

Kamal Kapadia
Report for Link Foundation Energy Fellowship
09.26.07

I. RESEARCH NARRATIVE

Electrification, economic development and poverty alleviation: examining the role of macro-factors in Sri Lanka

**** This is a work-in-progress. All claims are tentative, and analysis is still underway.**
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Introduction

Access to modern energy services is central to enhancing rural incomes, reducing poverty and achieving the Millennium Development Goals; however, it is not sufficient in and of itself (Barnes 1988; Barnes & Floor 1996; Barnes & Foley 2003; Bose 1993; Cabraal et al 2005; Department for International Development 2002; Modi et al 2006; Saghir 2005; The World Bank 2001; The World Bank Group 2004; UN-Energy 2005; United Nations Development Program 2006). Energy services need to be integrated into a broader development program that also delivers other rural development services such as agricultural improvement technologies, healthcare and education, in order to play a transformative role in the economy of the rural poor. In recognition of this, the focus in development agencies is on enhancing the productive uses of energy (Cabraal et al 2005; Energy Sector Management Assistance Program 2005; Kapadia 2003).

However, studies that examine the *concrete* relationship between energy programs and the productive uses they enable tend to be few, and most of these fall into two categories which I call “micro studies” and “macro studies.” Micro studies focus on a village or a few villages, and evaluate the local set of factors which influence how energy is being used for income generation and poverty reduction (Chaurey et al 2004; Energy Forum 2003; Reddy 2004). Macro studies tend to focus at the scale of a country (Barkat et al 2002; ESMAP 2002; Yang 2003), or a group of countries (Chen et al 2007; Karekezi 2002; Lee 2005; Modi et al 2006; UN-Energy 2005), and analyze the relationship between access to energy and income, and/or broader development indicators like the Human Development Index. Some papers discuss how macro-factors such as the health of the energy sector and tax policies can influence the energy-development relationship at the micro, or village-level (Saghir 2005; The World Bank 2001).

There are, however, no studies which analyze how *non-energy* macro-factors (e.g. trade policies) can shape the ways in which electrification will or will not transform the rural micro-economy of the poor (e.g. in a village). A few authors point to the need for enabling conditions such as “satisfactory fiscal and monetary policies and economic efficiency in the management of exchange rates, agricultural prices, trade, and industrial policy,” (Barnes & Floor 1996: 526-227) but they do not concretely analyze how

specifically these policies influence the village-level energy-economy relationship. My research fills this gap.

My research

My Link Foundation-funded research focuses specifically on the dynamics of the rural economy of the poor in two villages in Sri Lanka, and shows that the transformative role that electrification can play in this economy is critically dependent on the broader structural nature of the global and national economy, as opposed to just the health of the energy sector or quality of energy services.

In Sri Lanka, about 60% of the rural population lacks access to grid-based electricity. Sri Lanka also has one of the best “success stories” in off-grid renewables-based electrification in the form of two consecutive World Bank/GEF funded projects; the second project explicitly focuses on enabling the linkages between economic development and energy, and thus makes for a good case study.

Over the course of one long and several shorter trips to Sri Lanka I studied in detail a) the nature of the village economy of the poor and its relationship with macro-level policies and institutions, b) how this relationship influences the development potential of rural electrification projects, and c) conventional ways in which the development benefits of electrification are calculated, at the Ceylon Electricity Board and at the World Bank.

In this report I briefly discuss my two case studies. I then touch upon the implications for energy research and policy.

Measuring the benefits of electrification in Muhudupitiya¹

The village of Muhudupitiya is a coastal community of 616 families. I lived in this village for long periods, and conducted an in-depth survey (obtaining data on 161 working individuals), focus group discussions and considerable ethnographic field research. The most frequently-occurring economic activity is the making of yarn out of coconut husk; this coir yarn is used to make bags, doormats, rugs and other similar products. This industry is very common throughout Sri Lanka. The coir industry is dominated by women, who perform the work at home. It is manual labor, requires no electricity, and is performed outdoors in the hot sun, all day. The income from this occupation is extremely low - between US\$ 5-30/month, and in my survey, 80% of households below the poverty line are at least partly engaged in the coir industry. The men in the majority of these poor households perform unskilled labor in the sectors of agriculture, fishing or construction.

After the tsunami, a major program has been launched by the Sri Lankan government and various NGOs to mechanize the coir industry. From the energy-sector perspective, this is a perfect way to stimulate the rural economy and also stimulate demand for electricity which can be used to justify grid-extension to rural areas. This is important because in Sri Lanka, the Ceylon Electricity Board will only extend the grid to places where the economic rate of return on the electrification project is greater than 10%. By linking electrification with economically-productive applications, it is theoretically

¹ All village names are pseudonyms, to protect the identity of informants, as outlined in my protocol submitted to the Committee for Protection of Human Subjects at U.C. Berkeley.

possible to improve the economic returns of electrification projects as well as stimulate economic development. Such projects are being developed in Sri Lanka.

In my research I use a conventional regression analysis to measure the economic benefits of electrification for such a project. This analysis is still underway, using primary data and a simple model that draws on elements of more complex ones used by UNDP and ESMAP (2002), Barkat et al (2002), and by the Ceylon Electricity Board.

I then show how a broader macro-perspective reveals vitally important factors that can erode the value of such a model. The coir market in Sri Lanka is totally liberalized. Global market prices are very volatile, and profitability is far from assured (Food and Agricultural Organization 2006; Rosairo et al 2004). Further, even as the Sri Lankan government and NGOs are trying to develop this industry locally, the global market faces stiff competition from synthetics (Rosairo et al 2004), and the Food and Agricultural Organization has projected an annual global growth rate of 1.1% a year only (Food and Agricultural Organization 2003). Even this is optimistic, as Sri Lanka's production of coir yarn and products has dropped from 2000-2006 (Food and Agricultural Organization 2006). While in theory, electrification combined with the mechanization of coir production may seem like a win-win proposition, in practice, the shrinking and volatile global market for coir will hurt both the women who will be employed in these factories, and the economics of the rural electrification project. I conduct similar analysis for other rural industries dependent on electricity.

ICT, electrification and development in Kandagama

In my second village case study, I analyze the changing economics of an electrification project in an agricultural community where an Information and Communications Technology (ICT) project has been recently introduced. The ICT project targets youth, and in addition to learning to use computers, it also helps people access information on government services, job listings, the news, entrepreneurial and farming activities, on obtaining a loan for the same, and on prevailing crop prices. The transformative effects on the surface seem substantial: help youth get training and jobs, and improve farmers' incomes through provision of information and facilitation of loans.

Using conventional analytical techniques described above, I will first analyze the economic benefits of this project from the perspective of the electric utility. I will then show how the benefits derived from this type of electricity-productive uses project is shaped substantially by macro-factors.

There is chronic youth unemployment in Sri Lanka - youth in the age range of 15-24 years make up 65% of the unemployed population and the unemployment rate is 28.5% for youth in the range of 19-25 years (Central Bank of Sri Lanka 2005). This youth unemployment is a structural problem, deriving from the interactions of a 25-year long civil war (which result in very low levels of investment) and a welfare-oriented government (which provides welfare in exchange for support of its Sinhalese nationalist project – ideologically and in the form of bodies to man the armed forces). This is amply demonstrated by ICT-based job databases, like the ILO-supported “Jobsnet” which youth in Kandagama can access. Jobsnet website states that their database contains profiles of 119,456 jobs seekers and had only 4,387 open jobs listed (International Labor Organization 2005). This essentially means that at best, less than 4% of job seekers will

find jobs through Jobsnet. In my survey sample, no job seekers had found a job through the ICT-enabled services in Kandagama.

The youth economy is further confounded by what is going on in agriculture, the other sector that these productive-use projects are intended to serve. In Sri Lanka, the incidence of poverty is strongly correlated with agriculture (Amarasinghe et al 2005; Narayan & Yoshida 2005) and in 2004, agricultural workers had the lowest mean and median income amongst all production sectors (Central Bank of Sri Lanka 2005: 117). According to a national survey, only 1.4% of the unemployed want a job in agriculture or fisheries (Central Bank of Sri Lanka 2005), yet the absolute number of people employed in agriculture has been growing (Narayan & Yoshida 2005). A key reason for the decline in agriculture is the liberalization of the agricultural sector, which has increased competition and led to increased imports of food commodities (Kelegama 2001). There is deep frustration amongst youth which I have captured through ethnographic research and focus group discussions. This is a dangerous situation in a country which has seen two armed uprisings of educated but poor youth (Brunton et al 1992; Moore 1985). Conventional approaches for measuring the economic benefits of the electrification-enabled ICT project do not capture any of these realities.

This is of course not an argument against electrification, but one for paying much closer attention to how changes in one set of policies (like liberalization of agriculture or of the coir market) combined with the structural conditions of the economy (like a lack of jobs for youth) influences the development potential of electrification, and also the economics of the electrification project. This latter is vitally important given that limited funds for rural electrification have to be efficiently allocated and justified based on potential benefits. The model used by the Ceylon Electricity Board to predict economic development (and justify the decision to extend the grid) does not in any way account for how agriculture and rural industry itself is changing rapidly in the context of changes in trade policy, for example.

Preliminary policy recommendations

- Research and models that measure benefits of electrification must include macro-factors that go beyond “inward-looking” issues such as health and governance of the energy sector and tax reform.
- Institutions like the World Bank which are heavily involved in rural energy projects and energy sector reform, but also deeply involved in trade and other non-energy policy reforms must research how reforms in one sector (e.g. liberalization of the agricultural sector) affects the benefit flows of rural energy projects, and use this to inform both energy and agriculture policy prescriptions.
 - The design of energy-rural development and energy-poverty alleviation programs must include concrete and serious considerations of the macro-conditions, e.g. the nature of commodity markets in a globalized world, where increased production of a given commodity in a few countries can have strong price reverberations worldwide.
 - Electrification projects must be planned in congruence with development projects that can concretely create jobs in sectors in which the country has a competitive advantage (although care must be taken to also maintain diversity of economic activities).

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II. PUBLICATIONS

I have not published any papers based on this research yet, but am currently working on publications for *Energy Policy* and/or *World Development* where I will certainly acknowledge the Link Foundation.

III. USE OF DISCRETIONARY FUNDS

Discretionary funds were spent entirely on travel expenses between Berkeley and Sri Lanka and within Sri Lanka, and on equipment such as a computer and printer.

IV. HOW THIS FELLOWSHIP MADE A DIFFERENCE

This fellowship has been, without exaggeration, life-changing for me. Because of the type of field research it enabled, it has significantly shaped my understanding of the energy-development relationship, and my future work interests. To elaborate: without this fellowship, I would not have been able to spend as much time as I did in Sri Lanka (in total, I conducted a full year of field research, followed by two shorter trips), where I spent a lot of my time in villages trying to understand how rural people go about making a living, the challenges they face, and how energy relates to this. I also spent time in the capital city, Colombo, piecing together the “macro” factors, and making connections between the macro factors and the village economy as I traveled back-and-forth. It is difficult to overstate how valuable and rare such an experience is: the vast majority of studies on energy and development rely on impersonal data and very short field visits, and while these have important uses, there is much about development that cannot be captured through such approaches.

Through my village research, I came to understand several things: first, the quantitative model I was initially planning to develop could in no way capture the complexities that affected the energy-development relationship in these villages. While still doing quantitative research like surveys, I therefore started conducting a large amount of qualitative social science research (my interdisciplinary training in the field of energy, as well as in subjects like development economics and social theories of development enabled me to do this). Second, I learnt that many of the issues faced by villagers (e.g. low and fluctuating commodity prices, problems with youth unemployment) cannot be solved within the village no matter what the villagers do. This forced me to look outside the village – at national and global markets and systems – and link these to village-level experiences. Third, in scouring the energy-development literature, I came to see how non-energy macro-factors are rarely if ever discussed, even though they seemed so vitally important in the villages where I did my research. The Link Energy Fellowship enabled me to gain all these insights and adjust my research accordingly.

In the future, I would like to use my knowledge of the nature of the village economy and its links to macro conditions to inform energy research, policy and practice in institutions like the World Bank and UN agencies. I am very grateful to the Link Foundation for making this possible. I assure the Foundation that I will always use my skills and knowledge in ways that benefit the poorest people on our planet.