



# DATA-DRIVEN ENERGY ACCESS FOR AFRICA

INSTRUMENT ANALYSIS  
SEPTEMBER 2021





*Driving Sustainable Investment*

---

# Data-Driven Energy Access for Africa

LAB INSTRUMENT ANALYSIS

September 2021

---

## DESCRIPTION & GOAL —

A financial intermediary powered by AI and geospatial data analytics to better target customer segments and more efficiently distribute capital.

## SECTOR —

Energy Access

## FINANCE TARGET —

Commercial lenders | Concessional capital from Development Finance Institutions | Catalytic capital from donors

## GEOGRAPHY —

Nigeria, Kenya, and Uganda

The Lab identifies, develops, and launches sustainable finance instruments that can drive billions to a low-carbon economy. The 2021 Lab cycle targets three specific sectors: sustainable food systems, sustainable energy access, and sustainable cities, in addition to two regions: Brazil and Southern Africa.

## AUTHORS AND ACKNOWLEDGEMENTS

The authors of this brief are Amanda Lonsdale and Matthew Solomon.

The authors would like to acknowledge the following professionals for their cooperation and valued contributions including the proponents Kate Steel, Chris Woolhouse, and Grace Fenton (Nithio); and the working group members: Kome Johnson-Azuara (Africa Finance Corporation), Benjamin Denis (Agence Francaise de Développement), Peter Sweatman (Climate Strategy), Don Purka (International Finance Corporation), Martin Hagen (KfW), Adam Connaker (Rockefeller Foundation), Ashish Kumar (Shell Foundation), and Alice Caravani, Angelina Avgeropoulou, and Kavi Unadkat (UK BEIS).

The authors would also like to thank Ben Broché, Barbara Buchner, Rob Kahn, Júlio Lubianco, and Josh Wheeling for their continuous advice, support, comments, design, and internal review.

The Lab's 2021 programs have been funded by the Dutch, German, Swedish, and UK governments, as well as the Rockefeller Foundation. [Climate Policy Initiative](#) (CPI) serves as Secretariat and analytical provider.



## SUMMARY

The objective of Sustainable Development Goal (SDG) 7 is to “ensure access to affordable, reliable, sustainable, and modern energy for all”. The biggest challenge to meeting this goal is in Sub-Saharan Africa (SSA), which is home to nearly 3 in 4 of the 750 million+ people without access to energy globally. Despite a more than 30-fold increase from 2012-2018 in investments in off-grid energy alone, energy access in SSA has increased from 38% to 47% of the population over the same time, and investment in the sector has stagnated over the last half-decade.<sup>1</sup> A significant barrier to increased investment in energy access is the lack of understanding of customer repayment risk, which has also led to 1) a concentration of investment in the top 10 developers in the region who do not reach last mile end users, and 2) inefficient channeling of concessional capital and grants to the neediest populations.

Data-Driven Energy Access for Africa is a financial intermediary providing loans to solar distributors in Kenya, Nigeria, and Uganda. Powered by its Risk Analytics Engine, Nithio uses artificial intelligence (AI) and demographic, geospatial, and anonymized customer data to analyze customer repayment risk within distributors' receivables portfolios. This enables better credit assessment of underlying portfolios of receivables and more effective intermediation of capital to serve those customers with the greatest financial need. By incorporating a detailed segmentation of forecasted customer repayment abilities this approach scales investment efficiently and offers a step-change in making more rapid progress toward achieving SDG 7.

This instrument meets all four of the Lab's endorsement criteria in that it is:

**Innovative:** The use of AI-driven analysis of demographic and geospatial data to better determine repayment (credit) risk will expand lending beyond the top regional distributors, reaching customers in areas with limited or no energy access. By developing a common set of metrics to analyze portfolio health, the instrument at scale will create a new asset class for investors looking to deploy different types of capital (from concessional to commercial) in the energy access space.

**Financially Sustainable:** The proponent has already raised USD 23 million, and have begun deploying loans in their 3 target markets.

**Catalytic:** By 2025, the proponent expects to mobilize hundreds of millions of USD in blended finance. As the data-driven model is further proven, the potential to scale the AI approach could extend throughout SSA where nearly 600 million people lack energy access.

**Actionable:** The proponent has investment from leading private and public investors, including Kupanda Capital, TPG Rise Fund, EDFI-ElectriFI, FSD Africa Investments, Powerhouse Ventures, DFC, and others. It is led by a team with significant experience in the energy access space; co-founders and team members have experience at Google, Power Africa, Citi, AfDB, and world class investment banks and law firms. Nithio has disbursed loans in Kenya and Nigeria to date and has developed a strong pipeline with additional transactions planned to be announced shortly.

---

<sup>1</sup> Drew Corbyn and Laura Fortes . 2021. “2020: Off-grid solar investment remains robust during COVID-19 pandemic.” GOGLA. <https://www.gogla.org/about-us/blogs/2020-off-grid-solar-investment-remains-robust-during-covid-19-pandemic>.

**Next steps:** The Lab recommends endorsement of Data-Driven Energy Access for Africa due to its innovative approach to standardizing credit risk analysis for off-grid distributors, which presents the potential to rapidly increase energy access in Sub-Saharan Africa and beyond. The instrument represents a catalytic approach to an industry that has been largely stagnant over nearly a decade. Following endorsement, the proponent will continue to implement its initial loan programs, refine their legal structure to be able to deploy different forms of capital, work to mitigate foreign exchange costs, and continue to fundraise from a variety of investor types to expand their ability to lend in their target markets.

# TABLE OF CONTENTS

SUMMARY .....	3
CONTEXT.....	6
CONCEPT .....	8
1. Instrument Mechanics.....	8
2. Innovation.....	10
2.1 Barriers Addressed: A better understanding of risk .....	10
2.2 Innovation: Usage of data creates efficiency and transparency.....	11
2.3 Challenges to Instrument Success.....	12
MARKET TEST AND BEYOND .....	14
3. Implementation Pathway and Replication.....	14
4. Financial Impact and Sustainability .....	15
4.1 Quantitative Modeling .....	15
4.2 Private Finance Mobilization and Replication Potential.....	16
5. Environmental and Socio-economic Impact .....	16
5.1 Environmental Impact.....	16
5.2 Social and Economic impact .....	17
5.3 Sectoral Impact .....	17
NEXT STEPS .....	18
REFERENCES .....	19

## CONTEXT

*Insight into customer risk is needed to expand sustainable energy access investment to a wider range of operators to reach Africa's 2030 goals.*

UN SDG 7 calls for “universal access to affordable, reliable and modern energy services” by 2030.<sup>2</sup> As of 2021, more than 750 million people around the world lack access to electricity. In Sub-Saharan Africa (SSA), 54% of the population, or 570 million people, lack energy access.<sup>3</sup> Electrification through decentralized renewables is a lower cost, lower emissions, and more resilient approach than business as usual,<sup>4</sup> but significant barriers exist in the market.

The percentage of the population with sustainable energy access in Sub-Saharan Africa has not increased commensurate with the rate of investment, which has itself stagnated over the last half-decade. Data comparing total investment in the off-grid solar sector in SSA compared to energy access rates shows that while investment over the 2015-2018 period averaged around USD 200m per annum, this investment is not keeping pace with population growth.<sup>5</sup> The status quo is insufficient for meeting SDG 7 and indicates that funds are not being effectively channeled to those who need it most.

**Figure 1:** Off-Grid Solar Investment vs. Energy Access



Source: GOGLA, World Bank population and energy access

<sup>2</sup> United Nations. 2020. “The Sustainable Development Goals Report 2020.” <https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf>, p. 38

<sup>3</sup> IEA, IRENA, UNSD, World Bank, WHO. 2021. “Tracking SDG7: The Energy Progress Report 2021.” [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/SDG7\\_Tracking\\_Progress\\_2021.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/SDG7_Tracking_Progress_2021.pdf), p. 21

<sup>4</sup> Shell Foundation, Rockefeller Foundation, Catalyst. 2021. “Unlocking Climate Finance to Accelerate Energy Access in Africa.” <https://www.rockefellerfoundation.org/wp-content/uploads/2021/04/Unlocking-Climate-Finance-for-SDG7-Report-For-RF.pdf>, p. 6.

<sup>5</sup> Drew Corbyn and Laura Fortes . 2021. “2020: Off-grid solar investment remains robust during COVID-19 pandemic.” GOGLA. <https://www.gogla.org/about-us/blogs/2020-off-grid-solar-investment-remains-robust-during-covid-19-pandemic>.

One of the key barriers to increasing the volume and efficient deployment of capital for off-grid solar is investors' lack of understanding of credit risk as it relates to portfolio quality. Investors tend to gravitate toward well-known and well-established distributors, which has led to a concentration of investment: 87% going to the top 10 off-grid solar operators each year.<sup>6</sup> While concentration in the pay-as-you-go (PAYG) market can lead to certain efficiencies, the larger companies are not reaching as many customers as they could. Smaller, local distributors have portfolios that are in fact financially sound, but commercial investors currently consider these portfolios too risky, limiting their ability to scale. Proponent estimates indicate that in their target markets, there is latent demand of USD 25-50 million from Tier 3 distributors alone in just 3 countries. This figure represents their current capacity to absorb capital, and their capital needs are anticipated to grow once they are able to more easily access finance.

In terms of portfolio health, in the PAYG market there is a lack of consistency between solar companies as to how they report non-performing loans and payment delinquencies. This prevents companies and investors alike from understanding the true repayment risk of their customer base, which distorts deployment of capital to the sector. Currently, concessional capital (e.g., grants, subsidized loans, etc.) does not always enable distributors to reach last mile customers because without data on household ability to pay these funds are applied across a project or portfolio instead of being targeted to those who need it most. This inefficient deployment of capital means fewer resources for truly last mile households.

The proponent, Nithio, an AI-driven platform for clean energy investment, has proposed the Data-Driven Energy Access for Africa instrument to provide debt to distributors of energy access products, and through its data analytics will standardize credit risk in order to sufficiently scale the market.<sup>7</sup> As described in detail below, Nithio forecasts repayment rates for each customer in a distributors' portfolio and aggregates these analytics for each relevant portfolio.

Through this instrument, the proponent standardizes loan terms and structures, leading to the development of an asset class in energy access lending. This enables the proponent to match the right capital to the right market segments and provide sustainable and scalable financing for the off-grid solar sector. Nithio's data-based approach will align investor risk-return profiles to distributors with varying portfolios and help those distributors attract both public and private capital flows by providing data informed assessment of portfolio risk.

---

<sup>6</sup> GOGLA. "Investment Data." 2021. <https://www.gogla.org/access-to-finance/investment-data>, slide 4.

<sup>7</sup> We use the term "energy access products" or "energy access systems" throughout to reference the products distributors provide end customers. These are primarily off-grid solar home systems at the moment, but ultimately may include options like solar lanterns, batteries, productive use appliances, or clean cooking products, depending on the customer's ability and willingness to pay. The instrument can be scaled up to include a wider variety of energy access and productive use products financed on a PAYG basis.

# CONCEPT

## 1. INSTRUMENT MECHANICS

---

*Data-Driven Energy Access for Africa leverages anonymized customer and demographic data to standardize credit analysis of distributors' portfolios and offer them sustainable and competitive financing.*

---

The Data-Driven Energy Access for Africa instrument is an innovative approach to expanding the PAYG energy access market by incorporating a better understanding of distributors' portfolio repayment risk. The instrument is a financial intermediary that provides loans to distributors with rates based on the risk analysis of the distributors' portfolio. The structure of the instrument is shown below in Figure 2.

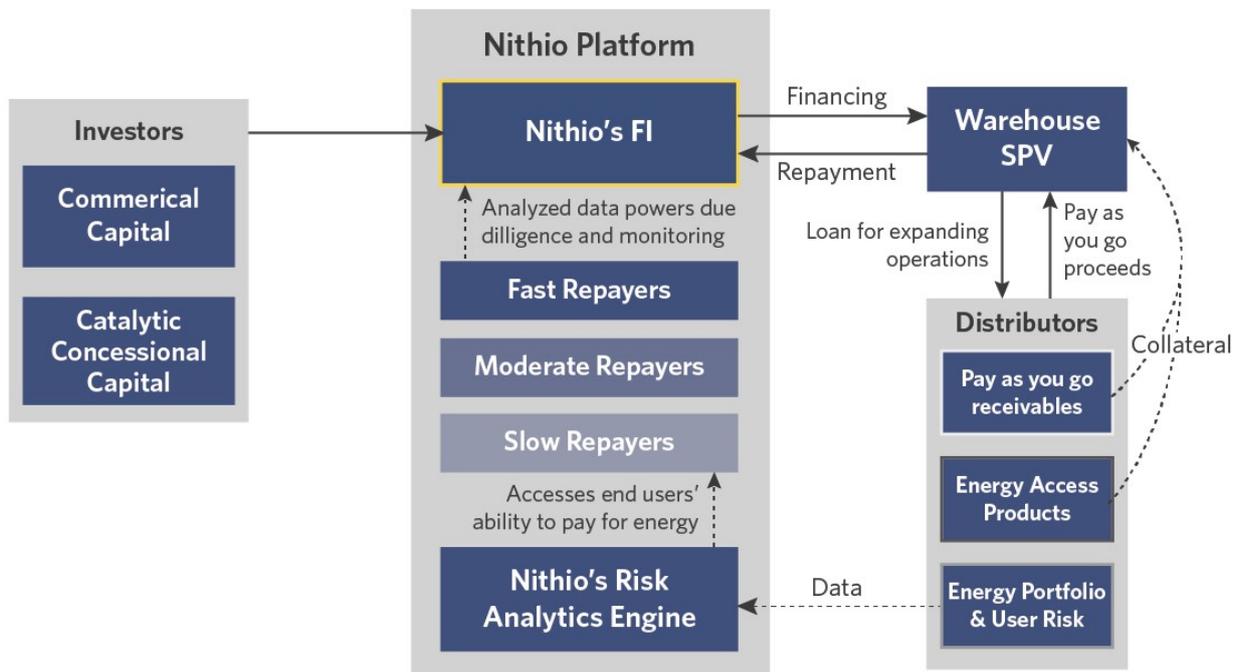
It works as follows: a mix of concessional and commercial investors provide capital to the investment vehicle, Nithio FI ("the FI"). Nithio then sources, analyses, and segments a distributor's customer portfolio using its Risk Analytics Engine, applying and promoting standardized metrics. Combining anonymized customer repayment data from the distributors and geospatial and demographic data (including income, assets, geography, roofing quality, and many more inputs), it forecasts repayment rates for each customer aggregating these analytics for the relevant portfolio. Customers are segmented based on repayment speed and rates of default over various timelines. This enables standardized measurement of credit risk across a pool of receivables, as well as sustainable loan pricing. Receivables are not "cherry-picked": the entire portfolio is financed with a blend of capital as suits the characteristics of the end-users in the portfolio. This makes it even more important for Nithio to have a clear, data-informed picture of customer ability to pay and forecasted repayment rates.

Using this portfolio analysis, the proponent calculates appropriate financing terms for each distributor. Working with its investors and distributors, Nithio can also intermediate grant capital to distributors such that those end users with limited ability to repay are still able to finance a relevant product, while distributors' business models can remain viable (see "Intermediating grant finance" below).

Financing is provided through an SPV structure to ringfence the receivables from the risks associated with the originating distributor. The PAYG receivables portfolios are the main collateral securing the loan. The distributor uses the loan to finance energy access products to end users.

As end users repay distributors for their energy access products the principal and interest on the loan from Nithio FI is repaid. That capital is then used to repay investors and pay financing costs, fund operating costs, and recycle funds to finance more distributors.

Figure 2: Instrument Mechanics



**Intermediating grant finance:** Regardless of repayment timeline and loan terms offered, there will always be some customers unable to pay for energy access, and who will require significant grant subsidies. Given the universal focus of SDG 7 and the proponent's mission-driven ethos, it is still imperative for Data-Driven Energy Access for Africa to reach these customers. A key component of the proponent's mission is to match the right capital to the right market segment. As they rollout their product offerings, they will work with investees and investors to provide the right incentives to include last mile customers in distributors' portfolios. Further details are available in the "Challenges to Instrument Success" section.

### Key Actors

- **Distributors:** The instrument is targeted at the full spectrum of distributors, including smaller, local distributors in Sub-Saharan Africa that currently have trouble attracting financing due to higher perceived portfolio risk. The proponent has also worked with top-tier distributors who are able to attract financing but are looking for more information on the repayment rate and default potential of their current customers – a key market segment to drive market standardisation.
- **Investors:** Nithio is seeking and has secured capital for the FI from a wide range of investors with varying risk-return profiles. This includes concessional and catalytic capital and commercial finance including from commercial banks and institutional investors. By aggregating the portfolio of smaller developers into a single instrument, the FI is able to attract and accept larger ticket size investments from institutional investors.

## 2. INNOVATION

*This is the only instrument built on deep data insights, allowing for larger scale and more targeted results, benefitting investors, distributors, and end-users.*

### 2.1 BARRIERS ADDRESSED: A BETTER UNDERSTANDING OF RISK

Data-Driven Energy Access for Africa addresses a number of barriers limiting the growth of the energy access sector in Sub-Saharan Africa.

Barrier	Description	Response
<b>Lack of standardized understanding of risk across distributor portfolios</b>	The PAYG energy access sector does not have transparent definitions around what risk looks like for different companies. It is very challenging to assess a company's or a portfolio's credit-worthiness if it is unclear over what timeline they are analyzing rates of repayment and default.	<p>The instrument combines geospatial, demographic, and anonymized customer repayment data to provide unprecedented insights into credit risk associated with receivables portfolios for both investors and distributors. The proponent is developing a common set of definitions with distributors so that outside actors know how to interpret data points such as default rates and non-performing loans, which right now are inconsistent throughout the industry and are therefore impossible to interpret.</p> <p>As the instrument scales and these definitions become the standard, loans across distributor portfolios will be able to be more easily aggregated, opening access to commercial capital with larger ticket sizes for this evolving asset class.</p>
<b>Capital only goes to a small set of larger distributors who are not scaling quickly enough to reach all geographic and socio-economic markets by 2030</b>	As the energy access market has plateaued in terms of growth in capital invested, a majority of investment still goes to just a handful of companies. While this is not necessarily negative in a mature market, this pattern exists in energy access only because investors view smaller distributors as riskier without an ability to assess the underlying portfolio quality. As a result, last-mile customers are not having their energy access needs met.	<p>Data-Driven Energy Access for Africa, by using a common set of data and metrics to analyze portfolio risk, levels the playing field between all sizes of developers. This allows the proponent to extend financing to smaller, local distributors that are unable to access other credit sources.</p> <p>The deep data insights also allow the instrument to offer receivables-based financing, where future PAYG payments are put up as collateral. This complements more standard inventory-based lending, which required significant cash or hard asset collateral that was prohibitively restrictive for smaller distributors.</p>
<b>Public and concessional capital is not</b>	Governments from developing and developed economies provide	This instrument is built on a deep understanding of customer repayment

Barrier	Description	Response
<p><b>targeted to those customers most in need.</b></p>	<p>millions of dollars of support to projects with the goal of enabling energy access for end-users unable to afford it. Much of this funding is distributed without the benefit of the type of insights available from the Nithio Risk Analytics Engine and therefore may unintentionally be allocated to those customers that can afford and are willing to pay commercial financing rates. This reduces the effectiveness of relatively scarce concessional capital and potentially crowds out private finance that would be focused on lending to those commercial customers.</p> <p>Nithio projects there are 270 million customers in Sub-Saharan Africa that could afford subsidy-free commercially-financed rates for energy access.</p>	<p>ability. Since the instrument is a centralized entity distributing blended finance, they can modify loan financing terms to each distributor based on the relevant ringfenced customer portfolio. The proponent can also intermediate investor capital with a particular mandate (such as grants or highly concessional capital) using the analytics to reach a precise customer profile. As discussed below, the exact model for delivering this “precision finance” is still evolving and may need additional structuring to accommodate concessional finance that cannot be paired with a commercial entity.</p>
<p><b>Data privacy concerns can prevent usage of end-user data.</b></p>	<p>Different operators and target markets have different data privacy rules and requirements, which can make it challenging to create a consistent and scalable database while adhering to numerous privacy laws and regulations.</p>	<p>The proponent only uses <i>anonymized</i> end-user data in their model, and combine that with demographic and geospatial data to develop credit profiles for each distributor. The proponent's on-the-ground staff are partnering with local service providers to understand distributor needs and data privacy constraints. Additionally, they have developed partnerships with leading data companies to inform the AI models.</p>

## 2.2 INNOVATION: USAGE OF DATA CREATES EFFICIENCY AND TRANSPARENCY

Data-Driven Energy Access for Africa is a unique financial approach in this sector and region due to the risk analytics underlying its lending. In assessing the innovative aspects of the instrument, the Lab Secretariat reviewed other investment vehicles in the PAYG solar space in SSA, as well as instruments that use data analytics in their underwriting processes. The proponent's approach to financing the PAYG solar space is innovative in a number of ways relative to the other investment vehicles reviewed:

- By using standardized demographic and geospatial data, aggregated from many public and private household surveys and geospatial data sources, and combining it with anonymized customer repayment data from distributors, the instrument will **eliminate the inconsistency and speculation on credit risk** common to today's lending practices in the off-grid space.

- **Data analytics underpins every aspect of the instrument's operations and lending.** The instrument uses these analytics to enable receivables-based financing, which leaves distributor assets unencumbered, allowing them to use their capital for expansion.
- This instrument includes **a pathway to deploy concessional capital more efficiently.** The underlying data focus makes it easier to track the impact and effectiveness of concessional capital.
- Data-Driven Energy Access for Africa is an **open-ended investment opportunity.** The proponent's goal in the medium-term is to scale the instrument to match the scale of the energy access challenge. The underlying data platform is easily scaled to larger numbers of customers and different markets and energy access products. Additionally, the instrument can accommodate different types of investors with different risk profiles, return expectations, and timelines.

## 2.3 CHALLENGES TO INSTRUMENT SUCCESS

The proponent for this instrument is actively deploying capital in two of its target markets, and using these initial facilities to address any challenges that arise prior to scaling up its offering. The table below highlights issues identified through the implementation process as well as risks identified by the Lab Secretariat, and provides the proponent's current or proposed approach.

Challenge	Description	Response
<b>Portfolio risk</b>	For this instrument to scale, it needs for there to be an ecosystem of distributors seeking finance. There are plenty of end-users to support these distributors, but the current lack of financing makes it harder to find companies with a portfolio of future receivables for the instrument to use as the basis for its projected repayment rate calculation.	Nithio is offering bespoke solutions to distributors, including inventory-based financing when there are not sufficient receivables already in the portfolio. This will help them to build their business, creating a long-term relationship for future receivables finance.  On-the-ground staff in each target market are helping to source companies and understand market needs.
<b>Foreign exchange risk</b>	The FI will be receiving investment in US dollars but lending to distributors in local currency. Depending on the market, the local currency may be volatile and could make lending riskier.	The proponent has explored currency hedging options as well as partnership with local financial institutions.  Forex costs are priced into the proponent's modeling, and sensitivity analysis shows they are not a barrier to financial sustainability. As the instrument scales and the proponent can realize economies of scale in managing its forex challenges, economics should improve further.  The FX issue is a well-recognized issue in the sector and the

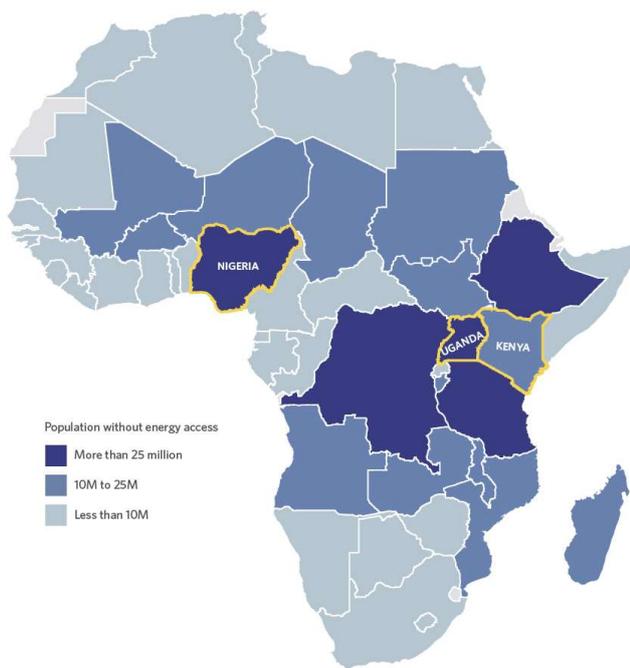
		proponent is exploring ecosystem wide solutions with DFIs and other potential partners. Ultimately, as local capital markets develop and the data-driven approach to the sector is understood, it is hoped that local currency institutional investors and pension funds will recognize and invest into the instrument as a recognized asset class.
<b>Legal structure to intermediate grant capital</b>	In order for the instrument to help meet energy access goals, public grant finance will still be required for customers unable to pay subsidy-free rates. Some grant providers are unable to commit money to commercial entities.	The proponent is working on various structuring options, including creation of separate entities, to address this issue.
<b>Potential for “cherry picking”</b>	By more accurately segmenting customers according to ability to repay their loans, there is a risk that distributors would choose to sell to those customers with the greatest ability to repay and exclude those least able to pay.	Nithio will work with investors and investees to provide incentives to INCREASE their exposure to slow repayers, and intermediate grant capital to distributors to help customers pay for their energy systems. <sup>8</sup>

<sup>8</sup> As a purpose-driven entity, the proponent has targeted investors whose missions align with its aim to achieve SDG7. As such, their investment thesis of intermediating capital across all risk categories is in line with its current capital providers. Going forward, the proponent is exploring approaches to formalize this mandate such that it is preserved as non-impact investors look to participate in the instrument.

# MARKET TEST AND BEYOND

## 3. IMPLEMENTATION PATHWAY AND REPLICATION

*The instrument has raised USD 23 million and is actively deploying capital in multiple target markets in Sub-Saharan Africa, with a goal to deploy USD 500 million by 2029.*



**Figure 3:** Target Markets

in three markets, the proponent already has developed analytical capabilities to work in every key off-grid African market.

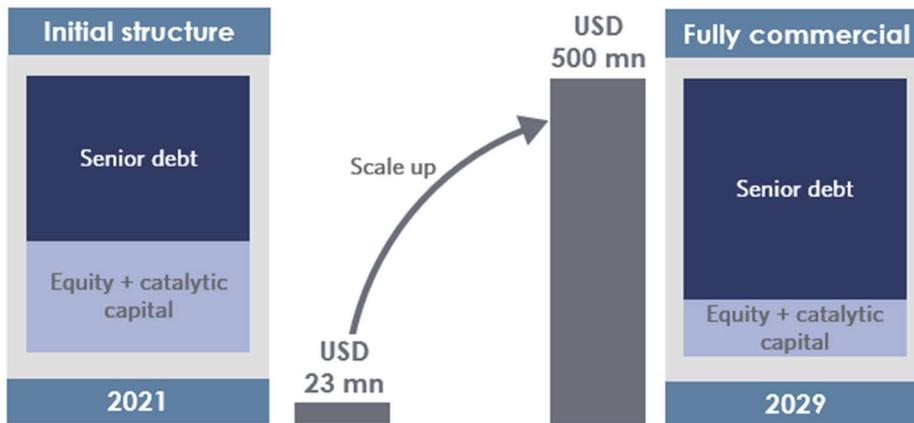
In the near term, the instrument itself will be self-sustaining and not require concessional capital to fund operations; however, the proponent will continue to raise grant capital to be intermediated by the instrument to reach last mile customers. The proponent aims to continue to leverage this catalytic capital to attract increasing amounts of commercial capital (primarily senior debt). **Figure 4** below shows the roadmap for scaling up and moving toward a fully commercial structure.

The initial target markets for the instrument are Nigeria, Kenya, and Uganda. These were chosen based on total off-grid market size, the growth potential for PAYG solar systems and appliances, presence of local operators, and the existing portfolio of PAYG receivables.

The proponent has disbursed loans to off-grid solar companies in Nigeria (to A&T Technologies and Winock), and to a Kenyan microfinance institution to finance its energy loans (Rafode).

The proponent has a physical presence in all target markets, and is actively engaging with local operators to develop pipeline for current and future phases. They are actively raising capital to fund the next wave of loan facilities, and have set a goal of deploying approximately USD 500 million in loans by 2029. While the instrument currently operates

**Figure 4: Instrument Scaling**



## 4. FINANCIAL IMPACT AND SUSTAINABILITY

### 4.1 QUANTITATIVE MODELING

The Lab Secretariat performed an audit of the proponent's financial model, which included a breakeven analysis. The proponent estimates the instrument will break even in the near term<sup>9</sup>, meaning fees on loan facilities will be sufficient to sustain the lending platform.

The core assumptions driving the instruments' financial sustainability were reviewed and analyzed for reasonableness as follows (all figures through 2025):

Assumption	Value	CPI Analysis <sup>10</sup>
Interest rate	Confidential	✓ At or below current rates for similar lenders
Volume of energy access systems to be financed	Approximately 700,000	✓ ~4% market share (Based on current (pre-COVID) growth rates in the target markets) ✓ 25-30% market share in conservative growth scenario
Average discounted loan size (value of energy access equipment for each end user)	USD 200 - 400	? Projected full value of average loan is between USD 200 and 400. Proponent assumes greater growth in higher value systems will lead to larger system sizes

With the exception of the proponent's assumptions on the average value of an energy access system, their model values are conservative and therefore reasonable. In terms of the energy access system value, the proponent assumes larger growth in Nigeria where system costs are higher, and where there is significant growth in higher-priced appliance finance.

<sup>9</sup> Because the proponent is actively deploying loans and raising capital, reference to specific figures and dates have been omitted for confidentiality purposes.

<sup>10</sup> Because the proponent is actively deploying loans and raising capital, reference to specific figures and dates have been omitted for confidentiality purposes.

## 4.2 PRIVATE FINANCE MOBILIZATION AND REPLICATION POTENTIAL

As noted above, the proponent has raised USD 23 million, and is actively raising additional funding. The proponent aims to raise USD 500 million in senior and subordinated debt capital as well as equity and grant capital through 2029.

The proponent's access to demographic, geospatial, and anonymized customer data combined with its AI technology to predict customer repayment profiles, means that the instrument and its analytics engine should be highly replicable in any market where traditional credit scoring data and methodology is unavailable. The proponent aims to replicate and scale its instrument throughout Sub-Saharan Africa, where nearly 600 million people lack energy access. With an estimated average system cost in 2024 of USD 320 (based on the breakeven analysis), this represents a market value of nearly USD 200 billion.

## 5. ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACT

---

*Data-Driven Energy Access for Africa will help avoid more than 90,000 metric tons of carbon emissions per year, equivalent to taking 20,000 cars off the road annually.*

---

### 5.1 ENVIRONMENTAL IMPACT

Data-Driven Energy Access for Africa will deliver a number of environmental benefits, especially related to reducing existing and projected carbon emissions. In particular, assuming the instrument can finance approximately 700,000 solar home systems through 2025 with greater than USD100 million, roughly equally distributed between Uganda, Kenya, and Nigeria and between small, medium, and large systems, we calculate the following impacts:

	<b>By 2025</b>
No. of Systems	~700,000
Average project size (in Watts)	0.5-50
Total Capacity (in MW)	3-14
CO <sub>2</sub> e emissions abated (tons per year) <sup>11</sup>	93,000
CO <sub>2</sub> e emissions abated / USD invested	0.004 MT/USD

In addition to emissions reductions, each solar home system installed also provides reduced local air pollution for users, many of whom will be vulnerable populations such as children and elderly people.

The actual benefits of the instrument are potentially even larger than these calculations. The proponent expects that for some customers, distributors will install a larger solar home system or provide more products, such as solar water heaters or solar water pumping, further

---

<sup>11</sup> Assumes annual CO<sub>2</sub>e emissions of 0.374 metric tons per kerosene lantern, per CDM methodology. See UNFCCC. "Small-scale Methodology: Electrification of rural communities using renewable energy." [https://cdm.unfccc.int/filestorage/I/O/F/IOFY140VMZSBUGPQ6JCAK8XD7ETNR2/EB81\\_repan21\\_AMS-1%20L\\_ver03.0.pdf?t=NDV8cXlOaG9kfDAKqkx1ZeGVQtQG5McoGxEr](https://cdm.unfccc.int/filestorage/I/O/F/IOFY140VMZSBUGPQ6JCAK8XD7ETNR2/EB81_repan21_AMS-1%20L_ver03.0.pdf?t=NDV8cXlOaG9kfDAKqkx1ZeGVQtQG5McoGxEr), p. 7.

reducing fuel-based emissions. In Nigeria, systems may replace diesel generators, which have higher carbon emissions and create worse acute health issues. Nithio anticipates that by 2025, they will finance 80,000 systems that will replace diesel generators, powering small- and medium-sized enterprises, health, education, and other civil services. Finally, benefits are only estimated through 2025, even though the systems should last longer.

## 5.2 SOCIAL AND ECONOMIC IMPACT

The benefits of installing solar home systems go beyond just the environmental benefits. With the same assumptions as used in Section 5.1, we project the following social and economic benefits:

	By 2025
No. of Households	~700,000
Additional income generated	USD60,000,000
Extra study time per year (hours)	1,064,000,000
Jobs created	24,000

On top of these direct economic benefits, providing energy access improves adaptation outcomes for customers. Communities with energy access have more diversified economies, better access to clean water and sanitation, and stronger institutions.<sup>12</sup> As acute and chronic extreme weather events like droughts, floods, and heat waves become more common, greater access to energy will help communities continue to develop sustainably and safely.

## 5.3 SECTORAL IMPACT

The main goal of the energy access stream is to identify innovative approaches to catalyze private sector investment into the energy access industry, which has seen stagnant growth in Sub-Saharan Africa for a number of years. Nithio will continue to scale its financing for solar home systems, productive use, climate smart irrigation, cold storage, clean cooking, and microfinance. This instrument expects to extend loans that will ultimately provide energy access to 700,000 households and 3.5 million people by 2025.

<sup>12</sup> Ben Murphy and Drew Corbyn. 2013. "Energy and Adaptation: Exploring how energy access can enable climate change adaptation." PISCES, Practical Action Consulting. <https://media.africaportal.org/documents/EnergyAdaptation.pdf>.

## ***NEXT STEPS***

The proponent is actively deploying capital at this time, and raising additional capital to scale up their lending activities. The instrument is set up as an open-ended fund, so the proponent is able to take on new investments ranging from concessional sources providing grant finance or subordinated debt to institutional investors providing senior debt at any time. Their major next steps include structuring and deploying larger facilities, exploring and optimizing facility structures in each jurisdiction, and continuing to refine a currency hedging strategy.

## REFERENCES

- Ben Murphy and Drew Corbyn. 2013. "Energy and Adaptation: Exploring how energy access can enable climate change adaptation." PISCES, Practical Action Consulting. <https://media.africaportal.org/documents/EnergyAdaptation.pdf>.
- Drew Corbyn and Laura Fortes. 2021. "2020: Off-grid solar investment remains robust during COVID-19 pandemic." GOGLA. <https://www.gogla.org/about-us/blogs/2020-off-grid-solar-investment-remains-robust-during-covid-19-pandemic>.
- United States Environmental Protection Agency. 2021. "Greenhouse Gas Emissions from a Typical Passenger Vehicle." <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>.
- Gregor Schwerhoff and Mouhamadou Sy. 2020. "Where the Sun Shines." IMF. <https://www.imf.org/external/pubs/ft/fandd/2020/03/powering-Africa-with-solar-energy-sy.htm>.
- IEA. 2021. "SDG7: Data and Projections: Access to Electricity." <https://www.iea.org/reports/sdg7-data-and-projections/access-to-electricity>.
- IEA, IRENA, UNSD, World Bank, WHO. 2021. "Tracking SDG7: The Energy Progress Report 2021." [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/SDG7\\_Tracking\\_Progress\\_2021.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/Jun/SDG7_Tracking_Progress_2021.pdf).
- Shell Foundation, Rockefeller Foundation, Catalyst. 2021. "Unlocking Climate Finance to Accelerate Energy Access in Africa." <https://www.rockefellerfoundation.org/wp-content/uploads/2021/04/Unlocking-Climate-Passenger-Finance-for-SDG7-Report-For-RF.pdf>.
- UNFCCC. "Small-scale Methodology: Electrification of rural communities using renewable energy." [https://cdm.unfccc.int/filestorage/I/O/F/IOFY140VMZSBUGPQ6JCAK8XD7ETNR2/EB81\\_repan21\\_AMS-1%20L\\_ver03.0.pdf?t=NDV8cXloaG9kfDAKqkx1ZeGVQtQG5McoGxEr](https://cdm.unfccc.int/filestorage/I/O/F/IOFY140VMZSBUGPQ6JCAK8XD7ETNR2/EB81_repan21_AMS-1%20L_ver03.0.pdf?t=NDV8cXloaG9kfDAKqkx1ZeGVQtQG5McoGxEr).
- United Nations. 2020. "The Sustainable Development Goals Report 2020." <https://unstats.un.org/sdgs/report/2020/The-Sustainable-Development-Goals-Report-2020.pdf>.