ELECTRIC CORPORATION OF ECUADOR

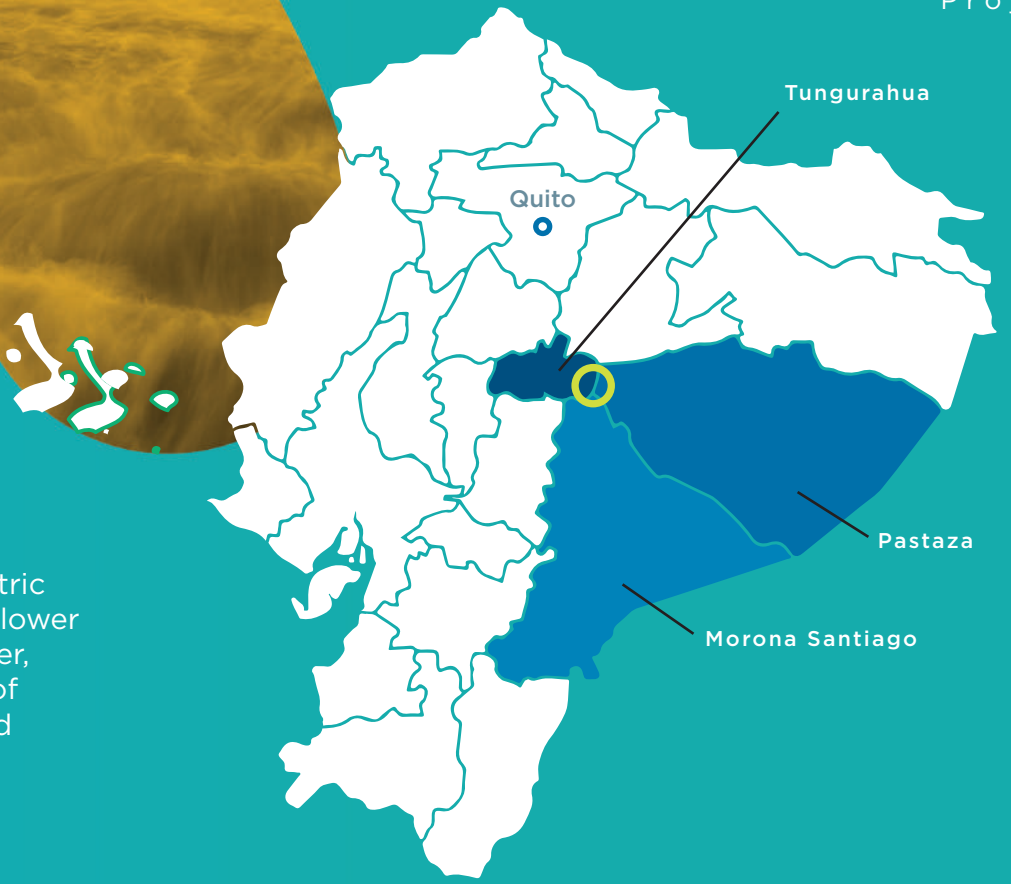
Abitagua Hidroelectric Project

CELEC EP
Corporación Eléctrica del Ecuador

Futuro Energético

LOCATION

The Abitagua hydroelectric project is located in the lower basin of the Pastaza River, between the provinces of Tungurahua, Pastaza and Morona Santiago.

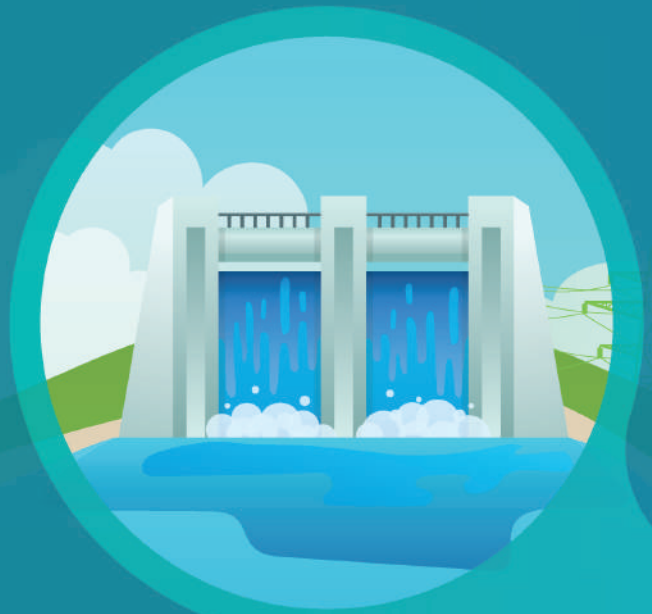


The accessibility of the project is good as it is located along the existing Baños-Puyo highway. This highway has excellent conditions for the provision and removal of construction materials and debris.

The conformation of roads with a width of 6 m is planned, with side slopes with a 1:2 inclination and with improvement of the roadway through compaction and placement of a material layer of compacted subbase material as wearing course.

For access to the alternative selected in the prefeasibility study, the improvement of the current access road to the “Tres Cascadas” farm is identified as the best option. From this existing road, new roads will have to be created for machinery access to the river and to implantation sites of the diversion and dam works, as well as for the provision and removal of construction material and debris.

GENERAL DESCRIPTION



In the prefeasibility phase, a series of alternatives were studied for energy development, the main characteristics of the selected alternative (number 7) were the following:

Dam

The dam consists of a conventional gravity-arch shaped type structure in roller compacted concrete of approximately 66 m high and 350 m long at the crown of the dam.

Hydraulic Circuit

The hydraulic circuit is sized to carry the design flow rate of 200 m^3/s and it's made up of the intake or catchment work, a 100 m long loading tunnel a 71.50 m long vertical well, a 50 m long penstock with its respective bifurcation and a 3,522 m long discharge tunnel.

Surge Tank

Given the length of the discharge tunnel, the installation of a surge tank has been planned so that it absorbs the oscillations of mass resulting from the untimely start-up or shutdown of the turbines. The surge tank will consist of a tunnel with a regular arch section, unlined (except for the crest) of 9.0 m high by 9.0 m wide, developed over a length of 300 m.

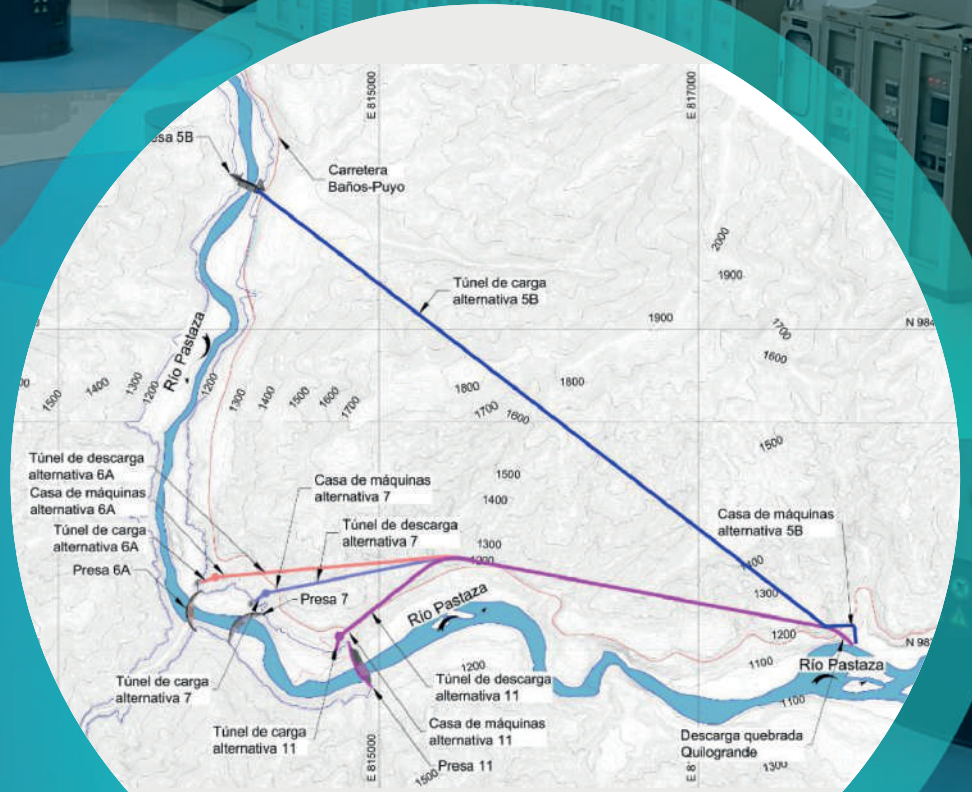
Interconnection

As an alternative for the interconnection of the Abitagua power plant in the prefeasibility studies, there is a connection to the Topo substation, for which a 230 kV yard must be expanded and installed in this substation. A 230 kV transmission line must be extended from the Topo substation to the San Francisco-Totoras transmission system. The connection scheme and number of circuits should be defined in subsequent studies.

Power House

The planned powerhouse is underground or in a cavern and will accommodate 2 vertical axis Francis turbines fed from the bifurcation of the penstock.

The planned dimensions of the powerhouse are approximately 70 m x 19.90 m in plan, where the caverns of the transformer, substation, and gates at the exit of the turbine diffusers will be housed.



Pre-feasibility plant alternatives studied

Level of study	Prefeasibility			
Existing studies	• Topography and Cartography • Hydrology • Sedimentology • Geology y geotechnics • Environmental baseline • Hydro energy			
Power (MW)	165,3	Energy (GWh/year)	1114	
Estimated plant factor (%) and design flow	77% - 200 m^3/s	Study completion date	Year 2019	
Estimated construction time	48 months			
Estimated construction budget	489 (MM USD)	Civil works 326MM UDS Hydro-electro-mechanical works 163 MM USD		

For the project area the following characteristics were evaluated

- **Physical**
  - Land cover and use
  - Hydrology
  - Geology
  - Geomorphology
  - Soils
- **Biotics**
  - Present ecosystems
  - Plant formations
  - Types of vegetation
  - Flora and fauna
  - Mammals
  - Bird fauna
  - Herpetofauna
- **Archaeological**
- **Socio-economic**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