United Nations Development Programme

Financial Innovations for Clean Energy in Africa

Presenting the Seven Innovations Supported by UNDP's Climate Aggregation Platform

January 2024

UNDP

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The Climate Aggregation Platform (CAP)

The Climate Aggregation Platform is a Global Environment Facility (GEF) funded flagship initiative of UNDP, which seeks to support the structuring and deployment of innovative business models and financial mechanisms to accelerate energy access and a just energy transition.

The CAP seeks to advance and raise awareness for innovative solutions to market barriers for financial aggregation in the small-scale, low-carbon energy sector - with the goal to increase access to low-cost financing for clean energy in emerging markets.

Learn more at /climate-aggregation-platform

GEF

The Global Environment Facility (GEF) is a family of funds dedicated to confronting biodiversity loss, climate change, pollution, and strains on land and ocean health. Its grants, blended financing, and policy support help developing countries address their biggest environmental priorities and adhere to international environmental conventions. Over the past three decades, the GEF has provided more than $23 billion and mobilized $129 billion in co-financing for more than 5,000 national and regional projects.

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Cover photo: UNDP / Karin Schermbrucker

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The UNDP task team responsible for the production of this report was composed of Teresa Le, Eduardo Appleyard and Mateo Salomon.

The report includes inputs from Louise Pos, Peter van der Linde, Patricia Espinosa and Christiaan Pennekamp (Hypoport), Nicole Kugelmass and Christiane Wurdemann (Mirova SunFunder), Jude Sandouk, Ben Storrs and Gregor Paterson Jones (PJ&Company / EVAF), Anshul Patel and Andreas Lehner (Incharge Energy / Powerblocks), Manon Dubois and Siten Mandalia (Solaris Offgrid), Grace Fenton Olatunji and Njeri Kara (Nithio), Jon Ridley (4R Digital).

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Contents

The CAP Financial Innovation Challenge

UNDP's Climate Aggregation Platform

Last year marked the halfway point towards the 2030 deadline for achieving the Sustainable Development Goals (SDGs).[1] While considerable progress has been made towards the SDG 7 targets on clean and affordable energy, in particular in relation to energy access (7.1), 675 million people remain without access to electricity and a further
2.3 billion have no access to clean cooking solutions.2 Based on the current pace of progress, efforts must be significantly ramped up to achieve the SDG targets by 2030.3 What's more, although clean energy is a crucial element of most NDCs, more ambitious targets are needed to keep us below the
1.5° C threshold.[4]

Distributed renewable energy (DRE) solutions such as mini- grids or off-grid solar are poised to play a key role in our path towards universal energy access; they represent the least- cost option for addressing a large portion of the electricity access gap.[5] Looking back at the DRE sector's remarkable growth over the past decade, there is reason to be optimistic about its future. However, we must also recognize that there are still many hurdles to overcome if the DRE sector is to achieve its full potential.

The sector remains notably underfunded, with the bulk of investments being concentrated in a few geographies and market players. We need to significantly ramp up the level of public and private investment in DRE. To achieve this, new approaches are needed to de-risk investments and crowd in new sources of capital and make financing accessible to more players in the space.

For that reason, the Climate Aggregation Platform (CAP), a GEF-funded flagship initiative of UNDP, aims to support the structuring and deployment of innovative business models and financial mechanisms to accelerate energy access and a just energy transition.

More specifically, the CAP seeks to advance and raise awareness for innovative solutions to market barriers for financial aggregation in the small-scale, low-carbon energy sector6. By fostering innovative finance, we can increase the availability and reduce the cost of financing for clean
energy, and ultimately, we can help make clean, reliable, and affordable energy accessible to everyone. Sustainable energy is a key enabler for achieving the Sustainable Development Goals (SDGs) and delivering the goals of the Paris Agreement.

Learn more about the CAP at:
/climate-aggregation-platform.

Contact us at

Photo:UNDP/Karin Schermbrucker

1 UN News, 2023, 'Halfway to 2030, world 'nowhere near' reaching Global Goals, UN warns', 17 July 2023 (Link)
2 IEA, IRENA, UNSD, World Bank, WHO. 2023. Tracking SDG 7: The Energy Progress Report. World Bank, Washington DC. © World Bank. License: Creative Commons Attribution — Non-Commercial 3.0 IGO (CC BY-NC 3.0 IGO). (Link)
3 Ibid.
4 International Renewable Energy Agency (IRENA). 2023. (Link)
5 International Energy Agency (IEA). 2020. (Link)

6 Within the small-scale, low-carbon energy universe, the CAP is agnostic with regards to technology sectors (e.g., off-grid solar PV, mini-grids, electric mobility, etc.) and business models.

What is financial aggregation?

One of the inherent characteristics of the DRE sector is the small-scale and distributed nature of the energy assets or projects in question. While this represents a key advantage, notably contributing to the cost-effectiveness and rapid deployment of such solutions[7,8], it also brings about challenges when it comes to financing. In general, financing large numbers of smaller-scale projects and businesses in emerging markets is challenging and not unique to energy[9] but sector specific barriers exist, including the particularly capital-intensive nature of certain business models such as Pay-As-You-Go (PAYGO). UNDP worked closely with the Climate Bonds Initiative to document such barriers and potential market enablers in the joint flagship report "Linking Global Finance to Small-Scale Clean Energy".

This same research and subsequent market assessments undertaken by the CAP in East Africa show that financial aggregation could help counter some of these barriers. It could notably help reduce the mismatch between DRE funding needs and investor requirements, and in turn, increase investments in such solutions.

In essence 'financial aggregation' is used to create scale by combining small-scale energy assets, projects, or aspects of projects into a portfolio in a process known as bundling.[10] Larger-scale financing can then be provided across these bundled assets based on their future cash flows. Financial aggregation can occur at multiple levels: e.g., on the balance sheet of a PAYGO solar company; on the loan book of a domestic commercial bank; and in more mature financial aggregation markets, via public securitizations from either project developers or commercial banks, in this way accessing institutional investors.

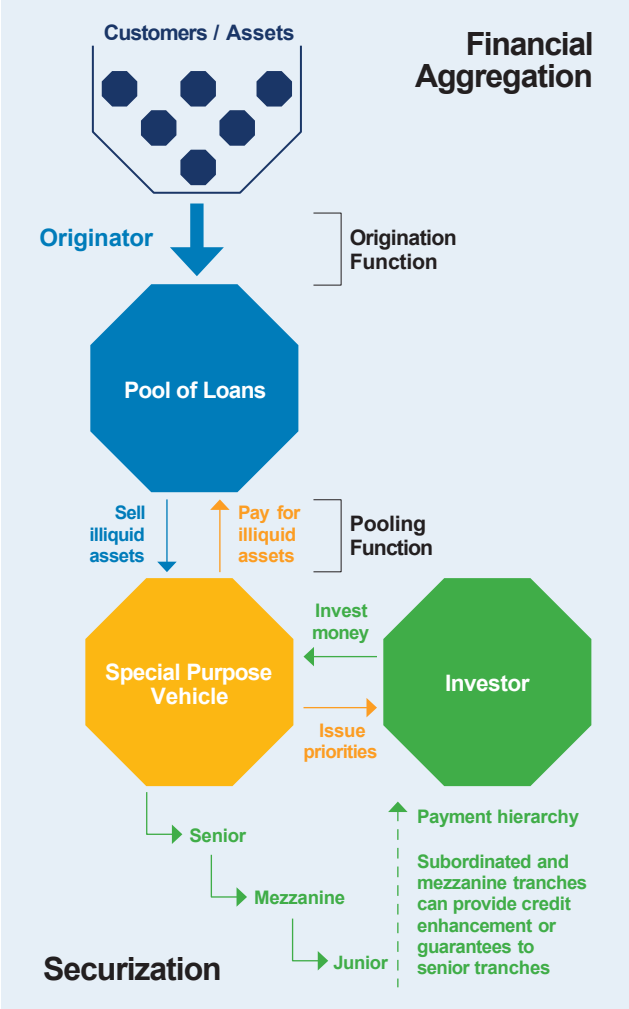


Figure 1: Diagram of Financial Aggregation and Securization process

Source: Adapted from Green Bank Network, 2019. Green Bank Insight: Aggregation and Securitization. (Link)

It can take the form of securitization of future cash flows (i.e., accounts receivables) and the aggregation of these into pooling structures, typically Special Purpose Vehicles (SPVs). It can also take the form of aggregation of projects into portfolios for project finance purposes. Securitization of receivables is more commonly performed in product-based sectors, for example Solar Home Systems (SHS), while project aggregation is more commonly deployed in project based sectors, mainly mini grids and captive power.

In addition, financial aggregation can also be complemented through mechanisms such as carbon credits and renewable energy certificates. Finally, the concept of aggregation can be considered more broadly to include other approaches such as 'bulk procurement' (i.e., aggregating equipment orders across companies to enable economies of scale) or aggregating information via digital platforms[11], etc.

When designed correctly and deployed in suitable markets, financial aggregation instruments can offer faster and more affordable access to capital. However, these need to go hand in hand with adequate credit risk management and consumer protection practices[12], and the necessary safeguards, to ensure that end-users continue to benefit from quality energy services they can afford, and the sustainability of the businesses being financed, while also protecting investors.

7 REN21. 2019. Renewables 2019 Global Status Report. (Link)
8 More information on the advantages of DRE solutions can be found here.
9 IIED. 2019. Inclusive finance for universal energy access. (Link)
10 National Renewable Energy Laboratory. 2018. Financial And Operational Bundling Strategies For Sustainable Micro-Grid Business Models. (Link)
11 IIED. 2017. Turning up the volume: Financial aggregation for off-grid energy. (Link)
12 CGAP (2021), Two Sides, One Coin: Credit Risk Management and Consumer Protection. (Link)

The need for information sharing about innovative financial aggregation models and structures

Financial aggregation holds great potential to unlock new sources of capital for the DRE sector in emerging markets. The CAP has documented several innovative financial structures involving some form of aggregation in the sector. But until very recently, there were few examples of transactions truly showcasing the potential of financial aggregation.

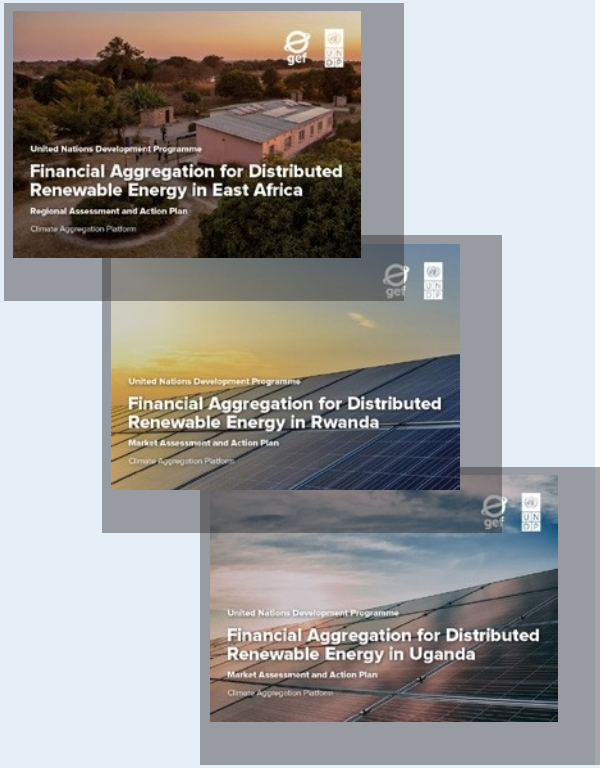
In 2023, two pioneering receivable securitization structures were announced involving market leaders in the off-grid solar sector in East Africa as the sole recipients.[13] These transactions could potentially mark an inflection point and pave the way for future growth, but they also exemplify the concentrated nature of investments in the sector.

As highlighted in the CAP's recently launched report series, financial aggregation instruments are complex, and their successful implementation depends on a favourable enabling environment. In that sense, the market is still nascent, and several barriers must be addressed if financial aggregation is to be widely employed in the DRE sector and scaled up, rather than confined to a few geographies and market leaders.

Furthermore, one of the key findings from the research and extensive consultations undertaken in the context of the CAP is the need to demystify financial aggregation transactions. More specifically, while there has been pioneering work done by leading DRE companies, arrangers, and investors to close such transactions, this work is typically done in siloes. As a result, there is limited knowledge dissemination on how to structure and close such transactions.

13 See the press releases from Sun King and Citi here, and from African Frontier Capital (AFC) here and d.light here.

To that effect, the CAP has notably published a white paper as part of its 'Financial Aggregation for Distributed Renewable Energy' report series as an initial attempt to shed light on the main ingredients involved in closing cost-effective and scalable DRE financial aggregation transactions, and to share insights and lessons from real-life demonstration examples. This was also a key motivation behind UNDP's CAP Financial Innovation Challenge.



You can find the CAP's Report Series on 'Financial Aggregation for Distributed Renewable Energy' here and the white paper on "Mainstreaming Financial Aggregation for DRE" here.


Photo: UNDP/Karin Schembrucker

The CAP Financial Innovation Challenge (CAP FIC)

In 2022, UNDP launched the CAP Financial Innovation Challenge to:

- **Crowdsource and foster the development of Innovative Financial Aggregation Structures and Models** that can help increase the availability and reduce the cost of financing for clean energy in emerging markets. And, in doing so, help close the investment gap to achieve universal energy access.

- **Facilitate the transfer of know-how and innovative solutions** that can help overcome development challenges in emerging markets and contribute to the achievement of the Sustainable Development Goals, notably **SDG 7 on clean, affordable energy for all and SDG 13 on climate action.**

Through the CAP Financial Innovation Challenge, UNDP aimed to support solutions at the design stage, so that novel financial aggregation structures and models can be developed that can lead to financially closed transactions in East Africa, in the near future. Moreover, this also offers an opportunity for information discovery on market barriers to financial aggregation - and possible solutions - which can in turn help guide possible interventions to address such barriers. This creates a 'learning by doing' experience to capture key insights and lessons learnt in a real-life context.

In response to the call for applications, UNDP received many submissions from around the globe, with very diverse and interesting innovations that target different energy sub- sectors and countries in East Africa.

Photo: UNDP/Karin Schembrucker

The winners

Seven innovations were competitively selected as the winners of UNDP's CAP Financial Innovation Challenge. Each of them involves a different approach to financial aggregation to help unlock new sources of financing for the clean energy sector, including climate finance. They target different sub-sectors (e.g., off-grid and on-grid solar, mini-grids, productive use appliances, e-mobility and clean cooking, etc.) and could be deployed across different countries in East Africa, including Rwanda, Uganda, Kenya, Tanzania, Malawi, Ethiopia, Madagascar, Mozambique, and beyond.

UNDP provided an award of up to US$40,000 to each of these innovators to develop a feasibility study for their Innovative Financial Aggregation Structure or Model – using that process to grow from a concept to a more defined solution and gain a better understanding of the opportunity, the requirements, and possible challenges to overcome to implement it. This also provided an opportunity to test the initial idea and assumptions so they can be tweaked – In some cases, this led innovators to pivot to an updated model, informed by the findings from the feasibility study.

More importantly, the process enabled synergies between innovators, unlocking new opportunities for collaboration.

Over the past few months, UNDP has worked closely with the seven innovators to complete this process and promote the innovations to a broader audience and across its network.

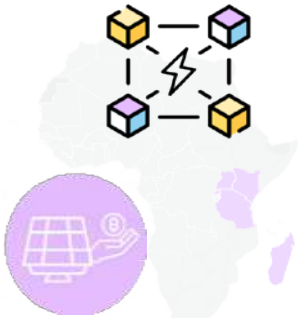
This report provides a summary of each innovation and the outcome of the CAP Financial Innovation Challenge process, highlighting key lessons and takeaways from the feasibility studies, and the next steps defined by the innovators.

The seven feasibility studies resulted in over 300 pages of high-quality insights and assessment on financial innovations and aggregation models for energy access in emerging markets. The detailed feasibility studies and additional annexes can be requested from each of the innovators, whose contact details are provided in this document.

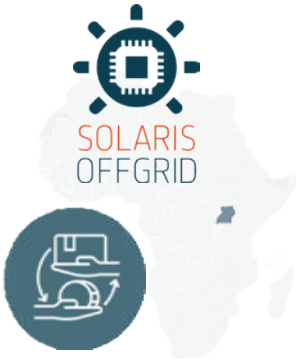
Climate Asset Financial Aggregation Solution by Mirova SunFunder

An Electric Vehicle Growth Fund by PJ&Co

AI-Enabled Financing to Scale Energy Access by Nithio



A Financing Platform to Enhance Mini-Grid Utilization by Incharge Energy



PAYGO Receivables Financing Platform by Solaris Offgrid

Synthetic Securitization for Solar Home System Contracts by Hypoport Africa

A Digital Platform to Bundle Debt and Results-Based Finance with Climate Finance by 4R Digital

Climate asset financial aggregation solution

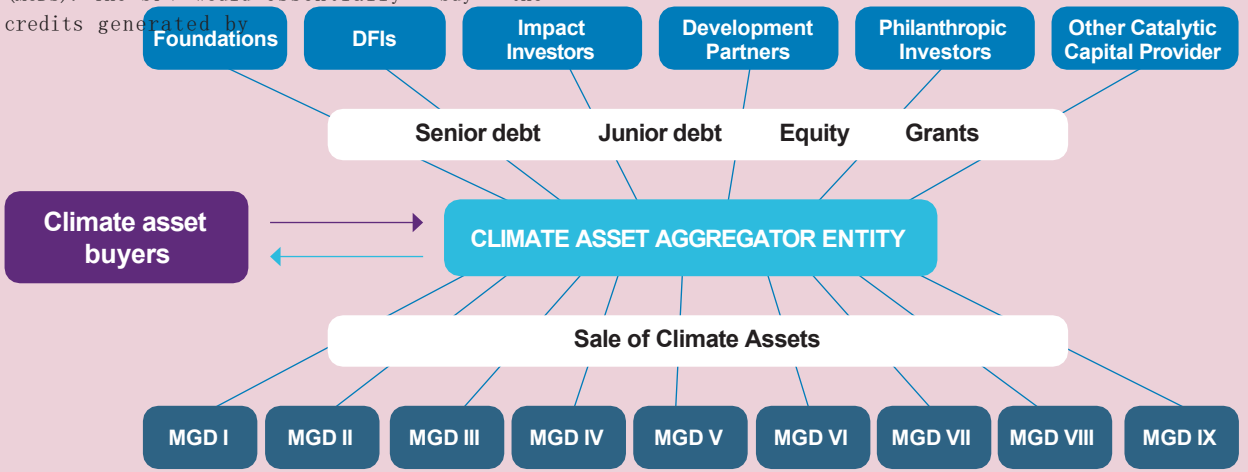
by Mirova SunFunder

The problem

There is growing interest in climate assets – such as carbon credits and Distributed Renewable Energy Certificates (D-RECs) – as a means to offer an additional revenue stream for mini-grid companies, enabling them to improve their bankability, ultimately making clean energy accessible to a larger population. However, the small scale of projects impairs developers' ability to seize the full benefits of climate assets, owing to the time and cost involved in developing carbon credit projects, and the high financing costs relative to the scale for both developers and lenders. It also limits the buyer pool for credits and certificates, given the relatively small quantities issued.

The solution

Mirova SunFunder's solution is a blended finance Special Purpose Vehicle (SPV) that aggregates carbon credits or D-RECS from multiple mini-grid developers (MGDs). The SPV would essentially 'buy' the credits generated by these projects, soak up the pre-financing requirements and engage with buyers of the assets, benefitting from the scale achieved through aggregation.



Source: Mirova SunFunder

i. The aggregator will **enter into a framework agreement** with climate asset (carbon credit/ D-REC) buyer(s).

ii. The aggregator will be **structured as a blended facility**, attracting capital from concessional sources as well as commercial lenders and equity investors.

iii. The aggregator will **pull together the rights to future climate assets from eligible mini-grid developers –** by entering into a contract with developers for the sale of these climate assets to the SPV.

iv. Eligible companies will **go through the verification process** for each batch of carbon credits / issue the D-RECs on a monthly basis.

v. Eligible companies will **receive purchase price,** partly upfront and partly deferred, to create an incentive for the verification / issuance of the assets.

vi. A **software solution will be required,** for which the facility will partner with a relevant provider.

The project targets mini-grid developers, climate assets buyers and investors in the DRE sector in sub-Saharan Africa with an initial focus on East Africa.

CAP FIC support

With support from UNDP's Climate Aggregation Platform, Mirova SunFunder embarked on research to assess the feasibility of pooling climate assets in the mini-grid sector as a means to i) optimize demand-side pricing by creating bargaining power through scale; ii) reduce the cost and burden of carbon credit or D-REC project development; and iii) de-risk the investment, enabling capital providers to invest in the mini-grid sector and in an emerging financial product.

The study then focused on quantifying the percentage of Capital Expenditure (CAPEX) that could be financed with the climate assets, as the key metric to assess the financial appeal of the proposed solution for developers.

Over the last year, Mirova SunFunder engaged with stakeholders in the mini-grid sector including developers, capital and technology providers, as well as parties involved in both the carbon credit and D-REC sectors to understand the challenges, opportunities and requirements to ensure the feasibility of the aggregator.

Key lessons & takeaways

Results showed the clear benefit of aggregation: Whilst a single developer would only cover 0.92 percent of its initial CAPEX through the sale of carbon credits, that ratio improved to 1.72 percent with the aggregation approach. When considering D-RECs however, a single developer would cover 2.34 percent of CAPEX, while the aggregator metric stood at 5.79 percent. On the basis of financial results alone, aggregating D-RECs would seem to be more economically beneficial for mini-grid developers.

Mirova SunFunder further concluded that a mix of the following elements would likely make a more significant mark on the sector:

i) larger scale;
ii) lower cost of capital; and
iii) a partnership with a larger sales platform - enabling developers to access improved asset pricing through bargaining power.

This outcome justifies a holistic and blended approach to mini-grids financing, in which climate assets can be one of the sources of funding. According to Mirova SunFunder, there is immense potential to scale up the aggregator structure across different regions and sectors (e.g., Solar Home Systems (SHSs), clean cooking, Commercial and Industrial (C&I) solar, etc.).

> *"The aggregated solution enhances the sustainability of mini-grid operations by providing an additional revenue stream, improving the bankability of the sector."*
>
> **– Nicole Kugelmass, Mirova SunFunder**

Next steps

> Attract grant funding for design and structuring phase;

> Sign a Letter of Intent (LOI) with mini-grid developers;

> Sign LOI with financing partners;

> Assess requirements and sign LOI with software provider.

The next steps will require support from:

- Capital providers - particularly concessional capital for i) a technical assistance facility to set up the project; and ii) a first loss tranche for the blended structure.
- Large corporates interested in offsetting emissions: Emissions Reductions Payment Agreements (ERPAs) or offtake agreements will de-risk the investment for lenders and capital providers.
- Stakeholders in the sector - Achieving scale requires coor- dination and alignment across market fragmentation.

About Mirova SunFunder

Mirova SunFunder's mission is to pioneer and scale climate investments in emerging markets by offering innovative financial solutions and advisory services to clean energy transition companies and projects in Africa and Asia. Their 40-person team, based in Nairobi, London and Paris, has built the most extensive track record of distributed solar investments in Africa - financing over 60 solar companies over the last decade.

SunFunder was launched in 2012 and in June 2022, it joined forces with impact investing leader Mirova to accelerate emerging market clean energy and climate investments as Mirova SunFunder.

Having been the first movers in financing off-grid solar, Mirova SunFunder is now scaling up its investments in new sectors and geographies with its new $500 million Gigaton strategy.

Contact details: | www. sunfunder.com

Photo: UNDP/Karin Schermbrucker

Electric vehicle growth fund

by PJ&Co

The problem

The uptake of electric vehicles (EV) in Africa is expected to dramatically accelerate in the coming years, including in the two-wheeler, three-wheeler, and bus markets. This is a result of lower comparative costs to that of Internal Combustion Engine (ICE) vehicles, improved technology and accommodating government policies. However, one of the key obstacles to the sector's growth is a significant lack of financing: According to PJ&Co, approximately $520 million[14] investment is needed in just five markets in the next few years, but there is a lack of dedicated sources of capital to help EV firms scale up.

14 This refers to PJ&Co's estimated financing needs for the next 5 years (to the end of 2027) to reach 400,000 E2W in 5 markets. This only includes the capital needed for bikes and batteries; it excludes finance requirements for R&D, overheads and infrastructure charging and other items.

> *It's hard to raise funding in the EV sector due to investor uncertainty about the technology and business models. We need flexible financing to build the ecosystem of vehicles, batteries, and charging infrastructure, to help EV firms scale up from pilot projects to national leaders.*
>
> **– Gregor Paterson-Jones, PJ&Co**

The solution

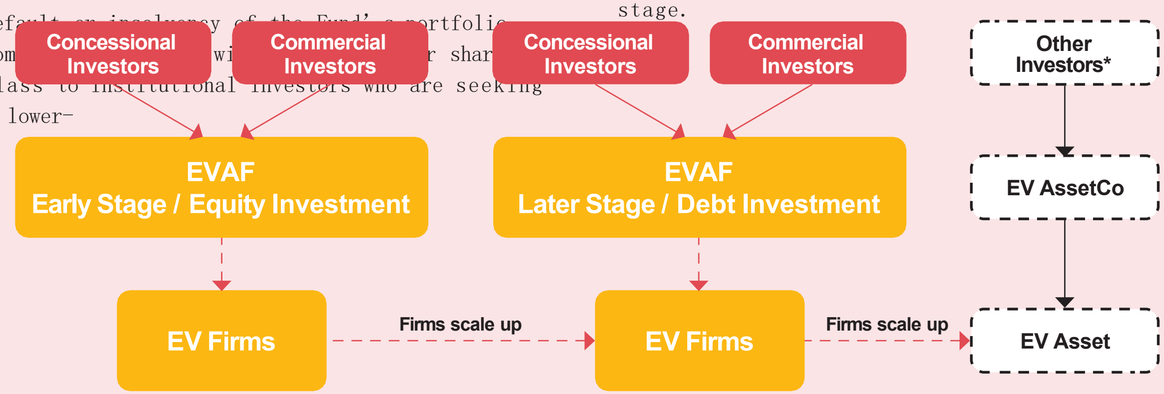
The Electric Vehicle Africa Fund (EVAF) is a novel financing platform that will provide debt and equity capital to help EV firms scale up – EVAF will target firms with a proven technology, looking for Series B funding for national or regional expansion. EVAF will consider EV opportunities across Africa, especially in East and West Africa, and offer scale up investments of $3 million to $10 million, with a focus on Electric Two-Wheelers (E2Ws), e-buses, charging infrastructure and local assembly opportunities.

The objective of EVAF is to achieve a market return for investors while also supporting the long-term development of EVs in Africa and contributing to SDGs 1, 5, 7, 8, 9, 11 & 13. The Fund will use a blended finance structure designed to attract various types of investors by offering different classes of shares that align with their preferences. It will offer a junior share class to donors and organizations who are seeking to invest in projects with high social and environmental impact and therefore willing to take on more risk; this share class will absorb the first loss in the event of a default or insolvency of the Fund's portfolio com[illegible] wi[illegible]r share class to institutional investors who are seeking a lower-risk investment with a lower return. It will have priority over the junior share class in the event of a distribution. In addition, the Fund may offer a mezzanine share class.

Concessional funding is critical to ensuring that EVAF can offer patient capital, proactively help implement best practices among EV firms and potentially engage with critical "EV ecosystem" initiatives which will benefit end- users in the long term.

The Fund will consist of two cells: an equity-focused cell (and equity-like products) and a debt-focused cell (and debt-like products). These cells might have distinct shareholders but could invest in the same companies, sharing criteria for countries, markets, and businesses. They might also collaborate on certain instruments, like venture debt.

EVAF aims to help firms with funding at every stage of their growth, from equity funding at Series B rounds, to structured debt finance, and supporting large scale financial aggregation structures. This approach will help EV firms scale up quickly and use the most appropriate financing at each stage.



Source: PJ&Co.

When market conditions are suitable, EVAF will also support the aggregation of the financial assets of EV firms.

EVAF's investment structure. *Potentially e-buses & E4W leasing.