

MARKET MECHANISMS TO ENABLE OFF-GRID ELECTRICITY ACCESS FOR THE HARDEST TO REACH IN ZAMBIA

- Energy as a Service (EaaS) has the potential to increase the number of households willing to pay for Tier 1 Solar Home Systems by up to 1.2 million.
- Combining PAYGo or EaaS with subsidies further increases impact. Combining EaaS and a 50% subsidy can potentially increase access for up to 1.7 million households.
- Factors which hinder people’s ability to engage with market mechanisms must be addressed for potential impact to be achieved in practice.

As of 2021, 53.3% of Zambia’s population, around 1.8 million households, had no access to electricity. Market mechanisms (financial interventions designed to improve energy affordability) will be crucial in achieving universal access and ensuring that the 2.6 million households living in extreme poverty (less than \$2.15 a day) in Zambia, of whom just over half (1.5 million) lack electricity access, are not left behind. This brief explores the ability of different market mechanisms – including both business models and external interventions - to increase the number of households willing to pay for a basic Tier 1 Solar Home System in Zambia. It looks at the total population, households living in extreme poverty and those practicing subsistence farming in rural areas (1.8 million of whom lack electricity access).^{1,2}

Increasing access through business models alone

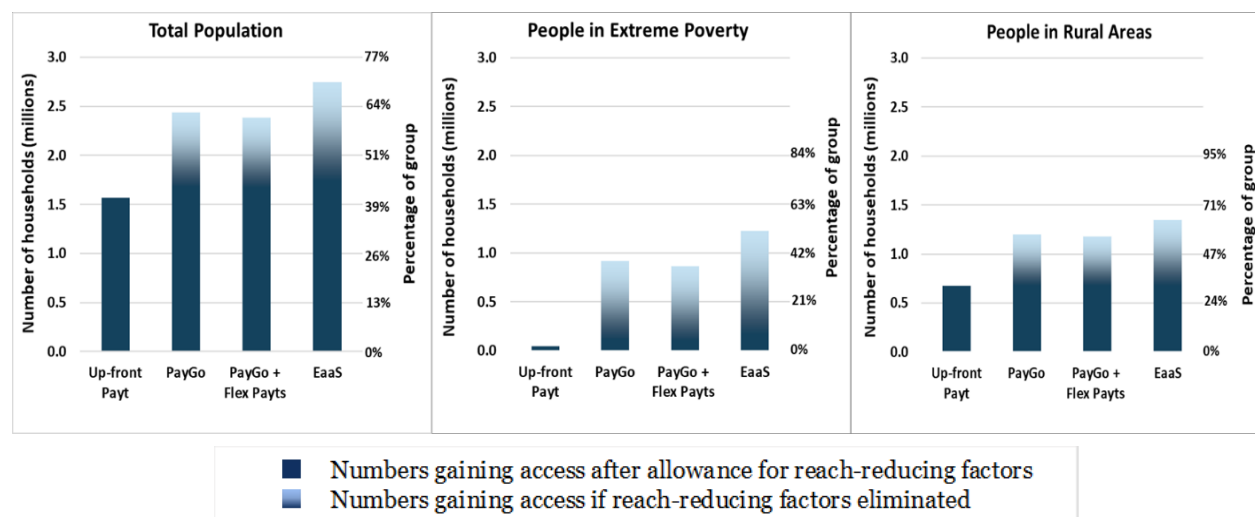


Figure 1: The number of households willing to pay for a Tier 1 Solar Home System under different business models (compared with the number willing to pay the upfront cost).

Figure 1 indicates that each of the business models assessed -PAYGO, PAYGo combined with flexible payments and Energy as a Service – can substantially increase the number of households willing to pay for a Tier 1 SHS across all groups. However, factors which reduce people’s ability to engage with business models, particularly seasonal or unreliable incomes,

¹ Potential impact relative to the number of households willing to pay upfront without financial support.

² The analysis presented here builds on an earlier study conducted for the Transforming Energy Access platform. Details of this, including the econometric modelling used in this brief, are available on [Practical Action’s website](#).

low experience and hesitancy in taking on financial commitments and physical remoteness, could mean that far fewer households may take up support (and, therefore, gain electricity access) in practice. It is essential that these factors are addressed either in the design of business models themselves or through supporting interventions.

PAYGo combined with flexible payments has a lower impact than PAYGo alone across all groups. In the scenario considered, postponing payments resulted in higher total finance costs and so lowered the number of households willing to pay. In practice, impact will depend on context. For instance, the option of flexibility may make PAYGo more feasible among those living in rural areas where income streams are often seasonal and irregular.

EaaS has greater impact than either PAYGo or PAYGo combined with flexible payments, with the potential to **increase the number of households willing to pay within the total population by up to 1.2 million**. This impact is felt entirely by those living in extreme poverty as the model assumes a strong correlation between income and, therefore, ability to pay, and willingness to pay (i.e. WTP increases with income). For those living in rural areas specifically, EaaS results in a potential increase of up to 670,000 households.

Increasing access through market interventions alone

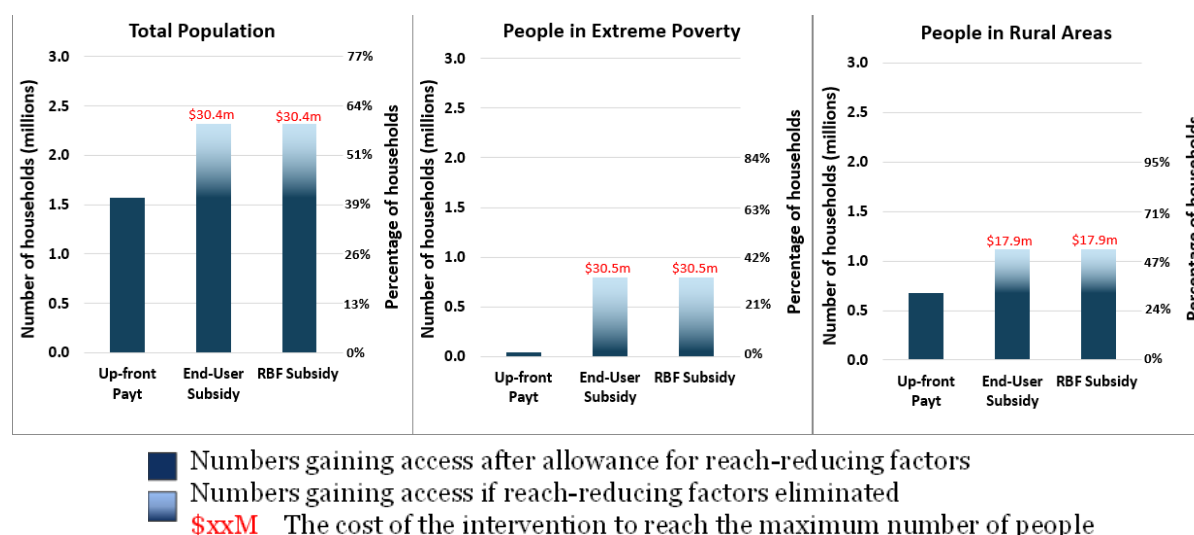


Figure 2: The number of households willing to pay for a Tier 1 Solar Home System as a result of external interventions (compared with the number willing to pay upfront).

Figure 2 indicates that either a 50% end-user subsidy or a 50% results-based finance sales subsidy would increase the number of households willing to pay for a Tier 1 SHS across all groups. Within the total population, each has the potential to enable **an additional 750,000 households to access electricity**. This is slightly below the number from PAYGo over 12 months (870,000) and much lower than the 1.2 million from EaaS with a 5-year product life. As with business models, this impact is felt by those living in extreme poverty. For those living rural areas, the potential impact is up to 440,000 households.

The two subsidy types are predicted to have the same impact because they are assumed to reduce the cost to the customer by the same amount. In practice, impacts may be different - for example, if a subsidy is not used entirely for this purpose or if poor targeting results in fewer intended households benefitting. Again, factors which hinder people's ability to engage with market mechanisms are likely to reduce subsidies' reach in practice. Such factors, including lack of registration in national databases or proof of residence, will hinder targeting and inclusion for certain groups.

Combining business models and market interventions

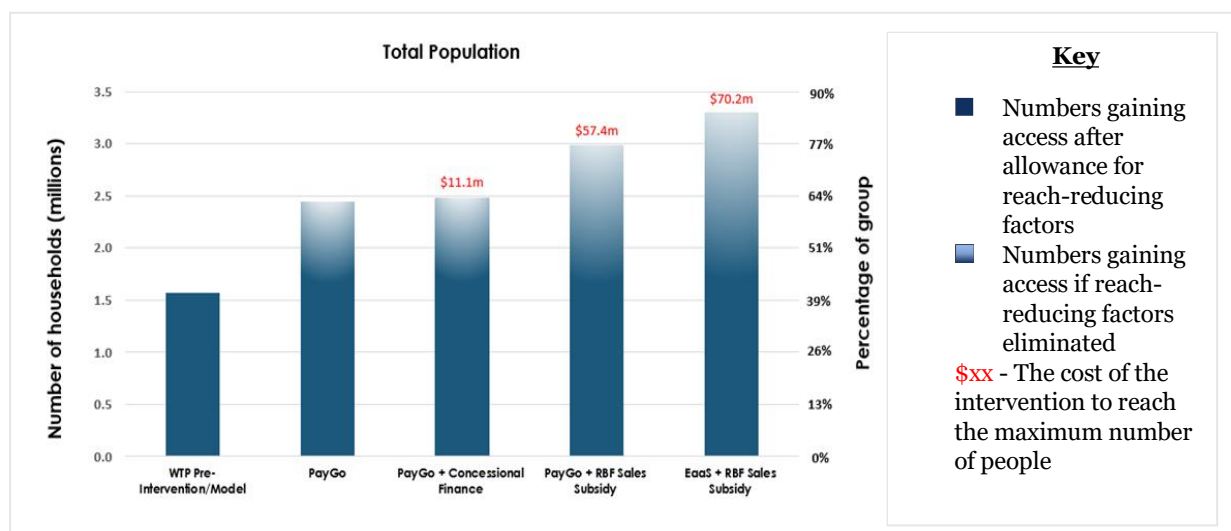


Figure 3: The number of households willing to pay for a Tier 1 Solar Home System as a result of different combinations of business models and external interventions (compared with the number willing to pay upfront).

Combining business models with market interventions produces a higher potential impact across all groups than any one mechanism on its own (although not as much as the sum of the impacts of the individual mechanisms applied separately). However, reach-reducing factors also combine which may substantially reduce the impact of combining mechanisms.

Figure 3 indicates that combining PAYGo with concessional finance has the potential to increase the number of households willing to pay within the total population by up to 911,000. This is only slightly more than the number achieved through PAYGo alone. Combining PAYGo with a 50% RBF sales subsidy has a much higher potential impact at 1.4 million households (although the cost of reaching these households is much greater at \$57.4 million compared to \$11.1 million for concessional finance). However, of the mechanisms assessed, **EaaS combined with a 50% RBF sales subsidy has the greatest overall potential, increasing the number of households willing to pay by up to 1.7 million.** Because more households are reached, the cost is also higher at \$70.2 million. Again, the model assumes that the mechanism's impact is felt by people in extreme poverty.

For households living in rural areas, PAYGo combined with concessional finance has a slightly greater impact than PAYGo alone (roughly 550,000 households compared to 530,000). Combining PAYGo with an RBF sales subsidy increases the number of households by roughly 820,000 but, again, the greatest impact is achieved when EaaS is combined with a RBF sales subsidy, increasing the number of households willing to pay by roughly 1 million.

Conclusion

Business models and market interventions have the potential to substantially increase the number of households willing to pay for off-grid electricity in Zambia. Of those explored in this analysis, EaaS alone and either PAYGo or EaaS combined with a significant (e.g. 50%) subsidy had especially high potential impact. Crucially, results reflect the level of impact that can be achieved if factors hindering people's ability to take up market mechanisms are addressed; something that is not guaranteed in practice. Mechanisms need to be carefully designed and implemented to overcome such factors - ranging from low and irregular incomes to the exclusion of people in poverty from public databases used to target subsidies.