M.Sc. Thesis Proposal
Department of Energy Technology

TITLE
RENEWABLES BASED POWER GENERATION FOR KENYA PIPELINE COMPANY

Background
The Kenya Pipeline Company is a Government owned Corporation in Kenya that is involved in Pumping of refined Petroleum products. To achieve this objective, the company has pumping stations spread out all across Kenya. Currently, 8 pumping stations along the Mombasa-Nairobi Pipeline has a peak demand of 3.2MW each. Whereas, four Pumping Stations along the Nairobi-West Kenya Pipeline has a peak demand of 1 MW each.

Over the last 1 year, the cost of Electricity purchased from the National grid has doubled from about USD 0.1 per KWh(Inc taxes) to about 0.2 USD per KWh(Inc taxes), shooting the company's annual electricity bill to USD 23 Million. The increase has been brought about by the fact that Hydro Power plants, which account for about 70% of Kenya’s Electricity have been affected by a prolonged drought, and the fact that even when the dams are full, the growth in demand for electricity outstrips the ability of the state utility to build new power plants. As a consequence, the state Utility Company in Kenya has resorted to expensive Fossil fuel fired Power plants, leading to an increase in tariffs. This steep price increases, coupled with the unreliability of the national grid has led to many companies in Kenya initiating their own power plants, an idea which is being considered in this Project. The objective of this project is as follows:

1. Determine the load profiles of the major pumping stations in Kenya Pipeline Company and Size the Power Plant/Plants appropriately.
2. Identify suitable options for Power generation based on renewable sources like Solar PV, solar thermal, and wind hybrid systems.
3. Conduct cost benefit analysis considering carbon credits along the CDM mechanism of the Kyoto Protocol, or any other agreement that might replace it.
4. Determine which option is feasible, if any.

Thesis/Learning objectives
After the thesis has been performed the student should be able to:
- Conduct a literature review on solar and wind Energy systems for pumping purposes.
- Identify major components of the integrated systems.
- Set up suitable computational methods to assess the feasibility the integrated systems.
- Conduct computer simulations of the selected systems and generate results.
- Discuss the obtained results and write a final report including his conclusions.

Method of attack
Set up a techno-economic model of the solar/wind pumping systems, identify major inputs and outputs of the algorithm. Conduct feasibility study of the various systems.

Preliminary proposed time schedule, including milestones and dates for intermediate reports
Weeks 1 through 6: literature review on solar/ wind hybrid systems, components
  Report part 1 due at end of 6th week.
- Weeks 7 through 12: Set up of computational algorithm of solar/wind/pumping system.
  Report part 2 due at end of 12th week
- Weeks 13 Through 18: Conduct feasibility studies. Discuss and analyze the results
- Weeks 19 Through 20: Put together final report and present the project results

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Duration: 5-6 months, Start date: Open

**Industrial Partner and Contact**

**Kenya Pipeline Company**
Name, e-mail and phone number. Company name