



# SCALING UTILITY-ENABLED DISTRIBUTED ENERGY RESOURCES FOR NIGERIAN COMMERCIAL & INDUSTRIAL (C&I) CUSTOMERS

Funded by the United States Trade and Development Agency (USTDA), Daybreak Power Solutions Limited (Daystar) and Rocky Mountain Institute (RMI) conducted a feasibility study to optimize energy supply to 20 commercial and industrial (C&I) entities in Nigeria using utility-enabled distributed energy resources (DERs). The objectives of this project were to identify a pipeline of 20 C&I projects, de-risk them by extensive technoeconomic analysis, regulatory assessment, design acceptable contract terms, facilitate customer-developer-distribution companies (DisCos) partnerships, and ultimately prepare projects for implementation.

The project successfully identified and completed the feasibility study for 20 potential C&I customers in Abuja and Lagos under three DisCo territories, namely Abuja Electricity Distribution Company (AEDC), Eko Electricity Distribution Company (EKEDC), and Ikeja Electric (IE). These projects represent a total of 27 MW in new solar capacity, \$43 million in capital investment, and an estimated 25,000 metric tons of CO2e in annual greenhouse gas (GHG) emissions reductions. The proposed utility-enabled business model has strong potential to reduce energy costs for customers by replacing the burning of diesel and petrol through self-generation with DER systems, and increase DisCo revenue by enabling more grid consumption and connecting new customers to the grid. At scale, the business model can potentially apply to 170,000 C&I customers across Nigeria, eventually unlocking 3.3GW of solar capacity and \$6.5 billion investment opportunity. Despite constraints resulting from the new administration's monetary policy affecting foreign exchange (FX) in Nigeria, customer and DisCo engagement delays and post-COVID-19 pandemic, a few projects in the pipeline are well positioned for immediate deployment subsequent to the USTDA-funded study.

## NIGERIAN POWER SYSTEM AND C&I SECTOR CONTEXT

Due to inadequate generation capacity and electricity infrastructure across Nigeria, the bulk grid remains unreliable for the majority of customers. In some areas, it's common to have blackout for hours daily and transmission and distribution networks can collapse frequently. This is particularly problematic for C&I customers who require reliable and affordable power supply for their business operations. With poor grid services quality, many of these customers currently revert to diesel-fired generators as main or sometimes sole supply of electricity, bearing cost that can be twice as expensive as grid tariffs. With growing and unstable fuel prices, customers are increasingly looking at alternative DER solutions.

In recent years, Daystar among other DER developers had encouraging success deploying solar-based solutions to C&I customers. These systems are installed without the involvement of the DisCos, which is a missed opportunity as leveraging available low-cost grid supply can improve cost effectiveness, making projects more attractive for customers. Innovative business models can enable customers, developers, and DisCos to all benefit from C&I DER projects in a win-win-win scenario.

## UTILITY-ENABLED C&I BUSINESS MODEL AND PIPELINE PROJECTS

The proposed utility-enabled business model will leverage the reliability benefits of distributed power, such as solar and batteries, and the increased grid electricity consumption, to better serve C&I customers, replacing expensive diesel usage. This model requires no upfront capital investment from the customer. Daystar, as the developer, is responsible for securing financing and installing and operating the DER system on-site to provide power supply during daytime peak hours (9am to 3pm). The DisCos, on the other hand, are expected to increase hours of grid supply to provide energy to the customer in the evening, night and early morning hours (3pm to 9am). Grid interruptions can be backed up through the

batteries and generators, delivering high reliability with a lower overall cost than generator-only backup systems.

In developing a pipeline of C&I projects, RMI identified dozens of potential customers and prioritized 20 C&I customers for technoeconomic analysis and further de-risking. The economic modeling showed that economic impact is positive for 17 of the 20 customers, with an average savings of 26% under current market conditions. For the remaining three customers, estimated energy costs increased mainly because they reported high grid consumption now. Still, the improved reliability is valued by customers and our sensitive analysis revealed that if certain market conditions change (e.g., diesel cost, battery cost, FX) rate, these projects would offer cost savings to customers. For DisCos, profitability could grow significantly, from 8% to 1,000%.

## IMPLEMENTATION AND SCALING OUTLOOK

For the 20 pipeline projects, RMI has prepared draft contracts and implementation plans to guide the execution of projects and continuous engagement with customers and DisCos. For a few customers, especially with a furniture manufacturer in Abuja, Daystar are in the late stage of contract negotiation and hopeful for procurement and deployment to kick off in early 2024. Once the initial batch of projects are implemented and proven viable, we also estimated a conservative scaling scenario where 36 such projects can be implemented every year with Daystar's current operation size, adding an estimated of 17MW solar installed capacity to Daystar's portfolio annually. In a more optimistic scenario in which Daystar double its operational capacity, 72 projects or 34MW solar could be deployed per year.

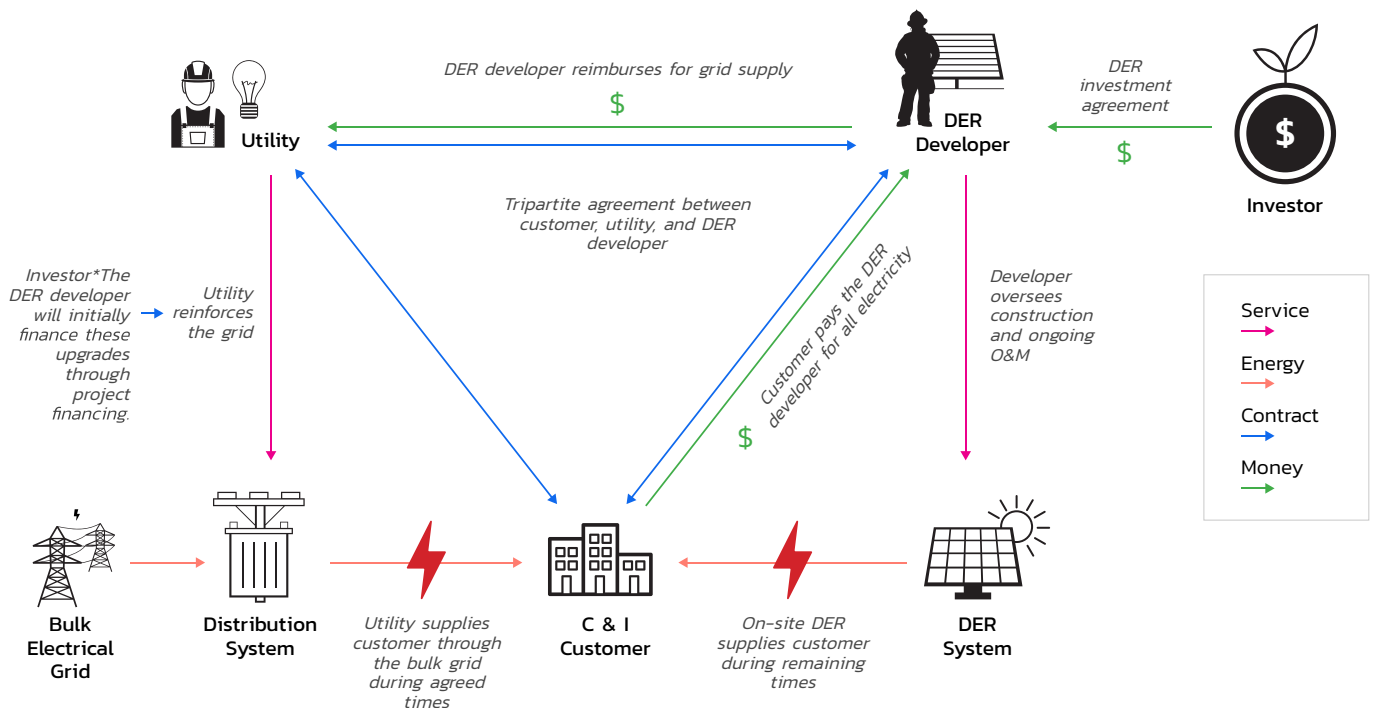


Figure 1: Illustration of the proposed utility-enabled C&I business model