agency, CELEC EP is represented by the Directorate of Planning and Development of Expansion Projects.

Even though the tasks to be performed by the Consultant have been specified with the utmost possible detail, the following list of activities and tasks cannot be considered as an exhaustive and comprehensive list of the Consultant's obligations. Therefore, the Consultant will be responsible for verifying the scope of the indicated services and for proposing their expansion, reduction, or modification when deemed necessary, according to their professional experience and the knowledge obtained during the

preparation of the offer, provided that the services allow to ensure the correct and timely execution of the works and supply of the equipment.

The consultant is expected to conduct the following activities:

1. Planning and detailed preparation of the Field Development Phase and supervision of the execution of works (Drilling services).
2. Assistance to CELEC EP in the preparation and pre-contractual phase during the bidding process for contracting drilling services, including the preparation of documents, technical specifications, budget, and any other required documents, as well as counseling during the qualification of interested parties.
3. Basic design of the 13.8kV transmission line for the wellhead plant.
4. Preparation of the Environmental Management Plan, Environmental Monitoring Plan, and Environmental Impact Study.
5. Engineering, procurement, Implementation and construction of a wellhead plant of up to 5 MW.
6. Execution of reservoir tests with generation at the wellhead (up to 5 MW).
7. Basic design for the construction of the steam hauling system, transmission line and 50 MW geothermal power generation plan, detailed design of additional necessary wells, and the corresponding continuous transfer of knowledge.

The scope of consulting services at each stage covers all necessary aspects, from selection of contractors for works to provision of goods and services. Thus, JICA provides separate types of standard prequalification and bidding documents. The tasks of the Consultant and the terms used will be based on these standard documents and, in this context, the terms Consultant and Engineer (Auditor) may be used interchangeably.

Consultant Staff

To comply with the consulting services, the consultant is expected to have a key technical team consisting of specialists who may be of national and international origin with full command of English (spoken and written) and preferably, also Spanish.

The Consultant must have specialized personnel with experience in diverse fields involved in the project, who should be available as support and/or replacement in different circumstances. Additionally, it is implied that both the specialties and the number of experts described are of an indicative nature.

There must also be auxiliary personnel such as technicians, supervisors, secretaries, drivers, draftsmen, auxiliary surveyors, and others, if necessary.

TERM FOR THE PROVISION OF SERVICES

The term for the provision of consulting services will be around fifty-six (56) months plus twelve (12) additional months as a liability period for defects, in which the permanent presence of the Consultant/Engineer (Auditor) is necessary. Consulting services are

estimated to begin in the second half of 2025. The work must begin immediately after the corresponding advance is delivered.

The terms, estimated as a reference for each of the components, are the following:

1. Start of consulting services – Completion of detailed design and tender documents (18 months).
2. Bidding process, including prequalification and monitoring (14 months).
3. Drilling works, project validation with results from the first two wells -includes drilling mobilization and demobilization (16 months).
4. Evaluation of reservoirs, preparation, and implementation of the wellhead plant (16 months).
5. Reservoir evaluation with wellhead generation (1 month).
6. Phase II preparation (4 months).
7. Defects Liability Period (12 months).

The effective times of participation of the professional personnel will be determined by the Consultant based on the real requirements and their professional experience.

The expected times represent the common cost calculation basis by the bidders.