

Session 25, 5/15/07

Final Student Presentations (Powerpoint Shows) – following completion of project proposals, continued from last class

(3) Biogas Nicaragua by Chris Tostado and Xavier Gonzalez

- The Need: Energy for the poor rural farmers in Nicaragua
 - The majority of the population is poor rural farmers
 - 50% of the population is below the poverty line
 - Nicaragua is the 3rd poorest nation in the Western hemisphere
 - Most Nicaraguans currently use firewood for fuel
 - This creates indoor air pollution
 - It requires hours and hours spent collecting the firewood
- A Viable Solution: Biomass Alternative Energy
 - What is biomass?
 - Any form of organic material that has stored chemical energy
 - What is biomass alternative energy technology?
 - The use of biomass for renewable, sustainable energy generation
 - Biogas digesters take advantage of naturally occurring processes as biomass is broken down by bacteria
- Disadvantages of Single Phase Biogas Digesters
 - Batch process
 - Limited in its applications
 - Various chemical reactions with bacteria take place in same environment without specialization (impeding maximum productivity)
 - High start-up times and retention times
- Multiphase Biogas Digester
 - Aspects of our design:
 - Tri-phase, pH controlled continuous bioprocess applied to a developing country's energy challenges
 - Gravitational material flow design in biogas digester facilitates autonomous process dynamics
 - New approach advocating an integrated rural house plan synergistic with biogas technology
 - Advantages:
 - Continuous process at steady state
 - More applications
 - Lower start-up and retention times

- More methane per volume of manure
 - Greater benefit to cost ratio
 - Interchangeable parts make it more modular
- Integrating energy system with local housing infrastructure
 - We want people to think about the design of their housing so that it can be more synergistic with biogas technology
- Our prototype biogas digester
- Potential project phases (We have a 5-10 year plan. This summer we will be primarily focused on phase 1 and setting up for phase 2.)
 - Phase 1: building and testing full scale prototype
 - Phase 2: Symposium and exhibition with model kitchen
 - Phase 3: Dissemination to surrounding regions
 - Phase 4: Company for manufacturing of modular biogas kit and replacement parts
- Summer 2007 Goals
 - Completion of Phase 1 and setting up of Phase 2
 - Make contact and schedule with team members from UNA
 - Choose site (on reserve), plan, design, acquire local building materials, and build a full-scale biogas digester prototype. Troubleshoot design and building problems, and test digester.
 - Design and build small model Nicaraguan kitchen to test the connectivity of the digester and the convenience and compatibility of local rural farmers.
 - Document (with video) everything we do and keep a detailed lab manual for future research and installations
 - Make a strategic short term 2 year plan with our community partners for continuation of project.
- Target community and partners
 - We'll be staying on the coast
 - Rancho Guadalupe
 - The grad student we're working with will be in Managua this summer
- Pictures of the area

(4) DataHealth Pakistan: Disease Mapping in Lahore Pakistan by Ali Alhassani and Ibrahim Kanan

- Motivation
 - Desire to apply statistics knowledge to serve those in need
 - Simple Techniques can be used to prevent many needless morbidities and mortalities
 - Desire to bring healthcare services to the underserved
- Why Lahore, Pakistan?
 - Over 250,000 deaths due to diarrhea

- Over 300,000 deaths due to diseases such as TB, measles, whooping cough, and pneumonia
 - Health expenditure per capita was \$15 in 1999 and \$13 in 2003
 - National Health Management Information Systems (NHMIS)
- Project Overview: Innovative Data Tracking
 - Uses data from public hospitals and cross references it with socioeconomic information
 - Constructs maps that identify highly vulnerable communities
 - Targets vulnerable communities for improved healthcare
- Phase I: Data Interface
- Phase II: Data Analysis
- Phase III: Reporting findings to guide community-based efforts
- Budget
- Community Partners and Future Outlook
 - Advisory board:
 - John Guttag
 - Jonathan Rosen, MD
 - Susan Murcott
 - Lahore Hospital Partners:
 - Shalimar Hospital
 - Gulab Devi Hospital
 - \$5000 in capital raised so far
 - Two team members traveling to Lahore this summer
 - Data collection to begin...

(5) Vac-Cast Prosthetics by Tess Veuthey

- Team members
- Project summary
- Problem
 - There are more than 10 million amputees worldwide, and most of them are living below the poverty line
- Community Partner: Jaipur Foot
- Current Technology: Plaster of Paris
 - Wasteful, takes 3-5 hours per socket
- Current technology: Vacuum sand casting
 - Far more efficient, but not portable
- Our solution: portable human powered vacuum sand casting
 - This could create a 5-fold increase in patient throughput
- We won an IDEAS grant to put our project into use.
- We're thinking of expanding our program at MIT and creating a seminar class in rehabilitation here

(6) New Dots by Angela Kirby (project presentation not recorded in these notes)

(7) EVCO-Heating Schools in Lesotho by Tamira Gunzberg (project presentation not recorded)

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