

Chapter 6



Rural Chinese village with electric poles. (Photo from the World Bank Photo Library.)

Conclusion and Lessons Learned

Answering the Evaluation Questions

What is the rationale for Bank support of RE?

Why does the Bank support RE? The policy paper “Rural Electrification” (World Bank 1975) argued that investments had to be justified by the benefits to consumers and increased production. If the resulting return on investment (ERR) was insufficient, a case might be made on social grounds. However, it should be recognized that electricity is not a necessity like water or health, although it does benefit consumers and results in increased production. In contrast, the two 1993 policy papers, which were not specifically concerned with RE, proceed straight to their core subject matter without offering a rationale for energy investments.

More recent policy papers have stressed the links between energy and poverty. Most notably, *Rural Energy and Development* (World Bank 1996) documented the time burden and adverse health implications of relying on biomass fuels. The 2001 sector board paper begins with the bolder statement: “Efficient and clean energy supply is central to the reduction of poverty through many and varied linkages, as well as being important for economic growth.”

Alternatively, project documents can be examined to understand the rationale for Bank lending. The majority of projects take the benefits as self-evident, as the objectives are restricted to the outputs of improved access or institutional development. A minority of RE projects have welfare objectives, the most common of which are increasing growth and a general improvement in welfare (cited in the objectives of 21 percent and 19 percent of energy projects—that is, excluding

multisectoral investments—respectively; appendix table B.3). A final perspective is given by the benefits included in the project analysis.

Quantification of benefits is most commonly restricted to lighting benefits, with a small number of analyses including TV viewing. Other benefits are sometimes mentioned but not quantified.

The largely private quantified benefits appear rather distant from the broad claim that clean energy is central to poverty reduction and economic growth. This is especially so because the poor are still excluded from direct benefits, and few Bank projects have taken explicit steps to include them.

In summary, the economic case for investments in RE is proven, provided technical problems in service provision are adequately addressed. But the evidence base for the links between RE and poverty remains thin. Improved evaluation tools—of the sort already adopted in some recent projects—are needed to build the case that RE should be a priority for a poverty-oriented lending institution.

What has been the growth in coverage of RE in countries receiving Bank support? To what extent has the Bank contributed to these connections? What is the distributional profile of those taking connections? What are the unit costs of connection by type of supply to the user and to the supplier?

RE has increased substantially in many countries receiving Bank support. Where the Bank has had a series of dedicated projects, it has made a significant contribution to increases in coverage.

Support for electrification has mostly been provided to communities where connection was deemed most cost-effective, leaving remote communities—often among the poorest—the last ones connected. This pattern is at best only partially overcome by the development of off-grid electricity sources, but per unit costs of off-grid sources are significantly higher than the price of electricity on the grid. Once a community is connected, however, electricity from both grid and off-grid sources represents substantial cost savings compared with kerosene. However, the connection charge barrier prevents many of the poorest from connecting once electricity is available, and few Bank projects have introduced mechanisms to help overcome this barrier.

What are the direct economic benefits from RE? Who gains these benefits? What are the indirect economic benefits (employment generation), and who gains them? How does the distribution of benefits change as coverage of electrification programs expands?

Direct economic benefits from RE occur as electricity supply lowers the cost of energy to the user, resulting in an increase in consumer surplus. Such benefits tend to favor the well-off, because connection charges and tariffs are often prohibitive for the poorest. The pattern of electrification favors the non-poor, but distribution becomes more equitable as electrification coverage expands.

RE does not in general drive industrial development, but it can spur growth of home businesses. Such businesses mostly employ family labor and increase their hours once electricity becomes available. Electrification thus provides a small, but not negligible, boost to the incomes of some households. However, the evidence base on this point remains thin.

What is the impact of RE on time use, and what are the welfare implications of these changes for health, education, and increased leisure?

Electrification extends waking hours, with a principle impact being more time spent watching television. Time is also saved from chores, but this gain is limited, and the time spent in home businesses increases. Health clinics remain open

longer. Again, more evidence is needed to substantiate these findings.

How does RE affect the quality of health and education services?

RE benefits the quality of health services and lowers costs by extending opening hours and significantly strengthening the cold chain for vaccines—though it does not increase the extent to which such services are offered. Electrification was also found to reduce worker absenteeism in both health clinics and schools by improving living conditions and morale. However, the cases studied are few, so further analysis is required.

How do the aggregate private benefits and the public good benefits compare with the WTP? What is the distributional profile of these benefits?

The WTP internalizes many of the benefits and exceeds the supply cost. The benefits, like electricity consumption, favor the better-off.

What are the private and social rates of return from investments in RE?

The private returns to electrification are high—as indicated by the fact that most, if not all, households that can afford electricity take it once it becomes available. Great value is placed on the improved lighting it makes available and the possibility of watching TV. Because these benefits are mostly private, the economic and social returns would be close if electricity prices reflected economic cost. The divergence between the two returns emerges because of the subsidy element and makes a case for reducing the amount of that subsidy, which could be better targeted to getting poorer households connected.

Lessons Learned

It is difficult to generalize about RE because both costs and benefits are context specific. However, some broad statements can be made.

- RE investments have often generated sufficient benefits for the investment to be warranted from an economic standpoint.
- The value of these benefits to households is above the average supply cost, so cost-recovery tariff levels are achievable, even if

they are politically unpopular in countries with a history of low tariffs.

- Analysis of feasible tariff levels can be informed by good quality economic analysis of the sort pioneered by the Philippines ESMAP study (ESMAP 2003). But the quality of that study is not uniformly replicated, as the quality of project-level analysis is uneven, with apparent weak quality control.
- The evidence base remains weak for many of the claimed benefits of RE. Tailor-made surveys, designed to test these benefits, need to be built into a greater number of Bank projects and designed so they allow rigorous testing of the impact of electrification.
- Countries with low coverage rates, which are now mostly in Africa, still have to make investments in generation, transmission, and distribution, which implies relatively high average supply costs and low coverage, increasing slowly

by extensive growth for some years to come. The principal challenge is to balance financial sustainability with growing coverage, requiring efficiency by limiting system losses. Because grid connections will grow slowly, many areas may be eligible for off-grid connections, but the logistics of maintaining technical quality will be challenging.

- Some countries in Asia and Latin America are reaching the limits of grid extension. Further increases in coverage require intensive growth, which requires instruments designed for that purpose, or off-grid schemes, which need design improvements if they are to be financially sustainable.
- There are project design options that have been uncommon but that would enhance project benefits. These include financing schemes for connection charges, consumer education, and support for productive uses.