

The Beles Multipurpose Project is located in the south-western bank of Lake Tana, some 350 km north-west of Addis Ababa and 70 km west of Bahar Dar, and is aimed to increase energy and power supply to the national grid.

The Project foresees the construction of a single stage power scheme with a total installed capacity of 468 MW, given by four Francis turbines to be installed in an underground powerhouse under a total gross head of about 335 m. The average annual generation capability is 2050 GWh/y. The hydropower plant can be excluded for irrigation purposes by the means of an underground by-pass.

Apart from a 820 m long approach channel, the project develops completely underground for a total length of about 20 km. A pressure headrace tunnel approx. 12 km long conveys water, up to 160 m3/s, from Lake Tana into the underground powerhouse, accomodating the four Francis turbine – generator units. The restitution into the Jehana River, a small tributary of the Beles River, is assured by a tailrace tunnel 7.3 km long, running free-flow.

The underground works consist of 1) a powerhouse cavern 105 m long x 19 m wide x 40 m high, 2) a transformers cavern 60 m long x 16 m wide x 13 m high, 3) two TBM excavated tunnels (headrace and tailrace respectively) characterized by an inner circular section of 7.2 m diameter, 4) an underground penstock approx. 340m long, 6m to 2.8m internal diameter, including steel lined pressure shaft 274m high, high pressure tunnel and manifold, 5) a surge shaft with a diameter of 18 m and a depth of 91 m, 6) a ventilation and cable shaft, 7) an access tunnel to the powerhouse, 1.2 km long and 8) an irrigation by-pass diverting up to 77 m3/s flow. The outdoor works are characterized by 400kV switchyard, concrete intake and outlet structures, river diversion works and regulating weirs along the Jehana River and more than 40 km access roads.