

Learnings from a Decade of Investing in Energy Access in Africa

WHY SCALE IS NOT EVERYTHING,
PROFITABILITY IS HERE,
AND NOW IS THE TIME TO
DOUBLE DOWN

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PERSISTENT

Introduction

Since its early days, Persistent has been one of the thought leaders and chief architects of the energy access sector. In 2014, we published the seminal [white paper](#) presenting the business model for the sector and since then we have invested in 18 companies and launched and provided venture building services to more than 10 of these companies across Sub-Saharan Africa. Over the years we worked very closely with co-investors, debt funders, grant providers, industry organizations, foundations, governmental organizations, and the likes - all on our joint mission to build the energy access sector in Africa.



We, like many others, thought that pay-as-you-go (PAYGO¹) off grid solar as a subsector of energy access would reach profitability and hockey stick growth within 5-7 years. That has not happened. The lack of rapid growth to profitability discouraged the continued flow of equity to the sector to fuel the growth needed to meet the UN Sustainable Development Goal - SDG 7 (ensure access to affordable, reliable, sustainable, and modern energy for all) by 2030. It has also delayed the development of exit opportunities for fatigued early investors, starving the industry of capital.

Faced with disappointed expectations, we decided to re-analyze our experience taking another deep dive into the industry financials, reflecting on our venture building work and speaking to founders, executives, investors, and other stakeholders. Today, we want to share our learnings - and not least - a lot of good news! We do so by reviewing the assumptions we made in 2014 and assess the extent to which these assumptions have been proven right or wrong. Our goal is to spur discussion, exchange experiences and encourage all our readers to join us on this critical mission of building strong energy access companies while lifting millions out of energy poverty.

¹ PAYGO is defined as a company that removes the initial financial barrier to solar energy access by allowing consumers to pay for their solar lighting system (with or without appliances or add-ons) with a series of monthly payments instead of paying upfront for the entire system.

Our assumptions when we started – how did we score?

Assumption 1: Strong unit economics, with gross margins of 55%+, are critical².

TRUE.

To ensure that there is enough cash flow to pay for operations and financing, we anticipated that strong unit economics are critical to the success of the business model.

Indeed, to be profitable at scale and generate enough cash to cover operating expenditures, a PAYGO business should have a gross margin of 55%+, where gross margin is defined as: $(\text{contract value} - \text{COGS}) / \text{contract value}$. We see most companies achieving gross margins in the 45-55% range with the most successful companies achieving a sustained gross margin of ~60%+.

Assumption 2: To reach operating break even requires a PAYGO solar company to connect >25-50,000 households, raise >\$10mm and operate for >2 years. To reach complete breakeven (covering overhead) requires a PAYGO company to connect >50-75,000 households and raise >\$20mm.

NOT TRUE.

Here comes the good news. We have seen companies (including those in our portfolio) reach profitability much earlier and the key determinant does not seem to be large scale but rather an ability to run a lean operation and adjust the operating model to work optimally in the local context. We also see companies which have reached scale far beyond what we theorized but that still have not reached the break-even point (even corrected for growth). Of course, a certain scale is required to cover overhead, but smaller companies have a lot of advantages in terms of being able to stay lean. Their processes are less complex, their management team can maintain control of key functions and their teams are closer to

“The key determinant of profitability does not seem to be large scale but rather an ability to run a lean operation and adjust the operating model to work optimally in the local context.”

² Assuming a standard 18-24 months PAYGO contract with a 10+% down payment

the home base, which makes it easier for them to adapt to local specificities. Of course, smaller businesses must invest and run losses as they grow, so it is often difficult to see whether a fast-growing business is inherently profitable.

Another reason not to overemphasize fast growth and scale as the key to reach profitability, is the fact that experience has shown that companies are taking a lot longer to reach 25-50,000 households and - those who reach them - do so at higher cost levels (see below). Educating customers on the products and payment terms and operations, building and growing teams in a scarce talent environment, raising affordable working capital as well as equity are only a few aspects that simply have turned out to take longer than expected. Of course, any business will have increased overhead as it grows. Therefore, as discussed below, tightly managing these costs is also critical.

Assumption 3: Keeping costs of operation low is critical. Operating costs at scale should range from 25-35% of revenues as companies are able to spread fixed costs over a larger revenue base.

PARTIALLY TRUE.

Keeping costs of operation low is one of the most critical aspects for the business model to work. However, keeping operating costs³

to less than 25-35% of cash revenues at scale is much harder to achieve than anticipated.

While direct customer costs are expected to increase in line with sales, overhead costs are expected to remain relatively stable once a certain level of overhead is established. However, the truth is that certain overhead costs do not scale as well as anticipated because with growing companies, complexity tends to grow disproportionately. This is particularly true for companies that focused on fast growth and did not invest sufficiently in setting up optimal, ideally automated processes and checks and controls along the way.

Below are just three examples to highlight this point:

a. Targeting more rural customers to increase reach of customers with a PAYGO model is often cost prohibitive.

As companies strive to grow their customer base, they often need to move away from the initial more 'low hanging fruit' of semi-urban customers towards rural, more sparsely populated areas with poor infrastructure. Here product value is typically low, cost to reach and educate rural customers is high, mainly due to low population density in rural areas and weak or non-existent infrastructure.

³ Refer to Annex for a definition and different categories of operating costs.

Furthermore, the income streams of rural customers are highly volatile, making them less likely to be able to make continuous payments. Also, the cost of repossessing systems might be prohibitive which prevents companies from enforcing contracts and redeploying otherwise well-functioning units.

b. Growth makes organizations complex, often driven by a large talent gap at middle management levels as well as insufficient automation of processes.

Early stages founders often do a lot themselves, but as they grow, they must delegate duties to middle management. Talented middle management is scarce and/or expensive, with companies often taking longer than a year to fill such positions.

Companies that have not adopted effective digitization enabled by standardized processes suffer from an overflow of manual processes, from capturing customer data in remote areas with paper forms to manually linking incoming payments to the right customer to unlock systems. Also, while labor is relatively cheap, the cost benefits of automation take time to materialize and PAYGO companies are always cash

constrained. Hence, there is a strong temptation to delay investment in automation.

While companies have an increasing amount of data available as they grow, it is often stored in many places and maintained by many different employees, which makes it difficult to find the relevant information and draw appropriate conclusions that can be acted upon. It further will make it difficult and costly to monetize this data in the future (e.g., for follow on sales).

c. Growing across multiple countries is complex and costly.

An alternative to going more rural is to venture out of the home territory and expand across countries. However, as this happens, each country builds its own significant fixed cost basis. Consolidation of finance is overly complex, with the finance team's workload potentially increasing over-proportionally. Teams are often far from their home base, which makes it more difficult for them to adapt to local market conditions, which is critical to be successful.

“Well defined and efficient processes is key to creating a sustainable model. Businesses should pay a lot of attention to keeping organizational complexity low.”

Having well defined and efficient processes is key to creating a sustainable model. Businesses should pay a lot of attention to keeping organizational complexity low, which sometimes means weighing fast growth with complexity and cost. Since adapting or enhancing processes once the company reaches a certain size is extremely difficult, companies should invest in getting key processes (customer acquisition, sales and after sales, distribution) right from the start and aim to standardize as much as possible, while keeping the organization still agile and responsive. While operating costs at scale of 25% of revenues is challenging, we see 35% as a reasonable goal to run a net profitable operation.

Assumption 4: Focus on building robust distribution networks and incentivizing sales agents is key.

TRUE.

As companies scale up, large agent and service networks are required to create and maintain customer relationships in regions with often poor infrastructure. This can be complex to manage. Hence, setting up robust distribution networks and aligning incentives of sales agents with those of the company is key.

Achieving a collection rate of 80%+ has proven to be hard, due to several reasons: agricultural cycles limit customers' ability to pay in certain months, customers prioritize other essential goods and services (food,

school expenses, health expenses) and are able to live without energy for some time, technical problems may result in customers not paying, etc.

We have seen many different agent incentive models in the market. The ones that tend to work best find ways to incentivize the agents not only on the sale, but also on collections and an ongoing strong customer relationship which can be leveraged for follow-on sales. For example, one company pays agents a commission on any customer payment made over time. As a result, agents select customers that they believe have a high likelihood of making payments upfront, are quick to fix any issues that could lead to delay or non-payment and encourage ongoing payments over time. It also gives agents an income over time and makes them more incentivized to stay with the company long-term. Of course, this model implies higher complexity when calculating commissions and making agent payments, but it is one example of how incentives are as closely aligned as possible with the company.

Assumption 5: The business model has the potential to generate substantial impact by lifting millions of households out of energy poverty, providing more sustainable electricity-based energy services (e.g., lighting, phone charging) and creating thousands of jobs.

TRUE.

As anticipated, the distribution business model has generated both substantial social

and environmental impact and remains the most impactful method of pursuing energy access.

GOGLA estimates that since the inception of the industry, an estimated 246 million people live in a household that has achieved improved energy access. Currently, about 108 million people benefit from improved energy access thanks to off-grid solar products.

By reducing the use of kerosene through the distribution of solar powered lighting, an estimated 59 million metric tons of CO₂ have been avoided. Aside from reducing the amount of CO₂, solar lanterns and multi-light systems have also led to increased income, improved learning, and reduction in health hazards, with savings on energy-related expenditure estimated at \$9.1 billion⁴.

Additionally, off-grid energy companies have generated thousands of jobs across Sub-Saharan Africa. The sector is estimated to currently support about 370,000 full-time equivalent (FTE) jobs, of which 56% are in rural areas⁴.

However, with 588 million people still off the grid and 153 million on unreliable grids in Sub-Saharan Africa⁴, the impact potential of the sector is yet to be fully harnessed. To reach the full potential and reach SDG 7, 200 million African households will need to be connected by 2030 given current demographic trends⁵. This includes a large share of last mile rural customers, hence companies will need to receive subsidies to do so, since many of those customers cannot be served in a financially viable way.

Still, reaching these customers with solar home systems (SHS) distributed through private companies is much cheaper than reaching them with grid connections or not reaching them at all, which prevents them from getting a chance at positive economic development. Additionally, reaching them with low carbon solutions instead of high carbon solutions will lead to approximately 268 Mt CO₂e being avoided by 2030⁵.

“With 588 million people still off the grid and 153 million on unreliable grids in Sub-Saharan Africa, the impact potential of the sector is yet to be fully harnessed.”

⁴ Investing in the off-grid solar sector: What you need to know. GOGLA (2019)

⁵ Unlocking climate finance to accelerate energy access in Africa. Shell Foundation (2021)

In conclusion: A lot of good news for investors in the industry - now is the time to double down.

The energy access space in Africa is not what it was 10 years ago. The early years were characterized by a lot of excitement about PAYGO technology and the endless markets it can open at the bottom of the pyramid with the help of technology. After some years, it has become evident that the pace of growth is slower and more costly than expected.

At the same time, we know so much more today than we knew 10 years ago. We know what it takes to create strong, profitable businesses in the energy access space. We also now know what the pitfalls are. Building an energy access company is not sexy and takes incredibly dedicated entrepreneurs putting in hard work - one customer at a time.

We also believe that those companies that are built on a solid foundation driving profitable growth are in a very bright spot right now. Debt funders have a lot more supply of debt funding than they can place in suitable companies. Grantors are looking for partners who can execute subsidized energy access projects at the bottom of the pyramid. At the same time, we see contract values going up across the board in our portfolio, driven by strong customer and business demand for additional appliances to be acquired on a PAYGO basis. Also, solar and appliance prices are still falling, and products are getting more efficient. And finally leveraging the solar distribution channel with its wealth of data and reach, few have yet had the chance to fully explore.

In our next article, we will deep dive on the role of equity in the sector, while we are grateful for the immense support of our early funders like Shell Foundation, FCDO, USAid, the Cottier Donzé Foundation or Dream Project Incubators to just name a few. For now, we want to leave you with a final thought. Africa stands to benefit immensely from the tech revolution as it helps to leap the huge infrastructure gaps on the continent - from e-learning to e-health to e-farming, to name a few. However, without access to electricity, these innovations do not even have a chance to get to where they are needed most. And in the short to medium term (possibly even the long term) there is really no alternative to off-grid solar to electrify the many millions without access to electricity in Africa.



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About Persistent

Founded almost a decade ago, Persistent is Africa's Climate Venture Builder. We believe in the power of carbon neutral economic development in Africa and as such are the leading experts and pioneer investors in the renewable sector on the continent. We build commercially successful businesses that can scale sustainably, driven by the belief that it is the best approach to outsized climate and socio-economic impact in underserved African markets.

Persistent invests financial capital and human resources, through our Venture Building model, focusing on ideation to early growth stage. We often second our team members (venture builders) to work in operational roles, hand in hand with the management teams of our portfolio companies. In alignment with the needs of the portfolio companies, our team typically focuses on strategic and operational finance management, capital raising and structuring, business analytics and development of KPI tools and legal and human capital advisory.

To date, Persistent has made 18 early-stage investments (2 exits) in PAYGO solar home systems, Commercial and Industrial solar, Ecosystem enablers and E-Mobility players. Next to delivering solid financial returns, we have also contributed to improving over 4 million lives, powering half a million households, avoiding over 1 million tons of CO₂e, and creating 10,000 jobs to date.

Persistent further leverages its unique industry expertise as an advisor to the \$120m [Energy Entrepreneurs Growth Fund \(EEGF\)](#), managed by Triple Jump. Initiated in 2019 by Shell Foundation and FMO, the EEGF provides catalytic financing for early and growth stage companies in Sub Saharan Africa, operating in the access to energy ecosystem.

Persistent is fortunate to count a distinguished group of impact-oriented funders as our investors such as Shell Foundation, USAid, FCDO, the Cottier Donzé Foundation and Dream Project Incubators amongst others. We have raised capital from high-net-worth individuals, family offices, corporate and private foundations and DFIs and have a history of accepting equity, debt, and grant capital into Persistent.

The company is committed to a collaborative approach to accelerate the development of the renewable energy sector, which is underscored by numerous sector-defining [publications](#) and analysis.

Annex

Operating costs are defined as follows:

- **Direct customer costs**
 - Sales/ Field team (Salaries, commissions, transport costs, equipment, airtime, shops, etc.)
 - After sales/ call center
 - Mobile money/ bank charges

- **Overhead costs**
 - Management and support function salaries
 - Marketing (e.g., advertising, social media, promotional materials)
 - IT (e.g., IT service providers, IT infrastructure, equipment, consultant fees)
 - Facilities (e.g., tent, water, internet, electricity, communication costs)
 - Travel (management/ senior staff travel)
 - Other (all other costs not included above: legal fees, governance costs, extraordinary expenses, etc.)



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