

Energy systems are embedded in social, economic, and environmental contexts. Analyses of these systems and their components need to provide cognitive space for considering and comparing choices that is inclusive of these various contexts and their interrelations. The resulting complexity is difficult to manage in small scale projects and is often beyond the capacity of small companies implementing bioenergy systems, resulting frequently in project failure (Buchholz et al. 2009). This research aims to refine sustainability assessment processes for end users and build empirical arguments for the use of such methodologies through applied research. Using multi-criteria analysis, researchers will further develop a sustainability assessment framework to evaluate alternative biomass supply options of small scale gasification projects operating in rural Uganda.

Access to modern energy services, such as electricity, is crucial in order to achieve development goals of poverty reduction, improved education, and environmental sustainability. Sub-Saharan Africa is dramatically behind other regions of the world in rural electrification. For example, in Uganda, about 84% of households are located in rural areas, but less than 1% of them have access to modern energy services (Buchholz and DaSilva 2010).

Nascent efforts to provide electricity to rural populations in the region through small-scale bioenergy systems are in various stages of implementation. Pamoja Cleantech AB, a Swedish-Ugandan social business, is currently operating bioenergy systems delivering expanded and affordable electricity to rural communities at three pilot sites in the Mityana, Opit, districts. Biomass such as agricultural residues as well as woody biomass from dedicated source can be used as fuel (Buchholz and Volk 2007).

There is a need for an assessment and monitoring tool that i) synthesizes relevant information from all components of such a system ii) integrates the social, economic and environmental context and iii) facilitates communication amongst stakeholders in a time and cost efficient process (Buchholz et al. 2012). Current activities build on a preliminary framework developed by co-PI Thomas Buchholz and was previously tested by M.Sc. students from France and Sweden on three case studies (Furtado 2012, Christensen 2013, Joërg 2013). Further research will work to fully capture sustainability requirements in the ecological, social, and economic sphere through testing on a wide range of case studies. This will set the stage for a larger research effort in building, implementing, and disseminating a generic sustainability assessment framework for small-scale bioelectricity systems in rural East Africa. In addition, application and analysis of MCA methodologies for project valuation will continue to develop strategies for energy system analysis which build stakeholder capacity to incorporate social, economic, and environmental considerations.