Small Grid Connected Biomass Power Plants in Nicaragua

D. Walden*[a] , S. Filomeno[b]
[a]Bronzeoak Corporation, 5210 35th St Ct W., Bradenton, Florida 34210 USA
Fax: 1 941 751-0943; bronzeoakc@aol.com
[b]Prolena Office, Managua, Nicaragua

Bronzeoak, a private company which develops energy projects, and Prolena, a Nicaraguan NGO, which promotes a sustainable environment, have coordinated their efforts to promote and develop privately owned biomass to energy projects in Nicaragua.

The power plants under development include:

- 1432 kW (net) rice husk fired located at a rice and flour mill complex,
- 1136 kW (net) peanut shell fired located at a peanut mill,
- 5,000 kW (net) sawmill waste and forestry residue fired located to optimize collection of waste, source of cooling water and off-take of electricity.

Techno-economic feasibility studies have been prepared for all three projects to assess commercial viability and environmental impacts and benefits. The relatively small size of the rice husk and peanut shell projects provided challenges to achieve economic viability. Potential carbon credit quantities which each project will create have been estimated.

The rice and peanut shell projects have been pre-selected by the World Bank Prototype Carbon Fund (PCF) as candidates for the Central American Fund which the PCF is developing. When the selection process is complete, the projects should secure long term contracts to sell carbon credits which they create. This revenue stream is particularly important because it helps to offset the higher costs generation experienced by biomass power plants which tend to be relatively small compared to fossil fueled plants.

The rice husk and peanut shell projects will sell a portion of their electrical production to supply close to 100% of their host mill requirements. The balance will be sold to third parties, possibly through the spot market. Another option may be to negotiate a PPA with the private distribution company. The sawmill waste plant will need to sell all of its output to third parties.

The rice husk plant has the potential to produce an additional revenue stream from the high silica ash which results from combustion of this fuel.

Nicaragua is at an advanced stage of privatization of its generating and distribution systems. However, there is no special tariff or set aside for renewable energy. Therefore, the biomass projects need to be competitive with other sources of new power. In recent years, generation expansion has been by residual fuel oiled reciprocating units which effectively set the marginal system cost.

The projects are considered to be typical of many which could be developed to avoid installation of new reciprocating plant in many developing countries.

The paper describes the key technical, environmental and commercial characteristics of the projects. Key steps in the development process, the influence of system design and equipment options on project economics, environmental impacts and benefits (including estimation of carbon credits) are examined. The results of financial modeling are used to compare base cases with alternates and reach conclusions concerning project viability.

Conclusions

The evaluation shows that small biomass projects can be implemented on a commercial basis under the current Nicaraguan electrical market conditions. The possibility to create and sell carbon credits on a long term basis to the World Bank Prototype Carbon Fund is an important factor in reaching commercial viability.