Background on the Identified Need

Over 1.6 billion people worldwide do not have access to electricity; more than 3 billion people rely on solid fuels, including biomass and coal, for heating and cooking needs. In sub-Saharan Africa, approximately 250 million people lack access to electricity and biomass accounts for 86 percent of energy consumption. Relying on kerosene lighting and rapidly dwindling wood supplies, these same individuals will be hardest hit by climate change. In addition, the health consequences of using solid fuels for heating and cooking are staggering. Exposure to indoor air pollution was responsible for 1.5 million deaths globally in 2002; 396,000 people - mainly women and children - died in sub-Saharan Africa due to indoor smoke. At the same time, water-borne diseases continue to be the leading cause of death in many developing nations. According to the recent WHO report, approximately 4 billion cases of diarrhea are reported each year, causing 2.2 million deaths, mostly among children under the age of five; about 10% of the developing world population is infected by intestinal worms; 6 million people are blind from trachoma with 500 million of the population at risk from this disease; hazardous water contaminants such as arsenic and fluoride threaten millions of people's health. Clearly, improving health in developing countries requires an interdisciplinary approach to sustainable development.

To educate Rice University students on these issues, the Rice 360° Initiative and the Baker Institute Energy Forum cosponsored a Rice University course on "Integrated Approaches to Sustainable Development" (BIOE/CEVE 402). Initiated in the spring semester 2008, the course focuses on the barriers to sustainable development; the interrelated roles of energy, water, health, education, and policy in development; and the new technologies and other tools that promote sustainable development. The course prepares students to conduct an energy and water needs assessment for a community in the developing world and to develop cost-effective solutions. Six students from the pilot course were selected to participate in the Lesotho Sustainability Assessment Project in Maseru, summer 2008.

Project Development in Maseru, Lesotho

Initially focusing on projects in Lesotho, a developing country in sub-Saharan Africa, faculty-student teams will conduct community-level assessments to identify energy, environmental, technological, health, and educational adaptations that when implemented could provide improved, sustainable, and cost-effective adaptive capacity.

Building on the success of this experience, the Lesotho Sustainability Assessment Project proposes to expand efforts to consider a broader range of adaptation technologies that encourage sustainable development.

Why Maseru, Lesotho?

The Project developers consider Lesotho the ideal location for a pilot study. Taking advantage of the following factors, the project will identify locations for pilot programs and collect the data necessary to assess needs, identify possible solutions, implement the most sustainable/cost-effective solutions, and evaluate impacts:

- The Government of Lesotho is relatively stable;
- Institutional relationships may be effectively established and maintained due to the sufficiently high educational levels and small district sizes found in Lesotho;
- Other non-governmental organizations (NGOs) have worked effectively in the country;
- Prior relationships and project development in Lesotho-conducted by Rice University's Beyond Traditional Borders (BTB) Initiative-founded a successful undergraduate internship program in Lesotho in summer 2007, providing a strong foundation for further work there. The summer 2007 experiences established working relationships with the Lesotho Ministry of Education, several local primary and secondary schools, and several NGOs working in the country.

Maseru, Lesotho was identified as a potential project site in the fall of 2006 when researchers at Rice collaborated with NGO staff to identify HIV/AIDS educational needs in settings such as health clinics, primary schools, and orphanages in Lesotho. In spring 2007, four Rice undergrads developed HIV/AIDS educational materials, and in summer 2007, two Rice undergrad interns through BTB spent eight weeks in Maseru, Lesotho pilot-testing these interventions.

The interns' materials were received enthusiastically, and an assessment of student learning showed that students made substantial educational gains as a result. Also, while in Maseru, the undergrad interns developed and implemented an additional program for each NGO partner in response to needs identified on the ground. These were also successful in advancing identified educational goals and priorities. BTB is currently working with the Lesotho Ministry of Education to develop a more comprehensive plan to implement some of these materials on a country-wide basis. The project had a very positive impact on the undergrad interns in Lesotho, who report a strong desire to pursue careers that integrate technology, international outreach, public health, and the development of sustainable policies.

Masianokeng High School: Pilot-Project for 2008

In summer 2007 BTB and Energy Forum staff identified Masianokeng High School, located just outside Maseru, for the summer 2008 pilot location. With support from the Irish government in the 1970s, Masianokeng developed a focus on environmental sustainability. The school has a dedicated staff of administrators and science teachers, some of whom have taught for more than 20 years at this location. The school serves one of the poorest communities near Maseru. Of the 853 students enrolled in the school, 89 are double orphans (having lost both parents), and 104 are single orphans. For many students, the only meal they receive each day is the one provided by the school. Most students walk to school, many traveling 10 km or more.

In summer 2007, Rice faculty, staff, and interns worked with teachers at Masianokeng to collect baseline assessment data for the families whose children attend the school. There are two sources of water in the village: community taps provided by a company called WASA, and a well owned and operated by the village. The water from the community taps is very unreliable: water pressure is frequently poor, and it can take hours to collect water. The water that comes from the tap is believed to be clean. The water that comes from the well, however, is not properly purified and people take no steps to purify it.

Approximately 50 percent of villagers have access to electricity, of which the majority is dedicated to cooking. Those without electricity use parafin or firewood to cook. Parafin can be bought at a small café in the village. However, it may take three hours to gather firewood, a task that is usually performed by girls and women to the detriment of their studies and income-generating activities. Many people cook indoors with firewood and do not have properly ventilated stoves. The students found it very difficult to breathe in these homes. While not complete, these informally collected data provide a picture of some of the important needs in the community and will serve as a guide when building survey tools for a comprehensive assessment of community needs. We have also begun to identify some locally available resources to meet these needs. For example, an organization called Stock Aid is teaching many Basotho areas close to Mafetang district how to build ventilated stoves.