

UGANDA - ISHASHA SMALL HYDROPOWER PROJECT

Energy poverty is one of the most significant economic challenges facing Africa today. Inadequate access to electricity is endemic to most African nations, constricting their potential to develop and prosper and limiting the capacity of their people to live healthy lives. Lack of electricity negatively affects both economic growth and poverty reduction. Without modern energy services, medicine and food cannot be refrigerated, industry cannot efficiently grow, and children cannot study at night or access quality learning resources. In rural areas throughout sub-Saharan Africa, biomass is the primary source of energy. In rural Uganda, up to 90 percent of energy consumption is fueled by burning biomass. Wood fires, used for cooking and heating, pollute the environment, cause high incidence of respiratory disease, and contribute to rapid deforestation. While the problem of energy supply plagues the entire continent, electrification rates in some African countries are far below the average. In Uganda, the World Bank-Sustainable Energy for All database estimate only 22% of the population (mostly in the urban areas) has access to electricity.

While small hydropower projects are becoming more prevalent, Uganda's hydropower development has typically focused on large hydro projects that utilize the waters of the Nile River. However, past experiences with large hydropower in Africa have often been negative. Projects have forced communities to resettle or disappear, damaged freshwater ecosystems, and prioritized urban development. Conversely, small, mini, and micro hydropower has great potential for reaching rural communities in Uganda and across Africa: these systems have lower capital requirements, can be sized to meet demand and local resource availability, and can be readily integrated into a balanced mix of small-scale renewable energy resources that are adaptable to local needs. Given its scale, small hydropower also has the advantage of affecting smaller populations and land areas, enabling its benefits to the surrounding communities to outweigh costs.

The Ugandan government partially privatized the energy market in 1999, enabling private investors to participate in the generation and distribution of power. However, the World Bank reports that the risk factor associated with investments in countries like Uganda is perceived to be significant and there are several barriers to private sector participation in small hydropower. Despite the Ugandan government's push to expand small hydropower, the relative lack of experience with such projects, lack of grid infrastructure, and a lack of access to necessary technology leave huge amounts of potential energy generation unexploited.

The Ishasha Small Hydropower Project supports a 6.5 MW small hydro power station located on the Ishasha River in the Kanungu District, an impoverished district with a population of 205,095. Located in southwest Uganda, Kanungu borders the Democratic Republic of Congo and is in the Western Region, a largely undeveloped, mountainous area with protected natural reserves but little infrastructure or industry. This project provides much-needed electricity to households, businesses and institutions in Kanungu using efficient and carbon-neutral hydropower generation. The Ishasha Small Hydropower Project is being developed and managed by Eco Power Uganda Limited (EPUL), a firm specializing in the design, construction and operation of small hydropower plants. Its parent company, the Eco Power Group in Sri Lanka, has a proven track record of developing and maintaining small hydropower projects (SHPs) across Africa and Asia.

TECHNOLOGY

The Ishasha Small Hydropower Project (the "Plant" or the "Project") harnesses the energy of Ishasha River waters 500 meters below the Bwindi Forest National Park and drops the water 90 meters through a steel penstock to two turbines. The power generated by the Project will be sold to the Uganda Electricity Transmission Company Limited (UETCL), which has signed a 20-year power purchase agreement with EPUL. Electricity has been provided to the local communities through a 33 kV transmission line connecting the plant to the national grid, financed and constructed by the project developers. The two parties have negotiated and signed a tariff structure that ensures the financial and operational sustainability of the hydropower plant, allowing it to respond to the area's fluctuating demand for power.

The Plant generates clean, renewable power for the national grid and displaces the burning of oil for electricity. Because the Ugandan power grid consists of hydropower and oil-based generation plants, the emissions factor will be 0.68 kg of CO₂ per kWh of generation, based on experiences of other countries with a similar generation mix. On this basis, the 29.518 GWh of electricity expected to be generated by the Ishasha Plant will produce approximately 20,000 certified emission reductions (CERs) annually from 2010 to 2021.

As a SHP, the total land area required for the Ishasha Project is only four hectares. The local communities that occupy the land surrounding the hydropower plant signed onto a Resettlement Action Plan prepared by EPUL. Under the plan, approved by Uganda's National Environmental Management Authority, no one was resettled, as only small portions of surrounding individual plots are being used. Written agreements documenting compensation payments for the persons living on the land were negotiated and executed before construction of the plant began. The Government of Uganda issued long-term leases for the land to EPUL, as compensation was paid to the landowners and certified by the Local Authorities.

SOCIAL BENEFITS

Lack of electricity in Uganda, particularly in rural areas like the Kanungu District, is one of the central barriers to improving living standards and economic opportunities for the local population. Rural electrification rates in Uganda were as low as one percent in 2000, with even fewer households having access to reliable, grid-based transmission lines, and, according to the World Bank, are still only around 22%. Current supply does not come close to meeting the demand for power: The World Bank reports that some rural businesses even resort to self-provision of electricity at a far higher cost than would exist in a commercial delivery system. Government officials note the difficulty of expanding electricity coverage to new customers when existing customers' requirements remain unmet. Thus, the Ugandan government strongly supports generating power through small hydropower sources, an eco-friendly way of taking advantage of the country's renewable natural resources.

The positive economic impact of the Ishasha Small Hydropower Project cannot be overestimated. Uganda's rural population remains isolated and without the benefits of adequate physical infrastructure and integration with regional, national and international markets. Since the average rural household use of electricity in Uganda is between 20 kWh and 100 kWh per month, many additional households will be able to access electricity through the power generated by the Project. Many of the homes and businesses in the Kanungu District either run inefficient, polluting, and expensive diesel generators or survive without electricity, resulting in lower productivity and less time for income generating activities. The Ishasha plant has improved the access to, reliability of, and quality of the electricity supply used by a significant portion of the 41,000 households in Kanungu District, as well as its numerous health facilities, educational institutions, and commercial enterprises. The list of local beneficiaries of increased power access and reliability include many of the 132 primary schools, 13 secondary schools, a teacher training college, a public hospital and 22 health clinics, and private medical centers located in the District. Additionally, the District is home to almost 500 registered industrial and commercial establishments that consume electricity, some of which are the major enterprises of the region. Tea and coffee processing factories, grain mills, and other local commercial business suffer from intermittent or no access to power. This reliable source of clean, renewable energy has supported the growth of local entrepreneurs, and helped increased the potential for expanding the rapidly-growing telecommunications and manufacturing industries.

PROTECTING THE SURROUNDING ENVIRONMENT

The Ishasha River is part of one of Uganda's most spectacular and valuable ecosystems, running through Bwindi "Impenetrable" National Park, a recognized World Heritage Site. Located less than a mile from the border of the park, the Ishasha SHP plays an important role in preserving this natural resource while contributing to the economic growth of the surrounding area. The project developers from the outset ensured that the environment surrounding the hydropower

plant was not damaged by maintaining the natural flow of the Ishasha River. Environmental clearance, obtained early on from the National Environmental Management Authority and the Directorate of Water Development, requires that a minimum quantity of water be released in an unrestricted manner; the hydropower plant allows 250 liters/secs of water through the dam without impediment and uses the remaining available water flow to generate power.

CARBON FINANCE

The Ishasha SHP needed carbon finance to mitigate its associated risk and make viable the expansion of renewable energy and rural electrification through a clean source of power. The Government of Uganda has set aggressive goals for expanding electrification to rural villages: its Rural Electrification Agency has a medium-term goal to connect about 132,500 low-income Ugandan households (or approximately, 655,000 beneficiaries) to electricity grids throughout Uganda, in rural, peri-urban and urban areas in four years, and a long-term goal to connect all households in Uganda by 2035. While Uganda is rich in untapped resources for renewable energy, accessing project finance is the main obstacle to achieving this goal. Private investors and financial institutions are wary of the risks involved with financing rural electrification and clean energy projects. Without the revenues created from the sale of carbon offsets, the Ishasha SHP would not have been possible. It now serves as a replicable demonstration of how renewable energy projects and rural electrification can be financed and developed with carbon credits as a relevant source of funding, how carbon credits can tangibly support sustainable development by enhancing the financial viability of higher risk investment in clean energy in higher risk developing economies.