



An empirical study into the benefits of relieving energy poverty in the developing world.

Summary Results



Clean energy: One step to poverty relief in the developing world

Today 1.6 billion people in the developing world live without access to electricity and rely on fossil fuels such as kerosene to power critical parts of their lives. Poor households typically spend as much as one third of their incomes on kerosene with over half of this as fuel for lighting (IFC/World Bank, 2010).

With such a large proportion of developing world incomes devoted to the purchase of this fuel, opportunities to lessen (or even break) this dependence should thereby result in significant financial savings. Such savings are a first step in breaking poverty cycles, with additional incomes instead spent on items such as food, clothing, education and medicines.

Our field study sought to quantify the financial benefits of reducing dependence on kerosene in developing world households. We also measured benefits in other areas of development including health, safety, education as well as environment.



About the study

The study involved distributing robust solar lights into poor households that had a reliance on kerosene for lighting and measuring the changes in kerosene usage over time. Financial, health, safety and education impacts of the solar lights were also measured. Data was collected before and after distribution of the lights and compared to quantify



their impact. The research was conducted across three countries: Tanzania, the Philippines and Indonesia. To provide operational assistance, cultural/language expertise and impartiality, local NGO partners in each country were tasked with distributing the solar lights and gathering data from respondents.

Tanzania

- Study location: Arusha
- Date: June, 2010
- NGO partner: *Floresta Tanzania*
- Sample size = 1000



Philippines

- Study location: Bohol
- Date: October, 2011
- NGO partner: *PATH Foundation Philippines*
- Sample size = 500



Indonesia

- Study location: Bali
- Date: December, 2011
- NGO partner: *East Bali Poverty Project*
- Sample size = 500



Results - Part 1: Financial

	Tanzania	Philippines	Indonesia	AVE.
Ave. kerosene saved per light per year (Litres)	68 L	58 L	69 L	65 L
Ave. financial savings per light per year (USD)	\$70	\$78	\$113	\$87
Ave. decrease in kerosene spend (%)	67 %	72 %	70 %	70 %

Results after the introduction of an alternative lighting option suggest that households are quick to change their kerosene their consumption habits. On a kerosene saved per-light basis, results were largely uniform across the three study regions showing on average a 70% decrease in kerosene consumption. This suggests that in line with the IFC/World Bank, lighting is the key reason for household kerosene purchases. Financial savings in Tanzania and the Philippines were similar, while the higher relative cost of kerosene in the mountainous and largely inaccessible study region in Indonesia provided the greatest financial savings.



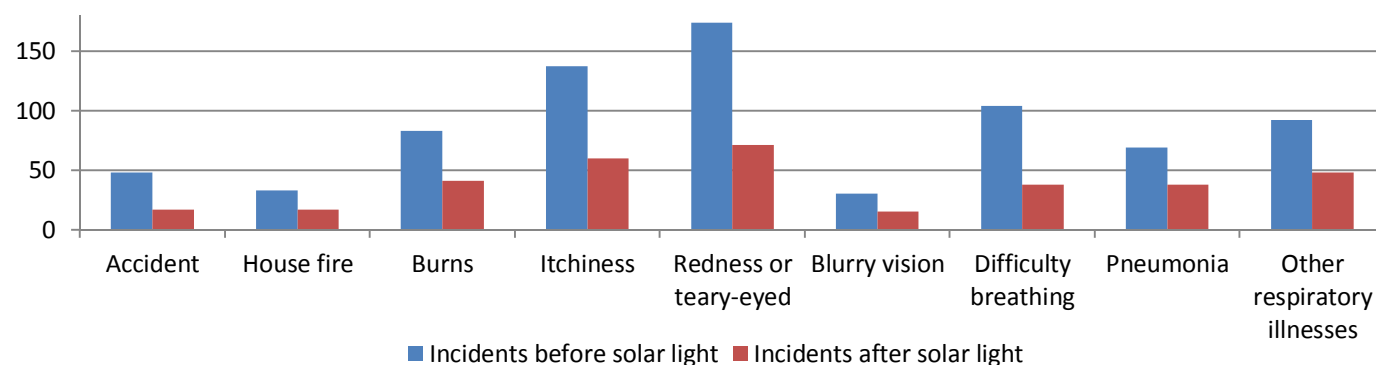
Results - Part 2: Environment

	Tanzania	Philippines	Indonesia	AVE.
CO ₂ reduction per year (metric tonnes)	0.163 t	0.139 t	0.166 t	0.156 t

Each litre of kerosene combusted emits 2.4 kilograms of CO₂ into the atmosphere. With average kerosene savings of 65 litres per year, this equates to emissions reductions of 0.156 tonnes of CO₂ per light per year. The global population of people using kerosene for domestic purposes therefore represents a considerable opportunity for substantial emissions reductions in the developing world.

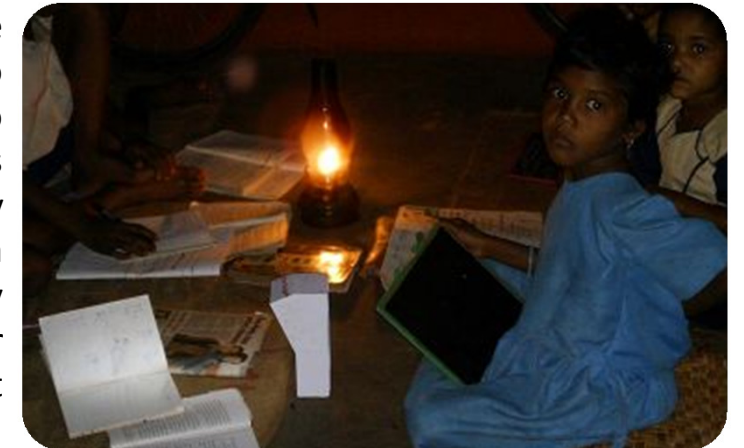
Results - Part 3: Health & safety

Kerosene fumes cause illnesses particularly felt by young children. Overturned lanterns also cause most house fires in the developing world and pose a significant safety risk. The Philippines study quantified the health and safety benefits of reducing domestic kerosene use, with respondents reporting a halving of issues previously experienced.



Results - Part 4: Education

Children in developing countries are typically unable to study after dark due to the high price of kerosene required to provide their light as well as the noxious fumes the lanterns emit. Survey respondents in the Philippines provided data on changes in their children's total study time after the introduction of the solar lights. The results showed a significant increase in total study time of 78%.



The qualitative feedback also gathered provided insights into changes in study behaviour. Respondents whose children studied at night reported that their children previously took turns to study by the kerosene lantern. However due to improved light quality, many households reported that their children now studied together around the one solar light, reportedly contributing to improved study and overall educational performance.

Summary and future study

The study indicates that kerosene usage among respondents reduced significantly after introduction of the solar lights. Reductions were relatively consistent across regions indicating similar usage patterns. The economic benefit to households through reduced kerosene dependence was also significant and consistent with World Bank estimates.

Future study programs will focus on: (i) increasing the geographic scope of the study, particularly in Africa; (ii) determining more accurately where created savings are subsequently spent; and (iii) investigating other energy requirements beyond lighting.

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