



# RESEARCH PROJECT

**Kirubi, Charles**

## **General Information:**

Title of Research: How important is modern energy for micro-enterprises? Evidence from rural Kenya

Start date: May 2005 End date: August 2005

Host Institution: University of California, Berkeley Country:USA

Faculty/Department: Energy and Resources Group

Degree Sought: Master of Science in Energy and Resources

Supervisor Name: Prof Daniel Kammen Supervisor e-mail address:kammen@berkeley.edu

Other institutions involved:Scottish Power, Energy for Sustainable Development (UK) Energy for Sustainable Development Africa

## **TOPICS COVERED**

### **Abstract**

In this study I explored the relationship between modern energy and economically productive activities in rural Kenya. Research is based on surveys done in Mpeketoni Village where a community-owned and managed diesel-powered mini-grid has been in operation since 1994. The findings reveal that access to electricity, in combination with simultaneous access to markets and other infrastructure (roads, communication, and schools), have contributed to robust growth of microenterprises in clear and compelling ways. For instance, productivity per worker and gross revenues per day increased by the order of over 200% for both carpentry and tailoring microenterprises.

Despite high tariffs [Ksh22.50 (US\$0.30)/kWh or nearly 3 times the national grid tariff], Mpeketoni Electricity Project (MEP) has demonstrated that there exists substantial unmet rural demand for electricity. My key policy recommendation is that small-scale power generation and distribution projects below a pre-determined capacity (say, 1000 kW) should be permitted to operate license-free in rural areas under a revised Electricity Power Act as is the case in India and Nepal. Removal of licensing bureaucracy for such small-scale mini-grids would make it possible for owners of diesel generators in rural areas to sell power “over-the-fence” to households and enterprises, thus increasing access to rural electrification.

### **Main objectives/Questions**

The guiding questions framing the survey were:

1. What difference did access to electricity make to the small and medium enterprises (SMEs) and other social institutions like schools?
2. How did SMEs and other residents themselves assess and experience the difference?
3. What are the policy implications for rural electrification arising from the Mpeketoni Electricity Project (MEP) experience?

### **Background information**



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Small and micro-enterprises (SMEs), also known as the informal sector, have become an integral player in the African economy. In Kenya, for instance, this sector accounted for 20% of the GDP in 1999 (CBS et al, 1999) and 64% of the urban employment by 2002 (Karekezi and Majoro, 2002). Studies in India have also shown that SMEs enable rural households to generate non-farm income which can largely contribute to poverty reduction (Lanjouw and Shariff, 2002). In general, SMEs purchase (rather than harvest or collect) their energy, including electricity, LPG, kerosene, firewood and charcoal. This is true even in rural areas. Moreover, despite energy being one of the significant factors for most microenterprises, there is knowledge gap on how much energy is being consumed; neither is it systematically documented what role energy plays in diversifying production and expanding employment opportunities by microenterprises, both in urban and rural areas (Clany and Dutta, 2005). Motivating my study was the need to address this knowledge gap within the broader discourse of productive energy uses

## **Rationale**

Mpeketoni Electricity Project has been hailed as a “successful” project and proposed for scaling-up into a wind-diesel hybrid energy system by the e7 Group in conjunction with Ministry of Energy (Kenya), ScottishPower Plc (UK) and Energy for Sustainable Development. Thus understanding how and why the project has been “successful” and documenting its local micro-enterprise and livelihoods impacts is both critical and timely. The findings will provide policy makers, rural development practitioners and entrepreneurs with insights and lessons regarding the role and value of modern energy in facilitating and supporting the establishment and growth of micro-enterprises and how and why these can be linked to sustainable livelihoods and poverty reduction in Kenya.

## **Data sources**

- primary data from field surveys administered in June-July 2005
- electricity generation and consumption data from Mpeketoni Electricity Project
- review of relevant literature

## **Methodology**

The study combined quantitative and qualitative methods, including surveys, electricity generation and consumptions analysis as well as changes in SMEs’ productivity to analyze the social and economic significance of access to electrification in rural Kenya. Primary data was collected using participatory rural appraisal (PRA), combined with secondary electricity consumption data from the MEP’s records. The PRA used a combination of techniques to collect a consistent set of data from direct observations and interviews. The impact of electricity was assessed using two types of SMEs: carpentry and tailoring. As the supply of electricity at Mpeketoni is very erratic, the two trades are always switching back and forth between using electricity and manual labor for their production. Thus, the erratic power supply permitted me to observe and compare the production patterns of workers in the two trades as they consistently operated on two modes, i.e., “with” and “without” electricity. Frequent outages presented a unique “experimental” opportunity to observe two distinct production scenarios within the same sample group; yielding a more reliable data set used to estimate the cause-and-effect relationship between electricity and production of typical SMEs.



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### Expected results

- the set of factors and circumstances under which access to electricity leads to growth of SMEs, job creation, poverty reduction, and rural development.
- Policy recommendations on regulation and licensing of distributed generation (mini-grids) in Kenya.

### Impact on Sustainable Energy Development

Electrification statistics in Kenya are depressing: only 15% have of the population has access to grid electricity, less than 4% have access in rural areas, and electricity consumption per capita is a mere 104 kWh (Kamfor, 2002). That grid-based rural electrification program has connected less than 100,000 customers in four decades makes a compelling case for distributed generation (DG). The Mpeketoni Electricity Project (MEP) has contributed to advancing the sustainable energy development agenda in Kenya in significant ways. First, strong linkages to poverty reduction via job creation, income generation and improvement in quality of education constitute were documented. Second, the experience with DG at MEP, combined with other micro-hydro schemes in Meru and Kirinyaga Districts, has enabled both the communities and policy makers to “learn by doing.” That is as it should be. This experience has fundamentally shaped the new Sessional Paper No. 4 (2004) on Energy. In addition to explicit support for DG, the Sessional Paper gives priority to electrification of income-generating activities while providing incentives to attract private and community investments towards rural electrification. In conclusion, DG that combines a wide portfolio of energy technologies (solar, wind, small-hydro, diesel, co-generation) will play an increasing and central role in sustainable energy development in Kenya.

### Duration and budget estimation

Duration: May 2005 – August 2005

Estimated Budget: US\$5000

### References

1. Central Bureau of Statistics (CBS), International Centre for Economic Growth (ICEG) & K-EP Holdings Ltd, 1999, “National Micro and Small Enterprise Baseline Survey” Survey Results, Nairobi.
2. Karekezi, S., & Majoro, L., 2002, “Improving modern energy services for African’s urban poor” *Energy Policy*, 30, 1015-1028.
3. Lanjouw, P. & Shariff, A., 2002, “Rural Non-Farm Employment in India: Access, Income and Poverty Impact.” Working Paper Series No. 81, This paper was prepared for the Programme of Research on Human, Development of the National Council of Applied Economic Research, sponsored by the United Nations Development Programme, National Council of Applied Economic Research, India.
4. Clancy, J., & Dutta, S., 2005, “Women and Productive Uses of Energy: Some light on a shadowy area.” Paper presented at the UNDP Meeting on Productive Uses of Renewable Energy, Bangkok, Thailand, 9-11 May 2005.



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5. Kamfor Ltd, 2002, "Study on Kenya's energy demand, supply and policy strategy for households, small-scale industries and service establishments." Final report to the Ministry of Energy, Nairobi.
6. GoK (Government of Kenya), 2004, "Sessional Paper No.4 of 2004 on Energy." National Energy Policy. Nairobi.