Productive Use of Energy – PRODUSE
Measuring Impacts of Electrification on Small and Micro-Enterprises in Sub-Saharan Africa

Introduction

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By Kilian Reiche and Jörg Peters

Introduction

Access to modern energy is considered key to poverty alleviation and growth strategies by policy makers and development practitioners alike. While energy access was not declared an explicit Millennium Development Goal (MDG) in 2000, UN (2005) emphasized the role that modern energy plays in achieving most of the MDGs; UN (2010) stated that 'energy is at the heart of most critical economic, environmental and developmental issues facing the world today'; and the recent SE4All Initiative has mobilized broad international support for achieving universal energy access with good chances to make energy access an explicit UN Development Target in the Post-2015 Development Agenda (UN 2013, UN SDSN 2013).

Access to electricity in particular ranks high in subjective demand prioritizations in most household surveys. According to the SE4All Global Tracking Framework (2013), about one billion people need to be provided with electricity to achieve universal access by 2030 at total investments of about US $ one trillion.

At the same time, the energy sectors in virtually all least developed countries are in need of urgent improvements: generation capacities are often not sufficient (with frequent blackouts as a consequence) and electricity tariffs are hardly cost covering, making the extension of electricity grids difficult. New electricity users in rural areas are the most unattractive market segment, due to low demand densities and a relatively higher fraction of low income households compared to connected areas. As a response to these difficult conditions, governments as well as bilateral and multilateral donors have increased their efforts in this sub-sector over the last decade and subsidized grid and offgrid electrification in many countries.

Electrification practitioners often refer to a set of common sense-based causalities to underpin the hypothesis that electrification contributes to poverty alleviation. Most notably, they often emphasize the crucial role *productive electricity take-up* may play in increasing income generation for home businesses and enterprises - thus making electricity service provision more viable in turn. Accordingly, UN (2010) and SE4All (2013) both stress the importance of productive energy uses as an explicit element of universal access strategies.[7]

However, systematic evidence on (i) the relationship between access to electricity and poverty alleviation in general as well as (ii) productivity impacts of electrification in specific are scarce, and rigorous evaluations of electrification interventions particularly in Africa are virtually non-available (IEG 2008, Estache 2010, Chapter 2).[8]

In order to (i) start filling this gap between practitioners' perceptions and the lack of robust evidence and to (ii) inform the design of interventions to promote the productive use of energy, GIZ and ESMAP launched the *Productive Use of Energy (PRODUSE*) study. In three African countries – Benin, Ghana and Uganda – the usage of electricity in micro-enterprises was examined and the effect of electricity use on firm performance was assessed.

At the outset of the project, a joint survey methodology for all cases was developed: a number of firms should be surveyed that would be sufficiently high to allow the application of statistical tools. In the optimal case, both an electrified and a non-electrified area are included in order to obtain an idea about how the performance of firms differs – taking into account other differences like, for instance, the industry they belong to, the firm size or the entrepreneur's education. The methodology aims to identify counterfactual outcomes and, thereby, the PRODUSE study is one of few attempts to *date to apply rigorous evaluation techniques (as outlined in Ravallion 2008) to analyse the particular impact of electrification on micro-enterprises.*

7) UN 2010: *"The global community should aim to provide access for the 2-3 billion people excluded from modern energy services, to a basic minimum threshold of modern energy services for both consumption and productive uses."* SE4All (2013): *"The SE4ALL universal access goal will be achieved only if every person on the planet has access to modern energy services provided through electricity, clean cooking fuels, clean heating fuels, and energy for productive use and community services."*

8) IEG 2008: *"The evidence base remains weak for many of the claimed benefits of [rural electrification]. Tailor-made surveys, designed to test these benefits, need to be built into a greater number of Bank projects and designed to allow rigorous testing of the impact of electrification. [...] While stimulation of productive enterprise is claimed to be among the benefits of electrification, few studies have tried to quantify these benefits using an impact evaluation methodology".*

The methodology can be used beyond the specific PRODUSE exercise and adapted to evaluate the impacts of any other electrification project, at relatively modest costs.

Thus the cost can be covered by most electrification projects from their M&E budget. This is essential to allow for a wider use of such impact evaluation modules in electrification projects (which should be an explicit element of SE4All roll-out), with the aim to produce a broader body of evidence-based findings on the energy-poverty nexus. Depending on the available M&E budget of the project, co-funding from evaluation departments or research networks can be complementarily considered to meet the financial requirements to implement a robust impact study.

The main objective of the PRODUSE study is (a) to gain insights into the interaction between electricity access and productive electricity usage and (b) to improve the available toolkit for evaluation of electrification projects (with a particular focus on productive usage). Based on a better understanding of how modern energy access might lead to economic and social development, effective interventions can be planned to complement energy programmes.

In parallel to this study, GIZ and the EUEI Partnership Dialogue Facility have reviewed the experience with ongoing and past productive use promotion efforts. Based on this review, a practical guide for project planners was developed to design concrete activities to promote sustainable productive use of electricity. This parallel guidance note has been published under the title P*roductive Use of Energy (PRODUSE) – A Manual for Electrification Practitioners*.[9]

The main part of this report presents the application of the developed tools and particularly the results regarding objective (a). *Chapter 2* starts with an overview of the existing literature showing that, while a couple of solid publications exist on electrification and its impacts, rigorous project evaluations focusing on electricity take up in general and productive use impacts are rare. *Chapter 3* outlines the methodology to evaluate the impacts of productive electricity usage, which is then applied in *Chapters 4-6* for the case of Benin, Ghana and Uganda. *Chapter 7* contains concluding remarks.

Regarding objective (b), *a hands-on step-by-step guide for electrification practitioners on how to implement an impact-based M&E system* is presented in the Annex. This tool helps project managers to move from simple monitoring and reporting of numerical targets to a methodologically sound evaluation of the impact achieved through electrification among micro-enterprises.

9) See EUEI PDF/GIZ 2011. The PRODUSE Manual is available at *www.produse.org/manual*.

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