EnDev: Driving change through Results-based Financing

Lessons and insights from over a decade of RBF experience

endev 20 years

20 years

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ACRONYMS AND ABBREVIATIONS

ABC	African Biodigester Component
BMZ	Federal Ministry for Economic Cooperation and Development (Germany)
DGIS	Directorate-General for International Cooperation (Netherlands)
DSS	Demand-side subsidies
EnDev	Energising Development
ESMAP	Energy Sector Management Assistance Program EUR Euro
FASER	Fund for Sustainable Access to Renewable Energy
FCV	Fragility, Conflict, Violence
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ICS	Improved Cookstove
IoT	Internet of Things
IVA	Independent Verification Agent
LNOB	Leave No One Behind
MSME	Micro, Small and Medium Enterprises
MWK	Malawian Kwacha
NPR	Nepalese Rupee
OMIS	Off-grid Monitoring Information System
PUE	Productive Use of Energy
RBF	Results-based Financing
SEforALL	Sustainable Energy for All
SDG	Sustainable Development Goal
SDC	Swiss Agency for Development and Cooperation
SHS	Solar Home System
SIINC	Social Impact Incentives
SNV	Netherlands Development Organisation
TA	Technical Assistance
UK	United Kingdom
USAID	United States Agency for International Development
USD	US-Dollar
VAI	Vulnerability Access Index
WTP	Willingness to Pay

Introduction

From learning laboratory to a global portfolio

EnDev has been a pioneer in applying Results-based Financing (RBF) to advance energy access in our partner countries. What started as a bold initiative over 10 years ago has grown into a cornerstone of our work, enabling transformative impact on energy markets worldwide.

While RBF is now a widely used tool in the energy access sector, EnDev's journey began with the establishment of the groundbreaking RBF Facility (2013–2020) funded by the United Kingdom. This initiative served as a learning laboratory, encompassing 17 projects across 14 countries – and that, as it turned out, was only the beginning. The RBF Facility laid the foundation for a portfolio of more than 70 RBF projects implemented by EnDev to date. Many of these projects have been adopted, replicated, and scaled by others, a testament to their value and transformative potential.

EnDev's RBF journey: Expanding reach and impact

Building on the foundations laid by the UK-funded Facility, EnDev gradually expanded and diversified its RBF work. The first generation of RBFs focused primarily on increasing sales volumes (so-called sales RBFs; see chapter 1). These straightforward, supply-side subsidies helped companies expand distribution networks and scale the delivery of energy products. The Facility successfully demonstrated the viability of the approach, paving the way for its adoption in many EnDev countries.

As EnDev's RBF journey evolved, and as the wider energy access sector developed, the challenges also shifted. In addition to accelerating markets from early stages to maturity, the focus increasingly included reaching the customer segments that are hardest to serve. This shift aims to fully contribute to achieving Sustainable Development Goal (SDG) 7 – access to affordable, reliable, sustainable, and modern energy for all – by striving to "leave no one behind" (LNOB). Consequently, the RBF instrument was further refined to incentivise companies to serve more challenging customer segments. Instead of paying for each verified product sale, new RBF mechanisms were introduced with specific eligibility criteria for customers, such as households in remote areas (leading to Last Mile RBFs, see chapter 2), or low-income and vulnerable households (leading to pro-poor and LNOB RBFs, see chapter 3). Specifically, within LNOB RBF projects, EnDev employed demand-side subsidies to incentivise companies to lower the price of energy products for targeted end users, helping to overcome affordability barriers.

To strengthen social impact and enhance companies' investment readiness, EnDev also piloted the Social Impact Incentives (SIINC) approach (see chapter 4). Unlike traditional RBF models that reward outputs such as product distribution, SIINC incentivises verified social outcomes, enabling companies to reach underserved communities while attracting impact investments. At the same time, EnDev explored digital tools to improve RBF efficiency, monitoring, and verification (see chapter 5), supporting smarter project delivery without being an end in themselves.

EnDev has also applied RBF in some of the most challenging environments, including crisis-affected areas and fragile states (see chapters 6 and 7). These experiences highlight the instrument's adaptability, showing that even under high operational risks, RBF can support companies in scaling their operations and sustaining market activity. By adjusting incentive structures and verification processes to local constraints, EnDev has been able to maintain effectiveness, ensure accountability, and provide critical support where conventional market mechanisms often struggle.

A one-stop shop for EnDev's RBF experience

This publication brings together EnDev's RBF experience in one place. Over the years, we have tested a variety of approaches, generated key lessons, and published a range of learning products. Building on EnDev's first comprehensive RBF **Lessons-Learnt Report** this report extends on it in several areas and highlights new lessons and innovative approaches. It also provides links to additional learning products, which include deeper dives marked with a dedicated **learning icon** .

Designed for policymakers, practitioners, investors, and private sector partners, this report offers practical insights and inspiration to apply, adapt, or engage with RBF approaches in their own contexts.

So join us as we take you through EnDev's RBF story, from strengthening markets to operating in fragile contexts. Enjoy the read!

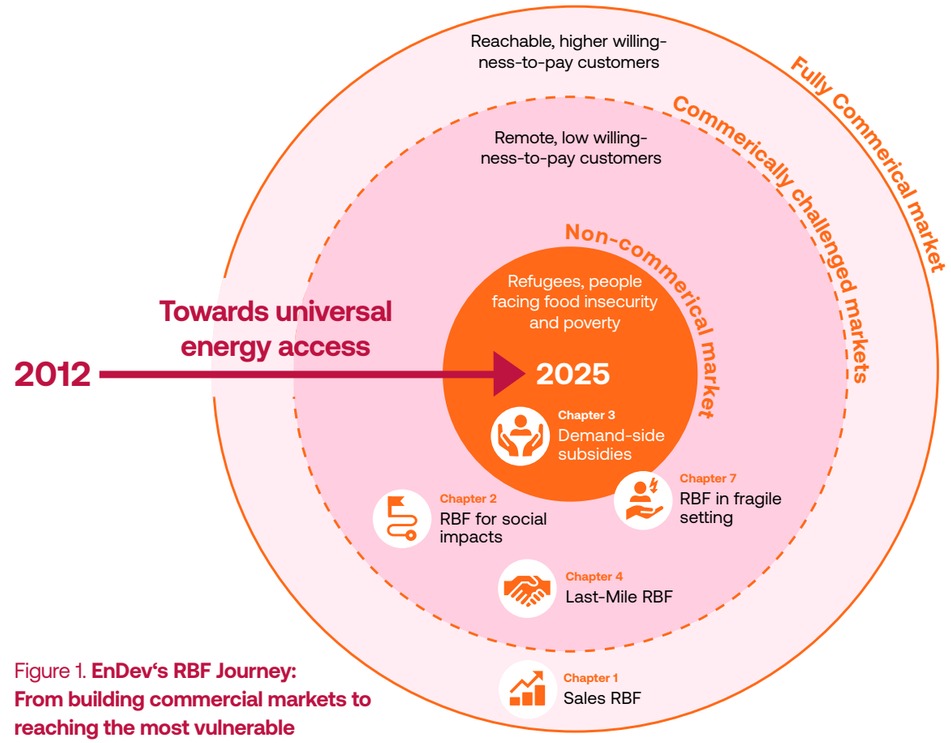

Figure 1. **EnDev's RBF Journey: From building commercial markets to reaching the most vulnerable**

No silver bullet, but a powerful lever: RBF accelerates growth, strengthens companies, and extends opportunity to those often left out – refined through our learning, built for sustainable impact.

– Alexander Haack
EnDev Programme Director

What is RBF?

Results-based Financing (RBF) is a funding approach where payments are only made after pre-agreed results are achieved and verified. It shifts the focus from inputs to outcomes, driving efficiency and accountability in project implementation.

In the energy access sector, RBF can encompass **supply-side and demand-side incentives.**

• **Supply-side subsidies:**
Companies or organisations receive financial support based on successfully delivering energy products or services. Payments are tied to measurable outcomes, such as the number of units sold or connections established, encouraging market expansion.

• **Demand-side subsidies:**
Companies receive financial incentives for each verified sale of an energy product or service, provided they pass on a mandatory price reduction to end users. This helps bridge the affordability gap and makes energy solutions accessible to more people.

By aligning incentives with measurable results, RBF helps to unlock markets, build sustainable business models, and ensure impact.

I think the EnDev team was really a pioneer in initiating RBF in the development sector. I remember that in the northern parts of Tanzania, their RBF scheme supported the roll-out of standalone solar in remote rural areas. Those experiences, as well as bringing RBF into the clean cooking space, are of great value, something the EnDev team has brought to the table and continues to bring.

– Mikael Melin, Director, Partnerships and Development at Sustainable Energy for All (SEforALL)

Figure 2. **Geographical coverage of EnDev's RBF portfolio**

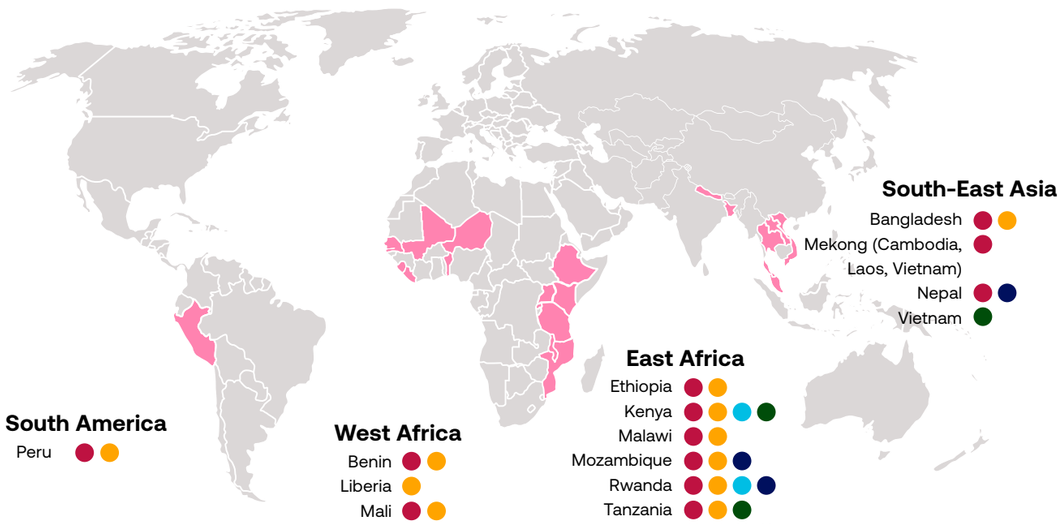


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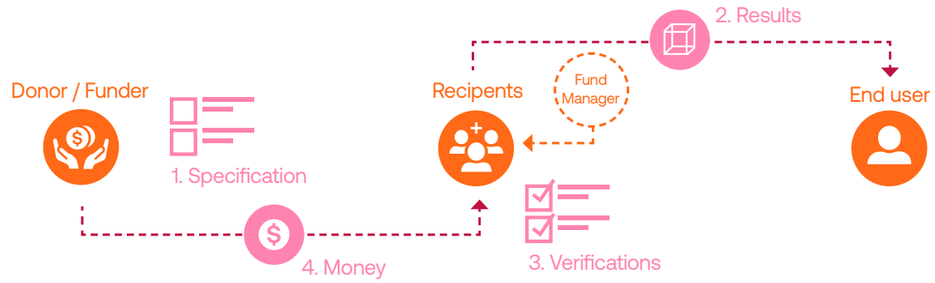
Figure 3: **Typical setup of an EnDev RBF project**



EnDev's RBF projects are designed to provide financial incentives to companies delivering energy access products and services to end users. For each verified sale, companies receive results-based payments. To ensure the accuracy of reported sales, independent verification agents (e.g. local consultants) conduct desk, phone, and on-site checks.

In many cases, a fund manager (such as a local bank) is appointed to manage contracts, oversee the disbursement of funds, and coordinate external verification. Where no fund manager is in place, these responsibilities are assumed by the EnDev country teams.

Further publications

Results-based Financing – EnDev ↗

Chapter 1

Strengthening markets

From transactions to transformation

RBF is not simply about getting products into the hands of consumers; it's about building markets that enable companies to expand, innovate, and thrive in the long term. It's about creating and strengthening an environment where businesses can grow, and customers can access energy solutions that meet their needs. In scaling markets, development typically follows an S-curve – from pre-commercial activity and pioneering to expansion, maturity, and eventually saturation. To respond to these different market phases, EnDev's UK-funded RBF Facility (2013–2020) allowed each of its 17 projects to tailor interventions to local conditions. The sales RBF, most frequently used during the pioneering and expansion phases, directly rewarded companies for extending distribution networks and increasing deliveries to end customers. In this chapter we'll take a closer look how the sales RBF plays out, and travel to Peru, where EnDev implemented one of the first such projects under the UK-funded RBF Facility (see Box 2).

Something's cooking in Peru

José Humberto Bernilla, a long-standing entrepreneur in Peru's cookstove sector, is well aware of the challenges in this market. For many years, cookstoves were often homemade, directly built by families. In 2008, EnDev began supporting local stove producers in designing improved models that could be permanently installed in households. However, these new stoves were not portable, and distribution to remote areas proved costly and logistically difficult. For José, the business case for selling stoves in rural areas simply didn't add up – and as a result, many people in remote communities were left without access to cleaner, more efficient cooking solutions.

So, how could a business like José's be encouraged to serve beyond the easy-to-reach customers? That's where RBF came in – offering financial incentives that reduced risk and made it viable to expand into underserved markets.

Unlocking market potential

The idea was simple but powerful: offer financial incentives not for intentions, but for actual results. While RBF had already been applied in sectors like health and education, EnDev tested it in the energy access sector. In José's case, EnDev tied payments to verified sales of improved cookstoves, encouraging him to invest in product development and expand his reach into harder-to-serve areas. The scheme reduced the risks of innovation and market entry, triggering private sector investment and strengthening the cookstove market from within. In doing so, it didn't just support individual businesses; it helped build a more dynamic and inclusive market, where more households could access affordable cooking technologies.

Market-building effects in Peru

The impact in Peru was tangible. Following the launch of the RBF in 2014, several companies – including José's – channelled the incentives into developing portable improved cookstove models tailored to the needs of rural customers. The RBF project helped shift the market from small-scale, often informal production to more professional and scalable operations. Manufacturers refined their business models, expanded distribution networks, and improved product quality. Within just 3 years, six companies and seven distribution companies had successfully sold over 5,400 cookstoves to families in remote communities and more than 17,400 units to social institutions (mostly schools), a clear sign that the market had taken root and begun to grow beyond its initial limitations. An independent ex-post evaluation conducted in 2022 confirmed that the results of EnDev Peru's RBF had proven sustainable. It found that the approach reduced technology and logistics costs, fostered product diversification, and helped establish a lasting commercial market for improved cookstoves in Peru.

RBF's versatility: incentives for different market barriers

The experience in Peru highlighted just how powerful well-designed incentives can be in stimulating innovation and unlocking new market segments. But Peru is just one example. Across countries and contexts, EnDev has learned that RBF can take many forms, each tailored to the specific challenges of a given market environment. Over time, EnDev has applied RBF also to address other barriers at various stages of market development and to support different types of actors across the energy access ecosystem.

© Bill & Melinda Gates Foundation

Box 2

EnDev's RBF Facility: Catalyst for accelerated growth

- **Funding:** UK-funded, active 2013–2020
- **Countries:** 14 countries, 17 RBF projects
- **Products:** PicoPV lights, solar home systems, mini-grids, biogas, improved cookstoves, electric pressure cookers, productive use appliances, grid connections

Key outcomes:

- **5.8 million people** gained access to modern energy services at an efficient cost of < €6.60 per person
- **1.39 million devices** sold (solar home systems, cookstoves, etc.)
- **8,900 companies** and entrepreneurs directly benefited
- **11,200 jobs** created, including 3,800 for women

Every €1 spent **leveraged €5.1** in private investment

Chapter 2
Reaching the last mile

Private sector perspective from Uganda

The EnDev RBF plays a crucial role in the Uganda cookstoves market by improving production quality, stimulating market growth, reducing risks, and contributing to a more sustainable energy sector. The RBF project has helped our company Mubende Stoves to manufacture and deliver high quality cookstoves and to improve our business performance.

– Oswald Kakande, Director, Mubende Stoves Uganda Limited

Key lessons: Strengthening markets through RBF

1. RBF incentives work – if well designed: Results-based approaches can strengthen markets and unlock innovation, but their success depends on careful design tailored to market needs. Market sensitivity is crucial.
2. Beyond short-term sales: Effective RBFs aim to strengthen market systems and build lasting structures, rather than simply subsidising transactions.
3. Continuous learning drives improvement: Applying RBF effectively requires iteration, reflection, and adaptation as contexts and markets evolve.

Deep Dive

Explore the full report on the UK-funded RBF Facility

Further publications

EnDev (2021): Bringing higher-tier cookstoves into the Cambodian market.

EnDev (2021): Giving RBF a voice: 17 projects, 14 countries, 7 years.

EnDev (2023): Sun-Powered Change: Transforming Farming in Bulindo

GOGLA (2023): Unlocking off-grid solar: How results-based financing is driving energy access and powering productivity.

Addressing the realities of last-mile energy access

Getting energy products into remote communities isn't just a logistical challenge, it's a test of how inclusive and resilient our approaches to energy access really are. For many companies, serving the last mile means higher costs, longer travel times, weaker infrastructure, and greater risks. Without targeted incentives, there's often limited business rationale for engaging with these populations. This chapter looks at how in particular RBF can be tailored to reach those who are usually left out: people living far from trading centres and beyond standard sales routes.

The last-mile challenge

Especially across many Sub-Saharan African countries, electricity access in rural areas remains drastically lower than in urban zones. In 2022, for example, just 36% of Uganda's rural population had access to electricity, compared to 72% in urban areas (IEA et al., 2024). While there is overall progress in electrification in Sub-Saharan Africa, its energy access deficit in rural areas grew from 376 million to 451 million between 2010 and 2023, albeit with a slight decrease in 2024 (IEA et al., 2025). This gap illustrates the persistent challenges of reaching remote communities. Serving rural communities often means higher transport costs, more staff time, and greater operational risks. Limited or absent mobile coverage further complicates customer follow-up and remote payments.

Targeted RBF approaches to reach remote communities

Earlier EnDev RBF projects focused mainly on supporting companies expand and strengthen their market presence, for instance by incentivising product sales and distribution network growth.

While these approaches proved successful in accelerating early market development, they did not always reach the most remote or underserved communities. Recognising this gap, EnDev began adapting its RBF instruments to specifically tackle last-mile challenges. In several countries, dedicated incentive schemes were designed to encourage companies to reach customers in remote areas – not just where the market was already growing. There are different ways to do this, for example, by using a geographic targeting approach that provides incentives for reaching households in pre-defined remote areas.

Reaching the last mile in Uganda

Uganda's Last Mile RBF project exemplifies this approach. Tailor-made incentives helped solar companies expand into remote areas, offsetting the costs of opening new branches, hiring staff, and setting up service infrastructure. To define remoteness, EnDev and its partners developed a "remoteness index" based on distance from Kampala and the nearest trading centre. Sales to customers in qualifying areas were rewarded with extra incentives.

In practice, EnDev partnered with the Private Sector Foundation Uganda to implement the scheme and verify sales. Over the project's duration, six companies expanded their operations to more than 110 of Uganda's 135 districts. With support from the US Agency for International Development (USAID) and the Swiss Agency for Development and Cooperation (SDC), the programme helped bring solar home systems to 25,000 people.

"We wouldn't have gone there without RBF"

Participating companies in Uganda underlined how decisive the incentives were in driving their expansion:

> The RBF helped us to reduce costs. We expanded to places to which we would not have expanded without the RBF support. We reached basically more customers.

> On the demand side it gave us a push in terms of customer demand as we put more products out there. Our business runs a lot on referrals as customers depend on their neighbours, on their friends, for a review of the product. As we put out more of the tier 2 [solar home] systems, we see that we began to see an increase in demand and customers coming to us for the same product, which wasn't the case before.

As market presence grew, word-of-mouth and local infrastructure helped reduce costs per unit sold – creating the foundation for a self-sustaining market even after incentives phased out.

Key lessons: Reaching the last mile

Targeted incentives are essential: RBF can motivate companies to reach remote communities that would otherwise not be serviced, if incentives are explicitly designed for those areas. At the same time, the incentive structure should not be too complex.

Deep Dive

Explore all learnings from EnDev Uganda's Last Mile RBF ↗

Video EnDev Uganda: Last Mile RBF

Watch how the Last Mile RBF project in Uganda expands access to solar energy in remote communities by rewarding companies for verified results.

Chapter 3

Closing the affordability gap

Ensuring no one is left behind

Reaching people in remote areas is only part of the challenge of leaving no one behind (LNOB). Even when energy products are physically available, they remain unaffordable for millions of low-income households, particularly in fragile contexts. Hundreds of millions of people live under economic conditions that make market-rate energy services unaffordable. In Sub-Saharan Africa alone, over 140 million people currently require humanitarian assistance, and as many as 490 million live in poverty, unable to afford even entry-level solutions (UNOCHA, 2023; ESMAP, 2024).

Closing this affordability gap requires targeted support. This is where EnDev's demand-side subsidies (DSS) come in. By complementing supply-side incentives with DSS, EnDev helps ensure that the most vulnerable can still access the benefits of modern energy.

EnDev's demand-side approach

EnDev's DSS model recognises that a purely commercial approach will never reach everyone, especially not ultra-poor and female-headed households, displaced populations, older people, or people living with disabilities. Funded by the Netherlands, EnDev's DSS component is being piloted in Liberia, Malawi, Niger, and Uganda.

Box 3

EnDev's DSS component

- **Countries:** Liberia, Malawi, Niger, Uganda
- **Technologies:** Off-grid solar products and/or cooking technologies
- **Project period:** 2022 – 2026
- **Budget:** 20 million EUR
- **Co-financed by:** Directorate-General for International Cooperation (DGIS) of the Netherlands Ministry of Foreign Affairs
- **Coordinated and implemented by:** Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Netherlands Enterprise Agency (RVO)
- **Project results:** Energy access for up to 1 million vulnerable people

While each pilot explores different interventions for delivering DSS, all are based on the following core principles:

- The development and implementation of the DSS schemes accord with the target groups' context and ability to pay as well as market development.
- All DSS schemes are carefully designed to minimise or avoid market distortion and align with EnDev's cost-efficient, market-based approach.
- Effective monitoring and verification systems are designed to minimise financial risk (i.e. fraud or abuse).
- Co-creation and co-implementation are pursued early on to leverage additional funds and ensure up-scaling.

In contrast to supply-side subsidies, which lower costs indirectly by supporting companies, DSS directly reduce the price that consumers pay for basic energy products such as PicoPV systems, small solar home systems, and various types of cookstoves. Within EnDev's DSS RBFs, this direct reduction is operationalised through companies: they receive results-based incentives only if they sell eligible products at a mandatory, pre-defined reduced price.

A new stove, a new start: Grace Samuel's story

The real impact of these subsidies is best understood through the stories of people. One such example comes from Malawi's Salima District, where just 14% of households have electricity and more than 90% still rely on firewood. Here, energy poverty is not an abstract term, it shapes everyday life. Grace Samuel, a 30-year-old mother of two, once relied on selling firewood to feed her children. Following her divorce in 2015, Grace became the sole provider for her family, using both the income and the same firewood for cooking on open fires. Like many others in her community, her livelihood was deeply tied to the rapidly depleting Mafuka Hills, until the area was closed off by authorities enforcing forest protection laws.

forced to walk long distances to gather fuel, exposing herself to health risks from smoke and physical exhaustion. But things changed when Grace purchased her first improved cookstove for 800 MWK (around 0.40 EUR). The heavily subsidised Chitetezo Mbaula stove, sold through Dziwani Investments under EnDev's DSS component, was a game changer for Grace.

> I used to burn 13 sticks of wood just to cook breakfast. Now, I only use three or four.
>
> The stove produces less smoke, saves me time, and uses much less firewood. It has changed my life.
>
> – Grace Samuel
> Salima District, Malawi

For Grace, the Chitetezo Mbaula is more than a stove: it means less smoke, less time spent collecting wood, and more time for her children.

Addressing the high cost of clean energy

Grace's story illustrates a key barrier faced by millions: even when energy products are available, the cost remains out of reach for vulnerable households. To tackle this, EnDev's DSS component in Malawi aims to distribute 75,000 improved cookstoves, benefiting 150,000 people, and 35,000 solar home systems, reaching 70,000 people. Collectively, these efforts are expected to provide access to clean energy solutions for over 220,000 people.

To ensure that subsidies truly reach the poorest of the poor, EnDev relies on Malawi's Unified Beneficiary Register (UBR), a national social registry used to identify vulnerable households. Depending on their vulnerability, beneficiaries receive up to 91% subsidy for cookstoves and 88% for solar products. This targeted approach is critical in a

country where over half the population lives below the poverty line and 20% live in extreme poverty. Without support, even basic clean energy solutions remain unaffordable: an improved cookstove can cost up to 7,000 MWK (around 3.48 EUR), while a basic solar home system can cost as much as 200,000 MWK (around 100 EUR).

Good targeting is at the heart of any DSS intervention

Ensuring that subsidies reach the right households requires more than simply providing funds. Careful targeting is at the heart of any DSS intervention: it defines who can benefit, which products are supported, and how funds are delivered. Poor communication can create resentment if people wonder why their neighbour received a subsidised product while they did not. Misuse of funds can occur if subsidies go to households that could afford to buy the products at full price. Market distortions are also a risk, for instance if people expect to pay the discounted price even after the project ends, undermining the market.

As is the case in Malawi, economic targeting can be done through a public household registry that classifies households according to their income levels. An existing public household classification system was also successfully used in Rwanda, where subsidies were only paid to households in the three poorest categories of the Ubudehe system. Other options for targeting beneficiaries include demographic targeting (e.g. Nepal in Box 4) and geographic targeting (only incentivising sales in pre-defined remote counties or districts, see chapter 2). Another example of advanced targeting is the Vulnerability Access Index (VAI) used by EnDev in Tanzania, a targeting tool that takes into account various socio-economic risk factors and the maturity of the energy access market.

DSS as a market builder – not a market disruptor

With project implementation typically running three to five years, a key question is what happens to poor and vulnerable households once an energy access intervention ends. EnDev's DSS component addresses this by incentivising companies to maintain a long-term presence in target communities, providing reliable after-sales services and extended warranties. In Malawi, EnDev's support has helped companies establish new sales structures and expand into districts such as Dedza, Balaka, and Nkhata Bay, which are difficult to reach. Alfred Chisale, Executive Director of Dziwani Investments, explains:

Through EnDev's support, we've sold over 10,000 improved cookstoves, created jobs for women, and established a production hub in the North. The impact is real.

– Alfred Chisale
Executive Director, Dziwani Investments

Box 4

EnDev Nepal's LNOB approach: Defining vulnerability along the local context

With an electrification rate of more than 97%, Nepal is close to achieving universal electricity access. However, the country also illustrates how challenging it is to close the final access gap: the remaining 3% without electricity are often vulnerable households living in remote areas. The situation is even more pressing in the clean cooking sector, with still 54% of households lacking access. These are typically marginalised, disaster-affected, women-headed, or low-income households, as well as microentrepreneurs who cannot afford the grid connection fee.

To ensure no one is left behind, EnDev Nepal – through its implementing partners SNV and Practical Action – has launched targeted RBF schemes offering discounted products and services to marginalised groups. The unique aspect of their approach is the definition of vulnerability they use, which is based on local circumstances. In the Nepali context, "vulnerable households" include Dalits (so-called low caste), Mukta Kamaiya (freed bonded labourers), Janajati (indigenous communities), people with disabilities, the ultra-poor (holders of social security benefit cards), and single woman-headed households.

Under EnDev Nepal's grid densification RBF, vulnerable households receive subsidies for household grid connections, while enterprises receive support for the required household wiring. Between 2017 and 2024, this LNOB-focused grid densification RBF provided access to more than 13,000 households, 1,000 social institutions, and 700 MSMEs.

EnDev Nepal's eCooking RBF follows a similar approach: since safe and functional household wiring is a prerequisite for using electric cooking appliances, vulnerable groups receive subsidies to ease the adoption and usage of eCooking. Between 2023 and 2025, this LNOB-focused higher-tier cooking RBF reaches 480 marginalised households with household wiring support and more than 1,300 households with eCooking appliances.

A strong partner is key to scale the approach

While companies can help reach poorer customers, some households require permanent public support. To scale DSS sustainably, partnerships with long-term actors are crucial. In Malawi, EnDev works closely with the World Bank. Biweekly coordination with the Energy Sector Management Assistance Program (ESMAP) during project design ensured alignment with the Ngwee Ngwee Fund, part of the World Bank-funded Malawi Electricity Access Project. This opens pathways to scale EnDev's DSS model through government-led mechanisms, potentially with further World Bank support. Beyond implementation, EnDev also plays a leading role in shaping the global discussion around DSS, also known as end-user subsidies. Together with partners such as ESMAP, GOGLA, and Africa Clean Energy, EnDev has created the End User Subsidy Lab. This exchange platform helps to build the knowledge base on end-user subsidies in the energy access community. Case studies, discussion papers, and toolkits are offered online and discussed in webinars open to all community members.

250,000 people

were reached by EnDev's DSS component, with implementation continuing through 2026.

Key lessons: Leaving no one behind

1. **Affordability matters:** Targeted DSS are crucial to reach ultra-poor, female-headed, displaced, or otherwise vulnerable households.
2. **Good targeting is critical:** Social registries, vulnerability indices, or geographic/demographic criteria ensure DSS reach those who need them, avoid social tension, and limit market distortions.
3. **DSS can strengthen markets:** With strong local partners, DSS can support company presence, after-sales service, and more sustainable adoption of energy products, though further learnings are needed to understand its full impact.
4. **Partnerships enable scale:** Collaboration with governments, development partners, and knowledge-sharing platforms helps embed DSS into broader energy access strategies.

Deep Dive

Explore EnDev's guide on planning and implementing RBF projects that consider various LNOB aspects

Further publications

EnDev (2025): Demand-side subsidies (DSS) – a tool for achieving universal energy access

EnDev (2021): The Vulnerability Access Index: How to develop solar markets in Tanzania's rural areas

Lighting Global (2024): Designing responsible end-user subsidies for energy access

GOGLA (2024): End User Subsidy Lab

Practical Action Nepal: Digital innovation for electric cooking (eCooking) market development

SNV Nepal: Increasing access to clean energy through pico-hydro and clean cooking technologies

Chapter 4

Engaging impact investors

Social enterprises hope to empower their local communities...

Kenya is the economic powerhouse of East Africa's off-grid energy market: as of 2023, 76% of the population had access to electricity and 32% to clean cooking solutions. Despite rapid progress, not everyone can afford to pay for energy access products, even on a pay-as-you-go basis. These low-income, often more vulnerable households are at risk to being left behind.

However, there are a number of companies – sometimes called social enterprises – that want to make a difference in their local communities. Deevabits Green Energy and Bidhaa Sasa are two of them. Both companies are last-mile distributors of energy access products such as small solar home systems, improved cookstoves, and productive use appliances. They have been operating in Kenya since 2016 and 2015 respectively. Their business models are based on creating jobs in local communities, for example by creating and working with women's groups as local sales agents.

...but access to finance is a challenge

Yet serving poorer households in rural areas is not always easy, as people often struggle to regularly afford the pay-as-you-go fees for their products. In turn, the companies' default risks tend to be higher and their sales volumes lower than those of companies that focus on the more affluent peri-urban customer segment.

In the battle for investment, these social enterprises often lose out to their higher-volume competitors. They therefore also pin their hopes on social impact investors. These provide more patient capital, often equity and debt at good terms and in smaller ticket sizes, for companies that can demonstrate social impact on the ground. However, it is not easy to get their attention and buy-in, as they require clear evidence that a business model with a social mission can work commercially.

Getting impact investors on board

This is where EnDev and its partners tested an innovative RBF model called Social Impact Incentives (SIINC). The model itself was developed jointly by the SDC and the advisory firm Roots for Impact. In a nutshell, the approach strives to make social enterprises impact-investment-ready. Like other RBF mechanisms, it provides incentives for verified results – but unlike conventional approaches that pay for outputs (such as sales), SIINC pays at the outcome level, for example improved quality of life, financial savings, or income-generating opportunities. Companies are therefore rewarded for achieving social impact, not just generating sales.

Beyond the financial rewards, SIINC participation provides companies with verified data not only on their sales volumes but also on the customers they reach and the social impact they generate. This strengthens their pitch to social impact investors and helps them leverage private investment in underserved markets.

EnDev introduced SIINC to the energy access sector

To test the waters of this new concept, SDC commissioned EnDev to implement a SIINC pilot in Kenya's off-grid energy sector. The goal was to apply the SIINC model for the first time in this context, establish the working processes for a standardised approach, and generate lessons for future upscaling. The pilot began in October 2021, ran for 12 months, and included two SIINC transactions with the Kenyan companies Deevabits and Bidhaa Sasa.

Expanding social impacts

Both companies soon began to see tangible benefits from participating in the SIINC pilot. David Wanjau, CEO and founder of Deevabits, highlights two reasons why the programme proved valuable: it helped his company expand its social impact in local communities, and it supported Deevabits in securing a loan from an impact investor. Thanks to the financial incentives offered through SIINC, Deevabits was able to expand its last-mile distribution network, expand promotion activities of its women's groups, and reach more vulnerable customers. David explains

> This kind of project entices us to think differently about the challenges in the community and how we can address them. The effect of these incentives is that we extend benefits to lower-income customers. I was surprised how well our poor inclusivity ratio increased.
>
> – David Wanjau
> CEO and founder, Deevabits Green Energy

Both participating companies achieved solid results despite the limited pilot implementation period of 12 months and the impact of the COVID-19 pandemic. They were able to shift their customer portfolios towards customer segments that otherwise would not have been served. It is remarkable that the vast majority of both companies' customers reported quality-of-life improvements for all their product segments.

Box 5

Universal energy access requires private investments at scale

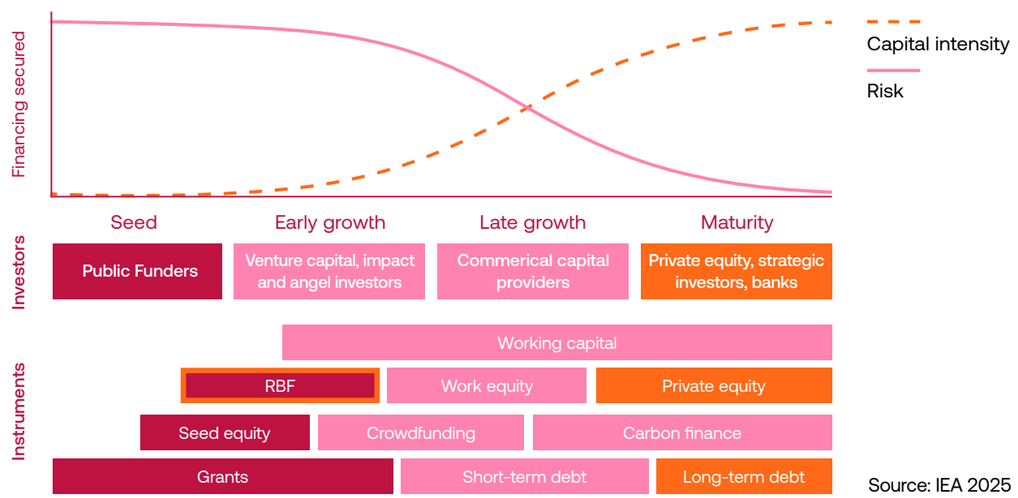
SDG 7.1 aims to ensure universal access to affordable, reliable, and modern energy services by 2030. Achieving this goal will require investments of around 45 billion USD per year for electricity access – including approximately 4.6 billion USD annually for off-grid solar – and about 10 billion USD per year for clean cooking (ESMAP, 2024; IEA et al., 2025).

We remain far from reaching this scale, especially in countries with the largest access deficits for electricity and clean cooking – the so-called high-impact countries. In 2020, investment commitments in the 20 high-impact countries for electricity tracked by SEforALL totalled around 8.9 million USD, and approximately 309 million USD for clean cooking. However, by 2022, these figures had fallen to just 5.4 million USD for electricity and a mere 27 million USD for clean cooking – raising serious concerns about the long-term sustainability of funding (SEforALL, 2024a).

In countries with more favourable investment frameworks, investor interest has primarily focused on the thriving off-grid solar (OGS) segment. OGS investments saw strong growth from 2021 onwards, peaking at around 746 million USD in 2022 (largely due to a major equity raise by one company), before declining to 425 million USD in 2023 (ESMAP, 2024). While most solar enterprises still depend on funding from development finance institutions and impact investors to meet their capital needs, commercial debt and equity investors are beginning to show interest in the sector.

Momentum has also started to build in the clean cooking segment, with 218 million USD of capital being raised in 2023 by clean cooking enterprises (CCA, 2025), though much more remains to be done. These are encouraging steps – but insufficient on their own. As a public grant instrument RBF has become one of the key elements in clean cooking market development as it de-risks further private investments (see Figure 4). On top, RBF is providing companies with verified sales data and – as seen in the SIINC model – can support them to quantify and monetise their impacts on the ground.

Figure 4. **RBF has become a key element in clean cooking market development**



Source: IEA 2025

The companies achieved these results by adjusting their value proposition, e.g. by adding smaller and more affordable products. They invested in expanding the pool of last-mile sales agents and company staff, expanding marketing outreach, establishing logistics and distribution channels, as well as developing and introducing flexible payment plans to reflect the ability to pay of lower-income clients.

A catalyst for impact verification and investment

SIINC also strengthened the companies' ability to understand and communicate their social impact. While both assumed they were generating positive effects on the ground, they previously struggled to quantify these achievements. SIINC's verified impact measurements enabled them to present clearer, evidence-based narratives to impact investors and other funders. Ultimately, the SIINC pilot helped both companies attract additional capital from a total of four impact investors.

> SIINC had a catalytic effect. We spoke to our impact investor and they gave us a non-interest loan ten times higher than the last time.
>
> – David Wanjau
> CEO and founder, Deevabits Green Energy

Scaling SIINC

EnDev's Kenyan pilot has generated several learnings that are now helping to refine and scale the SIINC approach. The RBF component of CEI Africa, KfW's Clean Energy and Energy Inclusion for Africa Foundation, funded by BMZ and SDC, is building on this experience. As a pioneer in the field of RBF within the sector, EnDev will continue pushing the boundaries of RBF approaches. While SIINC cannot be the only approach, it can certainly help bring us one step closer to reaching SDG 7 by unlocking the full potential of high-impact businesses and mobilising much-needed private capital.

Key learnings: Unlocking impact investments

1. **SIINC links impact and investment:** Outcome-based incentives help social enterprises to proof their business models and to build their track record – making them more attractive to impact investors.
2. **Data builds credibility:** Verified impact data strengthens companies' investment cases.

Deep Dive

Explore the full report on SIINC

Video The Impact of SIINC

Watch how SIINC rewards companies for verified social impact, featuring one impact enterprise.

Chapter 5
Using digital innovation

Enhancing efficiency with digital tools

Digitalisation is a key enabler of innovation in the energy access sector. Tools such as mobile money services and remote-locking technologies have paved the way for pay-as-you-go business models, revolutionising how users access and pay for energy (Lighting Global, 2024). Beyond payment systems, digital technologies enable more efficient data collection, analysis, and monitoring – opening up new opportunities for programme design and implementation. EnDev uses a variety of digital tools across its portfolio, also for RBFs.

Building on the data-driven nature of RBF, digital tools can provide targeted support at each phase of the RBF project cycle, reducing costs, improving service delivery, and strengthening verification systems. Various digital tools can be applied along the RBF project cycle (see Figure 5):

1 Planning phase

Digital survey tools enable cost-efficient, user-centred collection of socio-economic data from potential customers and intermediaries. The EnDev Survey App, for example, allows teams to collect data directly via mobile phones. Alternative solutions such as Kobo Toolbox can also be used to gather information on household characteristics and energy consumption patterns. In addition, spatial tools like the off-grid-planner support in optimising off- and on-grid solutions to local circumstances.

2 Implementation phase

Marketing, sales, and customer relations. RBF projects typically rely on companies to deliver energy access services, and these companies increasingly integrate a broad range of digital tools into their business models to improve efficiency and reach. These include online marketplaces for product promotion, QR codes for tracking products from warehouse to customer, digital payment systems like mobile money to facilitate transactions, as well as Internet of Things (IoT) features like remote sensors for usage monitoring and impact measurement. For example, ATEC, a partner of EnDev Bangladesh's eCooking RBF, has integrated a global SIM into its induction stoves to track usage and transmit real-time data to cloud-based servers, enabling both impact measurement and carbon credit validation.

Special case

Eligibility determination in demand-side subsidies schemes. Defining eligibility is a critical step in DSS projects, where clear criteria determine who can receive subsidised products. Eligibility can be straightforward when based on geographic boundaries (e.g., households in District A qualify, those in District B do not).

However, it becomes more complex when eligibility depends on household socio-economic factors. In such cases, digital eligibility tools like the Kobo Toolbox are valuable, enabling sales agents to verify in real-time whether a household qualifies for the subsidy (see Box 6).

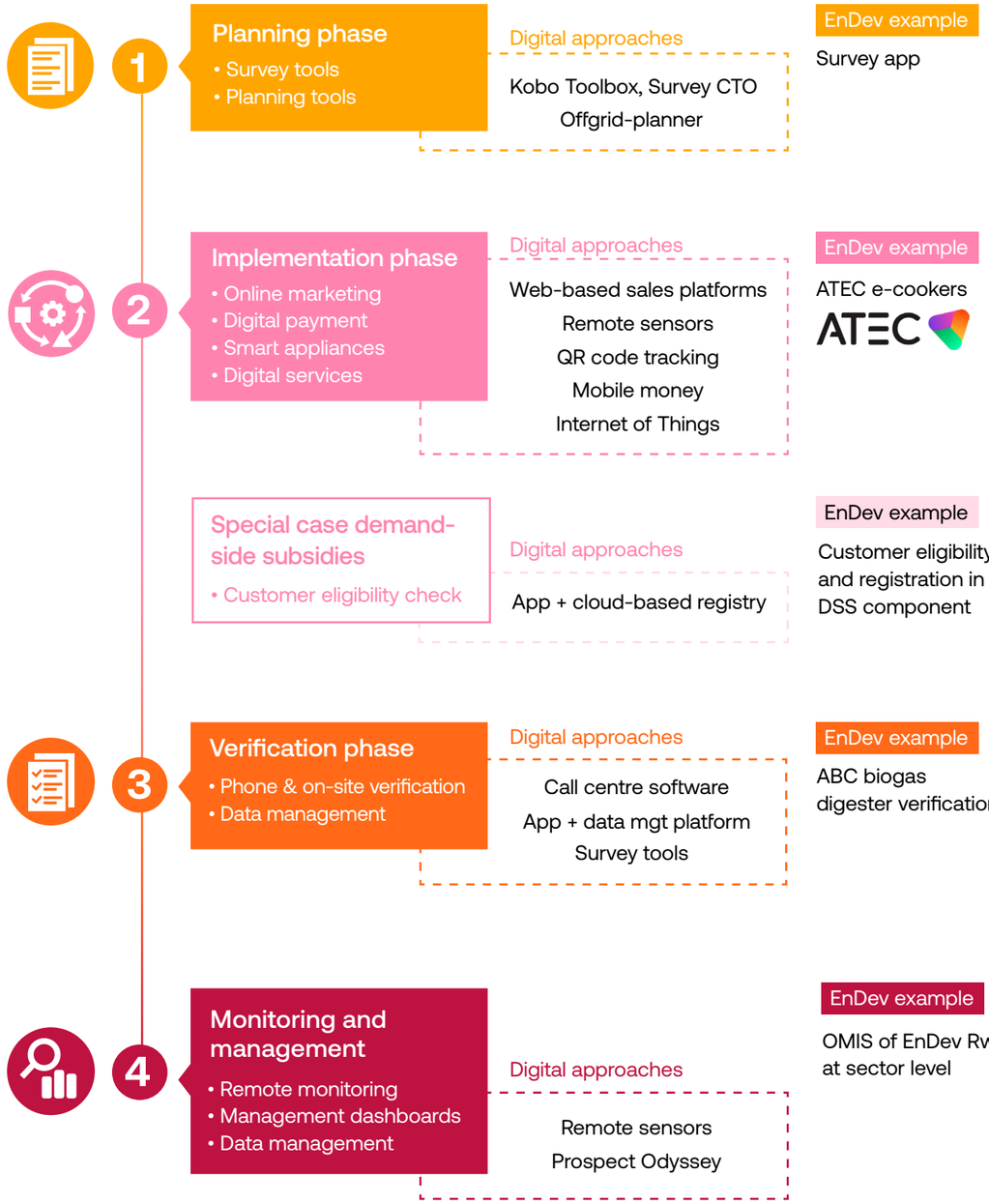
3 Verification phase

Digital tools are a great help for all kinds of verification processes. For example, during phone verification, customer calling lists and sampling systems as used by call centres can be used for systematic and efficient customer outreach. EnDev has also tested the lean data methodology (e.g. in the SIINC pilot; see chapter 2.3). For on-site verification, digital survey tools support data collection and on-site analysis as e.g., used in the sales verification of biogas digestors (see Box 7). In addition, remote monitoring devices can help collect usage and impact data.

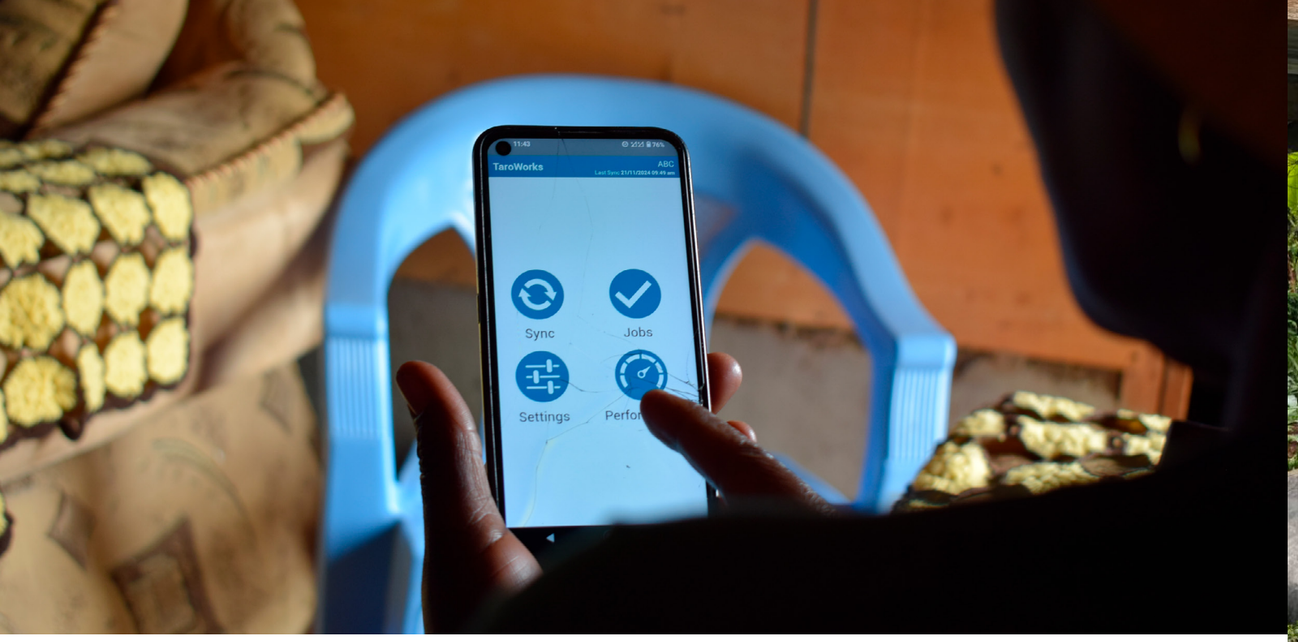
4 Monitoring and management

Platforms like Prospect and Odyssey can be used to manage RBF mechanisms. These tools provide project managers and stakeholders with real-time dashboards and analytics to track progress. They also facilitate administrative and operational tasks such as tendering, contract management, verification, incentive disbursement, and coordination with implementing companies, ensuring smooth project delivery and adaptive management. At a national scale, RBF data platforms can be linked to energy access online information systems (OMIS) that provide sector-wide information to government partners as e.g., supported by EnDev Rwanda.

Figure 5. **Digital tools across the RBF project cycle**



DSS = Demand-Side Subsidy Component
ABC = African Biodigester Component
OMIS = Off-grid Monitoring Information System



The outlook for innovation

Digital innovations are transforming how RBF projects are designed and implemented. Looking ahead, improved data sharing and interoperability between digital systems can enhance coordination, reduce duplication, and accelerate learning across RBF projects. Several interesting trends are emerging:

- **Unlocking new sources of finance.** Digitalisation is helping energy access projects tap into alternative funding streams. Crowdfunding platforms, for instance, combine mobile money and online payment systems to pool small contributions from large numbers of people – opening new opportunities for enterprises that may struggle to access traditional finance (Energy 4 Impact, 2023). Digital carbon trading is also gaining traction: In EnDev's African Biodigester Component in Kenya (see Box 7), smart meters measure the carbon savings of household biodigesters, with data linked to the Cavex platform to sell verified emission reductions on the carbon market (EnDev, 2024). Increased data transparency can help build trust and attract long-term investment into the sector.

- **Interoperable energy data platforms enable scaling.** Prospect, for example, is an open-source energy data platform that can be used to manage RBF mechanisms at scale. It allows device-level data – such as from solar home systems – to be integrated directly, removing the need for manual data entry. Prospect can be linked to company-internal software or accessed through mobile forms when digital infrastructure is limited. The platform provides secure data storage, visualisation, and performance analysis, supporting more efficient claim validation, project monitoring, and strategic decision-making.

Box 6

Eligibility for demand-side subsidies

EnDev's DSS component (see chapter 3) uses a customised Kobo Toolbox system across its pilot projects to digitally verify customer eligibility and track progress. Sales agents use the Kobo Collect app on smartphones or tablets at the point of sale to check if customers meet eligibility criteria, such as living in eligible areas, not already having electricity access, and not previously receiving a subsidised product. The app displays the correct subsidised price and records the sale, including product serial numbers and customer IDs, to prevent duplicates or resale. After installation, agents or technicians take photos of the installed product and capture anonymised location data.

Data then feeds into a Power BI dashboard, a digital tool that visualises data in charts and maps to provide a clear overview of sales by company, product, and beneficiary type, as well as their locations. Verified sales and subsidy payments are tracked separately by independent agents, but EnDev teams use dashboard insights to monitor remaining subsidies. This digital system enhances transparency and streamlines subsidy management within the DSS pilots.

Box 7

Digital registration and verification of biodigester sales

The African Biodigester Component, part of the EnDev partnership, supports the growth and sustainability of the biodigester sector across Burkina Faso, Kenya, Mali, Niger and Uganda. On the supply side, the component provides results-based incentives. Within these RBF projects, the component uses a smartphone application and a cloud-based platform to register, verify and manage sales claims.

For example, the ABC project in Kenya uses the TaroWorks app, which is user-friendly and compatible with most Android devices. The app enables company sales staff to register newly installed biodigesters directly on their smartphones, a practical solution given that they often lack access to computers. The EnDev project team provides training to ensure data is entered accurately. Data is first entered to confirm that the user has biogas in their kitchen. To verify continued use, enterprises are required to upload operational and maintenance data 12 months after commissioning for a second verification.

All data entered is automatically synced and is ultimately accessible on KPMG's Sofy platform. KPMG is the Independent Verification Agent (IVA). This enables the EnDev team to monitor key indicators – such as which companies are performing best and how many systems have been verified. The information on the platform forms the basis for reimbursements. Biogas enterprises also have access to their own results on the Sofy platform, enhancing transparency between the project team and companies. Finally, clients can claim their biodigesters on the project website ↗ and rate the biodigester company.

These digital tools not only improve transparency but are also straightforward to use. That said, the EnDev team has also invested considerable time and effort to train and support companies in using the tools effectively. Looking ahead, there is potential to adopt a fully open-source platform that would automatically transmit data from biodigester smart meters, eliminating the need for manual data entry by sales staff.

Digital challenges

While digitalisation is transforming the implementation and verification of RBF projects, it also introduces practical and ethical challenges that must be carefully managed. Customer data must be safeguarded not only to protect individuals' rights but also because these insights are core assets for energy access companies.

The feasibility of digital tools must also be considered, as they require reliable internet connectivity, which is not always available in remote locations. Finally, their cost–benefit ratio should be assessed: adding digital features to energy products can increase costs. It is important to ask whether these features genuinely benefit users or primarily serve the company or implementing agency.

Key learnings: Using digital tools

1. **Streamlined processes:** Digital tools can enhance each phase of the RBF project cycle from planning, implementation, results verification, monitoring, and overall project management.
2. **Efficient data management:** When tailored to local conditions, digital platforms increase efficiency by aggregating large amounts of data on customers, payments, and product usage.
3. **Enable growth:** RBF Management platforms have a high scaling potential.
4. **Data security & data privacy:** Robust governance and security mechanisms are essential when handling user data.

Deep Dive

Explore EnDev's knowledge product ('Scaling Up Energy Access with Digital Solutions') on digitalisation

Further publications

EnDev 2021: Rigorous Verification of Results: Value for Money or Waste of Time?

Chapter 6
Adapting to crisis

Multiple crises jeopardise energy access

Today's multiple crises, such as the repercussions of climate change, economic turmoil, conflicts and rising food insecurity, are challenging, especially for the most vulnerable people. The increasing pressure just to meet basic survival needs makes households and small businesses more risk-averse and affects their ability to pay for energy access. In conjunction with population growth in Sub-Saharan Africa, the gap to achieving universal energy access is growing rather than shrinking (IEA et al., 2025). In some contexts, there is even a risk of backsliding, where individuals or communities lose the energy access they had previously achieved (SEforALL, 2024).

RBF's versatility safeguards impacts

Crises and disruptions require adaptive approaches to energy access interventions. RBF has proven to be a highly versatile instrument, as the results for which incentives are paid can be adjusted quickly – for example by changing eligible products, incentive levels, target groups or delivery strategies. This flexibility helps ensure that the overarching goal of expanding energy access can still be achieved while implementation strategies adapt to evolving realities.

Data and dialogue help to keep RBFs responsive to change

A cornerstone of adaptive management is the continuous monitoring of both project progress and external developments that may disrupt initial plans. A robust M&E system, paired with trend analysis, can help identify tipping points early, for instance rising default rates due to declining payment capacities that may eventually push energy access companies into bankruptcy. Equally important is maintaining close dialogue with key stakeholders. Given EnDev's market-based approach, the private sector is essential in this exchange. Companies provide not only sales and payment data but also insights on sector challenges, emerging risks and potential mitigation measures. Their feedback is crucial to validate any adjustments to RBF schemes.

RBF adaptations to cope with COVID-19

The COVID-19 pandemic illustrates how sudden external shocks can disrupt energy access markets, particularly for vulnerable households whose immediate survival needs take priority over energy purchases. A survey conducted by EnDev in April 2020 across 23 countries highlighted the scale of the challenge: 29% of energy access companies had to halt operations, 50% anticipated staff layoffs, and 75% reported they could not cover financial losses (EnDev, 2020). In response, EnDev rapidly mobilised additional funding and reallocated resources to support companies through the crisis. The flexibility of RBF allowed for swift adaptation: short-term "COVID-Pay" top-ups helped mitigate default risks, while the longer-term "COVID-Plus" scheme enabled companies to continue expanding energy access for vulnerable populations (EnDev, 2021). This experience underscores how adaptive RBF design can maintain progress even under extreme and unpredictable conditions (see also Box 8).

Box 8

Business continuity during COVID-19

ENGIE Energy Access, one of the leading solar home system (SHS) companies in Africa, entered as a new player in the energy access sector in Mozambique in 2019. When the COVID-19 pandemic hit, the company was in the process of setting up its operations. As such, the investments and effort put into Mozambique were at serious risk of being put on hold given the uncertainties brought up by this situation. However, backed by EnDev through the COVID-PAY and COVID-Plus support mechanisms, ENGIE was able to continue its planned expansion with minimised risk and has experienced exponential growth despite the pandemic.

1.8 million people

Since the start of FASER implementation in 2019, EnDev's RBF support in Mozambique has supported over 1.8 million people to gain access to modern energy services.

Box 9

How EnDev's RBF fund in Mozambique (FASER) thrived thanks to its adaptive design

The experience in Mozambique is a notable example of RBF's adaptability. It began with a simple sales-based setup, typical of EnDev's first-generation RBF projects, and gradually evolved into a more sophisticated support scheme tailored to Mozambique's specific needs, continuously seeking solutions to emerging challenges. The journey unfolded through the following stages (see Figure 6):

2016

EnDev introduced a series of catalytic funds to prepare companies with technical and strategic support, ensuring they were ready for future RBF opportunities.

Early 2019

The Fund for Sustainable Access to Renewable Energy (FASER) was launched, offering basic incentives for sales of improved cookstoves and solar home systems. Additional top-up incentives targeted sales in remote areas, women-led households, and higher-tier cookstoves.

March 2019

Just before FASER's official launch, the provinces of Manica and Sofala, two of Mozambique's poorest, were hit by Cyclone Idai. To support affected communities, a Humanitarian Window was added, providing extra incentives for energy products delivered to displaced people in resettlement areas.

March 2020

In response to COVID-19, EnDev launched the special **COVID-Pay Window**, funded by Norad, to help vulnerable customers maintain energy access. The Humanitarian Window was also scaled up to cover COVID-affected populations via COVID-Plus, funded by the European Union. COVID-Plus supported off-grid solar companies and ensured business continuity during the pandemic. In the words of one company, FASER "made it possible to keep the lights on for customers without disturbing the market."

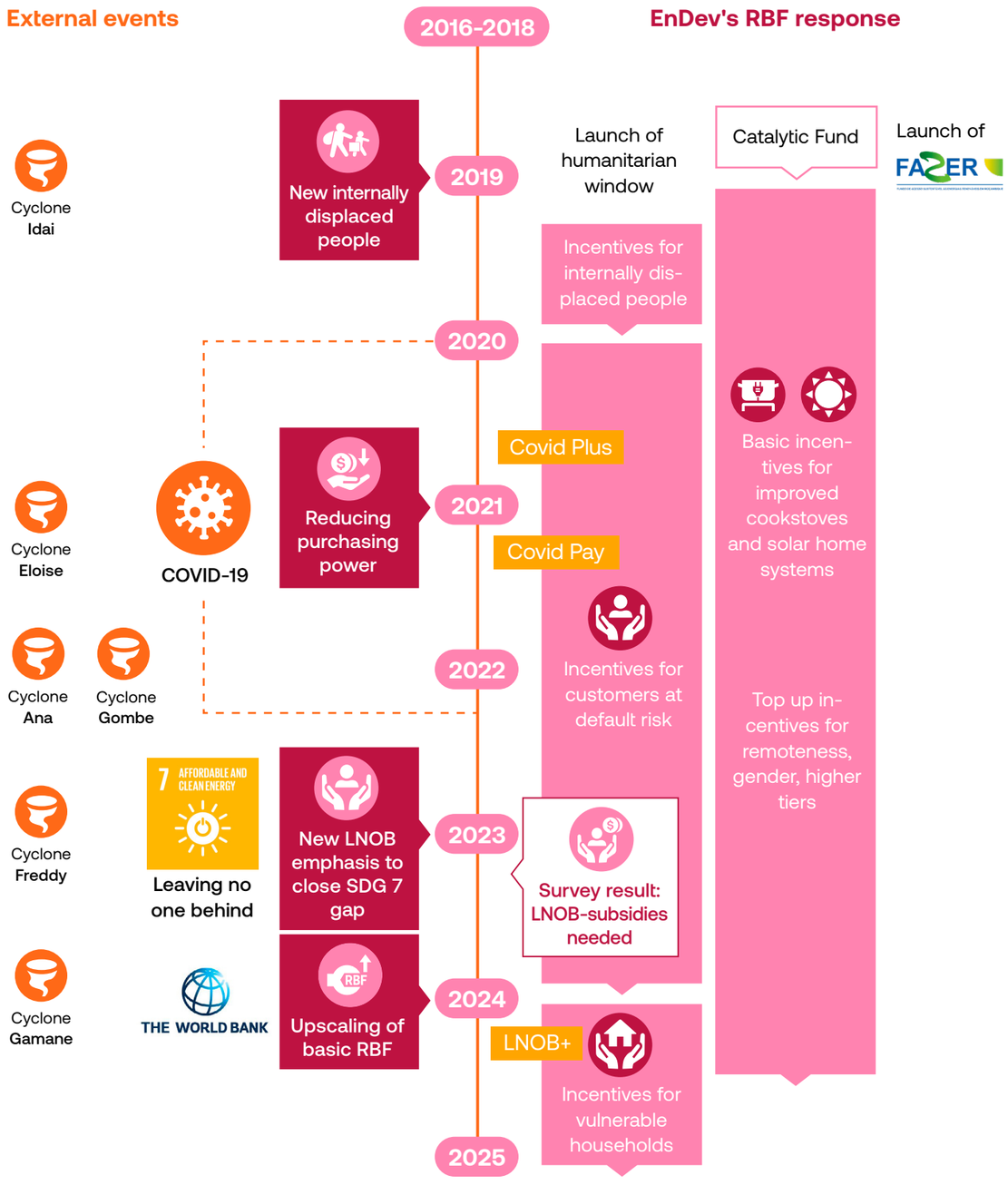
October 2023

Growing awareness of the gap to achieve universal energy access led to a renewed emphasis on the LNOB principle. EnDev surveyed Mozambican energy access companies on support needs; the overwhelming response indicated that subsidies were necessary to make reaching vulnerable groups viable. In response, EnDev launched the LNOB+ RBF Window, targeting women in vulnerable situations, internally displaced people, resettled communities, and low-income families in remote areas.

End of 2024

The World Bank and the Energy Fund (Fundo de Energia, FUNAE) launched their first call for proposals for +ENERGIA, a new RBF energy access facility in Mozambique. Scaling up the proven EnDev and FASER schemes, +ENERGIA offers incentives for distributed renewable energy and clean cooking solutions. EnDev continues to support energy access through two approaches: capacity development for local companies to prepare for +ENERGIA funding, and ongoing RBF support under FASER for the most challenging target groups, including vulnerable and very remote households.

Figure 6. **RBF adaptability as illustrated by EnDev Mozambique's FASER fund**



Key lessons: Adapting RBF to crisis contexts

1. **RBF is flexible by design:** Incentives can be rapidly adapted to respond to crises and shifting market realities.
2. **Trend monitoring:** A robust M&E system paired with trend analysis helps to warn when external events endanger initial goal attainment strategies and require a change of plan.
3. **Close communication with stakeholders:** Constant dialogue and feedback mechanisms with key partners, such as companies, help to optimise the RBF design whenever necessary.
4. **Adaptation builds resilience:** Continuous learning ensures RBF schemes stay relevant in fragile and changing contexts.

Further publications

FASER Fund homepage

EnDev 2024: Celebrating Five Years of the RBF-Fund FASER

Video FASER Mozambique (Portugese only)

FDC and GIZ created the FASER fund in Mozambique to reduce poverty and boost economic growth by expanding access to renewable energy solutions.

Chapter 7
Operating in fragile contexts

Fragility is on the rise, putting SDG 7 at risk

A quarter of the world's population – 2.1 billion people – live in contexts of extreme or high fragility. This marks an increase in both the number of fragile contexts and the population affected compared with previous years (OECD, 2025). The rise in the number of people affected by fragility challenges universal energy access. While the last decade saw progress in providing access to electricity and clean cooking to millions of people, that progress was concentrated in a few high-performing countries (IEA et al., 2025).

Other countries experienced slow progress and some even fell behind, such as Mali and Niger, where the rate of providing energy access is deteriorating (SEforALL, 2024). Often, these countries are the ones suffering not only from a challenging business environment, but from outright fragility, conflict, and violence (FCV). In these environments, households' ability to pay for energy access is usually low; the security situation may inhibit customer outreach and servicing; people tend to have little awareness of the benefits of off-grid solar electrification or clean cooking solutions; and the business environment is marked by limited access to local finance, corruption, and unclear policies. Moreover, such fragile contexts are inherently volatile, with rapidly changing and often unpredictable conditions that further complicate sustainable energy access.

> When working in fragile settings, you need flexibility and a high tolerance for frustration. RBF, especially when it also addresses the affordability gap, can be a good vehicle for market development in such early-stage markets.
>
> – Sarah Thomas-Parensen, former Project Manager EnDev Mali

New access delivery concepts are needed for fragile contexts

Despite the dire circumstances, these regions cannot be neglected in our striving for universal energy access. Energy access delivery concepts need to be launched that help overcome the barriers specific to FCV contexts. RBF can be one of them, if well adapted to the needs of the target groups and the private sector in FCV-afflicted countries. In such environments, affordability of energy access products and services is often a key challenge. Even PAYGo schemes reach their limits when the financing costs behind PAYGo become prohibitively high. To address the proportion of households with severe affordability constraints, EnDev also employs demand-side subsidies (DSS) to make access more affordable (see chapter 3).

Let us zoom in on the Sahel region, a particularly fragile area spanning parts of West Africa including Mali and Niger, where EnDev is active. While East Africa has seen a growing number of development partners adopting RBF approaches, the Sahel and West Africa more broadly still have a very limited RBF presence. In Mali and Niger, for instance, EnDev stands out as an exception by applying a market-building RBF approach, complementing humanitarian agencies that continue to rely mainly on traditional procurement and free distribution models.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Flexibility and patience are key, but the impacts can be worth the effort

While RBF projects in Mali and Niger are still ongoing, some preliminary lessons can already be drawn.

- **Make use of RBF's versability to stay flexible.** Changes in the security situation, but also economic crises, may impede companies' ability to sell according to initial schedules. Thus, contracts may need to be easily adaptable. In contexts such as Mali, another important aspect is that implementation regions may shift over time due to security issues, requiring continuous adjustments to programme design and operations.

- **Build markets with a long-time perspective.** Energy access markets in FCV contexts are either non-existent or in early stages, so any intervention to build markets will take time. Introducing RBF mechanisms to companies that are used to working on prepaid service contracts also requires a long lead time.

- **Test approaches in easier settings, then expand to more difficult places.** Markets need to be strengthened gradually, starting with lower-risk places and customers so that basic supply structures can be built before expanding to higher-risk target groups. While this argument applies to market building in general, it is even more relevant for fragile settings. EnDev's experience in Mali showed that even offering RBF incentives for sales in the capital – for improved cookstoves in restaurants – could be a starting point in a very early-stage market. Later on, the RBF scheme could be extended to secondary cities, peri-urban places, rural towns, and remote rural areas.

- **Adapt RBF verification procedures to FCV settings.** Verifying that results for which companies get paid were actually achieved is one cornerstone of any RBF mechanism. It usually involves a combination of phone and on-site verification methods. Especially on-site verification can be challenging in regions under security alerts. In extreme cases, as some parts of Mali, verifiers may need to fly in to verify a small batch of

sold cookstoves. Given the security and cost implications, verification processes need to be adapted for FCV settings. More remote verification practices – for instance through the use of mobile phones – can help reduce risks and costs, while ensuring that the personal data of end-users is handled with particular care and protection.

- **Partner with locally well-embedded organisations to build delivery capacity.** Local NGOs usually know their communities, speak the local language, and are well versed in the local security situation. Partnering with them for providing access in FCV settings is often the only solution and helps to build local delivery capacities in the long run. EnDev Mali works together with local staff from an international consultancy who serve as independent external verifiers for improved cookstove results. EnDev Niger works with Mercy Corps – a well-embedded international NGO with a strong local presence – as Fund Manager and engages a local consultancy for verification. Moreover, EnDev Niger partners with UNHCR and other international NGOs to facilitate access to refugee settings. Another crucial aspect is community engagement. Both EnDev Niger and EnDev Mali strengthen local technical and business capacities, e.g., of young people, cooperatives and women's groups, integrating them into the energy value chain. EnDev's experience shows that building local structures is very important, especially for sustainability, but it takes time, effort, and resources.

> Verification is a challenge in fragile settings: few sales, costly verification, security-related travel, and customers afraid to share personal data. If you want to do RBF here, you need to rethink your verification procedures.
>
> – Aukje De Jager,
> Country Director SNV Mali
> (implementing partner of EnDev Mali)

Figure 7. **Risk mitigation strategies tested by EnDev Mali and EnDev Niger**

Risk category	Risk description	Mitigation strategy
Affordability & high default risk	Low purchasing power, vulnerable to economic, political, or natural shocks, limiting ability to pay.	DSS can make products affordable for vulnerable clients while avoiding market distortions.
Difficult business environment	Limited finance access, high fiscal burdens, underdeveloped distribution networks, and low customer willingness to pay constrain private sector capacity.	Develop local private sector through tailored business support. Test market-based energy access in lower-risk areas before expanding.
Unpredictable country circumstances	FCV settings can change rapidly, affecting companies' business models.	Adaptive management with flexible contracts and longer-term project periods to allow adjustments.
Security issues	High, rapidly changing security risks can disrupt on-site verification and market activities.	Partner with local organisations to maintain operations and build local capacity. Adapt verification to remote methods if on-site visits are unsafe. Change implementation regions when necessary.

> RBFs are crucial for providing energy access in underserved markets, expanding market outreach and catalysing market development. RBFs must be accompanied with market development measures on the supply and demand side to enable sustainable impact. Especially, in a nascent, fragile and complex market environment, local community engagement and capacity building are crucial success factors for RBFs, as they create trust and ownership for the project and the promoted technologies.
>
> – Attila Yayrak,
> Project Manager EnDev Niger

Strategic partnerships to build the enabling environment

RBF – at least in its initial intervention rationale – was conceived as a special instrument that could overcome market barriers by providing the private sector with financial incentives to take the risks of expanding their businesses. While the RBF mechanism can be adapted to FCV settings, RBF is limited in addressing complex market barriers that involve factors like conflict, weak governance, and fragile currencies. Therefore, RBF should never be used in isolation in these environments. Its success depends on combining it witch technical assistance, effective security management and close cooperation with partners such as local authorities, humanitarian organisations, and local NGOs. Nonetheless, even within these constraints, RBF remains a valuable tool to initiate market development in FCV areas, supporting access to energy while also contributing to stabilisation and local economic activity.

Key lessons: Implementing in fragile contexts

1. **RBF alone is not enough:** It must be combined with technical assistance, security management, and local partnerships to be effective in FCV settings.
2. **Verification can become a challenge:** Ensuring credibility while keeping staff safe requires innovation in remote verification and data protection.
3. **Early wins matter:** Starting in lower-risk areas helps build confidence among companies and donors before scaling to more fragile regions.
4. **Local legitimacy drives adoption:** Community engagement and investing in local capacities significantly increase uptake and sustainability.

Conclusion and outlook

RBF as a cornerstone of EnDev – but never in isolation

RBF has become a cornerstone of EnDev's approach to accelerating energy access. It is versatile, evolving, and tailored to diverse needs. EnDev has applied RBF to strengthen markets, reach the last mile, improve affordability for end-users, and operate effectively in fragile and challenging environments.

RBF is highly adaptable, yet it cannot succeed in isolation. Technical assistance remains a crucial enabler, particularly in early-stage markets or where companies previously lacked the capacity to engage in performance-based schemes. For EnDev, RBF is therefore not a purely financial tool; its effectiveness depends on careful integration with complementary support measures. Simplicity is also key: schemes must be clear, transparent, and accessible to avoid overwhelming local actors and private-sector partners.

RBF goes mainstream – within and beyond EnDev

Over the past decade, EnDev has played a pioneering role in shaping RBF for the energy access sector. Today, it is a widely accepted and mainstreamed tool, used in programmes such as the Beyond the Grid Fund for Africa and by institutions like the World Bank. Geographic reach and technological scope have expanded from East Africa to West Africa and from smaller to larger systems, including productive-use appliances such as solar water pumps and fridges.

Coordination is key

As RBF becomes central to energy access, coordination among donors, implementers, and governments is essential. Harmonised subsidy levels, eligibility criteria, and reporting standards simplify participation for companies. While growing complexity poses challenges, it also creates opportunities for innovation, learning, and market acceleration, provided strong mechanisms for alignment, transparency, and accountability are in place. Strategic engagement by governments, early private-sector involvement, and shared digital data systems will be critical to maximise future RBF impact.

Looking ahead: RBF's new frontiers

EnDev has consistently pushed the boundaries of what RBF can achieve. Today, new frontiers are emerging as we seek to make RBF fit for purpose. The aim is to reach universal energy and to emphasise energy as an enabler of broader impacts, be these economic development, food security, health, and inclusion in an increasingly digital world. There is plenty of work ahead. Key tasks for the energy access community could include:

- Further build, accelerate, and expand markets serving commercial customers by scaling the use of sales-based RBFs focusing on early-stage energy-access markets where public support can de-risk private-sector investment.
- Refining supply- and demand-side LNOB RBFs to reach commercially challenging customer segments, building on EnDev's experience with Last-Mile RBFs, SIINC, and demand-side subsidies.
- Refine humanitarian RBFs to facilitate energy access in conflict-affected or climate-displaced settings, testing incentives and safeguards for private-sector engagement in high-risk environments.
- Testing social-service-type RBF approaches to serve people in severe poverty, involving NGOs and local authorities alongside private-sector actors.
- Employing nexus RBFs to achieve impacts beyond SDG 7, i.e. linking energy access to outcomes in health, education, and agri-food sectors, and adapting indicators to reward tangible results.

From health to energy

From its beginnings in the UK health sector to shaping energy access through EnDev, the RBF concept has proven its versatility and impact. Looking ahead, its evolution will continue to bridge sectors, unlock innovative solutions, and reach the most underserved populations. As energy access challenges grow ever more complex, RBF stands as a central tool – enabling learning, fostering inclusion, and driving adaptive, lasting change.

Figure 8. **The role of diverse RBF approaches towards 100% energy access**

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Dag-Hammarskjöld-Weg 1-5
65760 Eschborn
Germany
T +49 61 96 79-0
F +49 61 96 79-11 15
E info@giz.de
I www.giz.de

Contact:
Energising Development
E endev@giz.de
I www.endev.info

Authors:
Eva-Maria Brändle (EnDev/GIZ), Mirco Gaul and
Miriam Schröder (SiNERGi)

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