

Birere District of Goma 200 kva Bio-Power Generation
and
Bio-mass and Cooking Stove Substitution Project

Project Sponsor:

Nordic Sun Congo Foundation

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Special Important Note

The information contained in this report is accurate and judged to be feasible however this report is not a detailed project plan. There will need to be an on-site visit and evaluation to establish the exact technical specifications for the final project. The budget may have to be adjusted based on unknown requirements and specifications that may be added by government and external authorities.

Project Overview and Requirements

The project is being submitted to the Great Lakes Economic Council (CPGL) as part of the electrification project for the 40,000 families in Birere District of Goma. The main objective of this Project is to use the elements of this project as a Pilot electrification process that can be replicated across all of North Kivu. The project is in support of the following recommendations of the 2007 Report of the Economic Commission of Africa entitled "Optimizing UN Resources for the Development of Africa's Energy Sector". Specifically the project fulfills the following recommendations as identified in the Report:

World Summit on Sustainable Development (WSSD)

"...increasing access to reliable, affordable, economically viable, socially acceptable and environmentally sound energy services and resources"

"The second priority challenge is to improve the energy production mix by increasing the proportion of energy obtained from renewable energy sources".

New Partnership for Africa's Development (NEPAD)

- Establish and promote programmes, partnerships to support Africa's efforts to implement NEPAD objectives on energy: securing access for at least 35 per cent of Africa's population within 20 years, especially in rural areas.
- Provide support to implement other programmes on energy, including the promotion of cleaner and more efficient energy; use of natural gas; and increased use of renewable energy

Department of Economic and Social Affairs (DESA)

- Access to energy—increasing the share of renewable energy
- Energy efficiency—cost-effective emission reductions
- Power sector—setting the stage for expanding access and driving development

Economic Commission for Africa (ECA)

- Providing technical assistance in the formulation of energy policy;
- Strengthening human resources and capacity building;
- Improving power sector reforms for the provision of sustainable energy;
- Promoting regional integration in the development of renewable energy; and
- Improving energy accessibility

United Nations Human Settlements Program (UN-HABITAT)

- Urban energy program

The United Nations Development Program (UNDP)

- Promoting rural energy services to support growth and equity;
- Promoting clean energy technologies

United Nations Environment Program (UNEP)

- Rural energy enterprise development program

The Food and Agriculture Organization (FAO)

- Generation and dissemination of information on bio-energy production, trade, and utilization

United Nations Educational, Scientific and Cultural Organization (UNESCO)

- Technical assistance and support to pilot initiatives on renewable energy.
- Capacity building, training, advocacy, and public information

United Nations Industrial Development Organization (UNIDO)

- Improving energy efficiency

The World Bank Priorities

- Support to renewable energy and energy efficiency development
- Energy access issues;
- Rural and peri-urban electrification
- Climate management

Main Elements of the Projects

1. Purchase of a 200 kva Bio-Power Generator that is manufactured in the EU.
2. Afforestation of degraded parcels in North Kivu to assist with the start-up and reserve store for bio-mass material for the Project.
3. Manufacture and purchase of improved indoor health and environmentally friendly stoves and bio-mass briquetting equipment to assist with efforts to improve the health and livelihood of women and to allow for a low cost operational model of this project.
4. Maximum Job creation objectives especially for at-risk and vulnerable women.
5. Financially self-supporting nature of the Project could allow the residents to benefit financially from the sale of bio-mass and environmental stoves. It will also be possible to purchase additional Bio-Power generation equipment from the sale of the electricity provided the project can be structured in a self-supporting manner with the assistance of SNEL the DRC national electrical utility.
6. Significant Carbon Offset credits can be generation and Foreign Direct Investment can be attracted by the introduction of Bio-Power and the other elements of this Project.
7. The 200 kva Bio-Power Generator can be operational within 6 to 9 months after the agreement is signed and an order placed. The necessary legal, political and administrative details can delay the timeline of the Project.
8. The excess heat that is generated as a byproduct of the Bio-Power generation will be fully utilized to support other income producing activities such as a brick kiln or wood drying operations. These activities will depend on the final site selection and the availability of a significant work space at the generation location.

Bio-Power Generation Details

The main element of the project is the 200 kva Bio-Power Generator that will be used to supply power for the benefit of the 40,000 families who live in the Birere District of Goma. The Bio-Power Generator will be supplied by GreenForze, an EU based company with experience in bio-energy projects in Africa. The recommendation is that the Bio-Power Generator be operated for 18 hours a day from 6 am until 12 pm midnight. This would result in approximately 1,300 MWh of annual power being produced. This will also require the sourcing of 5,000 kg of bio-mass material per day. It is suggested that each family contribute ½ to 1kg of dried bio-mass per day. The families would then get the electricity at a greatly reduced rate. With the other improved health and livelihood aspects of this Project they would also be able to greatly increase their income. Other income producing activities are possible since there is a significant heat byproduct that can be used to support other income generating activities.

Bio-Mass Briquette Production Details

In order to generate the necessary amount of bio-mass and to slow the destruction of the forest resources there is a need to simultaneously develop a low cost source of bio-mass and develop a charcoal substitute. The technology that is selected has been developed by a number of sources including the Legacy Foundation. The Foundation has developed a low cost, low tech micro-enterprise-based briquetting technology that converts non-productive agricultural residues, wood byproducts and waste paper into economic and environmentally friendly bio-fuel that can be used to supply the Bio-Power Generator and supply the local cooking fuel market for the families and communities in Goma and all of North Kivu. The briquettes can be sold on the open market as a less expensive alternative to charcoal and fuel wood. The briquette production will provide employment and improve the health, especially of women, while significant progress can be made to save the existing forest resources. Prior to the Bio-Power Generator being installed, an intense series of small scale briquette production trainings and “train the trainers” sessions will be developed in the Birere District of Goma and other locations around North Kivu. This training activity will ensure a flow of high quality, low moisture briquettes are available as quickly as possible.

Afforestation Activities

In cooperation with our partner organization, African Green Footprints, the Project will expand a current tree planting project to serve as both a bio-fuel reserve location and a livelihood enhancing commercial wood plantation. If the trees are not needed as bio-fuel they will be sold on the market to be used as utility poles. It is these types of multi-purpose activities that are needed in the DRC to ensure the employment benefits of development flow to as great a number of people over as wide an area of North Kivu as quickly as possible.

Manufacture and purchase of improved indoor health and environmentally friendly stoves

Approximately half of the world’s human population depends on burning solid fuels for cooking, boiling water, and heating. Solid fuels include wood, charcoal, coal, crop residues, other biomass, animal dung, and various wastes. The WHO (World Health Organization) estimates that more than 1.5 million people prematurely die each year due to exposure to the smoke and other air pollutants from burning solid fuels. Millions more people suffer with difficulty in breathing, stinging eyes, and chronic respiratory disease. Women and children are disproportionately affected, because they tend to spend more time close to cook stoves. WHO identifies indoor smoke from solid fuels among the top 10 health risks and indoor air pollution is responsible for an estimated 2.7 percent of the global burden of disease.

Charcoal stove are famous for their smokeless burning from a particulate Matter (PM) point of view but little is discussed about the relative high Carbon Monoxide emissions and their effects on women’s

health. The Approvecho/Shell Foundation Benchmark testing has shown that the charcoal stoves are as high in CO as they are low in PM. However, the TLUD-ND stoves are BOTH low in PM and CO. www.bioenergylists.org/andersontludcopm

We will develop with our partners, the most efficient stove for the manufacturing and distribution realities in Goma and North Kivu. The most important aspect of the healthy stove part of our project will be to develop an additional, small scale, improved livelihood component of our project so the population will have another method to afford the electricity. We will assist with training and setting up small scale production shops to manufacture the stoves.

Other Manufacture and Business Activities

With the generation of a significant amount of heat as a byproduct of the power generation, other types of activities will need to be established to take advantage of this excess heat. Many different types of drying activities such as wood or brick kilns, food drying, processing and cooking can be explored and encouraged for the community.

Project Methodology

The introduction or enhancement of electricity for a community that has been without is always a very challenging endeavor. The city of Goma has some extremely challenging dynamics that add significantly important elements to this challenge. Chief among these challenges is the necessity of designing a system that will allow the community to come together and materially contribute to the success of the project. The bio-mass briquette production and other livelihood aspects of this project will serve this function. All 40,000 families of the Birere District will be required to contribute a minimum of 1 kg of dried bio-mass per day or pay someone else to provide the bio-mass for them in order to have access to the electricity power. We have made assumptions in the budget section for this suggestion that may have to be adjusted depending on the outcome of the discussion with SNEL, the DRC government and other stakeholders. The introduction of the improved indoor health stove technology and the potential for other small and micro business activities there could be many different ways for micro and small business to expand and grow in Goma along with the introduction of this type of electrical power. The community leaders will also have to discover ways to encourage the planting of fast growing trees and fully utilizing all available local bio-mass material for the power generator. These bio-mass production activities can also expand to the surrounding communities and supply or purchase dried bio-mass. Part of the Project goals will be to conduct a series of Birere District community meetings to develop a Public Participation outcome for the Project.

Project Budget

The exact goals of the Project will need to be refined according to the final goals that will be approved for this Project. While it is the belief of all of our organizations that a more comprehensive Project with more optimistic goals has a greater chance for success it is understood that some of these budget items may fall outside the scope of the Funding for this project.

Conclusion

The proposed Birere District Electrification Project will be a very challenging and ambitious Project in both scope and implementation. The basic project can be implemented in a more streamlined manner if necessary. At the conclusion of the meetings with the various stakeholders a more exact budget will be developed. A tiered electrical pricing scheme can be developed that would charge a higher price for businesses and individuals.

We are open to discussing in more detail all the elements and assumptions of the Project and adjusting the final Project to match the expectations of the various funding agencies and stakeholders.