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COVID-19 and Distributed Renewables: How the Crisis Has Affected the Sector and What It Means for People, the Planet, and the Future of Energy Access

A Synthesis of Stakeholder Perspectives

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INTRODUCTION

Over the course of 2021, the James E. Rogers Energy Access Project at Duke University (EAP) convened three dialogues with a range of distributed renewable energy stakeholders representing research, business, investor, nonprofit, and policymaker perspectives. The purpose of these conversations was to discuss the major impacts, lessons and narratives emerging within the sector in the wake of a period of great upheaval. One of these sessions was a public event at COP26 in Glasgow, Scotland—co-organized by Bboxx and EAP—and the two others were working group sessions of the EAP Affiliates cohort.[1]

Key contributors to these sessions, whose input forms the foundation of this brief, were Jonathan Phillips, Gary Almond, Benjamin Attia, Gabriel Davies, Maud Duprat, Robert Fetter, Mansoor Hamayun, Marc Jeuland, Rajat Khandelwal, Tanya Kothari, Leslie Labruto, Hon. Cina Lawson, Tessa Lee, Erin Litzow, Katherine Lucey, Jennifer Meyer, Harry Masters, Victoria Plutshack, James Smith, Carlos Sordo, Kate Steel, Daniel Sweeney, Christopher Timmons, John Tkacik, Rotimi Thomas, and Nathan Williams.

This brief distills the key takeaways and outstanding open questions identified from those sessions. It aims to help sector stakeholders understand the shifting dynamics in the sector and what it means for the future.

KEY FINDINGS

(1) COVID-19 demonstrated that basic household electricity access is an essential good. In the context of declining incomes and difficult sacrifices—skipping meals, selling productive assets—households largely continued to pay for electricity. While the performance of distributed renewable energy (DRE) firms was far from uniform, this was the crisis that did not happen for some firms serving these households.

- This is a significant story in and of itself given that the majority of households in low- and middle-income countries (LMICs) experienced a significant income drop. Coping strategies and government assistance were insufficient to sustain pre-crisis living standards, resulting in widespread food insecurity and dire economic conditions even three months into the crisis.[2] Survey data from solar home system (SHS) companies indicate the financial situation of their customers declined significantly as a result of COVID-19.
- SHS re-payments were strong for much of 2020 and 2021 after an initial period of uncertainty in many markets. Sales of new systems were very weak for several months after lockdowns began but at levels typical for consumer purchasing of new assets during an economic downturn.
    - Nithio partner payment data did not see much change, and sales remained fairly strong.
    - Data from the Renewable Energy and Energy Efficiency Partnership (REEEP) in Zambia illustrates a steep drop in payments in June 2020, but within three months payments had recovered into positive territory compared to the previous year and remained positive going forward. Sales of new systems were significantly and persistently lower for many months after lockdowns began.
    - BBOXX saw collection rates drop in Kenya and Rwanda in April 2020 but bounced back to pre-COVID levels within three months in both markets.
    - These experiences and variations appear to be consistent with data from the World Bank/Lighting Global and GOGLA.[3,4]
- The recovery in payments tracks with the general shift in the professed level of concern about COVID-19. Between August and October 2020, the share of low-income people in 19 countries (13 in sub-Saharan Africa) "very concerned" or "slightly concerned" by COVID-19 fell from 84% to 40%.[5]

(2) There was deep variation in how COVID-19 affected different groups of people in LMICs, which was one factor in the variation seen in the performance of DRE firms. A better understanding of the needs and nuances of these groups is needed to improve policymaking and enable greater viability of DRE enterprises.

- For many rural people in Kenya, especially the ones engaged in farming as their primary livelihood, COVID was just one of the shocks that they had to deal with, in addition to other shocks they now increasingly face, mainly related to extreme climate events

and pests. So even though they were significantly impacted, COVID was not their top concern.[6]

- Meanwhile, for people engaged in business, COVID was top of mind and significantly impacted their livelihoods. This certainly had implications on their investments and spending patterns.

(3) The economic crisis was real for companies serving businesses and productive uses in rural Africa. Mini-grid owners and operators—with a far greater proportion of revenues coming from commercial and industrial customers than SHS companies—saw much deeper declines in demand, similar to the environment that grid utilities faced.[7]

- As COVID reduced employment and household incomes, demand for manufactured goods and services declined and, with it, demand for energy to power commercial and industrial enterprises.
- In Nigeria, mini-grid developers' revenue dropped 35% after COVID-19 hit, mainly due to a decrease in revenue from productive users, although some of that drop was driven by seasonality. There also appeared to be a lag in when demand fell-off, with demand levels tracking previous year's levels until dropping-off abruptly in late July and early August. There was very little impact on residential demand for electricity. Electricity consumption did not increase in line with the recovery in economic activity, likely because customers were using their increased income to cover basic needs.

(4) Due in large part to the resilience of SHS sector, bail-out and bridge funds for DRE companies have not been deployed as anticipated.

- Donors and investors that helped build the DRE sector over the previous decade feared that the sector would collapse as COVID-19 took hold. Emergency funds came together, notably the Energy Access Relief Fund (EARF), to build a safety net for companies.
- Some perspectives on EARF, which disbursed initial loans in January 2021:[8]
    - It came together at lighting speed considering the diverse make-up of the funder coalition (DFIs, MDB, multilateral climate fund, philanthropy, impact investor) and represents an important demonstration for mobilizing blended climate finance to fill a key gap.
    - But it was too slow to deploy to save many companies hit hard over the first nine months of COVID.
- These funds have been unnecessary as emergency working capital for better capitalized SHS firms. Some companies actually saw sales increase during COVID, an awkward context for distributing relief funds.
- By the time the Fund launched, it was focused on smaller companies. There may be an issue of crowding out private funding, but it may also fill a critical real need from smaller companies and local companies that face challenges to accessing capital generally.

(5) While the sector seemed to have been spared supply chain disruption in the first months of the pandemic, eventually the global shortage of computer chips and other materials

required in the solar PV supply chain heavily impacted the sector, leading to long lead times and price increases for many DRE companies.

- Supply chain disruption has generated a backlog of merchandise at supply factories (especially in China), resulting in prioritization of companies able to pay upfront.
- Clearance processes at the borders is slow with COVID-19 standard operating procedures still in place.
- An industry survey undertaken in June 2021[9] found that of 33 manufacturer respondents, 73% expected the disruption to lead to product stockouts, with increased pricing and increased lead times identified as the most disruptive issues of the current supply chain disruption.
- Further, 87% of the respondents expected the disruption to lead to increased customer prices, driven by an on average 348% increase in electrical components (chips and controllers) and 56% increase in TVs, among other price increases.

(6) Like many industries, the DRE sector faced a crisis of investor confidence and the downturn seems to have had effects on the structure of off-grid industry. Different starting conditions of companies and differences in the way they responded to the crisis led to the range in company outcomes. Further research could help to understand the implications for competition and innovation.

- For larger companies with stronger balance sheets, access to capital, or in-house/-network expertise, understanding and responding to rapidly shifting market dynamics may have been easier than for smaller companies that were thinly staffed, with tight working capital during the downturn.
- With new customers hard to come by, DRE companies focused on servicing existing customers, improving collections, improving unit economics, and securing supply chains. Companies may be focusing on accommodating strategies, including:
    - Servicing better-off customers, leaving the hard-to-reach behind due to economic and ability-to-pay reasons, and
    - Adopting the necessary measures to accommodate existing supply chain limitations.
- Whether companies had access to capital during the crisis—either from reserves or from new or existing investors—determined whether they could move forward with limited strategic investments to help weather the crisis or had to pull back. For example, some companies were forced to increase prices to account for local currency depreciation. One company stopped PAYGO for a period. Some surveys showed that companies with the best customer service saw the best repayment rates.
- Companies with flexible and low-cost distribution channels and digitalized sales, fund raising, and customer care capabilities developed a cost advantage and were better positioned for growth as economies recovered.[10]
- Specific changes and responses in BBOXX operations and business model include:
    - Offered COVID relief to keep the lights on for customers by offering bonus up-time

for customers able to make payments and reducing the number of payments for 'switch on' for customers who had fallen behind.

- Kawisafi Ventures awarded customer-facing grants through Bboxx to support customers affected by COVID in Rwanda and Kenya, triggering broader consideration of how to support DRE firms, including through portfolio support.
- Integrated call center operations with the national COVID hotline to support pandemic-related information sharing.

(7) Macroeconomic changes that coincided with the COVID economic crisis—most notably the depreciation of LMIC currencies against the USD and other hard currencies—negatively impacted companies across the sector.

- With debt financing and equipment frequently originating overseas, many DRE companies face a currency mismatch, with accounts payables disproportionately denominated in hard currencies and Chinese yuan, and incoming payments in local currency.
- In Zambia, the value of the Kwacha declined 50% against the USD in 2020.[11] For DRE companies participating in the SIDA-sponsored Zambian Off-Grid Energy Fund—a results-based financing (RBF) program that incentivizes companies to sell into last-mile markets in the country—this currency shift opened a gap in the balance sheets that was greater than the value of the RBF incentive payments.

(8) Broad shifts in government policy had significant ramifications for the DRE sector and customers, which explains some of the deep variation in experiences across markets.

- Facing steep budget deficits driven by the economic slowdown, the government in Kenya re-instated energy sector taxes to increase revenues.
  - Petrol prices were increased, driving concerns around inflation, reduced disposable income, and potentially negatively impacting collections.[12]
  - A 14% VAT on solar and other clean energy products was reinstated. The VAT increase led to sector-wide SHS price increase of roughly 20%.[13,14] These tariffs were rolled back in July 2021.[15]
- In Zambia, a $438 million government stimulus package, which included payments to retirees as well as contractors and suppliers hit with reduced liquidity due to COVID-19, helped to stabilize SHS sales and support recovery of the sector over the year.[16]

(9) Certain actions from governments and multi-laterals opened unexpected opportunities, which may put the sector on a new growth trajectory as economies recover.

- In Togo, $20 million in fiscal stimulus was deployed to half a million people as a digital cash transfer as part of the Novissi program (see case study box).
- In Rwanda, the Renewable Energy Fund RBF subsidy program launched and is expected to increase SHS by up to 50%.[17] Though the program was in the works long before COVID, the pandemic built pressure on the World Bank and the Development Bank of Rwanda to move quickly. The program is spurring traction in additional markets to

scale-up digital end user subsidies as a tool to reaching the poorest and most vulnerable, including households who may newly slip back into extreme poverty due to COVID.

- In some cases, opportunities emerged to strengthen partnerships with governments, including:
  - Using DRE data for policymaking in Rwanda and Togo;
  - DRE businesses working with governments on cold storage and leveraging distribution networks to support vaccination roll out, including in Uganda, Zambia, and Nigeria.[18]
- With senior government leadership travelling less, COVID brought a unique "availability of attention and time" phenomenon which allowed some companies in some markets to engage more frequently and productively with governments on strategic priorities.

(10) Like in many other areas, COVID-19 accelerated existing trends.

- Companies continued to move from household needs to productive use of energy services. Some investors broadened their portfolio, and enterprises aimed to diversify their customer segments and product offerings.
- Marginal companies that were struggling pre-COVID may have gone under while those doing well generally survived and have adapted operational innovations.[19]
- Across the sector, new strategic investors—especially oil and gas majors—have entered looking to broker new partnerships and make new investments. There appears to be an opportunity for DRE businesses to work with oil and gas majors who are facing new pressure to decarbonize and looking for clean energy investment opportunities.

(11) Total investment into DRE remained roughly flat in 2020, but there were notable shifts in the type of capital raised and where it was deployed.

- Blended capital investment appears significantly in Wood Mackenzie's tracking for the first time, as seen in Figure 1. This appears to be new sources substituting—especially for equity investment—rather than adding. GOGLA data suggests a 46% drop in equity investment. This is, in part, due to an absence of corporate M&A and inability of equity investors to do on-the-ground due diligence.

Figure 1. Disclosed energy access investments over time

- Grants were also way up in 2020, according to GOGLA, to help companies enter new markets, pilot new business models and products, and seed early-stage companies. Rural health facility electrification was a strong grant-making priority for the first time.[20]
- Investment into DRE during 2020:
  - WoodMackenzie found a 12% drop year-on-year for 2020, with a hard drop followed by a strong bounce back at the end of the year.
  - GOGLA also found the investment volume into off-grid solar was $316 million, a slight increase over 2019. SHS accounted for 72%, and mini-grids 23%.
  - 2020 continued the trend of broadening investment to greater numbers of companies. While 95% of 2015 investment flowed to the top ten funding recipients and 62% to the top three recipients, 2020 saw far less concentration with the top ten recipients attracting 68% of investment and the top three recipients attracting 41%.
  - 78 companies attracted investment in 2020, up from 49 in 2019. 46 of these 78 companies with first time investees and 35 of those were funded through grants.[21]

KEY IMPLICATIONS AND OPEN QUESTIONS

(12) The crisis answered important questions related to the credit risk embedded in SHS balance sheets. While the typical credit profile of customers differs company-to-company—and the response of companies certainly had bearing on customer repayment behavior—the data pointing to quick recovery in payments may be an indication of general strength in underlying lending approaches.

(13) Robust household payment for basic electricity access and service during the crisis elevates the case for RBF, demand side subsidies, and/or other incentives that support electricity access for the most remote and/or lowest income customers.

(14) Since most households made their electricity payments and of the DRE sector overall showed resilience of the DRE sector, the cost of COVID-19 must have shown up in other areas. Further research is needed that puts the evidence on energy payments alongside data on how those customers approached difficult trade-offs in education, nutrition and health, selling of productive assets, and other sacrifices. How did these decisions impact households and how should social safety net policies—including those related to energy—be approached to improve household and community well-being?

(15) Foreign exchange (forex) risk is magnified during economic crises and can be financially devastating to DRE companies operating in LMICs. Most companies assume forex risk internally, as commercial hedging products are expensive and many DFIs and donors do not offer it in their financing products. As blended financing facilities emerge that align different types of capital with targeted risk/return needs, forex coverage represents a critical area for inclusion.

(16) Were there major new grant investors into the DRE space in 2020 or a shift in investment approach that explains the decline in equity investment and growth in grants and blended capital investment? Was this a short-term response to the economic crisis or a more enduring shift? If the latter, what are the ramifications?

DIGITAL TOOLS, ENERGY ACCESS, AND A RAPIDLY DEPLOYED SOCIAL SAFETY NET: A CASE STUDY FROM TOGO

The government of Togo has demonstrated how digital tools and development programs can be effectively aligned to strengthen the social safety net and help respond to crisis. Launched by the government of Togo in 2017, the CIZO program supports implementation of the off-grid portion of the National Electrification Plan, which calls for the deployment of 555,000 solar home systems, 300 mini-grids (55,000 connections), and 400,000 on-grid connections to achieve universal access by 2030.[22] The approach is underpinned by a least-cost geospatial model.[23]

CIZO, which means "switch on the light" in the local Mina language, is a public-private partnership that makes private sector partners responsible for financing, distributing, marketing, and servicing SHSs, while the government provides direct subsidies for eligible consumers who cannot afford off-grid energy access in rural areas. Eligible customers receive a monthly stipend of about $4 per month over 36 months, which is used to pay their SHS operator under the pay-as-you-go model.

Only companies that can remotely monitor usage of the off-grid systems can participate, which keeps the verification and administration expenses for the program low and ensures the government can access certain data that supports electrification planning and other policies.[24] CIZO was implemented alongside several other initiatives supporting the enabling environment for off-grid energy access, including consumer awareness campaigns, targeted lines of credit and VAT exemptions on key equipment.

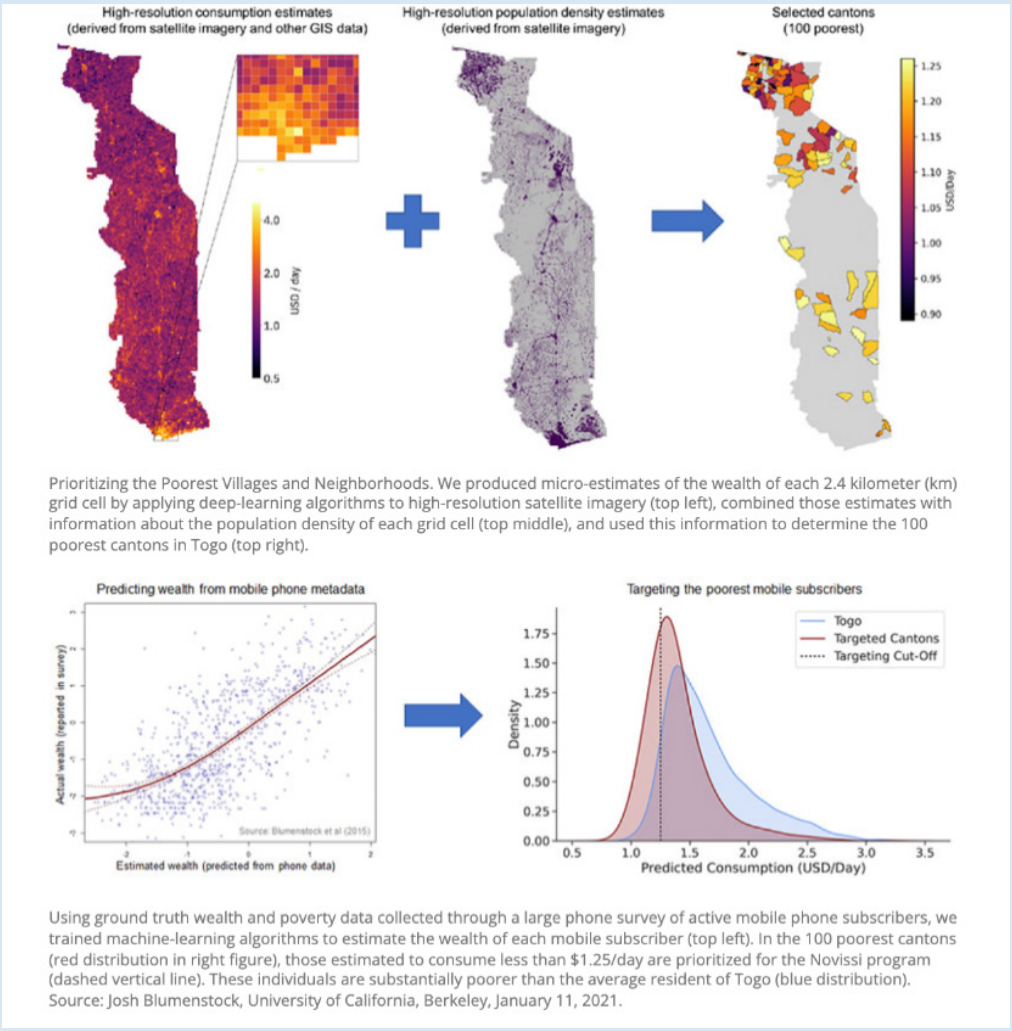
CIZO drove a strong uptake of DRE systems among low-income rural households and helped increase adoption of mobile financial services in Togo. Mobile money usage rose from 26% of households in 2017—the first year of CIZO—to 52% in 2020.[25,26]

The success of CIZO proved to be an important foundation for responding to the COVID crisis. In the face of the pandemic, the Togolese government used digital tools to enable an emergency cash transfer program called Novissi. Stood-up over less than two weeks, Novissi utilized geospatial data and deep-learning algorithms to identify and prioritize the 100 poorest cantons in the country, as outlined in Figure 2 (see page 10).[27,28]

The program targeted informal workers whose livelihood had been affected by COVID-19, ultimately reaching an estimated 23% of the population.[29] The transfer mechanism utilized a USSD based system for contactless cash transfer, eliminating the need for internet services or a smartphone for the transfers. This was essential since most of the population does not have access to a smartphone. The program designated a higher amount for female beneficiaries to account for women making up 59% of the informal sector workforce as well as to address gender inequities in the country.[30] The government also asserted that the female heads of households would better allocate spending of the money for household and community essentials,[31] an idea supported by research that finds women are more likely to invest additional income in health, education, and more inclusive local public goods.[32]

Novissi — born in the throes of COVID-19 and enabled, in part, through CIZO—has established an enduring, tech-enabled social safety net infrastructure. The success of this program has led to additional development partner financing from The World Bank and Agence Française de Développement to support the most vulnerable in Togo.[33]

Figure 2: Targeting under the Novissi program



Prioritizing the Poorest Villages and Neighborhoods. We produced micro-estimates of the wealth of each 2.4 kilometer (km) grid cell by applying deep-learning algorithms to high-resolution satellite imagery (top left), combined those estimates with information about the population density of each grid cell (top middle), and used this information to determine the 100 poorest cantons in Togo (top right).

Using ground truth wealth and poverty data collected through a large phone survey of active mobile phone subscribers, we trained machine-learning algorithms to estimate the wealth of each mobile subscriber (top left). In the 100 poorest cantons (red distribution in right figure), those estimated to consume less than $1.25/day are prioritized for the Novissi program (dashed vertical line). These individuals are substantially poorer than the average resident of Togo (blue distribution). Source: Josh Blumenstock, University of California, Berkeley, January 11, 2021.

Source. World Bank. https://www.worldbank.org/en/results/2021/04/13/prioritizing-the-poorest-and-most-vulnerable-in-west-africa-togo-s-novissi-platform-for-social-protection-uses-machine-l.

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