FROM PROCUREMENT TO PERFORMANCE:

Towards a private sector-led, service-based model to scale up sustainable electrification of public institutions

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SUSTAINABLE ENERGY FOR ALL

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EXECUTIVE SUMMARY

Providing quality social services, such as health care and education, is virtually impossible without access to reliable electricity in health facilities and schools. And yet, power is unavailable or unreliable in most health facilities and schools across Sub-Saharan Africa and South Asia. Off-grid solar combined with battery storage presents an opportunity to provide clean, reliable, quickly dispatchable and cost-effective electricity to underserved social infrastructure but ensuring that these solutions can provide electricity on a long-term, sustainable basis does not come without its challenges. To date, most public institution electrification efforts have been grant-based, donor-supported projects that largely focus on the procurement of solar photovoltaic (PV) assets. This focus has led to a bias towards equipment-ownership models, and because of relatively short project timelines, timely disbursement is inevitably prioritized over long-term operation and maintenance (O&M) planning. Such an approach can compromise the long-term sustainability of solar PV systems since the focus is more on the procurement of assets than on service delivery and performance.

As the shortcomings of grant-based projects are becoming more apparent, demand is rising for more innovative ways of ensuring sustainability. One such intervention is the service-based delivery model. Its advantages lie in its ability to leverage the expertise and capital of the private sector to deliver energy services to public institutions while ensuring financing and incentives are structured over the long haul. Given the scale of investment needed to electrify health facilities and schools in line with Sustainable Development Goal 7 (SDG7), SDG4 and SDG3, private-sector investments are essential to complement public resources. A performance-based service model provides a strong platform to raise the amounts of capital needed to bridge the energy gap in the health and education sectors.

While switching from an equipment-ownership model to a service-based approach avoids many of the sustainability pitfalls associated with the former, a range of barriers needs to be overcome for the approach to be viable in the context of powering social infrastructure. These include: i) the affordability of energy services and the public sector's ability to pay for them; ii) the willingness of the private sector to raise capital for these interventions; iii) the risk of crowding out national companies; iv) the high transaction costs; v) the risk of grid extensions; and vi) the continuation of more traditional grant-based models.

Thanks to a few pioneering organizations, the service-based model is now being piloted in a number of countries (e.g., Benin, Kenya, Niger, Nigeria), as a means of electrifying social infrastructure. These early adopters, which include the World Bank, UNDP, Differ Community Power, GIZ, and the GreenStreet Africa initiative, are addressing some of these barriers by building in opportunities for aggregation and economies of scale, as well as adding in de-risking mechanisms such as guarantee funds, special purpose vehicles, and third-party verification.

A service-based model may not be feasible or desirable in every circumstance, nor will its application in the public health and education sectors be as straightforward as it is in the residential sector. As such, the model will require further input, buy-in and diligence from a variety of stakeholders. To further advance the service-based model, this knowledge brief calls for:

- Increased investment in data, in particular on the location, energy status and energy needs of public facilities.
- Donors and development finance institutions (DFIs) to support the experimentation and demonstration of different service-based models through grants and pilots.
- Greater dialogue between energy and health stakeholders, as well as public- and private-sector stakeholders.
- Greater buy-in, support and coordination among a range of stakeholders, including governments, DFIs, service providers and investors.

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CHAPTER 1

INTRODUCTION

Background

Social services, such as health care and education, are cornerstones of human development and essential for the well-being of people and societies. However, despite notable progress, there remain persistent inequalities and deficiencies within health and education systems, especially in low- and middle-income countries, a fact that has been further exposed by the Covid-19 pandemic. According to the 2018 World Bank Human Capital Index, nearly 60 percent of children born before 2018 are expected to lose more than half of their potential lifetime earnings due to deficiencies in health and education. These losses are likely to be even higher now due to the Covid-19 crisis.

One of the major challenges in providing quality social services is the lack of a reliable and affordable energy supply, especially in low- and middle-income countries. Without reliable access to electricity, health facilities are unable to power essential medical devices such as ventilators, pumps and filters; heat water to ensure essential hygiene practices; adequately heat or cool medical rooms and buildings; or enable the deployment of cold-chain equipment necessary to deliver life-saving vaccines and medications. The Covid-19 pandemic has underscored the need for reliable power in the health sector to diagnose and isolate cases and provide emergency treatment. Furthermore, without power at schools and homes, quality education is not possible and distance learning during the Covid-19 pandemic has not been an option. In addition to the above direct impacts of not having a reliable electricity supply at health facilities and schools, other important impacts include poor staff retention due to a lack of electricity in staff quarters; this leads to limited availability of qualified professionals such as doctors, nurses and teachers to ensure timely and quality service delivery.

Despite its importance, power is unavailable or unreliable in many health facilities and schools across Sub-Saharan Africa (SSA) and South Asia. It is estimated that one in four health facilities in SSA has no access to electricity at all, and only 28 percent of facilities have reliable electricity access[2]. Two-thirds of schools do not have reliable electricity either and distance learning remains a distant aspiration[3]. Globally, over 200 million[4] children go to primary schools without electricity access. This is a barrier to a quality education for some of the poorest and most vulnerable children and young people.

This lack of access to power stems from the fact that many public institutions — particularly those offering primary or community-level services — are located in remote areas, characterized by low energy demand and virtually no access to the electricity grid. Cash-crunched governments and utilities find it difficult to justify grid extension to these areas, where revenues are low and the cost of building and maintaining infrastructure is high. Diesel generators — or in some cases petrol or gasoline generators — are used in many of these remote areas but many of them remain inoperative due to technical or budget-related challenges for fuel and maintenance, as well as logistical challenges that may hamper regular fuel supply, thus posing concerns of reliability and sustainability. Moreover, the use of diesel contributes to air pollution and greenhouse gas (GHG) emissions. Furthermore, where institutions are grid-connected, they often suffer from long power outages or poor quality of power, e.g., voltage fluctuations.

Given that electricity is an essential enabler to delivering health care and quality education in this era of digital learning, it is urgent that efforts to increase access to electricity at health facilities and schools be intensified. World Bank preliminary estimates indicate that billions of dollars are required to electrify all health facilities and schools by 2030. A range of energy solutions is needed to resolve energy poverty in public institutions, including through extending the central grid, deploying

[2] https://apps.who.int/iris/handle/10665/156847
[3] https://www.worldbank.org/en/news/opinion/2020/04/22/energy-access-critical-to-overcoming-covid-19-in-africa
[4] https://sdgs.un.org/sites/default/files/2021-06/2021-UN_POLICY%20BRIEFS-063021.pdf

community-wide mini-grids, and installing stand-alone off-grid power solutions. Public sector and grant financing alone cannot fill this gap, making the role of the private sector, innovative technologies, and sustainable delivery and business models critical to address this huge challenge.

Off-grid solar combined with battery storage presents an opportunity to provide clean, reliable, quickly dispatchable and cost-effective[5] electricity to public institutions that lack access to reliable electricity. But ensuring that these solutions can provide electricity on a long-term, sustainable basis does not come without its challenges. Despite the growing use of stand-alone solar systems to electrify health and education facilities in low- and middle-income countries, many of these systems prematurely fail or underperform [see Chapter 2], leading to the perception that renewable technologies are too new and unreliable to serve the needs of remote communities in the long term.

One of the key determinants of the sustainability of an off-grid solar photovoltaic (PV) system is the type of delivery model used to supply and manage the energy solution over the long run. To date, most public institution electrification efforts have been donor-supported projects. Typically, donor-funded programmes operate within relatively short time frames (usually less than five years). These projects therefore normally finance up-front capital costs with the assumption that long-term operation and maintenance (O&M) costs will be covered through other means (e.g., government budgets). This focus has led to a bias towards equipment-ownership models, and because of relatively short project timelines, timely disbursement is inevitably prioritized over long-term O&M planning. Such an approach compromises the long-term sustainability of solar PV systems since the focus is more on the procurement of assets than on maintenance and service delivery. Moreover, this ownership approach of using solar systems to electrify health facilities and schools has made the sustainable electrification of public institutions largely dependent on public resources, including donor grants. As a result, the pace of electrifying health facilities and schools has largely been determined by the level of funds donors can allocate to procure solar PV systems for them. Lastly, for public institutions solely or largely dependent on (limited-term) grants from donors, governments have very little incentive or opportunity to focus on O&M because the systems are typically provided free of cost (as grants) by donors, resulting in governments often obtaining a new grant-funded solar PV system from another donor when the first one stops working. This can be further exacerbated by donor preferences and incentives, which may be skewed towards investing in new hardware rather than in the maintenance and repair of existing assets. This has also inadvertently crowded out private investments in the electrification of public institutions, as market-driven activities are undermined by free donor grants and the limited focus on O&M.

As the shortcomings of donor projects are becoming more apparent, development partners are considering a wider range of supportive interventions, including: i) developing O&M planning and budget capacities within line ministries (this is the approach taken by several development partners, for example in projects related to solar direct-drive refrigerators for cold chains); ii) planning extended-term donor-supported projects beyond one to two years to shift the focus from up-front investment to sustainability; and/or iii) designing private sector-led service-based models to address both sustainability and scalability. All three approaches have the potential to improve sustainability and may need to be pursued jointly (e.g., the first two interventions are needed to support the effectiveness of a service-based model).

This knowledge brief focuses on the third approach, the service-based model, as a particularly innovative approach to sustainability and scalability and one that is relatively less understood in the context of the electrification of public institutions. As explored later in this knowledge brief, the service-based model represents an opportunity for a new set of stakeholders — primarily from the private sector — to take on an expanded role in the delivery of energy services to public institutions (e.g., rather than just focusing on procurement and installation). It also changes how electricity is paid for by the end-user (or the organizations that support them), shifting from the procurement of energy assets to paying for energy services. There is now a need to assess the model's feasibility and determine how and where it could be viable and scaled up, giving the private sector enough confidence to invest in the electrification of public institutions.

[5] Refer to Annex 4 (including Table A8) in https://apps.who.int/iris/bitstream/handle/10665/156847/9789241507646_eng.pdf?sequence=1&isAllowed=y for evidence on cost-effectiveness and climate friendliness of PV (off-grid solar) + battery solutions as compared to other solutions

Objectives of the Knowledge Brief

This knowledge brief is the product of a collaboration between the Energy Sector Management Assistance Program (ESMAP)/World Bank and Sustainable Energy for All (SEforALL) that leverages the extensive experiences of both organizations in advancing the electrification of public institutions. The knowledge brief discusses the limitations of the conventional equipment-ownership model for electrifying public institutions[6], and explores an alternative private sector-led, performance-based service model, to promote sustainability of electricity supply.

The goal of this document is to draw attention to: i) the role of the private sector in advancing electrification of public institutions given the limited funds available from governments and donor agencies to electrify public institutions at scale and sustainably; ii) the enormous challenge of ensuring the operational and commercial sustainability of off-grid electrification of public institutions; and iii) the role and feasibility of a private sector-led, service-based model in addressing this challenge. It is hoped that the knowledge brief stimulates further discussion and critical comment from those stakeholders interested in advancing the long-term sustainability of off-grid electrification efforts targeting public institutions.

The remainder of this knowledge brief starts with a brief overview of the conventional equipment-ownership model and its limitations in ensuring long-term system performance and financial sustainability (Chapter 2). The knowledge brief goes on to explore: i) how a service-based approach could improve sustainability; ii) what challenges stand in the way and how they could be addressed; and iii) several case studies of ongoing and planned electrification interventions that are already applying elements of a service-based approach (Section 3). This knowledge brief ends with a set of recommendations to further advance and better understand the opportunities and limitations of a service-based approach in more reliably and sustainably electrifying public institutions (Chapter 4).

[6] This knowledge brief focuses primarily on electrification through stand-alone solar PV solutions for public institutions, though many insights are applicable to other electrification models as well (e.g., community-wide mini-grids with the public institution as an anchor load.

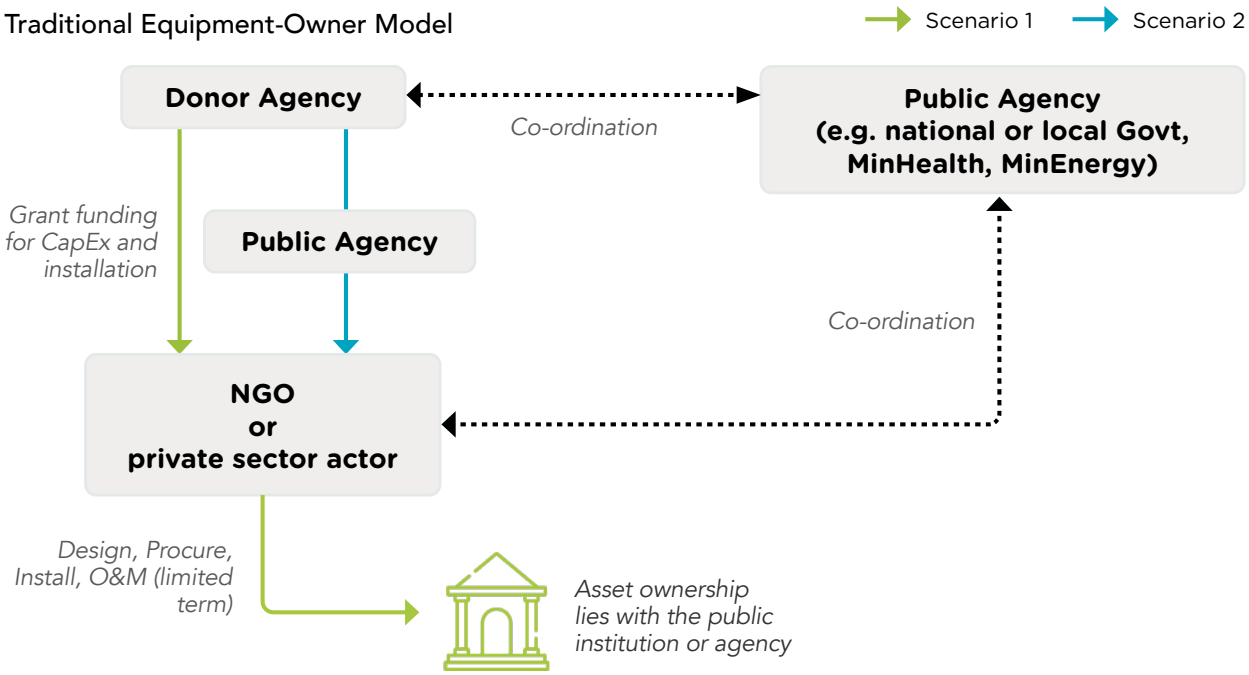
Photo: UN Foundation

CHAPTER 2

WHAT IS THE CONVENTIONAL EQUIPMENT-OWNERSHIP MODEL AND WHAT ARE ITS DRAWBACKS?

In the conventional equipment-ownership model, a government agency typically makes the up-front investment needed to purchase and install an off-grid system using its own or donor funds; in other cases, donors and development partners may provide funding directly to another implementing agency (e.g., non-governmental organization (NGO), private-sector actor). This model often follows a 'design, procure, install' approach, with an implementing organization tasked to lead this approach. Beyond component and installation warranty, operation and maintenance (O&M) is then either managed by the government agency itself or outsourced through contracts for a certain (but often limited) period (see Figure 1).

FIGURE 1
Schematic of Conventional Equipment-Ownership Model

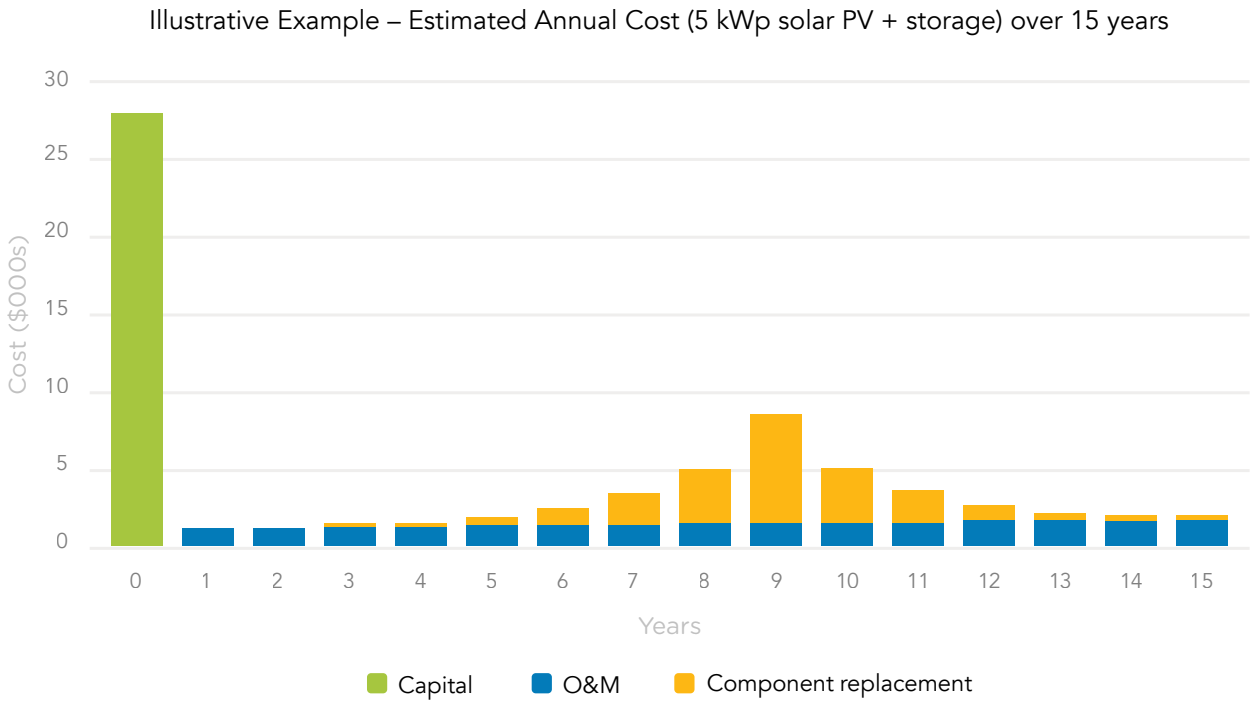


Unfortunately, this approach is prone to a variety of sustainability challenges —as discussed in SEforALL's report, Lasting Impact: Sustainable Off-Grid Solar Delivery Models to Power Health and Education:

- The equipment-ownership model creates a mismatch between how financing/funding is typically structured (or made available), and when capital is needed over a system's lifetime. Oftentimes, electrification interventions that rely heavily on donor funding are limited in time, as donors have internal requirements to ensure their funds are spent by a certain date. This tends to lead to procurement-based models that focus funds on capital investments, often at the expense of other lifetime costs such as O&M and component replacements which, as Figure 2 highlights,[7] can be significant. Unless these recurring costs are budgeted for, systems will be prone to underperformance or premature failure, defeating the purpose of the capital investment.
- In the equipment-ownership model, incentives are not necessarily aligned, and responsibilities may be placed on public agencies with no funding or technical capacity (staff may not have the requisite expertise or competence) – leading to very little focus on O&M. Even where O&M funding exists (e.g., to pay for utilities or infrastructure maintenance), it is typically spread over multiple agencies and managed at different levels of decision-making power (e.g., national vs county vs district). This lack of clear accountability structures and institutional arrangements along with limited coordination further complicates how these budgets can be used for long-term O&M.

FIGURE 2

Capital and O&M Cost over 15 years: Illustrative Example



[7] This illustrative example is based on an unpublished analysis conducted by UN Foundation in 2019 based on the following assumptions: 5 kWp solar PV + storage solution for a representative facility based on aggregated data from 36 facilities accounting for economies of scale, leading to approximate O&M costs of USD 1,000/year per facility rising with inflation. Key component replacements (batteries, inverters, charge controllers etc are expected to occur between year seven and 11 (est. normal distribution of costs) across the facilities.

These sustainability challenges are confirmed by a study[8] — carried out in Malawi — showing how 38 percent of installed energy systems (in health facilities and schools) lost all energy service within a matter of years. Similarly, in 2014–2015 the United Nations Foundation (UN Foundation) commissioned a series of energy needs assessments of health facilities in Ghana, Malawi, Tanzania and Uganda[9]. These audits showed that, in addition to a general lack of accessible data on health facilities' access to energy, there were often multiple off-grid projects that were delivered in an uncoordinated manner resulting in a duplication of efforts and the inefficient, non-uniform installation of systems. For example, in Malawi, solar photovoltaic (PV) systems were found in 96 percent of 79 Tier 1 health centres surveyed. However, among the 396 discrete off-grid solar PV systems found, only 57 percent were functional. Operational issues were found upon audits of power-dependent appliances as well. While 96 percent of facilities had some type of lighting system (most of which were powered by solar PV systems), only 42 percent of installed lighting systems were operational. The equipment was mostly purchased centrally (e.g., through a public agency or NGO), with the health facility lacking guidance on the maintenance and monitoring of systems.

Lastly, the Energy for Rural Transformation (ERT-II) project in Uganda[10] yielded positive results and favourable feedback from government representatives with regards to the limited duration O&M contract (five years) that ended in 2019–2020. As of today, based on discussions with representatives from the Ministries of Health and Energy, about 75 percent of the solar PV systems are functional at health centres and about 52 percent of them are functional in schools. The performance of the non-operational systems can be largely attributed to no allocation of funding for the replacement of batteries (this budget was not allocated in the five-year O&M contracts either) and partly to limited funding available and allocated for the continuation of O&M contracts. It is evident that continuous O&M service over the lifetime of the solar PV systems and especially allocation of budgets for the replacement of batteries and other key components such as charge controllers and inverters (either embedded in the O&M contract or allocated separately) are critical to ensure the sustainable service of electricity for health care and education.

[8] For more info: https://www.researchgate.net/publication/313805683_Sustainability_analysis_off-grid_community_solar_PV_projects_in_Malawi
[9] Accessible at: https://www.seforall.org/energy-and-health/powering-healthcare-resources
[10] ERT-II powers 560 schools and 665 health centres. The time frame of the programme was such that five-year O&M contracts ended in 2019–2020.

Photo: UN Foundation

CHAPTER 3

A PERFORMANCE-BASED SERVICE MODEL

A. A CONCEPTUAL FRAMEWORK

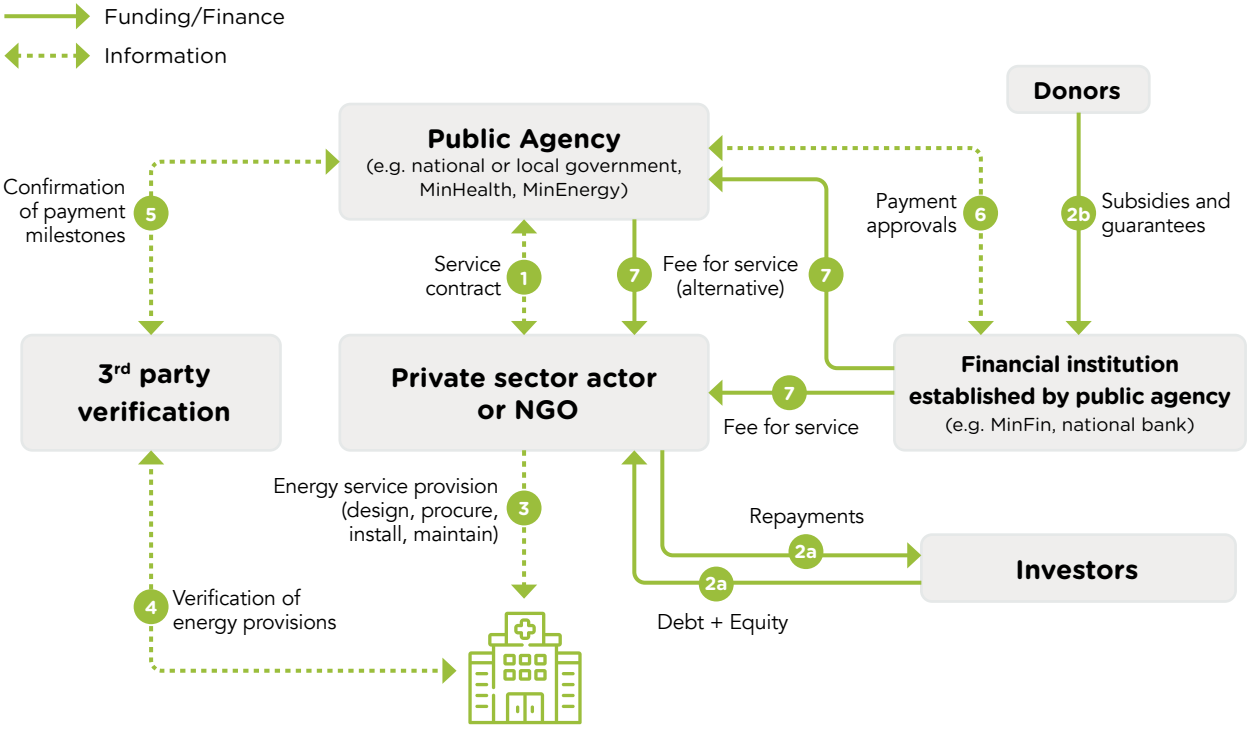
A long-term, performance-based service model is one potential way of reducing sustainability risks. Under such a model, the government selects a service provider to provide electricity services (installing and operating the solar photovoltaic (PV) systems) to public institutions, typically over a 10- to 15-year period. Service providers can be selected through a variety of competitive means, including through auctions, issuing concessions, or general tenders. The service provider is responsible for raising investment capital[11] and ensuring that key performance indicators (KPIs) are met during the contract period (for example: target energy available each day to power loads, target availability of solar PV systems over a period of time, response time to fix operation and maintenance (O&M) issues, target depth of discharge of batteries, etc). The government[12] pays the provider on a regular basis, as it would with other utilities. This service-based delivery model promotes sustainability because the private sector, with its expertise and technologies, can deliver long-term quality service aligned with the lifetime of the assets.

This approach removes the burden of raising the up-front investment needed for the energy assets from the government, however the government must allocate an adequate and consistent budget to ensure that public institutions can make regular payments to service providers over time[13]. Innovative project designs, such as results-based financing (RBF) and performance-based conditions, can support these interventions. Governments can use internal budgets or raise funds from development finance institutions (DFIs) or other donors to help make these regular payments (see Figure 3 for an illustrative model). An example of a relevant instrument to drive sustainability is the World Bank's Multiphase Programmatic Approach (MPA)[14] that provides long-term engagement in financing that could offer some reassurance to the private sector. Moreover, innovative technologies such as remote monitoring can generate valuable data that can help validate performance and serve as a trigger for payments from the government to the private sector monitored and arbitrated by a third party, if needed. These technologies can also help enhance the security of systems by reducing the risk of inappropriate/sub-optimal usage, theft and vandalism. The responsibility of regular monitoring could lie with the public agency (e.g., Ministry of Energy, Ministry of Health, Ministry of Education) that is tasked to make performance-based payments to the private sector. Moreover, the data from remote monitoring should be made available to the third-party verification agency for verifying service as well as the different relevant ministries so that they can be better coordinated and make interventions as and when needed.

[11] The ambition is that the service provider raises 100 percent of the capital up front. Of course, grants and other support mechanisms can be mobilized to aid the service provider on a case-by-case basis.
[12] This would usually be the line ministry (energy/health) but in some cases other government funds may be allocated.
[13] It should be noted that public institutions usually have a working budget that could include a budget for procuring diesel; this budget could be re-allocated to payment for service from stand-alone solar solutions.
[14] The Multiphase Programmatic Approach (MPA) allows countries to structure a long, large, or complex engagement as a set of smaller linked operations (or phases), under one programme. As a result of breaking down a single loan into phases, World Bank clients can match borrowing more closely with financing needs, permitting more efficient use of financial resources for both the Bank and its clients. This "adaptive approach" also strengthens the potential for crowding in other sources of capital to support development objectives.

FIGURE 3

Schematic of a service-based approach



1. A service contract is signed between the service provider and the public agency
2a. The service provider raises capital from investors; direct grants to the investors (for e.g., RBF) are not included in this figure
2b. Subsidies and guarantees are deployed; these are in addition to existing funds and finance going to public health, public education, etc.
3. An energy solution is deployed, and the end user starts using power as a service
4. A third party verifies that energy is being provided and consumed, including through remote monitoring technologies
5. The third-party verifier sends confirmation that payment milestones have been met to the public agency
6. The public agency sends payment approval to the financial institution
7. The financial institution (e.g., fund manager) issues payment in accordance with the contract and the service delivered
7alt. The financial institution releases funds, which the public agency uses to pay the service provider. Note: these funds can be provided up front.

Long-term, performance-based service models entail a business case for the private sector to be involved over an extended period, offering it both the incentives and security to invest in good equipment and service. Interviews by various organizations, including SEforALL and the World Bank, with private-sector players over the past five years suggest that solution providers are open to participating in these types of delivery models, provided the risk of nonpayment is adequately mitigated by means of a government that has a good credit rating or a creditworthy DFI that can offer some guarantee for payments.

The service-based delivery model associated with stand-alone solar solutions is not new to private clients such as households and businesses. As of 2020, service-based models (for stand-alone solar solutions) electrified roughly 420 million people across the globe[15]. Per 2018 figures, an estimated 1.9 million people[16] have used stand-alone solar systems for income-generating productive uses, largely deployed by a vibrant energy access private sector. However, solar PV companies have avoided serving public institutions because of the payment risks and administrative hurdles associated with

[15] https://www.lightingglobal.org/wp-content/uploads/2020/03/VIVID%20OCA_2020_Off_Grid_Solar_Market_Trends_Report_Full_High.pdf
[16] https://www.lightingglobal.org/wp-content/uploads/2018/02/2018_Off_Grid_Solar_Market_Trends_Report_Summary.pdf

supplying energy to government agencies. This and other challenges are discussed in the next sub-section.

B. WHAT CHALLENGES CONFRONT THIS APPROACH AND WHAT ARE SOME POSSIBLE SOLUTIONS?

While switching from an equipment-ownership model to a service-based approach avoids many of the sustainability pitfalls associated with the former, a range of barriers needs to be overcome for the approach to be viable. These include financial and operational barriers at different levels along the energy service provision chain. Six key barriers and potential solutions are outlined below.

1. Affordability and ability-to-pay

The Challenge:

One of the key challenges associated with a performance-based service model is the customer's ability and willingness to pay for ongoing electricity services. In most countries, the customer is a government agency such as the Ministry of Education, Energy, Finance or Health, depending on the public institution in question. As illustrated by the examples below (see Box 1), governments and their line ministries often have limited budgets for utilities such as electricity.

BOX 1:

Ability to pay for ongoing electricity services - research from Benin, Niger and Nigeria

Research conducted by the World Bank in Nigeria shows that almost all public facilities are responsible for paying the O&M costs associated with electricity, but few have the resources to do so. Health clinics surveyed were responsible for their own utility and maintenance bills; school development committees and parent-teacher associations often helped foot utility and maintenance bills at schools. Monthly available revenues to facilities, including for utility payments and site maintenance, averaged USD 126, while their reported willingness to pay for the O&M of a solar electricity system averaged USD 14 a month. Only large clinics and boarding schools were willing to pay more than USD 14 a month. It is safe to assume that USD 14 a month is well below the amount needed per month for O&M. Similarly, research carried out on 50 health facilities by GIZ under the GBE Benin initiative showed that while health facilities have monthly revenues between XOF 105,000 and XOF 1,600,000 (between USD 190 and USD 2,900), their willingness to pay for electricity is estimated to be between XOF 5,000 and XOF 50,000 (between USD 9 and USD 90) a month, based on how much similar-sized health centres connected to the national grid pay on average for electricity. In some cases, the willingness to pay for off-grid electricity access — if perceived as of higher quality and reliability — might be higher.

The Nigerian Federal Ministry directly allocates roughly ₦100,000 (USD 243) a month to some primary health facilities in seven states through the Decentralized Financing Facility under the Basic Health Care Provision Fund. A part of this allocated budget is sufficient to pay the monthly O&M costs to the private sector, estimated under the Regional Off-Grid Electricity Access Project (ROGEAP)[18] service-delivery model. Niger has a fund managed by the World Bank into which donors place their resources for health care provision; the Ministry of Health determines how these resources are to be used but O&M for energy services is currently not covered under the fund. In Benin, the fund for the support for communal development (FADeC) is used as the official decentralization fund and already covers aspects such as O&M for communal infrastructure and other joint running costs. Monthly costs of service-based models could therefore be structurally integrated within the FADeC. If governments, donors, and implementing agencies agree, the fund could be used to pay at least the O&M costs of off-grid systems installed by private providers. The sale of electricity for productive uses (e.g., photocopying, salons, solar fridges with refreshments) could help generate additional revenue to cover O&M costs, though may be difficult to implement in practice.

[17] Per the current exchange rate.
[18] ROGEAP is discussed in detail in Case Study 1 below.

Photo: UN Foundation

The budgetary constraints faced by public agencies in developing countries, their creditworthiness, and the lack of trust that the public institution, the government, or a contracting agency will make timely payments can deter the private sector from providing services. This is particularly true in the case of public services, such as health care, where the electricity service provider is often fearful of the reputational damage it may incur if it disconnects a health facility for nonpayment.

A different challenge is the capacity of public institutions in resource-constrained countries to manage a service-based approach effectively and efficiently, which inherently requires a certain time period for the service provider to amortize the capital investment. Many government agencies go through annual budget cycles, which can create uncertainty around the prioritization of certain activities over others. In most variations of the service-based model, a third party would have to be appointed as well to monitor and verify payments when KPIs have been met.

Possible Solutions:

For a performance-based service model to be viable and sustainable, additional funding support will be needed for public agencies to cover monthly service costs or address the risks of nonpayment. Smart subsidies, such as RBF[19] are one potential way of bridging the affordability gap. Other potential sources of revenue include carbon and energy markets, including new instruments such as Distributed Renewable Energy Credits (D-RECs) that mobilize new sources of capital to support the deployment of newly distributed renewable energy and help offset the carbon footprint of the D-REC buyer. Once public facilities are solarized, the funds obtained by selling D-RECs could be used to cover a part of the O&M costs.

Market sounding and consultations with different stakeholders is also critical to designing effective solutions. For example, the energy needs (in tandem with the opportunity for energy-efficient appliances) of the public institutions and the willingness of communities to pay for other services at public institutions should be closely assessed, to potentially design income-generating services offered by the public facilities. This approach can contribute to demand stimulation during holidays, in evenings and on weekends and help secure revenue for public facilities. Additional energy services (e.g., computer education in the evenings) that may lead to income generation would not only improve the ability of communities to pay for energy services and the sustainability of the facilities' systems but also enhance livelihoods in the communities.

Another proposed solution for mitigating the payment risk of government agencies draws on the energy sector's experience promoting private-sector investment in large power plants. Since the late 1990s, independent power producers (IPPs) have helped governments reduce their budgetary allocations to fund public power plants, releasing significant public resources for other purposes. IPPs enter into long-term power purchase agreements (PPAs) with public utilities and with governments providing payment guarantees in cases where the utilities lack the necessary creditworthiness. To improve the credit risk of public utilities and in cases where the government agencies may not be sufficiently creditworthy, organizations such as the World Bank Group have deployed de-risking instruments, focusing particularly on payment and termination risks. For example, the World Bank Group has been protecting investors against governments' failures to honour payment obligations or implementation agreements. With these and other guarantees in place, the private sector has been able to raise financing for investment and O&M of power plants through long-term electricity service contracts, with the government agencies making monthly payments to the IPPs under PPAs.

Such a guarantee and de-risking mechanism would add significant value in the case of health facility and school electrification as well. By significantly reducing initial capital costs and spreading the financial burden of these systems over time, such a structure is designed to enable governments to provide reliable electricity services to rural health clinics and schools at a much faster rate than might otherwise be feasible. Scaling up the programme in countries should also allow providers to lower their prices, as a result of economies of scale associated with larger volumes.

It is also important to set the right expectations regarding the terms and timeline of payments and associated risk-mitigation measures. Contracts must protect the interests of all parties and mitigate the risk

[19] The metric for RBF could vary from project to project. One example could be payment for results such as kWh sold or hours of service in a month that meet a certain quality standard, or some other appropriate metric.

of change of government, which often leads to changes in policies and priorities, as well as the risk of the private sector going out of business or abandoning the project. Options such as dedicated escrow accounts or lockbox mechanisms for ring-fencing government budgets could also help the public institution allocate the required budget — or at a minimum secure an available budget — over the lifetime of the solar PV assets.

2. Private sector willingness/ability to raise capital

The Challenge:

Another key barrier to overcome is the private sector's unwillingness/inability to raise the capital needed to carry out an expansive scope of work over such a long horizon. This could be because of the difficulty in creating a bankable project, the limited absorption capacity of off-grid energy companies, or the limited willingness to raise capital for activities that have a higher risk profile compared to household electrification and that commit them to a suite of activities for the next decade (whereas the large majority of OGS companies with a significant market share have been operational for less than that). Similarly, the risk profile of the inherently complex — and new for the off-grid solar sector — public-private contractual modalities required to carry out a 10- to 15-year scope of work may lead to a significantly higher cost of capital. Meanwhile, from an investor's standpoint, certainty about cash flow, scale of operation, and the timeline of revenues, ideally aligned with the system's lifetime, are key criteria guiding investment decisions.

Possible Solutions:

The role of governments and multilateral agencies in setting up a conducive environment for access to finance needs to be expanded so that the private sector is empowered to raise capital for the supply and installation of systems. The opportunities outlined in the previous section on financial de-risking mechanisms are an important step in the process, but more needs to be done to ensure that investors offer the right type of financing with the appropriate level of risk. This could include protection from local currency devaluations (in particular in the likely event that the energy service provider expects to receive payments in locally denominated currency while needing to repay its investors in foreign currency), and blended finance instruments. Coupling investment with additional lower-risk financing and funding streams — such as matching grants, RBF or D-RECs — can also increase deal flow. Positive results from pilot interventions testing these possible solutions could pave the way for mainstreaming private-sector delivery-service models in the electrification of public institutions. Another important de-risking mechanism is having the right enabling policy framework such as long-term electrification targets and strategies, clear and transparent contract templates, and policies that include clear 'grid arrival' clauses.

3. Transaction costs

The Challenge:

Unserved public institutions, such as health facilities and schools, are one part of the overall off-grid solar market. This, combined with the fact that many public institutions are geographically dispersed, can result in small ticket sizes and high transaction costs for those interested in electrifying public institutions.

Possible Solutions:

Aggregation of projects into larger portfolios or concessions (like what is being done in the mini-grids sector) by the responsible ministries or by intermediaries could help reduce project financing costs and make such projects more attractive to investors and energy service providers. As an example, the Sustainable Solar Market Packages (SSMP)[20] model employed by projects such as the Philippines Rural Power Project bundle system supply, installation, and maintenance contracts in community facilities in a contiguous cluster of villages with obligations to meet minimum targets for commercial sales to households and other private customers in the same districts, along with incentives and support for market development in the same communities. Contracts aggregate enough business volume to support continued commercial sales and after-sales support for public and private solar PV systems.

4. Risk of grid extension

The Challenge:

There is also a concern about what happens to stand-alone systems upon arrival of the grid. While this concern may also exist in the traditional equipment-ownership model, it usually represents a smaller risk to the installer as potential future grid connectivity does not lead to direct financial risks for the installer.

Possible Solutions:

In the service-based approach, it is important to select health facilities and schools that are likely to use a stand-alone system for a long enough period for firms to recoup their investment. However, extension of the grid to a health facility or school within the next five years should not prevent those facilities from benefitting from solar electricity earlier with stand-alone solutions. As a mitigation measure, when the grid arrives to a health facility or school before the investment cost is recovered, the long-term service contract must set mutually agreeable terms for termination of the contract, co-existence of the grid and stand-alone solar system, and/or clarify a feed-in-tariff framework to mitigate the risk of the grid reaching a public facility served by a private company under the service contract. National electrification strategies could be a useful resource to help identify institutions that would be most suitable for stand-alone solar solutions over a long enough period. Several countries already have 'grid arrival' clauses clearly defined in national policies and/or mini-grid regulations. Some additional suggestions to deal with the grid arrival could include:

- Buy-out of the solar assets by the utility
- If power becomes reliable when the grid arrives, the stand-alone solar solution could be moved to an institution where it is needed; however, this may be challenging particularly if the institution's energy needs are different
- If power is not reliable, then health facilities may want to keep their solar PV/battery systems in place as backup, ideally compensated for feeding excess power into the grid under a net metering arrangement or similar. Again, this would need to be evaluated keeping in mind the regulatory laws in different countries.

5. Continuation of grant-based models

The Challenge:

If donors continue to support health facilities with grants focused on covering the up-front costs, government agencies may not have the incentive to promote a service-based model that encourages private-sector participation and sustainability.

Possible Solutions:

Addressing this challenge requires advocacy and sector-wide buy-in of the importance of sustainability of solar PV systems and the role that service-based models can play in providing public institutions with reliable electricity over the lifetime of the solar PV asset. Governments should have a strategy (based on least-cost electrification plans where available) in place to electrify public institutions as a part of their national energy access targets, and all funding from development partners including donors should be structured to promote long-term sustainability and fill funding gaps to achieve that goal. Development partners could use indicators such as the number of health facilities electrified sustainably for a specific number of years using their funds. Pilot/demonstration projects to this effect must be prioritized so that subsequent scale-up and mainstreaming of this approach is possible. It is also important that the energy, education and health units of DFIs/donors are coordinated amongst themselves and with their respective counterparts in government agencies so that funds from different donors are used efficiently and effectively.

6. Crowding out national companies

The Challenge:

A related concern is the possibility of international firms crowding out the local private sector. In certain countries, the local private sector may not have matured sufficiently to be able to absorb the significant investment needed. Additionally, foreign companies can usually secure financing at low rates from global funders and financiers, leaving little room for local players to compete. The high cost of (local currency) financing (more than 20 percent a year) in many Sub-Saharan Africa countries typically does not allow businesses to serve rural public institutions viably.

Possible Solutions:

One possible solution is to ensure that local players are involved in different stages of the business cycle, which may include installation, distribution, routine maintenance, customs, shipping and consumer relations. This can be achieved by, for example, including policies and criteria within procurement processes that promote domestic involvement along the value chain as well as a requirement for capacity building of local staff at public institutions. Delivery models should promote partnerships between local and foreign private companies to provide the best possible sustainable solutions to consumers. In geographies where international companies find it difficult to identify credible and competent local firms, "matchmaking"

events that bring local and international players together can be organized. Furthermore, governments and DFIs could focus on capacity building and technical capacity to encourage and train local firms. Similarly, risk mitigation measures that focus on foreign exchange risks should be explored.

C. THE SERVICE-BASED APPROACH IN PRACTICE

There is growing interest among governments and their development partners in performance-based service models. In the past year alone, organizations from both the energy and the health sector have begun exploring different off-grid, service-based models for electrifying public institutions. A few of these efforts are summarized below.

CASE STUDY 1:

World Bank – West Africa Regional Off-Grid Electricity Access Project (ROGEAP)

Working with the governments of Niger and Nigeria, the World Bank has launched an effort under the ROGEAP to help both countries electrify health and education facilities. The start-up phase, during which about 15 health facilities and schools in each country will be electrified, will assess the feasibility of the technological and delivery model proposed under ROGEAP, summarized below. Lessons learned will be applied to scale up electrification in Niger, Nigeria and 17 other countries in West Africa covered by ROGEAP.

ROGEAP's goal is to establish a market for the private sector to become a supplier of electricity services rather than a supplier of solar PV equipment, moving the focus from the facilities' ownership of equipment to the delivery of service to the end user. World Bank mechanisms such as guarantees, insurance and parked funds could be used to reduce the nonpayment risk of the government/public sector and instill confidence in the private sector. Such efforts are expected to improve the financing of capital investments, attract more qualified developers, and ensure reliable and cheaper electricity service against timely payment. Multiple private-sector companies operating in Niger and Nigeria have expressed a keen interest in this approach.

The aim of the start-up phase is to encourage private companies already providing solar PV solutions in the two countries to raise finance to procure and install solar PV systems and then provide long-term (10- to 15-year) O&M to schools and health facilities as a part of a holistic service contract. With the aid of digital remote monitoring (described below) and mutually agreed performance indicators (for example: target energy available each day to power loads, target availability of solar PV systems over a period of time, response time to fix O&M issues, target depth of discharge of batteries etc), the government will pay the private sector monthly to cover its capital and operational expenses. In the start-up phase, as ROGEAP will not provide the private sector with any payment risk- mitigation measures beyond the project period of four to five years, the payments will be structured so that the private sector recovers its capital cost in four years.[21] While this recovery period is not ideal, it will test the efficacy of the private sector-led performance-based service model to electrify health facilities and schools. Beyond four to five years when the capital cost has been recouped, the private sector will continue to receive monthly payments for the O&M. Thus, the

[21] This duration was chosen after consultations with private-sector companies in Niger and Nigeria on what duration would encourage them (three to five years was the typical response). It is understood that there could be a concern from the public sector whether the private sector would have the incentive to serve beyond four years. While the private-sector companies interviewed did not see this as a concern, this will need to be discussed and negotiated on a case-by-case basis.

monthly expenditure in the first four to five years will be higher since it will include a portion of the capital cost and the O&M cost.

Quality standards for equipment, design and installation are combined with digital remote-monitoring technology to ensure and verify the performance of off-grid solar PV systems. By monitoring the performance of the systems against agreed performance indicators, a third party verifies that the service provider is delivering the contractually agreed service and signals the government agency to pay the corresponding fee.

Photo: UN Foundation

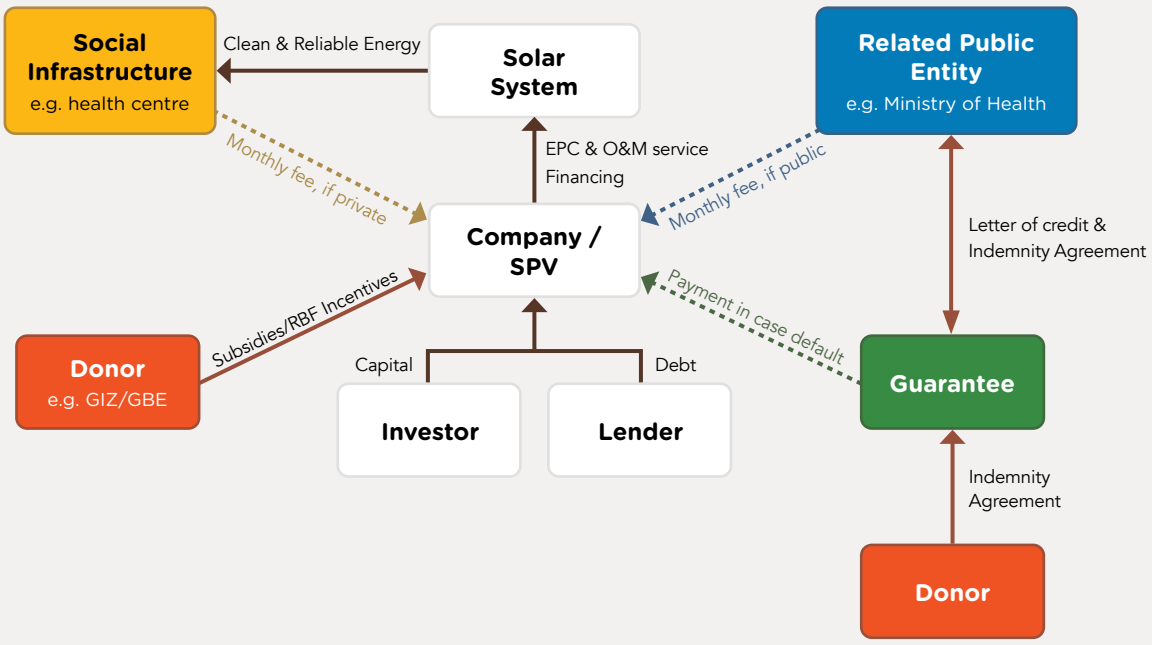
CASE STUDY 2:

GIZ – Grüne Bürgerenergie (GBE, Green People's Energy) in Benin

Grüne Bürgerenergie (GBE, Green People's Energy) supports the development of decentralized renewable energy in rural areas of Africa, involving local actors and private investors. This initiative is being implemented by GIZ in nine African countries, including Benin. One aim of the project is to electrify social infrastructures using energy-as-a-service (EaaS) delivery models, similar to the approach proposed by ROGEAP.

To achieve its aim, GBE Benin will provide technical and financial assistance, both on the supply (private sector) and demand side (public sector and private social infrastructure). GBE Benin is working with public stakeholders to ensure an embedding of the monthly fees in official budgets, and with the private sector to improve the planning and the sizing of equipment and services. At the same time, GBE Benin will cover the viability gap between the ability to pay off the social infrastructure and the costs of the private sector in terms of capital costs (CapEx) through an RBF mechanism. GBE Benin is also setting up a collaboration with a digital platform provider to display and analyze the solar-system data collected through digital remote monitoring, to calculate and monitor KPIs, and to offer public and private actors real-time information about the state of health centre electrification. GBE Benin is also in talks with DFIs to explore the idea of guarantees to further cushion the private sector.

Similar to studies carried out in other countries, GBE Benin surveyed 50 health centres in 2019 only to find that while 86 percent of health centres surveyed had a solar PV system, almost 40 percent of these systems were not working (even though most systems were less than three years old and therefore theoretically still under warranty). In addition, it created a working group of about 10 companies interested in operating under such a model in Benin. This working group supports GBE Benin in setting up project activities, designing the RBF mechanisms and addressing regulatory matters regarding the fee-for-service delivery model. Lastly, GBE Benin is carrying out a stocktaking of health centres in the country, including their geographic distribution, their level of access to electricity, and the state of functioning of their existing solar PV systems, with the aim of improving the level of information available for both public and private partners.



CASE STUDY 3:

UNDP – Solar for Health (S4H)

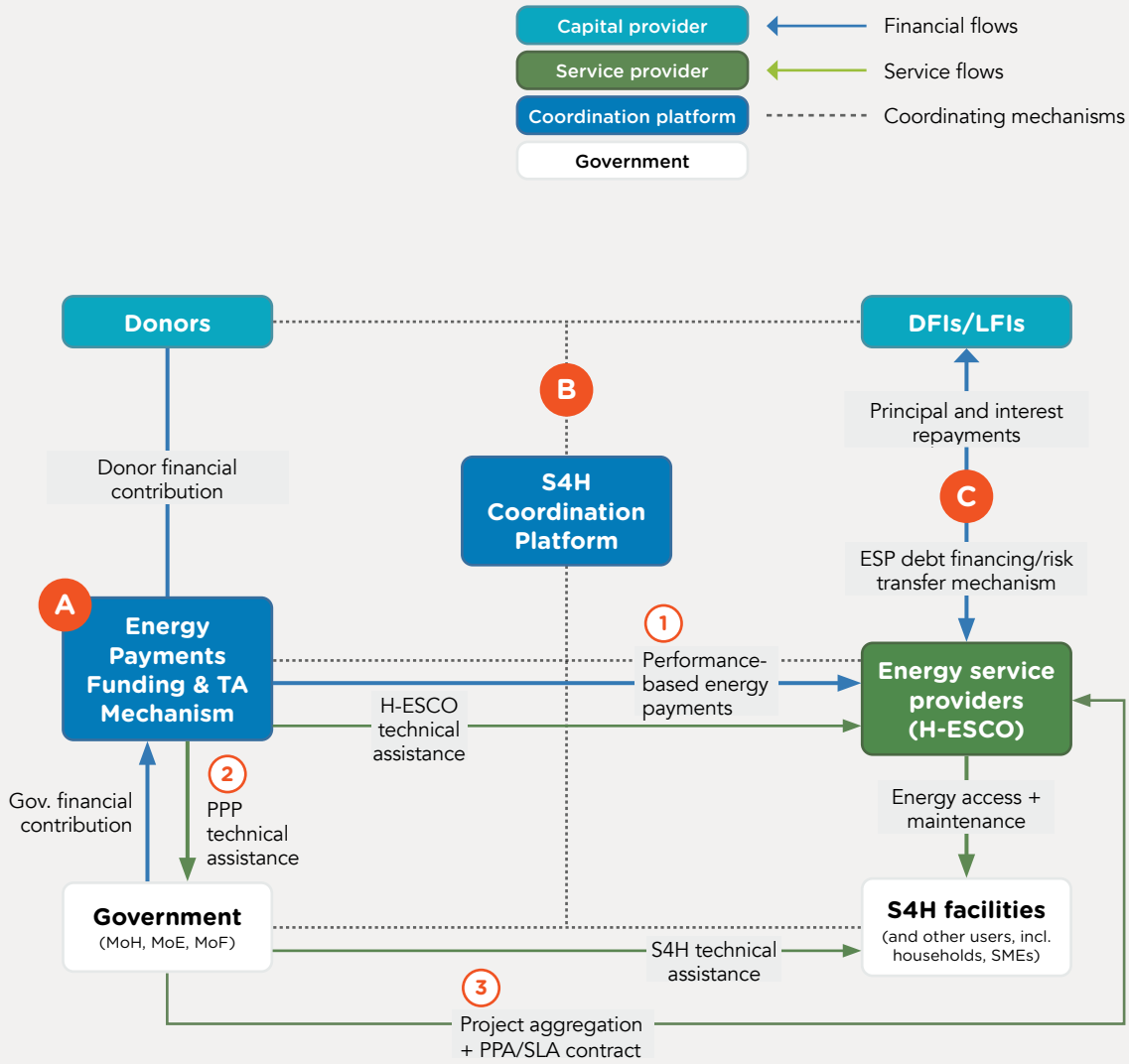
Since 2017, the United Nations Development Programme (UNDP) has been spearheading Solar for Health (S4H) interventions as a means of connecting two vital sectors — energy and health — to help countries advance universal health coverage (UHC) while protecting the environment and increasing climate resilience. Through these interventions, UNDP has supported countries to install solar PV systems in over 900 health centres and medical storage facilities in 13 countries.[22] The installation of these systems has been made through a traditional approach of purchasing, installing and transferring the solar assets in health facilities through grant funding. Although this model addresses the financial constraints and limited ability of the public health sector to pay for energy in these countries, as well as generate significant economic benefits,[23] it has limitations in ensuring the sustainability of the solar assets during their lifetime. Building on the lessons learnt from these interventions, UNDP has been actively seeking alternative models and developed an EaaS approach whose implementation is currently being explored in five countries.[24]

To ensure the sustainable operation of the solar PV energy systems, this EaaS approach proposes to shift the focus of donor funding for the electrification of health facilities from pure CapEx financing for the installation of energy-generating assets to an impact-driven model, which rewards the delivery of clean, reliable and affordable energy services by distributed renewable energy service providers. This shift in delivery models will give health facilities access to energy without them having to incur up-front equipment procurement costs, while at the same time providing service providers the incentive to ensure service quality and reliability over time. The proposed model should also enable the private sector to mobilize finance from financial institutions and improve local capacity in financing renewable energy by addressing the off-taker risks (through donor-backed PPA/lease agreements). This model also offers the opportunity to expand clean energy services to a wider set of consumers, with the health facilities acting as anchor clients in unserved areas and can thus lead to wider social and economic benefits.

The figure on the next page describes the key building blocks of the proposed S4H model:

Photo: UN Foundation

[22] Angola, Chad, Liberia, Libya, Malawi, Namibia, Nepal, South Sudan, Sudan, Uganda, Yemen, Zambia, Zimbabwe.
[23] Electricity costs have also decreased, for example by up to 60 percent in Zimbabwe.
[24] Liberia, Malawi, Namibia, Zambia and Zimbabwe



A **Energy payments funding & TA mechanism**

1. **Funding mechanism for PPA/leasing payments**
   Performance-based payment through PPA/lease; and third-party verification (incl. remote monitoring).
2. **Capacity-building of H-ESCOs, government stakeholders, and S4H facilities**
   Energy Assessments; market development for H-ESCOs; contract standardization; tendering; regulatory framework; PPP modalities & partnerships; data and remote monitoring.
3. **Project aggregation and PPA/leasing mechanism**
   Demand aggregation and pooled procurement; PPA/leasing contracts.

B **S4H Coordination Platform**

A coordination mechanism to harmonize stakeholders' interventions (e.g. UN agencies, donors, DFIs/IFIs, private sector and government entities).

C **Energy Service Providers access to finance**

DFIs/LFIs will provide access to affordable financing and risk transfer mechanism for ESPs.

CASE STUDY 4:

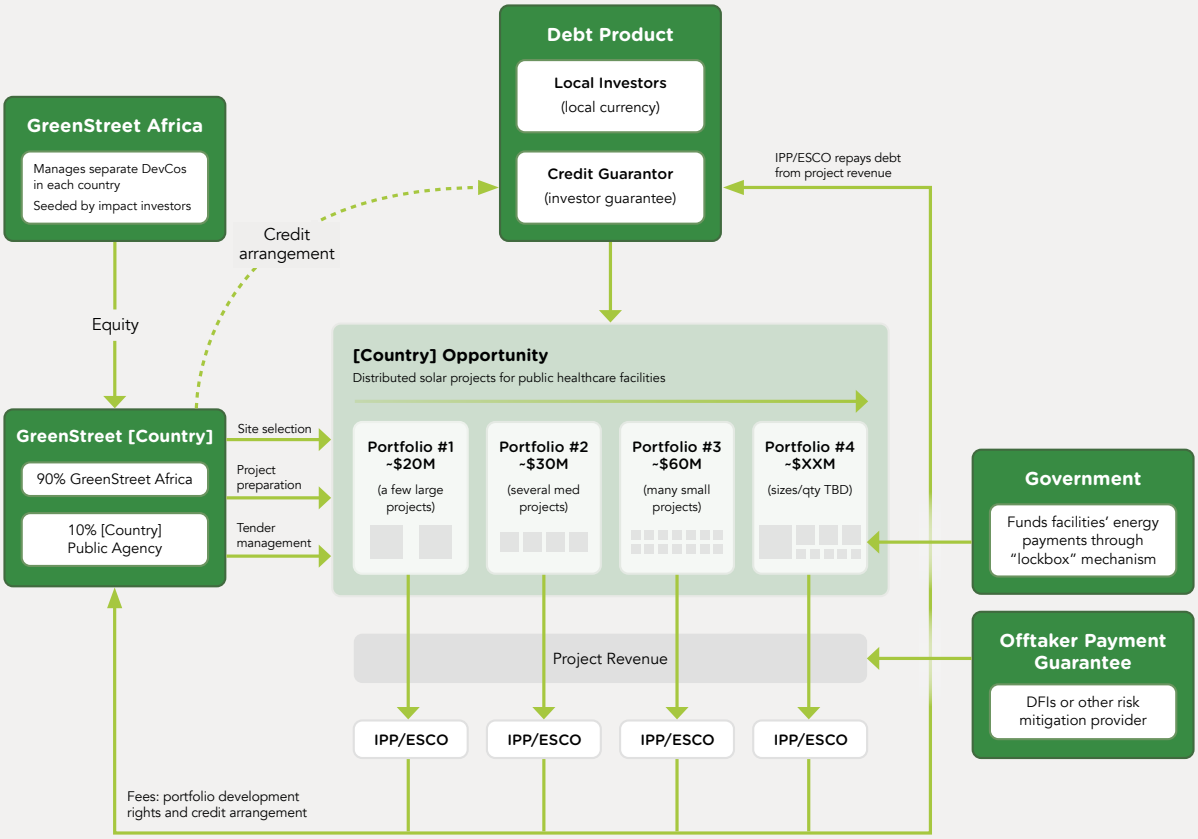
GreenStreet Africa

GreenStreet Africa is a new public-private partnership (PPP) initiative sponsored by the GreenMax Capital Group that was incubated by the Global Innovation Lab for Climate Finance, to rapidly scale up implementation of distributed solar generation initially for public health care and eventually also for public education facilities. With GreenStreet Africa, GreenMax is adapting an EaaS model to meet the challenges of Africa's public institutions.

The EaaS model can work in Africa only where project development risks are removed and when supported by a robust structure of guarantee mechanisms to guard against nonpayment by government off-takers. GreenStreet Africa will address these needs by preparing large portfolios of solar power projects at public facilities for implementation by private IPPs or energy service companies (ESCOs), with financing provided via local currency private-placement bond issues or bank syndications backed by third-party repayment guarantees. GreenStreet Africa is thus being established as a blended finance facility that will work in partnership with government bodies to serve as an aggregator, investing in the development and de-risking of these projects to make them attractive for private ownership and operation.

GreenStreet Africa's pilot portfolio will implement solar-hybrid-battery generation systems for six to eight federally owned hospitals, in partnership with the Infrastructure Credit Guarantee Company of Nigeria (InfraCredit). This partnership — GreenStreet Nigeria — will provide development funding and technical expertise to support the construction and operation of the distributed generation plants. The power plants will be owned and operated by a private IPP or ESCO, selected through a public tender managed by GreenMax, through which the Ministry of Health will enter into a PPA or energy services agreement with the selected bidder. A determination of whether a PPA or energy services agreement format will be deployed will be taken after further regulatory review.

For the pilot portfolio, InfraCredit will underwrite a local currency bond financing of the Special Purpose Vehicle (SPV) established by GreenStreet Nigeria to house the project portfolio. InfraCredit, supported by its DFI sponsors, will provide a repayment guarantee to bondholders. Ownership of the SPV will be transferred to the winner of the public tender for a fee, to make GreenStreet Africa's operations sustainable. The selected IPP or ESCO, which will be responsible for repayment of the InfraCredit financing, will be insulated from payment default by the Ministry of Health by a long-term agreement, backed by a government guarantee to annually pre-fund a "lockbox" with budget allocation sufficient to pay for the coming year's expected PPA or energy services payments. This payment obligation will be backstopped with an additional third-party guarantee from a DFI. After GreenStreet Nigeria has delivered proven results with the pilot portfolio, GreenMax will raise returnable capital from impact investors and DFIs to fund the preparation of additional portfolios in Nigeria and elsewhere in Africa. Future portfolios will focus on smaller public health clinics operated by regional and local governments.

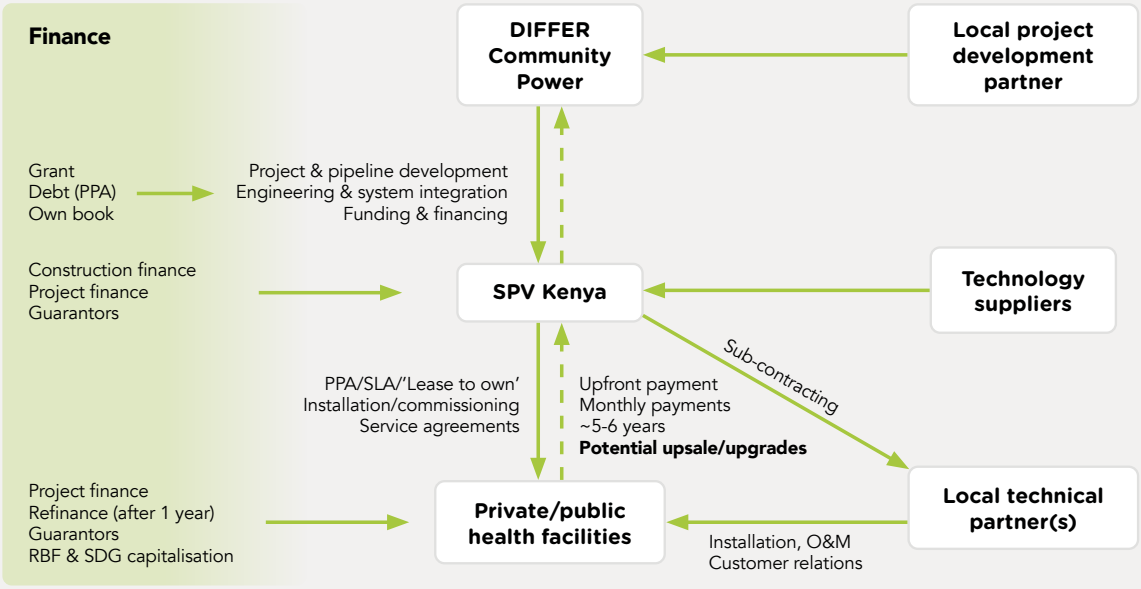


CASE STUDY 5:

Differ Community Power (DCP)

Differ Community Power (DCP) is currently — together with the World Resources Institute (WRI) and Population Services (PS) Kenya — piloting the viability of a lease-to-own delivery model applied to private health clinics in Kenya. Through bundling tens and hundreds of health facilities into one financing vehicle, an SPV, economies of scale are achieved. The project aims to prove that a lease-to-own model for the provision of electricity services to private health clinics is a viable delivery model that is attractive to investors and one that will minimize greenhouse gas (GHG) emissions. The financing vehicle is established to secure finance (equity and debt), to ensure proper installation, commissioning and O&M (through contracting local partners) and to ensure that customers are paying according to a pre-agreed installment plan so that investors and lenders get their money, including interest, back safely. This delivery model is replicable and scalable, also beyond Kenya, as the transaction costs are reduced over time.

Lease-to-own business model:
Technology, O&M and financing in one package



DCP takes responsibility for the entire value chain, developing, building, operating and owning energy services at health facilities. DCP not only sells hardware but also everything needed for reliable energy services throughout the value chain – project development, engineering, procurement and construction (EPC), and O&M as well as energy-efficiency measures that reduce the need for production and storage capacities. PV modules are commercially available off the shelf, and this is in general the case for batteries, inverters and solar chargers as well. The real value added — which is what DCP specializes in — is the integration of all these components in a proper way so that production and consumption are aligned, not only so that models are easy to install, but also so that they are easy to operate and provide reliable energy for years. This also includes the integration to and co-existence with the existing energy supply (grid and diesel).

DCP develops structures, standards and procedures to minimize the administrative and overhead costs per contract that the SPV project company enters into. It will then be cheaper for the customers and the risk of defaults are — in theory — reduced. This is very important as each contract size within the health sector can be relatively small compared to the work that goes into it. Through standardization, automation and digitalization, the overhead costs are reduced, making it possible to offer a manageable financing cost to the customer that is aligned with the return on investment required by those financing it.

While most of these case studies are still at concept phase, there are some distinct similarities between the different models. Importantly, they are all results- and performance-based, paving the way for sustainability of service and accountability.

- All models have a strong private sector-centred approach to delivering both installation and O&M, to leverage the existing skills of deploying and operating energy solutions in remote locations where they are, viz. in the private sector.
- These models differ strongly from the traditional equipment-ownership model, in particular how and where the funds are centralized and managed, and how this impacts the risk of payment default. Several models therefore bring in an SPV, a guarantee mechanism, and/or a third-party agency that can verify and authorize payments.
- Most of the concepts either directly or indirectly build in or rely on aggregation and scale to improve the economics that underpin the model. Economies of scale will be critical to drive down unit costs, both for CapEx and OpEx, and to make the market size more attractive for energy service providers.

D. UNDER WHAT CIRCUMSTANCES COULD A SERVICE-BASED MODEL WORK?

A service-based model may not be feasible or desirable in every circumstance. For example, in some countries with stronger institutional capacities and resources, governments may find it more feasible and appropriate to own, operate and maintain their off-grid power systems. This is an approach being taken in some parts of India,[25] for example. Under a certain set of conditions, a community-wide mini-grid with a health facility and/or school as an anchor load may be a more sustainable alternative. This approach is being implemented at scale under the Rural Renewable Energy Project (RREP) in Sierra Leone.

This section offers some guidance that governments, development partners or project sponsors may want to consider when evaluating whether a service-based model could work in a specific country. For a service-based model to be successful, the following preconditions should be in place:

- The customer (for example a Ministry of Education, Energy, Finance or Health) should **demonstrate willingness to pay** for energy service, and energy services must be prioritized appropriately in the budget planning for the health and education sectors; there must be strong collaboration and buy-in amongst ministries.
- Public-sector finance management and procurement should be **capable of long-term service contracting** consistent with the lifetime of solar PV assets, without having to rebid service contracts every two to three years.
- There should be an **active off-grid industry** in the country/region, ideally already involved in investing in service-based models (i.e., mini-grid operators and solar PV pay-as-you-go (PAYG) providers are in the country/region).
- There should be **lenders and local banks supporting access to longer-term financing**, ideally with precedents for lending to similar projects like mini-grids. Lack of commercial debt finance would make it difficult for international companies, and even harder for national companies to participate in these interventions.
- There could also be **regulatory frameworks or tested agreements** in place around operations of service-based models or mini-grids, ideally proven in-country and dealing with mitigation of risks including grid arrival risk, asset ownership issues, payment default risk and service provider performance. Successful pilot projects can offer a tangible and credible basis to mainstream and scale up the private sector-led delivery model.

In addition to these requirements, there are other more generic conditions for which a service-based model, or any other model for that matter, can be feasible:

- There should be adequate government/utility budgeting capacities and mechanisms at the sector, national and local levels. Financial mechanisms for ensuring payments to service providers over the long term should be in place. This could

[25] See case study of CREDA in Lasting Impact (2019), available at: https://www.seforall.org/system/files/2019-04/Powering-Health_042019.pdf

include national- or local-level escrow accounts or trust funds to which donors and line ministries may contribute. These accounts/funds could be underwritten by a long-term guarantee, to ensure transparent reserves, budgeting and expenditure for long-term service support.

- Cross-sector coordination is necessary to allow multi-sector planning, implementation and cross-sector finance flows within government ministries. Collaboration needs to occur between sector ministries (education, energy, finance, health), ideally avoiding fragmented approaches that are more disruptive than synergistic. New approaches need to be carefully informed by analysis, and not driven entirely by the needs of a specific stakeholder (e.g., donor preferences).
- Donors and other sources of grants or concessionary finance should be coordinated and be able to provide extended-term support to projects, including being able to underwrite financial risk tools over 10 to 15 years.
- Strong emphasis should be placed on quality assurance of solar PV systems, service, and monitoring mechanisms to track performance.

In the absence of the preconditions mentioned above, countries and their partners may want to consider the following alternative options:

- Even in countries that do not meet the above criteria, service-based models could be explored to assess their workability and determine what barriers or gaps to establishing them exist, what time frames need to be resolved or corrected, and could even be costed to assess their viability. This will enable adoption of the model at a later stage.
- Moreover, hybrid approaches could be adopted. For example, if the model remains too risky for the private sector in a non-favourable country, there could be a hybrid approach, in which a part of the costs is paid by the public agency upon installation (e.g., proportional to risk as per a risk assessment), and the rest is spread out over 10 to 15 years depending on the service offered, or asset ownership is progressively transferred to the public agency over a shorter time period. This would reduce the risk for the private sector, while still providing incentives for it to continue service and recover the costs over a longer-term period.

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CHAPTER 4

A WAY FORWARD

As the shortcomings of the conventional model for electrifying health facilities and schools become more apparent, demand is rising for more innovative ways of ensuring sustainability. One promising model, as outlined in this knowledge brief, is the performance-based, service model. Its advantages lie in its ability to leverage the expertise and capital of the private sector to deliver energy services to public institutions while ensuring financing and incentives are structured over the long haul. Given the scale of investment needed to electrify schools and health facilities in line with SDG7, SDG4 and SDG3, private-sector investments are a must to complement public resources. A performance-based service model provides a strong platform to raise the amounts of capital needed to bridge the energy gap in the health and education sectors.

Making the shift from procuring assets to paying for performance may not be as straightforward in the public health and education sectors as it is in the residential sector, and will require further input, buy-in and diligence from a variety of stakeholders.

To further advance the service-based model, this knowledge brief offers the following recommendations:

INVEST IN DATA

There is currently a dearth of data on electricity for public institutions. This includes data on: i) the location and electrification status of schools and health facilities; ii) the demand for electricity within public institutions; iii) the ability of institutions to pay for energy services; and iv) the pricing structure for energy-as-a-service (EaaS) models. It is important that these data gaps be filled to better understand the feasibility of this model and the design instruments that help mitigate its risks (e.g., guarantees, tariff structure, viability gap). Several ongoing initiatives are already beginning to unlock data, including an upcoming pilot project under development by Shell Foundation and Odyssey. Similarly, the Energy Access Explorer of the World Resources Institute (WRI) and the recently launched Access Insights Platform are both making progress in geolocating public institutions in a select number of countries.

SUPPORT DEMONSTRATION

As this model is relatively new and untested in the context of public institutions, it is important that donors and development finance institutions (DFIs) support the experimentation and demonstration of different service-based models through grants and pilots. This will help generate valuable lessons and insights that can be used to further refine the approach. This should also help identify and address the risks of different stakeholders (e.g., public agencies, private-sector actors, or impact investors). For example, the grants issued by Power Africa in 2020 to nine companies are expected to generate valuable insights into what works and under which conditions.

FOSTER DIALOGUE AND KNOWLEDGE EXCHANGE

For this model to be successful, stakeholders need to come together to exchange best practices and to identify any remaining barriers. A platform needs to be in place — especially at the national level — to allow this process to be inclusive across public- and private-sector actors, as well as across energy, education and health stakeholders. This is currently being advanced by several organizations at the country-level, including Sustainable Energy for All (SEforALL), Power for All and UNDP, and at the global level by the World Health Organization (WHO), the World Bank, and other partners through the Health and Energy Platform for Action (HEPA).

RALLY THE SECTOR BEHIND SUSTAINABLE DELIVERY MODELS

To be truly viable and scalable, the service-based models described in this knowledge brief will eventually require greater buy-in, support and coordination among a range of stakeholders, including governments, DFIs, service providers and investors. This is important to avoid market-led models, like those described in this knowledge brief, being undermined by purely grant/philanthropic-funded projects. This is a challenge the market for residential off-grid solar solutions has faced and has largely overcome. In recent years, SEforALL and the World Bank have already organized several events and publications around this topic, and more organizations are expressing their interest to contribute and learn from others.

SEforALL and the Energy Sector Management Assistance Program (ESMAP)/World Bank are committed to advancing the above-mentioned recommendations and invite our partners and other key stakeholders to join us in exploring how a performance-based service model can contribute to the sustainable electrification of public institutions.

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Sustainable Energy for All (SEforALL) is an international organization that works in partnership with the United Nations and leaders in government, the private sector, financial institutions, civil society and philanthropies to drive faster action towards the achievement of Sustainable Development Goal 7 (SDG7) – access to affordable, reliable, sustainable and modern energy for all by 2030 – in line with the Paris Agreement on climate.

SEforALL works to ensure a clean energy transition that leaves no one behind and brings new opportunities for everyone to fulfil their potential.

Former UN Secretary-General Ban Ki-moon launched the Sustainable Energy for All initiative in 2011. Now an independent organization, we maintain close links with the UN, including through a relationship agreement, partnerships with UN agencies and with SEforALL's CEO acting as the UN Secretary-General's Special Representative for Sustainable Energy for All and Co-Chair of UN-Energy.

Our staff is based at our headquarters in Vienna, Austria and at our satellite offices in Washington, DC, and New York, United States. Governance is provided by the SEforALL Administrative Board.

ESMAP is a global knowledge and technical assistance programme administered by the World Bank that works with 22 partners to help low- and middle-income countries reduce poverty and boost growth through sustainable energy solutions. The financial support of the Energy Sector Management Program (ESMAP) is gratefully acknowledged. ESMAP is a global knowledge and technical assistance programme administered by the World Bank that works with 22 partners to help low- and middle-income countries reduce poverty and boost growth through sustainable energy solutions. ESMAP's analytical and advisory services are fully integrated within the World Bank's country financing and policy dialogue in the energy sector. Through the World Bank Group (WBG), ESMAP works to accelerate the energy transition required to achieve Sustainable Development Goal 7 (SDG7) to ensure access to affordable, reliable, sustainable and modern energy for all. It helps to shape WBG strategies and programmes to achieve the WBG Climate Change Action Plan targets.

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