Executive Summary

a) **Target Countries:** Costa Rica, Nicaragua, Panama

b) **Point of Contact:** Ajit Srivastava, Ph.D., P.E., Professor and Chair, Biosystems and Agricultural Engineering, Michigan State University, East Lansing, MI 48824, email: srivasta@msu.edu

c) **Statement of Work:** Economical on-site renewable energy systems using agricultural waste streams will help rural communities in Central America increase access to affordable clean energy, advance development of low emission and high efficiency energy technologies, and alleviate environmental impacts of the waste streams. **The goal of the project is to develop and deploy an integrated small-scale self-sustained waste-to-clean energy generation system producing value-added by-products such as fertilizers for local farming applications and reclaiming water.** A small-scale portable demonstration solar-biopower generation system will be first developed to convert agricultural waste streams such as animal manure, crop residues, and food wastes into clean electricity and heat, reclaim the wastewater, and produce valuable byproducts. An outreach program including technology transfer, business development, and workforce training will also be established at University of Costa Rica, collaborating with universities and companies from Panama and Nicaragua, to further extend such technology to rural communities in Central America.

d) **Objectives and Activities:** In order to fulfill the goal and demonstrate the solar-biopower concept in participating countries, and to a larger extent in Central America, four specific objectives will be carried out:

1) Optimize local thermophilic anaerobic microbial consortia on mixed waste streams;
2) Design and implement the integrated portable solar-biopower generation system on mixed waste streams at UCR;
3) Evaluate technical and economic performance of the system for various rural scenarios in Central America; and
4) Establish an outreach program in Central America to include technology transfer, business development, and workforce training.

e) **Funding Requested:** $1,000,000

f) **Impacts of the Proposed Project:** The proposed work will innovatively combine solar and biological technologies into an integrated system that is suitable for local rural conditions in Central America to generate energy on-site. The success of the project will clearly demonstrate a self-sustaining energy generation process on locally available agricultural wastes to satisfy the energy needs of the communities, and to alleviate environmental concerns of agricultural wastes disposal. Consequently, it becomes considerably more likely that most rural communities in Central America will adopt the proposed solar-biopower concept not only as a clean energy generation unit but also as a waste management tool. In addition, the solar-biopower concept has a great potential to be applied to a wide range of waste streams from agricultural to human and municipal. The use of such technology will dramatically change the status of waste treatment, and will eventually turn municipal/agricultural wastes from an environmental liability into a public and private asset.