Rural Electrification and Security: Two Case Studies

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Introduction

Much has been written about the benefits of Rural Electrification (RE) from a development perspective. Less – much less – has been written as to the security benefits it may or may not provide. Numerous sources note the "public good" aspects of outdoor lighting, and electric pumps in a village square that eliminate long and potentially dangerous trips to streams and rivers, but few address the impact of RE on the stability and security of rural communities. In many cases it is not even estimated (World Bank, 2008) owing to incomplete data gathered. Yet anecdotal evidence suggests that the spill-over effects of RE directly affect security and stability.

Countries around the world are pursuing RE schemes with determination, mindful of the positive impacts it can have on their citizens. Electrification is a highly visible, concrete way governments and politicians can demonstrate their ability to provide. At a time when development projects are needed more than ever, the funding with which to do them is drying up, and as noted RE is complicated and costly. As budgets shrink and donations dry up, governments, corporations, NGOs and IGOs are all faced with difficult decisions on the funding of development projects period, let alone deciding which projects to fund. But without RE, many goals – particularly those articulated in outgoing Millennium Development Goals – are impossible to achieve.

Case Study – Brazil

Background

In 2009, Brazil reached a 97.8% overall electrification rate, with 99.5% in urban areas and 88% in rural areas (IEA, 2010). Unique to Brazil is a heavy reliance on large-scale hydroelectric projects, leading to grid extension being favored over distributed generation techniques (IEA, 2010) in contrast to the following case in India.

The current RE scheme in place is Luz para Todos (LpT), which began in 2003, with the goal of extending electricity to the estimated ten million Brazilians still without power, despite efforts to reach them since 1923 (Ministry of Mines and Energy, 2010). Notably, LpT, along with its Indian counterpart, has taken into account coordination with rural communities to ensure needs are met and expectations managed (IEA, 2010) through Management Committees which have a say in prioritization of future activities. As grid-extension projects are infrastructure-intensive, this is especially important. Without the support of the entire community in which these installations are housed, projects cannot equitably succeed.

However, grid-connected RE causes costs to rise well above international benchmarks (IEA, 2010) for each connection, especially in the lowest-density areas. Due to these high costs, Brazilian utilities have become financially vulnerable. It has been noted that "Promoting productive uses of electricity in order to raise utilities' revenues is thus vital to guarantee the long-term success of the electrification installations once LpT comes to an end (IEA, 2010)".

With that in mind, the progress Brazil has made since the 1988 Constitution is remarkable, and as a mature, nearly-complete program LpT stands as a success in bringing ten million free connections to rural Brazilians (Ministry of Mines and Energy, 2010). As the International Energy Agency notes, a study undertaken after areas had been electrified identified more opportunities for employment, increases in appliance purchases, and overall standard of living increases (IEA, 2010).

Security

Unfortunately, Brazil's murder rate rose concurrently with its RE program. Since the 1980s, the murder rate has risen 132% (InSight Crime, 2013). While this figure does not differentiate between rural and urban rates, it does not bode well as a signal for the country as a whole. Some have downplayed the roles of organized crime and drug cartels (InSight Crime, 2013), suggesting other socioeconomic factors are responsible. This would seem, in the context of this particular research, to offer an opening for RE and other development programs to have an impact.

Regrettably, the data are not available to test this hypothesis. While crime rates on a national level and for most major cities – especially tourist destinations along the coast – are readily available, rural statistics are harder to come by. Measurements of unrest, particularly riots or other mass disturbances, are not available.

Case Study – India

Background

In contrast to the case of Brazil, India has been much less successful in achieving rural electrification. The current program, the Rajiv Gandhi Grameen Vidyutikaran Yojana scheme, was established in 2005 with the goal of providing electrical access to "…all rural households in un-electrified and electrified villages in the entire country (RGGVY, 2014)". As of 2013, the official percentage of electrification was 75% (IEA, 2011). India has gone from over 500 million without electricity to 306.2 million during a period of 1990 to 2010, an annual rate of 1.9% (World Bank, 2010).

Classification is a major problem, as seen in India's re-defining what it means to be electrified: in 1997, "A village will be deemed to be electrified if electricity is used in the inhabited locality within the revenue boundary of the villages for any purpose whatsoever (IEA, 2010)." As the IEA notes, this could include one light bulb kept lit nightly, or one irrigation pump running at some point during the day. To India's credit, this was changed in 2004 to "The basic infrastructure (such as distribution transformer and/or distribution lines) is made available in the inhabited locality….and The number of households electrified should be at least 10% of the total households in the village (IEA, 2010)."

The result, of course, was an apparent increase in the number of villages without electrical access, even as the new definition provided for more accurate benchmarking. However, it still fails to reach 100% penetration, which means any number presented under this definition is still suspect. This disparity resultant from defining by 10% of households as electrified versus % penetration shows how much work there is left to be done.

Also of greater note is the focus on electric water pumps for agriculture. This has been accused of leading to unsustainable subsidies, non-payment of dues, and excessive demand (Battarcharyya, 2006). Ever present questions of cost and economies of scale reemerge, challenging the REC, State Electricity Boards (SEBs), and Rural Electric Co-Operatives (RECOs) to remain solvent while providing these services. Indeed, the Ninth Plan saw an 85% reduction in funds available for RE compared to the Seventh Plan (Rehman, 2004).

Lastly, due to geographical features and distance, grid connections will not be a viable option for 20% of the remaining villages (Puri, 2006). Transmission losses due to resistance, already a deterrent to pursuing RE programs, are too great to overcome in these instances. Because of this, distributed generation schemes, either using fuel oils, biomass, solar, or wind are required to bring electricity to these villages. Though the cost of renewable sources has dropped significantly in recent years, overall, RE has occurred at a much lower rate than in other developing countries and 306 million Indians still lack access to regular electricity (IEA, 2011).

Security

Across India crimes against public order, the formal term for riots, has risen each year for a total

263.5% since 1953 (National Crime Records Bureau, 2013); similarly the overall rate of crime has risen irrespective of electrification, rural or urban. There are no data regarding whether crime rates are higher in urban versus rural areas.

Incidents of terrorism sharply increased after 2006, particularly in the northeastern areas of the country (Global Terrorism Database, 2014). But again, we are unable to separate the signal from the noise to determine correlation, much less causation.

In sum, even as India inches towards its ultimate goal of electrifying every village, many questions remain as to the efficacy of these programs, how success is measured, and the ultimate cost and sustainability. Equally unclear is the impact these programs have on security and stability.

Conclusions and Lessons

Attempts to classify the precise impacts of Rural Electrification efforts on security and stability run into the same difficulties in both arenas: accurate data is difficult to come by, and that which is available is aggregated at too high of a level – country or state data that does not differentiate between rural and urban settings.

Because RE schemes do not have the same direct impact on stability and security as, for example, hiring more police officers might, it is difficult to pin down their effects on domestic stability and security.

Recommendations

- Collect and release data on rural electrification and security at the village or municipal scale. Due to the importance of the rural-urban divide, state-level data, let alone country-level data, is insufficient.
- Collect and release data over time – changes in electrical penetration and quality must be known, and mated with indicators of instability chronologically.
- Control for other variables – if RE is correlated with increasing levels of stability, determine what the causal link is.

So while the original question of this project – to determine RE's impact on stability and security – could not be satisfactorily answered, it has uncovered an important blind spot in our current understanding of the interaction between access to electricity and stability. Furthermore, the analysis of the cases of Brazil and India shed light on how this question may be answered. Going forward, a successful framework to measure this relationship would be instrumental in allocating the scarce development capital of local, state, and national governments, as well as the multitude of NGOs and IGOs at work today.