CLEAN COOKING ALLIANCE

2022 CLEAN COOKING INDUSTRY SNAPSHOT

THIRD EDITION


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GLOSSARY OF TERMS

IMPROVED COOKING SOLUTIONS: Cooking solutions that are cleaner or more efficient than the baseline technology/fuel combination. An improved cooking solution can be more efficient without being cleaner. For this report, this includes improved wood and charcoal stoves, as well as briquette-based solutions.

CLEAN COOKING SOLUTIONS: Cooking solutions that achieve ISO Tier 4 for PM2.5 emissions and Tier 5 for carbon monoxide emissions. These generally include solar, electric, liquefied petroleum gas (LPG), biogas, alcohol, ethanol, and some processed biomass/pellet stoves. For this report, all pellet-based solutions are included under this definition for simplicity.

CLEAN COOKING COMPANY: A company manufacturing or delivering clean or improved cooking solutions.

PROCESSED BIOMASS: Fuels derived from wood, agricultural waste, or other biomass products that have been processed in some way to improve characteristics for cooking, including improved energy efficiency and reduced pollutants. For this report, these include briquette- and pellet-based cooking fuels.

PAY-AS-YOU-GO (PAYGO): A pay-per-use service that makes a cooking solution available for households, typically through a smart metering solution. This allows utility subscribers to enroll without a large upfront deposit.

FOREWORD

As the clock ticks toward 2030, we still have a long way to go in achieving universal access to clean cooking. In 2021, global leaders at the United Nations High-Level Dialogue on Energy and the 26th Conference of Parties (COP 26) made several commitments to reaching SDG7. If we are to make these aspirations a reality, then 2022 needs to be the year of action.

We need greater amounts of capital to flow into the clean cooking sector, and we need that capital to come from a much wider pool of investors with varying appetites for risk and return. A pipeline of investable, commercially viable, and consistently profitable enterprises is crucial to allocating the capital needed to scale.

The opportunities are vast. As this report highlights, over half of the capital tracked in the clean cooking industry is being invested in enterprises that serve urban customers. Urban areas in West Africa, for example, contribute 25% to 65% of GDP and this trend shows no signs of abating. This provides clean cooking enterprises with a huge opportunity to address the urban poor through highly efficient and commercially viable business models.

Yet we also need solutions for the rural poor, who may be harder to reach and have lower ability to pay for clean cooking solutions. This report highlights the huge growth in carbon financing for clean cooking over the past several years, which provides some assurances for private investors that monetizing the positive impacts of clean cooking can enable these markets to be served with commercially viable business models. We must reduce the transaction costs of accessing carbon finance if the clean cooking industry is to fully leverage the benefits of a robust market for carbon credits.

This report also highlights an important shift in research and development, with several companies diversifying their technologies, including moving into LPG and electric cooking appliances. This shift reflects the growing realization that providing consumers with a suite of solutions enables multiple pathways to a future in which energy for cooking is clean, affordable, and sustainable. Enterprises that transition to increasingly customer-centric products and business model innovations are more likely to increase customer loyalty, retention, and growth, enhancing both impact and financial performance.

The data and case studies in the following pages suggest that many of the pieces of the puzzle are in place. What is needed now is a commitment to action, collaboration, and accelerating the pace of change.

—**Tariye Gbadegesin**
Managing Director & Chief Executive Officer, ARM-Harith Infrastructure Investment LTD

From the **CEO**

This report is being published as the clean cooking ecosystem prepares to convene at the Clean Cooking Forum in Ghana later in the year. This flagship convening will set the stage for clean cooking's critical role in climate conversations as the world gets ready for COP27—dubbed "Africa's COP."

Encouragingly, this report tracks recent investment and business trends that could represent a turning point for the sector. In recent months, several clean cooking enterprises have raised previously unheard-of levels of capital. The amount of capital raised in the first part of 2022 is more than double what was reported in the *2020 Clean Cooking Industry Snapshot*. In addition, several enterprises have seen significant customer growth, highlighting the potential to deliver pioneering technologies at a transformational scale. The ecosystem continues to mature as more businesses and collaborators from other industries develop partnerships and start new initiatives. Finally, the first close and launch of the Spark + Africa Fund—the first impact fund financing clean cooking solutions, with a target fund size of US$ 70 million—shows the appetite of a range investors—including development finance institutions, private foundations, and pension funds—for establishing and funding an emerging, commercial industry.

However, this report also highlights the challenges faced by the sector, the most significant being COVID-19. The pandemic and its associated public health restrictions resulted in devastating impacts for families, enterprises, and economies around the world. Enterprises in the clean cooking industry felt these impacts keenly, especially those operating at the last mile and reliant on direct interactions with customers. But the data in this report also highlights how resilient and innovative enterprises have been in the face of immense disruption. Indeed, with families spending more time at home, the case for reducing household air pollution from cooking has never been more compelling and, in many cases, enterprises have seen demand for their products and services rise.

As representatives of the world's governments gathered in Glasgow this past November for COP26, the message was clear: we need climate solutions that reduce harmful emissions but also address health, economic, and gender inequities. This transition will require significant increases in funding and resources to support technical and business model innovations that are responsive to the evolving needs of consumers. But making these solutions work also requires coordinated support from governments, donors, financial institutions, the private sector, and civil society to ensure an enabling environment conducive to a sustainable and scalable clean cooking industry.

As we look toward 2030, our focus must be on scaling the clean cooking industry and turning commitments into results. More than ever, transparent, and accessible data on the clean cooking industry's performance and progress, as provided in this *Industry Snapshot*, is a vital tool for investors, enterprises, implementing partners, donors, and the entire clean cooking ecosystem to achieve our shared goals.

—**Dymphna van der Lans**,
Chief Executive Officer,
Clean Cooking Alliance

Executive **SUMMARY**

Around the world, an estimated 2.6 billion people[1] still lack access to clean cooking solutions. Achieving universal access to clean cooking solutions by 2030 will require major acceleration in the pace of change, as companies continue to emerge from the economic fallout of the COVID-19 pandemic.

This third edition of the *Clean Cooking Industry Snapshot* has taken the investment and operational performance of approximately 60 clean cooking companies[2] for 2020 and combined their data with those in the two previous versions of the *Industry Snapshot*. The analysis therefore covers 2014 to 2020 and is based on a combination of self-reported and publicly available data.[3]

Key findings of the report are the following:

INVESTMENT TRENDS

- Investment in clean cooking companies remains in the tens of millions of dollars, far short of the billions of dollars needed to help clean cooking companies reach the billions of people who still depend on polluting fuels.
- Investment reaching clean cooking companies grew at a compound annual growth rate of 20% from 2014 to 2020. If this rate of growth continues, it will be 2036 before investment levels in clean cooking companies pass the US$ 1 billion mark.
- The average amount of equity being reported by clean cooking companies has been markedly higher in 2019 (US$ 3.9 million per company) and 2020 (US$ 3.3 million per company) than in the years leading up to 2018, as a series of notable equity deals closed.
- 88% of capital coming into companies was from the private sector, in line with the previous two years.
- New capital investment remains concentrated in increasingly fewer companies; in 2020, just seven companies raised more than 90% of the total investment in clean cooking.
- Direct funding from multilateral development banks and development finance institutions to clean cooking companies in 2020 was 84% lower than 2019.
- Gender lens investing accounted for 12% of the company-reported investment in 2020.

SALES AND OPERATIONAL TRENDS[4]

- Revenue from clean cooking sales tracked across 32 companies by CCA was US$ 26 million in 2020, a 13% decline from the previous year across the same companies.
- Six companies accounted for 82% of the total clean cooking revenue in 2020.
- Revenue from carbon credits rose to more than US$ 11 million in 2020, a 21-fold increase over the US$ 500,000 tracked in 2017.

- Biomass cookstoves remain dominant in terms of reported industry revenue share, and biomass cookstoves were the only subsector to post a net increase in aggregated revenue between 2019 and 2020.
- Most clean cooking sales revenue comes from companies that serve both rural and urban customers.
- Almost half of clean cooking companies reported having positive EBITDA (earnings before interest, taxation, depreciation and amortization) in 2020.
- Almost half of clean cooking companies self-reported being net profitable in 2020.

RESEARCH & DEVELOPMENT TRENDS

- Investment levels in research & development (R&D) declined by one-third from the 2019 R&D levels.

OTHER EMERGING TRENDS

- Metering technology products are being developed to track real-time consumer usage data, and methodologies for verifying usage will continue to be updated accordingly.
- More companies are tapping into revenue from carbon markets, and the number doing so is likely to keep going up.
- Product diversification across fuel types is a key growth strategy for several companies.
- Access to consumer financing for clean cooking remains scarce.
- On average, clean cooking companies are getting closer to other energy subsectors on measures of customer satisfaction and loyalty, but there is a large range.
- Adjacent sectors are expanding into clean cooking.

1 WHO Global Health Observatory. (2022). Population with Primary Reliance on Polluting Fuels and Technologies for Cooking.

2 This self-reported data has been supplemented with investment data on four companies compiled from past surveys and publicly available sources, including press releases and news articles.

3 This report intentionally does not cover any nonprofit developmental projects in the clean cooking sector.

4 KOKO Networks, a last-mile ethanol distributor, did not provide revenue data with CCA for this report. As such, the aggregated revenue and carbon data in this report is known to underrepresent the clean cooking sector.

A NOTE ON METHODOLOGY

Companies that contributed data to this report are not a fully exhaustive representation of the for-profit clean cooking sector. Different companies provided data to CCA in different years, so the revenue analysis was based on a set of 32 companies for which we have revenue data for all years.[5] As a "snapshot," this report is meant to provide an abbreviated understanding of a situation based on a particular range of time. As such, the data may not be representative and there will be inherent gaps and limitations around the depth, scope, and rigor of the information. Due to the absence of revenue data received from significant market players, the observations of clean cooking and carbon revenue will be conservative. Please refer to the Appendix for further details.

5 The number of companies whose data in the analysis has been shown in each chart in this report. There is not a consistent set of companies across different years; some companies have exited the sector and new ones have started up.

COVID-19 IMPACT

This report includes limited insights and analysis on COVID-19's impact on the clean cooking industry, as this edition of the *Industry Snapshot* analyzes data for 2020, capturing only the initial impact of the pandemic on investment activity in the industry as well as on company operations. While investment in the industry fell by US$ 10 million year-on-year, 2019 recorded a US$ 25 million equity deal, the single largest one tracked by CCA. As such, the 2020 figures are in line with a reversion to the mean. The Energy Access Relief Fund[1] was set up to support energy access companies to maintain staffing levels during the pandemic. However, any impacts of the fund will not be present in the data for 2020, since the fund did not begin disbursing loans until January 2021.

Revenue remained flat year-on-year; however, the proportion of revenue provided by carbon finance maintained the exponential trajectory seen since 2017. Some companies experienced limitations in supply chain, distribution, and sales because of public health restrictions. Tightening household budgets also contributed to families reverting to less clean technologies. However, some companies were able to mitigate these impacts by accelerating their use of digital tools, including remote training of distributors, digital marketing and sales, and mobile money payments in place of cash payments. In addition, there was evidence[2] that demand increased for some clean cooking solutions because school and workplace closures meant families were eating at home more frequently.

It will take more time to assess the full impact of COVID-19 on the clean cooking industry. However, 2020 demonstrated the ability for companies to adapt quickly, and the need for resilient supply chains for both stoves and fuels. The continuing—and, in some cases, increasing—consumer demand demonstrates the critical role that clean cooking plays for families even in times of extreme financial hardship.

A deeper analysis of COVID-19's impact on the industry can be found in the results of the **Sector Survey on the Impacts of COVID-19 on Clean Cooking**, where CCA surveyed stakeholders across the clean cooking ecosystem to better understand how the crisis is affecting their organizations, their work, and the broader clean cooking sector. Responses were received April 6–13, 2020 from organizations working in more than 100 countries.

INTRODUCTION

This report focuses on for-profit companies in low- and middle-income countries. The clean cooking industry is technologically diverse, and this report covers industrial biomass cookstove manufacturers, processed biomass-based fuel producers (including pellets and char-briquettes), ethanol cooking fuel and stove suppliers, prefabricated biogas systems manufacturers, liquefied petroleum gas (LPG) downstream distributors, and electric cooking appliance manufacturers, as well as companies that provide specialized services within the value chain such as technology integration and "last-mile" distribution services. The report does not cover informal below-the-radar for-profit businesses, businesses with operations in high-income markets, fuel and stove producers that exclusively target industrial or commercial applications, upstream and midstream fuel companies, or infrastructure developers and operators.

The *2022 Clean Cooking Industry Snapshot* aims to provide insights into investment and operational trends and to track progress toward a sustainable, scalable clean cooking industry. The report highlights recent major milestones in the sector, including key research released, watershed deals, and notable achievements for companies. The 2022 report builds on the two previous editions by analyzing data for 2020 that was submitted by more than 60 companies.

Investment **TRENDS**

Investment in clean cooking companies falls far short of the annual requirement to achieve universal access by 2030

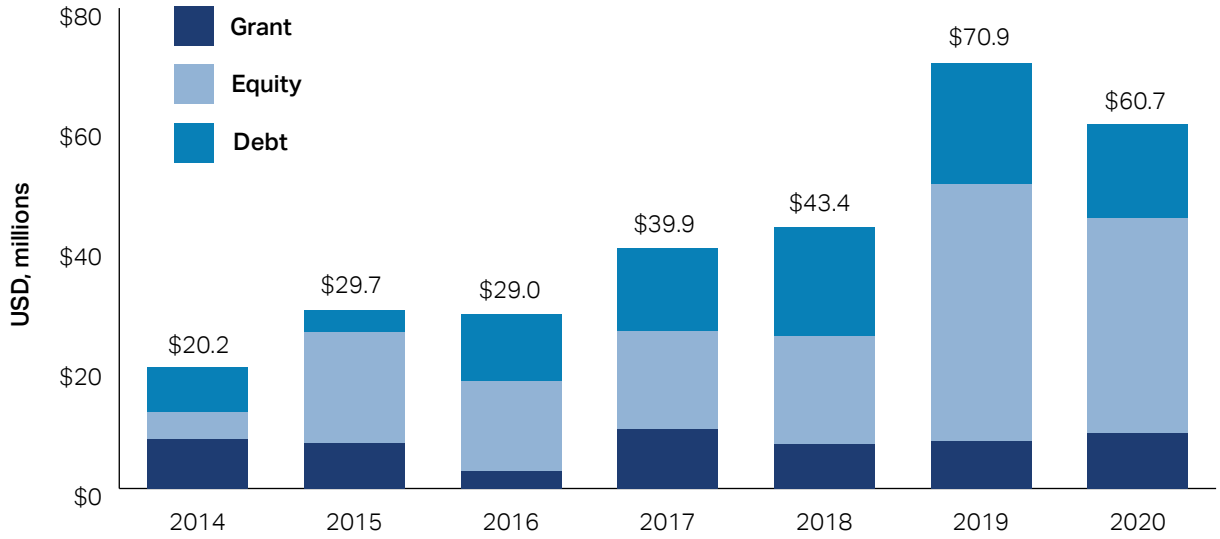
Investment in clean cooking companies remains in the tens of millions of dollars, far short of the US$ 4.5 billion in annual investment required[3] for the clean cooking sector to reach the billions of people who still depend on polluting fuels by 2030.

CCA tracked almost US$ 61 million going into 32 companies in 2020, as shown in Figure 1. This is the second-highest amount of capital tracked going into ventures on record. While COVID-19 might have played a role in diverting some investment away from clean cooking companies, the primary reason 2020 investment levels fell short of 2019 levels was that the largest private equity deal seen to date in clean cooking took place in 2019. No comparable deal happened in 2020.

Data from GOGLA, the global association for the off-grid solar energy industry, show that financial flows into the off-grid lighting sector have consistently been an order of magnitude higher than clean cooking, with about US$ 300 million tracking into off-grid solar companies each year for the past five years. Investment into off-grid solar in 2014 was US$ 74.5 million, a similar magnitude to that seen in clean cooking today.[4]

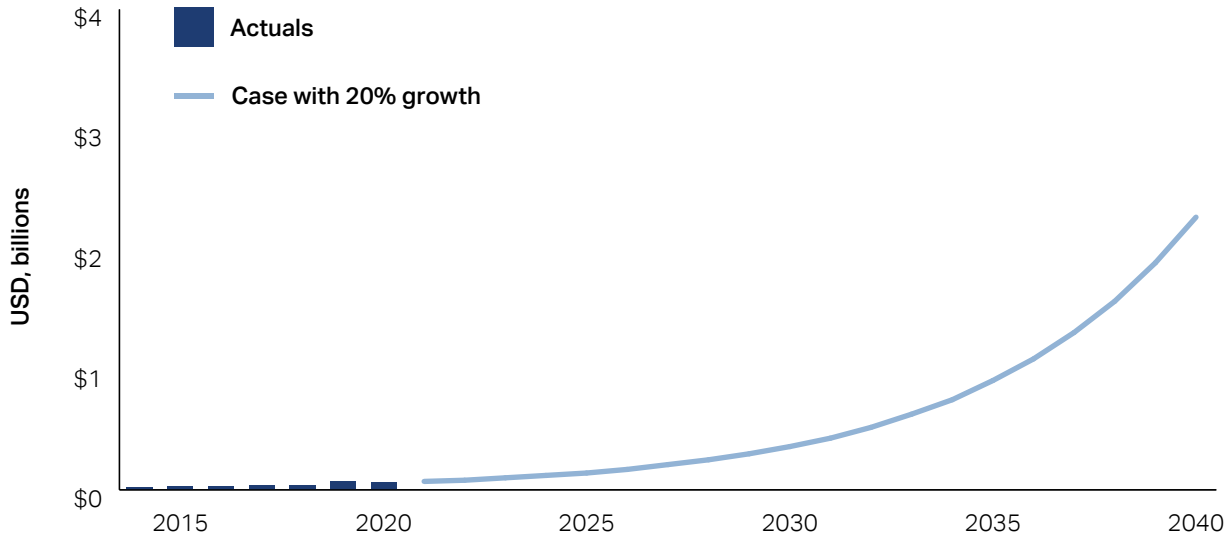
Looking at the investment trend between 2014 and 2020, the data show that investment reaching clean cooking companies grew at a compound annual growth rate of 20%. At this rate of growth — which is by no means guaranteed — investment in clean cooking

FIGURE 1. CAPITAL RAISED BY CLEAN COOKING VENTURES



Source: Clean Cooking Alliance. (N=92 for 2014–16, N=51 for 2017–19, N=63 for 2020). The data rely on self-reporting by the companies. N relates to the number of companies that answered the three Industry Snapshot surveys (2014–16, 2017–19, and 2020); not all these companies raised investment each year.

FIGURE 2. PROJECTING THE ANNUALIZED GROWTH RATE BETWEEN 2014 AND 2020 TO FUTURE INVESTMENT



Source: Clean Cooking Alliance

will still fall far below the US$ 4.5 billion in annual investment required for universal access[5] shown in Figure 2.

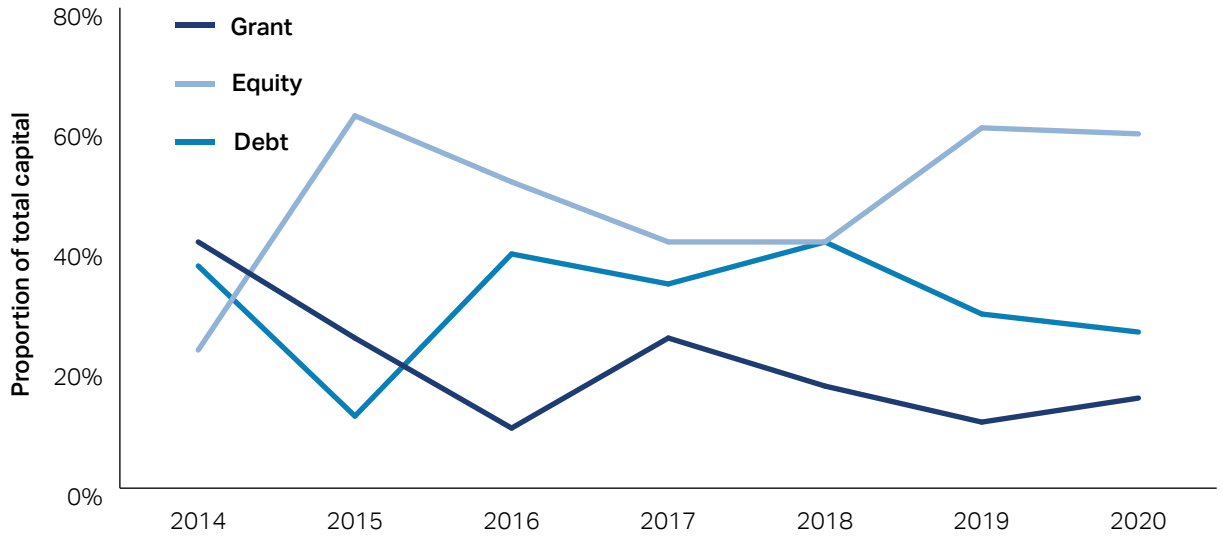
Equity investments have been the largest type of investment in clean cooking companies for the past six years

The relative proportions of equity, debt, and grant capital seen in 2020 were very similar to those in 2019, as shown in Figure 3. Equity has remained the most common type of capital flowing into the clean cooking industry for five of the past six years and represented 59% of the total capital deployed in 2020.

The large relative volumes of equity investments coming into the clean cooking sector imply that the sector is still nascent, but that it is attractive to early-stage equity investors: The US$ 25 million acquisition of KopaGas's proprietary technology by Circle Gas in 2020 provided a successful exit for Acumen, an early-stage investor that bought equity in KopaGas in 2018.

Figure 3 also shows that, in absolute terms, grants have been the smallest type of capital deployed in clean cooking ventures for five straight years. Grants accounted for 15% of the total investment into clean cooking companies between 2016 and 2019. For the past two years combined, almost nine out of every 10 dollars going into clean cooking companies sought some return on investment. That proportion is similar

FIGURE 3. SPLIT OF CAPITAL RAISED BY INVESTMENT TYPE



Source: Clean Cooking Alliance. (N=46 for 2014, N=51 for 2015, N=50 for 2016, N=39 for 2017, N=32 for 2018, N=25 for 2019, N=32 for 2020). The data rely on self-reporting by the companies and has been supplemented with publicly available investment data.

to what was seen in the off-grid solar sector in 2013 and 2014 combined.[6]

Many clean cooking companies report receiving small amounts of grant capital

In absolute terms, grants have been the smallest type of capital going into clean cooking companies, with an average of US$ 400,000 per company in 2020. Grants can be useful to early-stage clean cooking companies to test product market fit, and they can also help larger, more established companies explore the entry of new markets or pilot new products. The data show that grants were used in 2020 for all three of these uses.

Grants have consistently been the most frequently reported type of investment received by companies, as shown in Figure 4, but the number of companies reporting having received grants has declined on the whole, from 36 companies in 2014 to 19 in 2020. Clean cooking companies looking to attract grant funding will need to clearly articulate to funders the specific impacts that they are looking to achieve. From a funder's perspective, one of the most important impact areas associated with clean cooking is gender equality: A recent investor sentiment survey by Energy 4 Impact showed that impact metrics on female empowerment (such as women in management and jobs created for women) are the most commonly sought impact indicators, with 19 funders tracking these metrics.[7]

The number of companies reporting debt investments has declined each year since 2016. The number of companies receiving equity investments is more stable, ranging between 11 to 14 for six of the seven years, as shown in Figure 4.

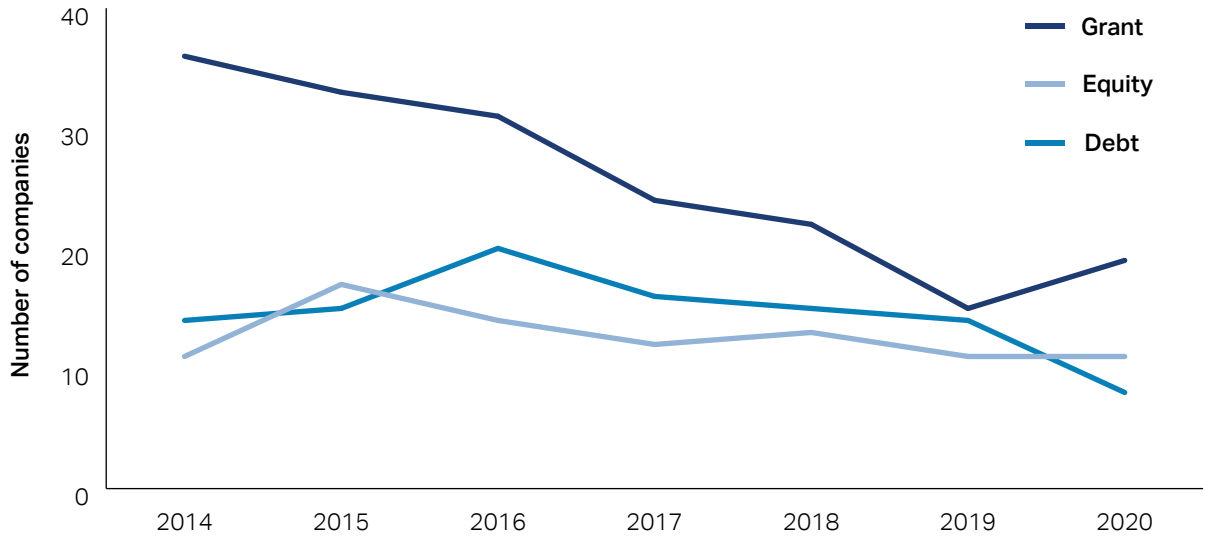
The number of clean cooking companies receiving some form of grant capital tends to be higher than other types of capital; however, transaction sizes are low. Figure 5 shows how the average amount of grant capital attracted by clean cooking companies has consistently been between US$ 100,000 and US$ 500,000 from 2014 to 2020.

Fewer equity transactions are reported by clean cooking companies, but on average these are higher-value deals than other types of capital

The average amount of equity being reported by clean cooking companies has been markedly higher in 2019 (US$ 3.9 million per company) and 2020 (US$ 3.3 million per company) than in the years leading up to 2018, as a series of notable equity deals closed.

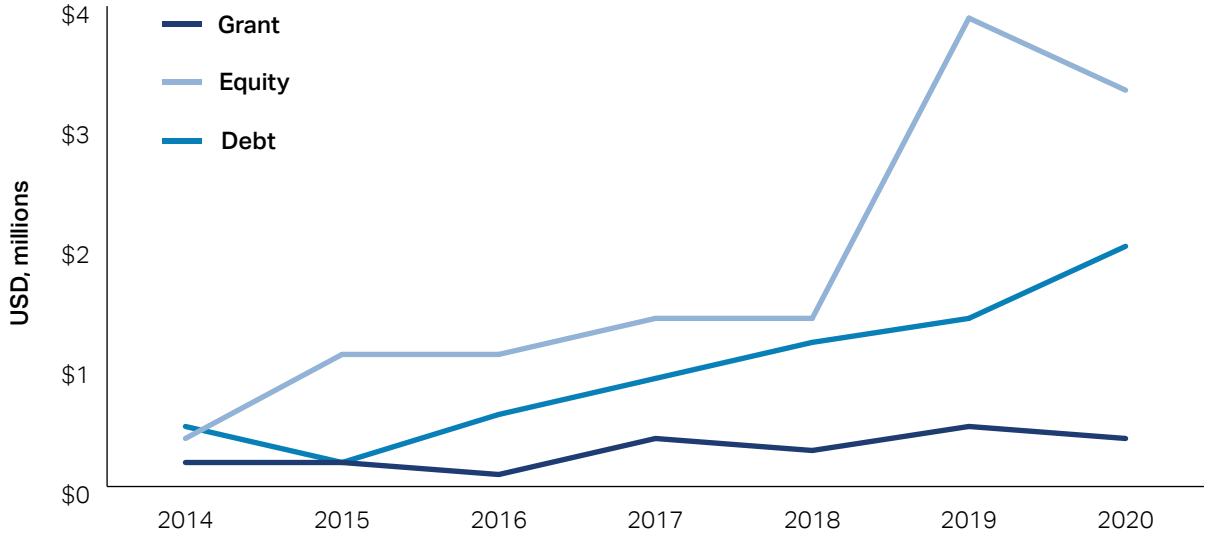
The average amount of debt taken on by clean cooking companies has increased almost linearly since 2015, as shown in Figure 5.

FIGURE 4. NUMBER OF COMPANIES REPORTING HAVING RECEIVED GRANT, EQUITY, OR DEBT INVESTMENTS, BY YEAR



Source: Clean Cooking Alliance. (N=46 for 2014, N=51 for 2015, N=50 for 2016, N=39 for 2017, N=32 for 2018, N=25 for 2019, N=32 for 2020). The data rely on self-reporting by the companies and has been supplemented with publicly available investment data.

FIGURE 5. AVERAGE AMOUNT OF CAPITAL RAISED BY COMPANIES



Source: Clean Cooking Alliance. (N=46 for 2014, N=51 for 2015, N=50 for 2016, N=39 for 2017, N=32 for 2018, N=25 for 2019, N=32 for 2020). The data rely on self-reporting by the companies and has been supplemented with publicly available investment data.

2021–22 INVESTMENT HIGHLIGHTS IN THE CLEAN COOKING INDUSTRY

Although this report focuses on 2020 data, several notable private investments were closed in the clean cooking sector in 2021 and 2022 that more closely reflect the investment trends seen in 2019. The highlights include:

- **Bboxx**, a next generation utility dedicated to transforming lives and unlocking potential through access to energy, received a senior secured medium-term loan of US$ 5.5 million from the AfricaGoGreen Fund for Renewable Energy and Energy Efficiency Investment (AGG) to roll out its solar home systems and cooking solutions in sub-Saharan Africa.
- **HomeBiogas**, an Israel-based company developing biogas systems, successfully completed its initial public offering (IPO) in Israel, with a valuation of 310 million Israeli New Shekels (NIS) after money, or approximately US$ 94 million. The IPO was oversubscribed, and HomeBiogas chose to raise approximately NIS 100 million from some of the largest and leading institutional investors in the Israeli market, including provident funds, insurance companies, and pension funds.
- **XpressGas**, one of the largest LPG companies in Ghana, raised US$ 6 million (US$ 3 million in equity from impact investing group Investisseurs & Partenaires [I&P] and US$ 3 million in debt from Belgian Investment Company for Developing Countries [BIO]) to accelerate the growth of its business to the consumer segment, to further consolidate the B2B business, and to improve its information system, health, and safety standards.
- **Sistema.bio** announced the close of a Series B investment round of US$ 15.6 million that included a mix of equity, debt, and nondilutive capital to support the continued growth and scale of the company's waste-to-energy technology and business model. The round was led by an equity investment from KawiSafi Ventures and matched by AXA IM Alts, a global leader in alternative investments, through the AXA IM impact investing strategy.
- The Government of Rwanda announced an agreement with **KOKO Networks** to develop the world's first nationwide renewable cooking fuel utility. Under the agreement, Rwanda will aim to strengthen the enabling policy environment through measures including removal of value-added tax and import duties on equipment and ethanol fuel, with the full benefit of these cost reductions passed to households via lower consumer prices. KOKO Rwanda, established in partnership with Dalberg Global Development Advisors, will deliver the technology, capital, and expertise to build and operate a nationwide network, leveraging private climate finance of US$ 25 million to create 500 direct jobs and new income streams for thousands of small business partners.
- **FMO**, a Dutch public-private partnership, and **BIX Capital**, a Dutch provider of debt financing to Small and Medium Enterprises (SMEs) to boost access to clean cooking solutions and water purification systems in Africa, both provided debt financing to **C-Quest Capital**, a US-based investor in projects that reduce the environmental impacts of energy production and usage in low- and middle-income countries. US$ 6.4 million was funded through FMO's Access to Energy Fund, a joint project with the Dutch Government to invest equity and debt in sustainable energy efforts in developing economies. The amount of financing from BIX Capital is undisclosed.

In terms of direct investing entities, the private sector remains the dominant source of capital going into clean cooking companies

Figure 5 also shows how the average amount of debt, equity, and grants received by companies all started from similar levels in 2014 but have steadily diverged since then. The divergence between 2015 and 2020 was driven by the increasing dominance of the private sector (angel investors, impact investors, commercial investors, philanthropic foundations, and crowdfunders), whose main instruments are debt and equity investments. Funding coming from public sources are more likely to be grants. Figure 6 shows how the proportion of capital from private sources has increased each year since 2017. It should be noted that this analysis considers only the entity directly investing into companies and does not consider the entity's sources of funds, which could contain public funding, as in funds through private sources originating from public sources, such as the Swedish International Development Cooperation Agency, Norwegian Agency for Development Cooperation, and others.[8]

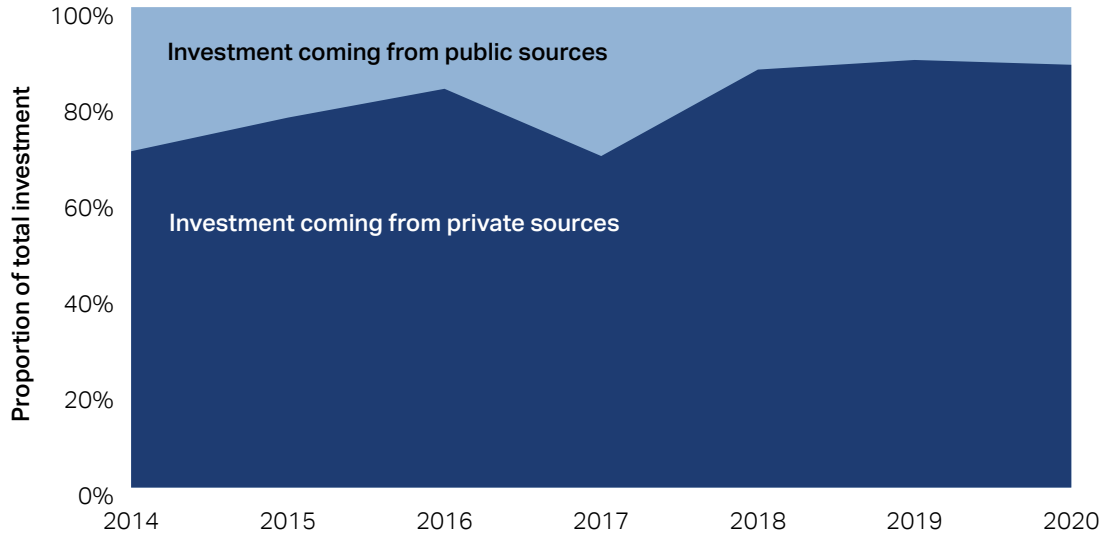
In 2020, the proportion of capital invested into ventures directly and from private sources — rather than directly and from public sources — was 88%, in line with the trend seen in the previous two years. Private sources of capital have provided at least three-quarters of the funds tracked going into clean cooking ventures for five of the past seven years. This is a much higher proportion of private capital than is seen in the climate finance sector more broadly: Research from the Climate Policy Initiative shows that an average of US$ 632 billion of investment was made available for climate projects across 2019 and 2020, and that 51% of this amount came from public sources.[9] However, it should again be noted that were the actual source of capital beyond the investing entity to be tracked, the proportion of public capital in clean cooking companies would likely be higher.

New capital investment continues to be concentrated in increasingly fewer companies

Private sector capital is motivated, all or in part, by the prospect of financial returns, so it is noteworthy that there has been such significant consolidation of capital into fewer clean cooking companies each year, as shown in Figure 7. In 2020, just seven ventures raised more than 90% of the total capital tracked going into 63 ventures. Four of these seven companies were also among the eight companies that received 90% of the capital in 2019.

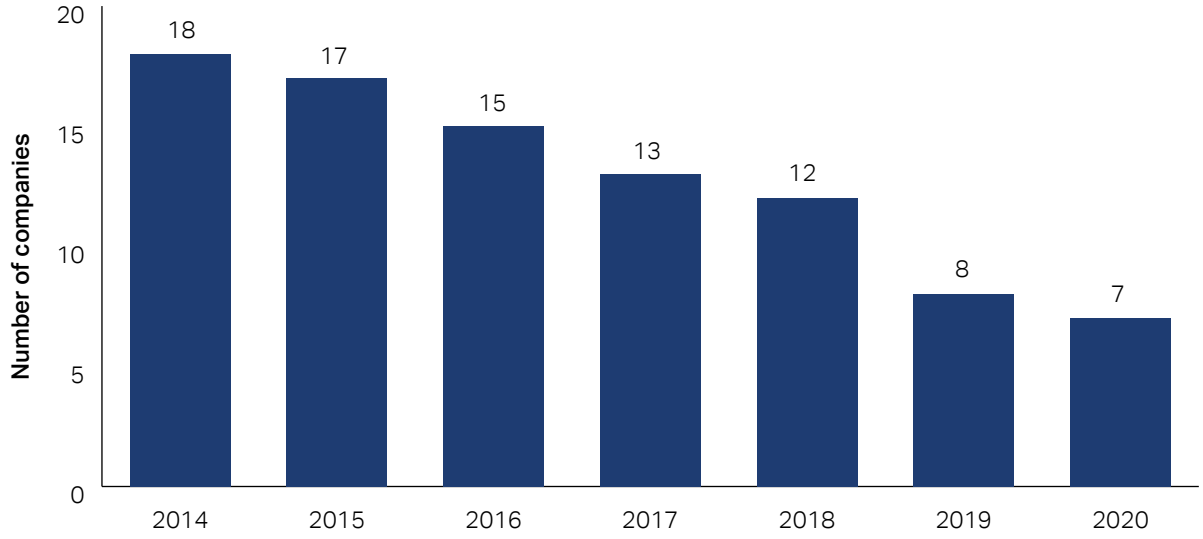
In the off-grid solar sector, GOGLA tracks the concentration of investments going into companies each year. GOGLA reports that, for seven of the eight years between 2012 and 2019, no more than 10

FIGURE 6. CONTRIBUTIONS TO CAPITAL RAISED EACH YEAR BY PRIVATE VERSUS PUBLIC SOURCES



Source: Clean Cooking Alliance. (N=90 for 2014, N=108 for 2015, N=111 for 2016, N=96 for 2017, N=94 for 2018, N=72 for 2019, N=54 for 2020). The data rely on self-reporting by the companies and has been supplemented with publicly available investment data. For this analysis, the classification has been made based on the status of the direct funder, not the source of their funds.

FIGURE 7. NUMBER OF COMPANIES THAT RAISED 90% OF THE TOTAL CAPITAL EACH YEAR



Source: Clean Cooking Alliance. (N=92 for 2014, N=92 for 2015, N=92 for 2016, N=51 for 2017, N=51 for 2018, N=51 for 2019, N=63 for 2020). The data rely on self-reporting by the companies.

companies received at least 90% of the funding in any given year.[10]

Concentration is natural in almost every sector, with a few top players that absorb most of the funding. Generally, a concentration of funding may indicate that investment is becoming increasingly focused on those business models that are viewed as commercially viable and could be seen as a sign of a maturing sector.

Figure 8 shows that the significant increase in average investment size observed in 2019 has been sustained in 2020.

Clean cooking companies serving mostly urban customers received more than half of the total investment in 2020

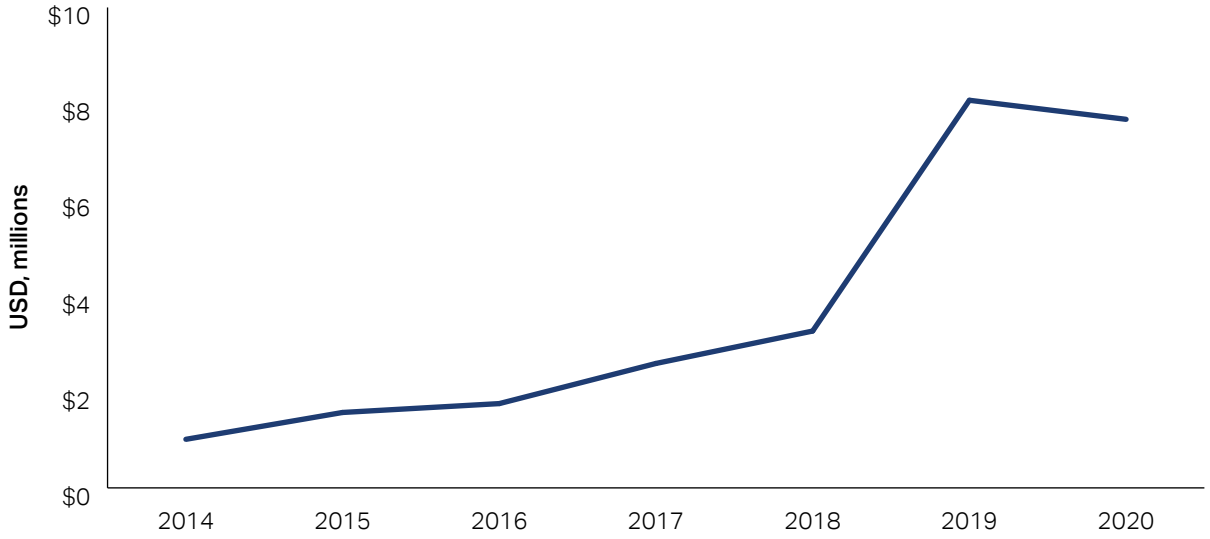
For the second year running, companies that serve only urban consumers raised more capital than companies with rural customers, as shown in Figure 9. This recent trend is linked to the large, return-seeking capital investments from private investors that are directed toward companies serving customers with higher incomes living in urban settings. Another reason to pursue customers in urban areas is that they have lower unit distribution costs due to their denser populations and developed infrastructure networks. These factors should allow companies to serve a greater number of consumers more economically and to penetrate the market more quickly.

Direct funding from multilateral development banks and development finance institutions into clean cooking companies in 2020 was 84% lower than in 2019

Capital flows into clean cooking companies from public sources — governments, multilateral development banks (multilaterals), and development finance institutions (DFIs) — decreased by 6% from 2019 to 2020. This decrease was driven by a 121% increase over 2019 in direct funding going into clean cooking companies from governments. Figure 10 shows that public sources in 2019 provided US$ 7.9 million annually to clean cooking companies, with most of it coming from multilaterals and DFIs. However, in 2020, investment by multilaterals and DFIs fell by 84%.

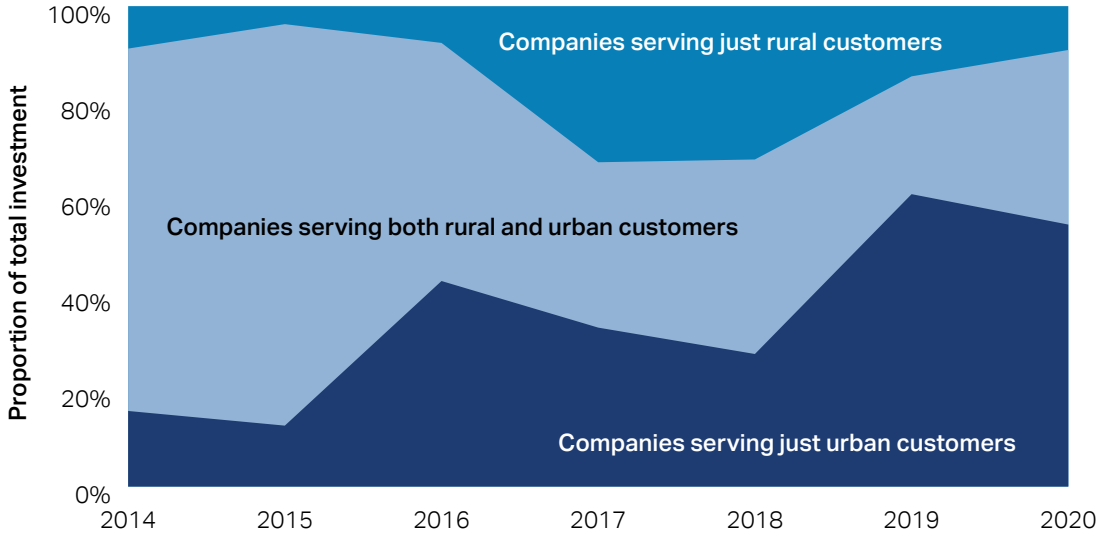
One theory for the decline could be that DFIs would prefer to invest via fund intermediaries, such as Spark+ Africa Fund, BIX Fund Management, Lion's Head's AfricaGoGreen Fund, KawiSafi Ventures, and others. This approach leverages the value-add of fund managers who are closer to the ground, bring specialized knowledge, and are more equipped to invest in and manage smaller transactions.

FIGURE 8. AVERAGE CAPITAL RAISED BY THE COMPANIES THAT COLLECTIVELY RAISED 90% OF THE TOTAL CAPITAL IN EACH YEAR



Source: Clean Cooking Alliance. (N=18 for 2014, N=17 for 2015, N=15 for 2016, N=14 for 2017, N=12 for 2018, N=8 for 2019, N=7 for 2020). The data rely on self-reporting by the companies and has been supplemented with publicly available investment data.

FIGURE 9. INVESTMENT RAISED BASED ON LOCATION OF CUSTOMER



Source: Clean Cooking Alliance. (N=47 for 2014, N=51 for 2015, N=50 for 2016, N=39 for 2017, N=32 for 2018, N=25 for 2019, N=32 for 2020). The data rely on self-reporting by the companies and has been supplemented with publicly available investment data.

Gender-lens investments accounted for 12 percent of the company-reported investment in 2020

In this year's Industry Snapshot, CCA asked companies to self-report whether the capital they received in 2020 was invested with the intention of achieving gender impacts. Companies were asked to indicate "whether the investment is specifically made to improve the lives of women, either because the investor was known to use gender as an eligibility or selection criterion to inform their investment decision, or because the investment will be used with the intent to address gender issues or promote gender equity." Of the 32 companies to report raising capital in 2020, eight (25%) noted at least some of the investments made in them had a gender-lens component. However, as shown in Figure 11, when the associated investment amounts are considered, only 12% of the funding going into clean cooking companies in 2020 was motivated by achieving gender impacts.

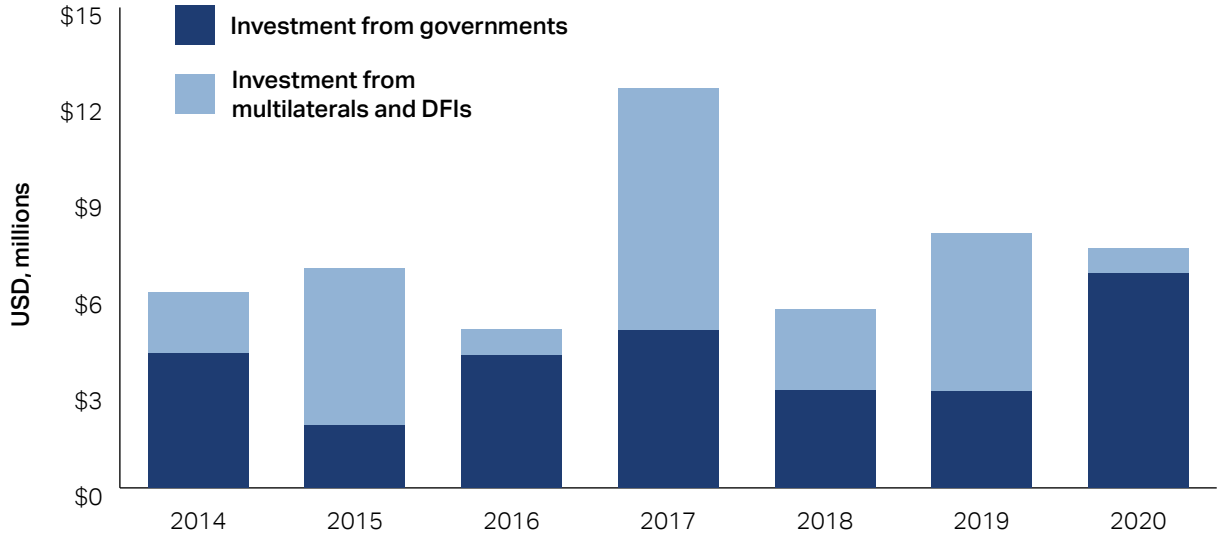
The disconnect between the proportion of companies receiving gender-lens investment in 2020 and the value of gender-lens investments tracked going into clean cooking companies shows that gender-lens investments tend to be smaller in size than gender-agnostic investments. The range in size of gender-based investments was between US$ 6,000 and US$ 3.5 million, and the average amount was US$ 537,000. The average gender-agnostic investment was US$ 2.6 million.

When the type of capital is considered, just 10% of the equity that was tracked going into companies in 2020 was motivated by gender impact. Grants had the highest proportion of investment that was motivated by impact on gender: 36% of grants were gender-motivated in 2020. Going forward, in terms of driving up the proportion of gender-motivated investments, funders should continue to set and track indicators of gender-related impacts being unlocked from their investments.

At least 12 of the 120 companies for which CCA has investment data have a female CEO, COO, CFO, or founder. However, it should be noted that investment tagged to female-led companies is likely to be underreported, as CCA does not have details of executive board memberships for all survey respondents going back to 2014.

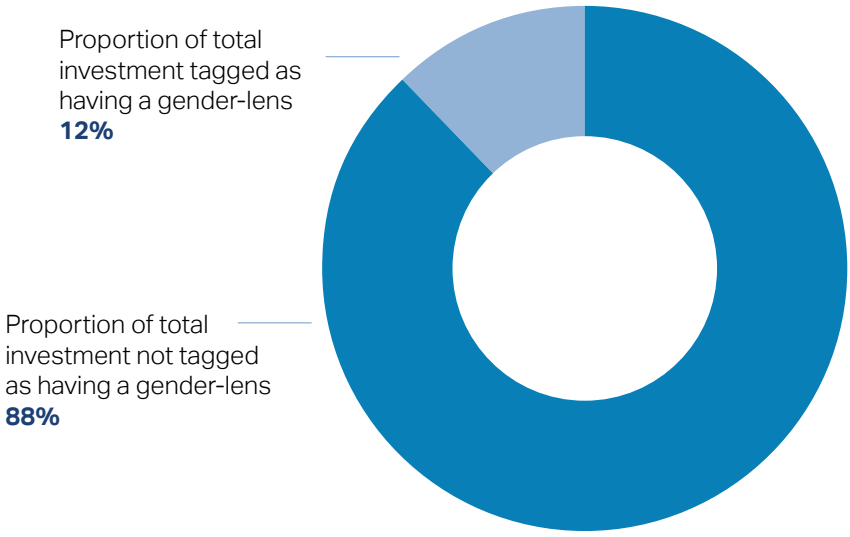
Companies with a female CEO, COO, CFO, or founder received 13% of the investment tracked going into companies in 2020, slightly below the 17%[11] average between 2014 and 2020. This is comparable with research from the Female Founders Forum, which shows that between 2016 and 2021, female-led businesses in the UK raised 15% of equity finance,[12] far lower than the 42% of investment that went into female-founded green tech businesses.[13]

FIGURE 10. BREAKDOWN OF CONTRIBUTIONS MADE BY PUBLIC SOURCES SHOWN IN FIGURE 6



Source: Clean Cooking Alliance. (N=75 for 2014-2019, N=12 for 2020). The data rely on self-reporting by the companies and has been supplemented with publicly available investment data.

FIGURE 11. PROPORTION OF CAPITAL RAISED IN 2020 WHERE THE INVESTMENT DECISION WAS MOTIVATED (ALL OR IN PART) BY IMPACT ON GENDER



Source: Clean Cooking Alliance. (N=32). The data rely on self-reporting by the companies and has been supplemented with publicly available investment data.

IN FOCUS

SPARK+ AFRICA FUND LAUNCHES AS THE WORLD'S FIRST IMPACT INVESTMENT FUND DEDICATED TO CLEAN COOKING ENERGY SOLUTIONS

In March 2022, Spark+ Africa Fund launched as a partnership of 15 DFIs, foundations, pension funds, and other investors. The Fund announced its first close at US$ 41 million and targets a final size of US$ 70 million.

Spark+ was developed through a multi-year collaboration between CCA and Enabling Qapital (EQ), a Switzerland-based impact investment advisory firm. The investment team is based primarily in Nairobi.

Spark+ invests throughout sub-Saharan Africa in early-growth stage companies with scalable business models across the value chains of LPG, ethanol, biomass, biogas, and electric appliances and fuels. It prioritizes innovative technology-enabled solutions which overcome affordability barriers, enable economies of scale, and build long-term customer relationships, and maximize social and environmental impacts in doing so.

The Fund plans to make US$ 1-7 million investments in the form of on- and off-balance sheet debt, as well as long-term, mezzanine capital (quasi-equity). In addition, it provides complementary technical assistance funding to support its portfolio companies.

DFIs in the Fund's first close include African Development Bank's Sustainable Energy Fund for Africa (SEFA), Investment Fund for Developing Countries (IFU) (Denmark), and the Belgian Investment Company for Developing Countries (BIO) (Belgium). Foundations and family offices include Ceniarth, Osprey Foundation, Fundacion Netri, and the Ashden Trust. Four major pension funds also participated in the first close, including the pension fund of leading insurance company Baloise Group, and GastroSocial, the pension fund of the hospitality industry, both in Switzerland.

EEP AFRICA ON THE IMPORTANCE OF FLEXIBLE GRANT FINANCING FOR MARKET DEVELOPMENT

Grant funding still has a critical role to play in de-risking innovation and developing successful business models in the clean cooking sector. Beyond project financing, grants can support the commercial progression of a company, enable sector-wide learnings, and stimulate markets.

EEP Africa, a multi-donor fund providing early-stage financing to innovative clean energy projects, technologies and business models in Southern and East Africa, has invested over EUR 56 million in early-stage clean energy projects in 15 countries across Africa over the past decade, including EUR 12 million disbursed to more than 50 clean cooking projects. Some early grantees have grown into market powerhouses, such as BURN Manufacturing (a vertically integrated original equipment manufacturer), while more recent grantees, like ACE and Acacia Innovations, are emerging leaders in the sector. The fund has increasingly targeted its support toward local companies (43% of the recent portfolio) and women-led companies (34%), which face significantly higher barriers to commercialization.

A new study[14] based on the EEP Africa portfolio shows that developers in the clean energy sector primarily use grants to test new products and markets. For a startup, the grant project may constitute its entire operations. For a more mature company, the grant may be used to innovate or expand in a new direction. In both cases, companies see grants as "learning money" that provides them space to find the right product fit and, if needed, to pivot their business model before trying to scale up or secure private investment. Since 2018, 24% of companies in the EEP Africa portfolio made market-driven pivots during the project period. Even grant-funded projects that "fail" according to traditional metrics, such as number of households reached, can offer the sector important learnings about the product, service, or market. Based on this, a line of inquiry can be closed or adjusted toward an approach that better attracts a customer base sufficient for growth and profitability.

To advance long-term sustainability and facilitate private investment, the analysis reveals that grant funding should be flexible, market-oriented, and rooted in the local context. EEP Africa's experience shows that grant funding fills an important gap in the clean cooking finance ecosystem and accelerates market development.

SIMA ON THE ENERGY ACCESS RELIEF FUND, ASSISTING COMPANIES WITH COVID-19 RECOVERY

Social Investment Managers and Advisors (SIMA), a fund manager focusing on innovative investments in emerging markets' social enterprises, has been providing loans to small- and medium-sized borrowers in sub-Saharan Africa and Asia Pacific as part of the Energy Access Relief Fund (EARF), which was launched in September 2021. There are several investors in EARF, with capital blended to encourage return-seeking investors to participate. Multilaterals such as the World Bank and IFC provided the first-loss capital, and Sweden's SIDA provided a guarantee that was subordinated to the senior fund investors: CDC, DFC, FMO, and Acumen.

EARF provides subordinated, unsecured, and subsidized loans to companies working in the energy access sector, serving some of the world's poorest consumers and experiencing liquidity challenges due to COVID-19.

At the time of publication, SIMA has received over 500 applications from companies across more than 50 countries. Within a few months of fund closure, EARF has approved loans to 46 companies across 17 countries and intends to provide an additional 50 to 60 loans by June 2022. The current EARF portfolio includes six clean cooking companies, four of which have already had funds disbursed to them. Among them are OTAGO, a char-briquette manufacturer in Cambodia that has received US$ 200,000 of subordinated debt, and Lanforce Energy, a biogas manufacturer in Zimbabwe, which has received US$ 60,000 of subordinated debt.

Recipients of EARF loans cited several benefits to these loans, including being able to retain workers during the pandemic since 2020, avoiding retrenchments, increasing their liquidity, building confidence with equity investors, and being better prepared for raising private equity financing. The impact of COVID-19 is still being felt by companies in the clean cooking sector, and the EARF facility, which expects to provide 90 to 100 loans in total, remains open for **applications**.

Sales & Operational **TRENDS**

To analyze how clean cooking sales revenue has been performing over time, CCA collated a consistent set of sales records for 32 clean cooking companies for 2014–20.[15] Looking into revenue recorded in 2020, three key observations emerge: that overall clean cooking revenue is driven by a relatively small number of companies, that there was a decline in non-carbon revenues during 2020, and that biomass cookstove manufacturers have experienced a resurgence in sales revenue.

Overall clean cooking revenue is driven by a relatively small number of companies

Six companies accounted for 82% of the US$ 26 million total clean cooking revenue tracked across 32 clean cooking companies in 2020.

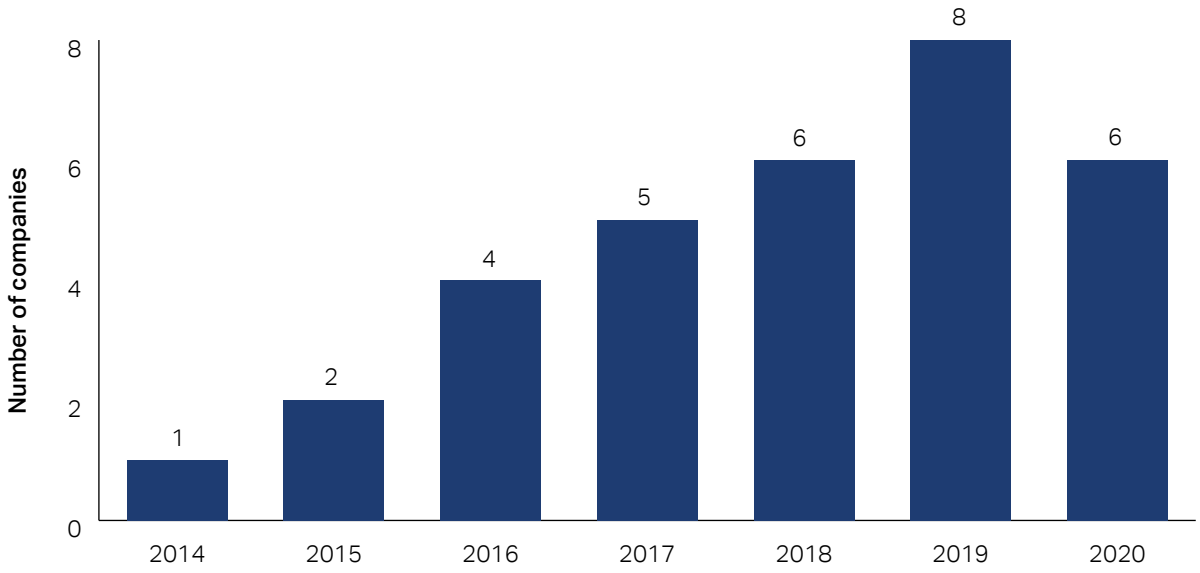
Figure 12 shows how the number of companies recording at least US$ 1 million in clean cooking revenue has changed over time. The general trend is one of a growing number of companies earning more than US$ 1 million each year, but 2020 was the exception. In 2020, just six companies had clean cooking sales revenue of at least US$ 1 million.

Of those six companies, five were among the eight that achieved the milestone of at least US$ 1 million in clean cooking sales revenue in 2019. One company was able to grow its clean cooking revenue in 2020 beyond US$ 1 million for the first time.

There was a 13% decline in non-carbon clean cooking revenue in 2020

Figure 13 shows that in 2020, clean cooking revenue across the 32 companies in the dataset fell to US$

FIGURE 12. NUMBER OF COMPANIES REPORTING REVENUE FROM CLEAN COOKING SALES OF US$ 1 MILLION OR HIGHER



Source: Clean Cooking Alliance. (N=14 for 2014, N=18 for 2015, N=23 for 2016, N=24 for 2017, N=25 for 2018, N=26 for 2019, N=27 for 2020). The data rely on self-reporting by the companies.

26 million. The 13% decline from 2019 clean cooking revenue across the same companies was much steeper than the 4% decline from 2018 to 2019. This is the third year running where a decline in non-carbon sales revenue occurred across the 32 companies in this dataset. COVID-19 may have been one of the drivers behind this result; however, carbon revenue also increased significantly in the same period (see below).

While 13 of the 32 companies registered a decline of more than 10% in clean cooking revenue for 2020 relative to 2019, 10 companies had an increase of more than 10% in their 2020 clean cooking revenue relative to 2019. Six of them were biomass cookstove manufacturers.

Some clean cooking companies have shown very high levels of clean cooking revenue growth over the past three years. Six companies were clean cooking "gazelles,"[16] with clean cooking revenue showing a compound annual growth rate of more than 20% per annum between 2018 and 2020.

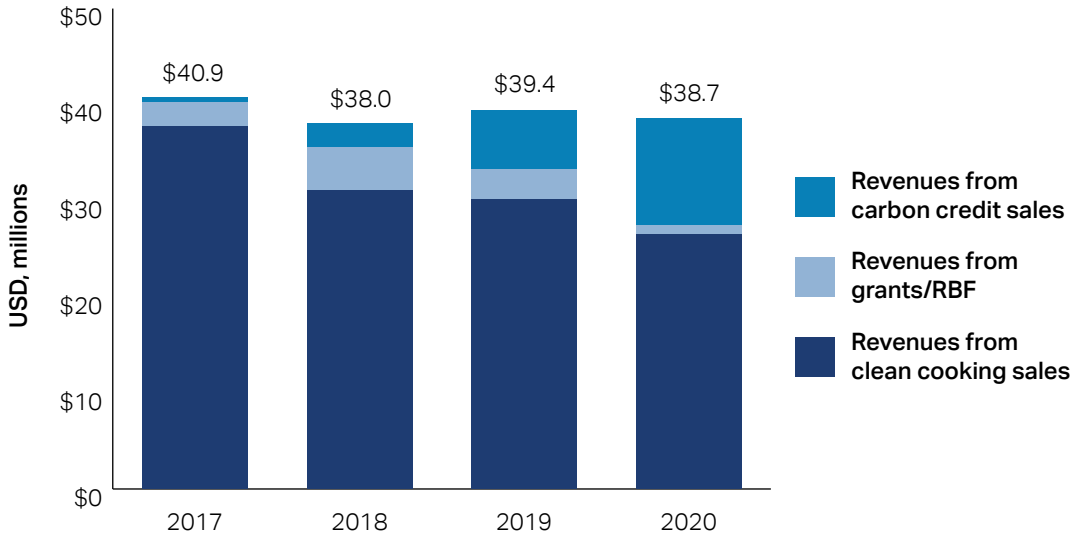
Revenue from carbon credits increased 21-fold between 2017 and 2020

As highlighted in Figure 13, the revenue from clean cooking sales from 32 companies has been in decline since the US$ 38 million peak in 2017. However, when revenue from clean cooking sales is combined with revenue from results-based financing and carbon credit sales, as shown in Figure 13, total clean cooking sector revenue has remained within a stable range of US$ 38 million to US$ 41 million since 2017.

The relative contribution of these three revenue components shifted significantly between 2017 and 2020; carbon credit sales revenue was just 1% of the total revenue in 2017 but has risen to 29% of the total in 2020.

In absolute terms, the total revenue from carbon credit sales reported by companies has increased by

FIGURE 13. REVENUE FROM DIFFERENT SOURCES



Source: Clean Cooking Alliance. (N=32). The data rely on self-reporting by the companies.

more than 21-fold (from US$ 500,000 in 2017 to more than US$ 11 million in 2020). The increase in carbon revenues has been driven by two factors: the number of companies that are receiving carbon credit revenue and the size of associated carbon credit deals. Of the 27 companies responding to the Industry Snapshot survey, seven (26%) reported revenue from carbon credits, double the proportion (13%) in 2017, as shown in Figure 14. Figure 14 also shows that the average carbon credit sales revenue reported by companies has increased by approximately US$ 500,000 each year between 2017 and 2020, to reach just over US$ 1.5 million in 2020.

There is potential linkage between the increasing carbon revenue from 2018 onward, shown in Figure 14, and the increasing dominance of the private sector as a source of investment into clean cooking companies, shown in Figure 6. The sector is in the early stages of a positively reinforcing cycle where carbon revenue provides private investors with a means of accessing larger returns from their investments more quickly, derisking return-seeking investments in clean cooking companies that are well positioned to generate carbon revenue. More investment then enters these companies, making them better equipped to fulfill larger orders, further unlocking larger volumes of associated carbon revenue.

Biomass cookstoves remain dominant in terms of reported industry revenue share

Biomass cookstove sales remain the dominant source of revenue for clean cooking sales throughout the period, as also shown by Figure 15. While just 11 of the 32 companies tracked for this analysis are biomass stove manufacturers (34%), they accounted for three-quarters of the sales revenue between 2014 and 2020.

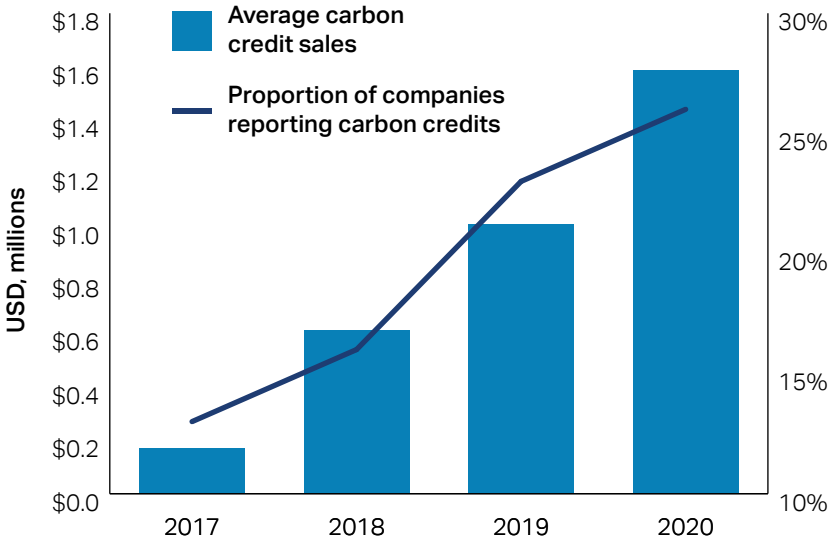
In 2020, sales from biomass cookstoves grew by 5% relative to 2019, stopping two years of declining revenue. The emerging trend of other clean cooking solutions gaining market share between 2017 and 2019 did not continue into 2020; sales from all other technologies fell by 35% from 2019 to 2020. As such, biomass stove sales were 69% of the total clean cooking sales revenue tracked in 2020, up from 58% in 2019.

The steep decline from 2017 to 2018 shown in Figure 15 was largely due to the substantial operational scale-down of Envirofit International, a biomass cookstove manufacturer.

Biomass cookstoves were the only subsector to post a net increase in aggregated revenue between 2019 and 2020

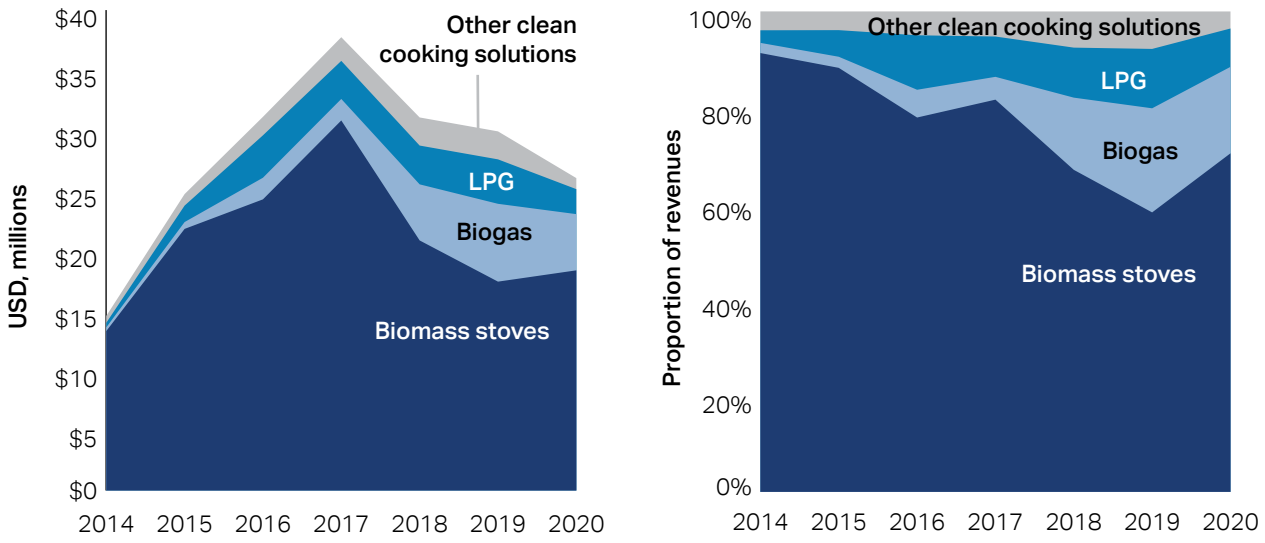
Biomass cookstove companies posted a net increase in aggregated revenue in 2020, as nine of 16 biomass

FIGURE 14. THE RISE OF CARBON CREDIT SALES AS A SOURCE OF REVENUE FOR CLEAN COOKING COMPANIES



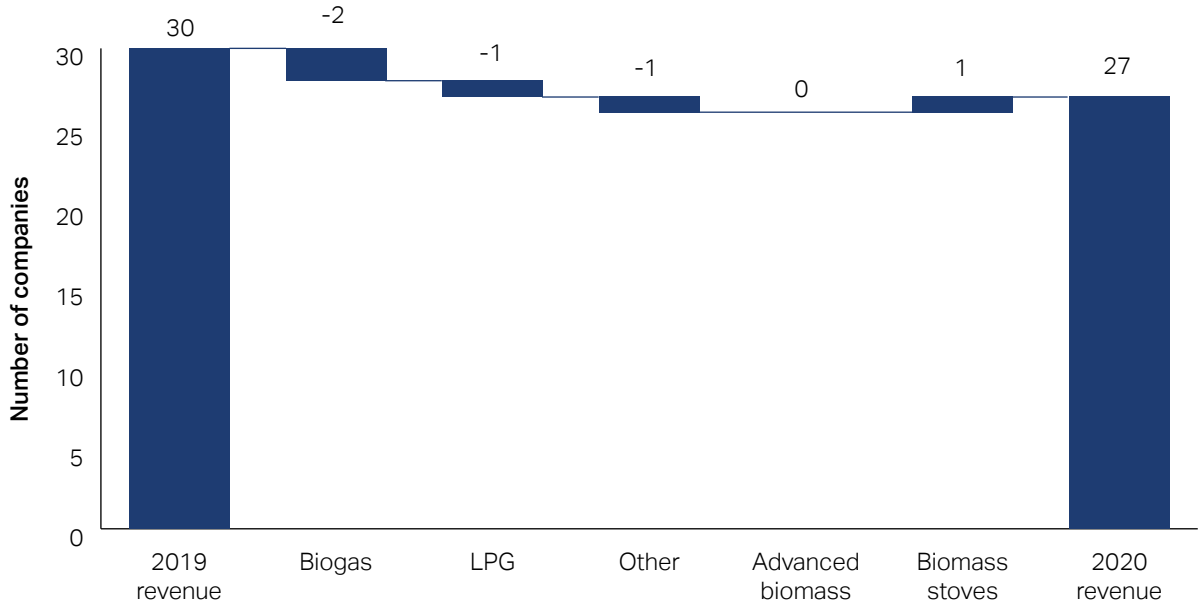
Source: Clean Cooking Alliance. (N=32). The figures tracked are not transaction amounts, but revenue reported in income statements.

FIGURE 15. REVENUE FROM CLEAN COOKING SALES BY TECHNOLOGY: (LEFT) BY ABSOLUTE REVENUE AND (RIGHT) BY PERCENTAGE



Source: Clean Cooking Alliance. (N=32). The data relies on self-reporting by the companies.

FIGURE 16. COMPARISON OF REVENUE TRACKED COMPANIES BETWEEN 2019 AND 2020, SPLIT BY TECHNOLOGY TYPE



Source: Clean Cooking Alliance. (N=36). The data rely on self-reporting by the companies. "Other" comprises ethanol, solar, and electric, but it does not include data from KOKO Networks, the biggest last-mile ethanol distributor. Advanced Biomass comprises pellets, char-briquettes, and briquettes.

cookstove companies increased their revenue relative to 2019. Biomass cookstove companies were the only formal technology type to do this, as shown by Figure 16.

It is possible that COVID-19 contributed to the steep decline in total clean cooking revenue from 2019 to 2020 and to the relative resurgence in sales revenue for biomass cookstoves

One-quarter of informal urban settlement households in Kenya switched their cooking fuel from LPG to wood or kerosene during COVID-19 lockdown.[17] Increased spending on more familiar and accessible biomass cooking fuels could have driven some consumers toward buying solutions that offer more efficient combustion of biomass fuels, boosting revenue from biomass cookstove sales in 2020.

Most clean cooking sales revenues come from companies that serve both rural and urban customers

Twenty companies serve both rural and urban customers, representing 63% of the dataset, and they captured 83% of the total clean cooking revenue tracked between 2014 and 2020.

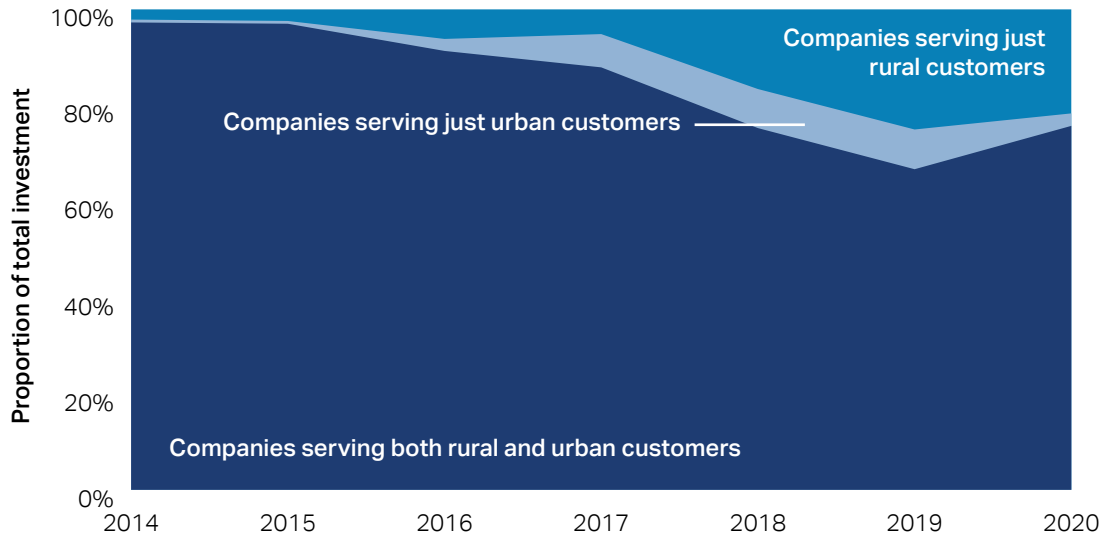
In 2020, nearly 3% of revenue tracked went to companies serving only urban customers, 22% came from companies serving only rural customers, and 76% of revenue was from companies serving both urban and rural customers, as shown by Figure 17.

Please note that the companies involved in this figure are not the same as the companies underpinning the investment numbers in Figure 9, so a direct comparison between these two charts is not possible.

Less than half of clean cooking companies reported positive EBITDA in 2020

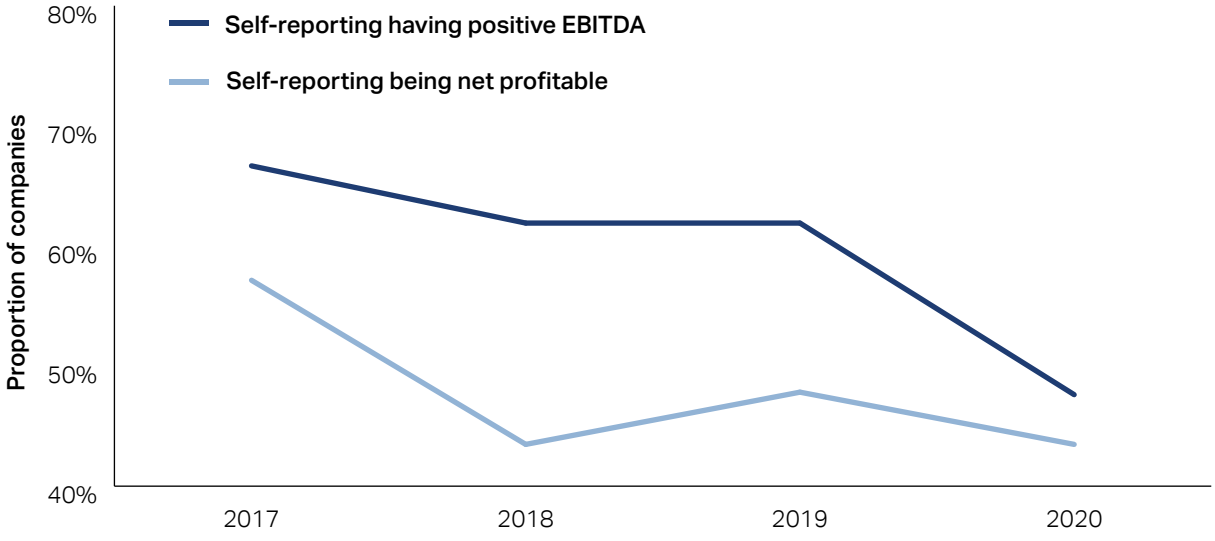
Self-reported net profitability and EBITDA data from companies confirm that, for many, 2020 was a tougher year than most. Figure 18 charts the proportion of companies self-reporting having positive EBITDA, and those self-reporting being net profitable. For the first time since CCA started collecting EBITDA and profitability data in 2017, less than half of the companies reported having positive EBITDA. The proportion of companies reporting being net profitable dipped to just 43% in 2020 — the lowest on record since 2017. Restrictions introduced in 2020 to stop the spread of COVID-19 severely disrupted global supply chains, caused delivery delays, and increased prices for many components and raw materials. On a worldwide basis, the number of manufacturers reporting shortages of transport supply was the highest since IHS Markit began tracking the indicator in 2007. These supply-side factors, combined with a demand-side issue of disposable income being squeezed by the impact of the pandemic, have put a downward pressure on margins for many clean cooking companies that is still being felt today.

FIGURE 17. PROPORTION OF REVENUE FROM COMPANIES BY CUSTOMER LOCATION



Source: Clean Cooking Alliance. (N=14 for 2014, N=18 for 2015, N=23 for 2016, N=24 for 2017, N=25 for 2018, N=26 for 2019, N=27 for 2020).

FIGURE 18. PROPORTION OF COMPANIES SELF-REPORTING POSITIVE PROFITABILITY AND EBITDA



Source: Clean Cooking Alliance. N.B. a smaller number of companies provided profitability data or EBITDA data than reported clean cooking revenue (N=21 for companies reporting profitability in 2017–20; N=23 for companies reporting EBITDA in 2017–20).

IN FOCUS

BIDHAA SASA'S RESILIENCE DURING COVID-19

Despite national and regional lockdowns in its core and growth markets of Kenya and Uganda, Bidhaa Sasa, a last-mile finance and distribution business, grew its geographic footprint during the pandemic from seven branches to 13 and its personnel from 80 staff members to 130. The company also maintained significant revenue in 2020 that was on a par with pre-pandemic levels, following a rebound in sales during the second half of 2020.

The company made several operational improvements during COVID-19, as lockdown-imposed downtime was used as an opportunity to identify and fix existing structural weaknesses. A new IT system was rolled out across its field workforce, time was invested in internal sales training efforts, and several operational process adjustments were made to better manage a diverse and dispersed set of sales agents going forward. The company also provided consumers with free re-usable masks and soap during the first wave of COVID-19 in 2020, which helped to build consumer trust and loyalty.

However, from Bidhaa Sasa's perspective, 2021 was a particularly challenging year. The economic effects of the pandemic could be felt across Kenya, with an accelerated school calendar necessitating a condensed school fee schedule — a major household expense. A similar picture is unfolding in Uganda, where schools were closed for almost two years. The economic hardship felt by Bidhaa Sasa's customers has put a squeeze on the company's revenue, as has an increase in taxation on clean cooking products by the Government of Kenya, which effectively made clean cooking products 16% more expensive overnight.

The need for investors to continue supporting companies in the clean cooking sector has increased because of COVID-19, but Bidhaa Sasa's available funding has decreased over the pandemic, as funders and supporters of the clean cooking sector have been less able to travel or have held back on making investments. For companies operating in countries with no government programs offering help with the financial impact of the pandemic, this tightening of private- and donor-funded capital flows was felt particularly acutely.

SSM AND THE IMPORTANCE OF CARBON CREDIT REVENUE

SSM is a mass market manufacturer of clean cookstoves that can produce 1.5 million improved biomass cookstoves a year. One of the key constraints for clean cooking sales is affordability for end users. For SSM, carbon credit revenue offers a way to bridge this affordability gap and increase the company's reach.

Carbon credit projects have three main benefits for SSM. First, they lower the cost of each cookstove for end users, which increases demand. Second, because carbon credits are associated with projects that have a defined geographical footprint, the target market becomes more concentrated, lowering unit distribution costs. Third, large, carbon credit-backed orders help to create certainty for demand.

This demand has enabled SSM to invest in large capital projects that have upgraded production technology and improved production capacity, which in turn lowers unit production costs and product prices. Since 2013, six large carbon credit projects in Kenya, Laos, Myanmar, Rwanda, and elsewhere have helped SSM to commit to investing in three upgraded advanced manufacturing bases. These improvements have enabled SSM to provide production capacity guarantees for large-volume orders of more than three million stoves, increase the degree of factory automation, and lower operating costs by 35% without compromising the stability and quality of the final products.

Research & Development **TRENDS**

Investment levels in research & development (R&D) declined by one-third compared with the 2019 R&D levels

R&D investment declined by one-third, from US$ 16.6 million in 2019 to US$ 11.1 million in 2020. R&D levels in 2020 were just 10% of total revenue.

The drop in company spending on R&D could potentially be linked to COVID-19 and the need for companies to tighten discretionary spending. However, there was not a complete cessation of innovation in 2020: As shown in Figure 19, 71% of companies still brought out a new offering, down from 93% of companies that reported doing so in 2019.

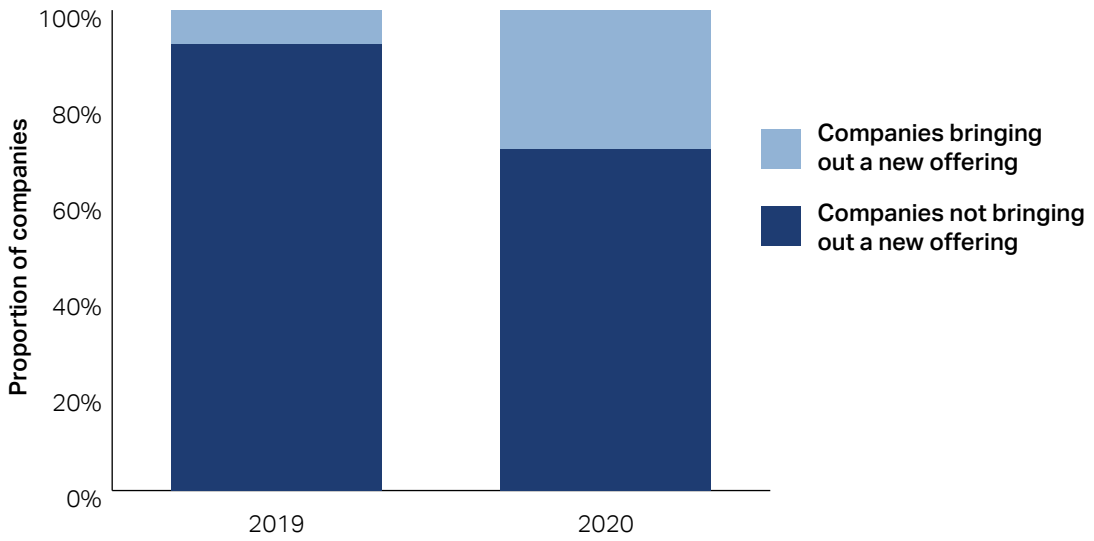
In 2019, the average amount invested in R&D by companies releasing a new product was US$ 640,000; in 2020, this average fell to US$ 470,000.

Equity remained the most common source of funding for R&D in both 2019 and 2020.

The overall number of patent applications made by clean cooking companies reached record highs in 2020

Another measure of innovation in a sector is the annual number of patent families.[18] A patent family is defined as a set of patents registered in various countries to protect the same invention. Patent family counts can be attributed to the date when the patent was first registered.

FIGURE 19. PROPORTION OF COMPANIES BRINGING OUT NEW CLEAN COOKING PRODUCTS OR SERVICES



Source: Clean Cooking Alliance. N.B. only a subset of companies provided data on R&D spending for 2019–20 to CCA (N=28)

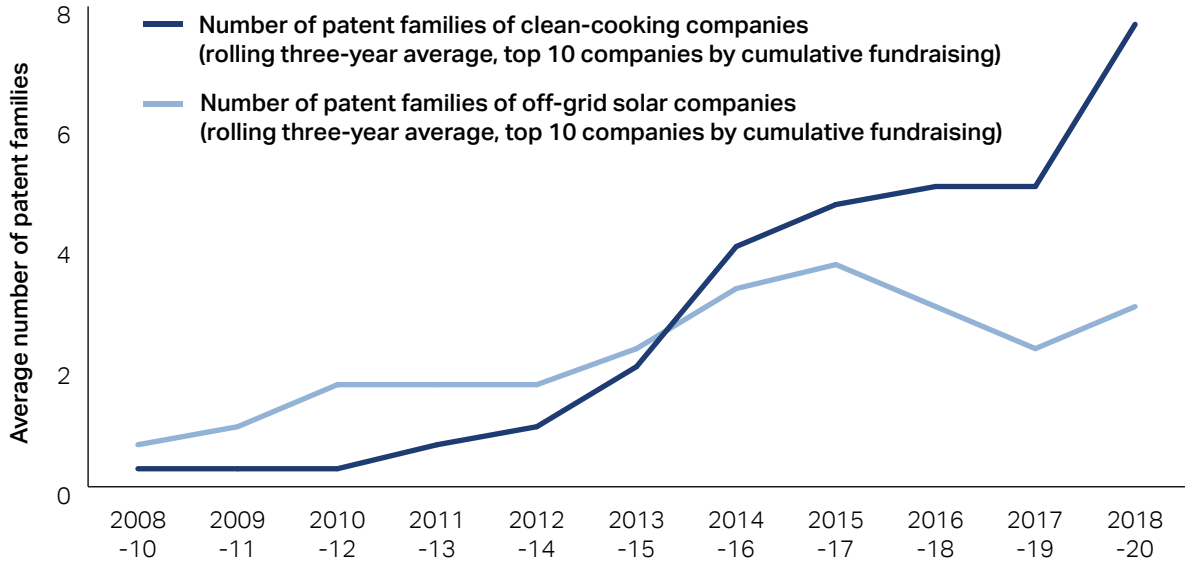
From 2008 to 2015, the 10 biggest companies by total investment commitment in off-grid solar[19] lodged more patent families than the 10 biggest clean cooking companies by total investment commitment. However, the trend flipped from 2016 onward, as shown in Figure 20. In terms of relative size, the 10 largest off-grid solar companies raised US$ 1.2 billion[20] since 2012 (accounting for 78% of the total investments in off-grid solar companies during this time), while the 10 largest clean cooking companies raised US$ 200 million since 2014 (accounting for 68% of the total investments in clean cooking companies during this time).

The uptick in the number of patent families of clean cooking companies since 2016 was driven by a single clean cooking company registering patents in China only. When that company's patents are removed from the analysis, the rolling average number of patents filed by the remaining nine clean cooking companies closely tracks — but remains just below — that of the off-grid solar companies throughout the period. The median number of patent families registered among the clean cooking companies is one patent family, just below the median of two patent families registered by off-grid solar companies.

The patents registered by off-grid solar companies were mostly related to the remote monitoring systems needed to enable PAYGO functionality, and to battery optimization, rather than lights and solar panels. This indicates that innovations happening in adjacent sectors such as off-grid solar have the potential for positive spillover effects into clean cooking.

Patenting data also hint to the more globalized nature of the off-grid solar sector. While in the clean cooking sector only 27% of patent family counts involve patents in more than one country, the corresponding figure is 44% in the off-grid sector.

FIGURE 20. COMPARISON OF PATENT FAMILIES OF THE TOP 10 FUNDRAISERS IN CLEAN COOKING AND OFF-GRID SOLAR, USING A THREE-YEAR ROLLING AVERAGE



Source: Clean Cooking Alliance analysis, based on WIPO Patentscope database (N=10 for clean cooking, N=10 for off-grid solar)

IN FOCUS

BURN MANUFACTURING DIVERSIFIES INTO NEW PRODUCT LINES

BURN Manufacturing has sold over 1.2 million fuel-efficient biomass cookstoves to date and recently expanded its production capacity to 55,000 units per month.

In 2020, despite the COVID-19 pandemic, BURN experienced significant growth with a 14% increase in revenue over 2019. This is because BURN has capitalized on the increase in global carbon credit demand caused by net-zero commitments.[21] That, in turn, has further increased demand for BURN's products, the use of which generates carbon credits due to its thermal efficiency tiering among natural draft wood and charcoal cookstoves.

This growth was also attributable to an expanded sales and marketing reach, which took BURN from its core markets in Kenya and Somalia to Ghana, Ivory Coast, Mozambique, Nigeria, Senegal, and elsewhere.

BURN has also diversified its product suite to include not only biomass cookstoves (its Jikokoa and Kuniokoa brands) but also hybrid, LPG, and electric cookstoves. As a result, BURN's team has grown to more than 700 full-time employees, with one in seven currently based in BURN's expansion markets. The company has an in-house R&D team of 35 people who continually refine and add to BURN's product catalog.

THE R&D STORY OF JET-FLAME AND ITS COMMERCIAL EXPANSION

In 2018, Aprovecho Research Center (ARC) was hired by Global Health Laboratories (GHL), which is funded by the Bill and Melinda Gates Foundation, to co-innovate how fan-driven jets of air could be optimized to reduce emissions in a rocket stove. GHL optimized the size and location of jets of primary air directed up into the fire and SSM improved the prototype further, ultimately creating the Jet-Flame device.

Recent laboratory tests of the Jet-Flame in earthen stoves, rocket stoves, and open fires have shown dramatic reductions in emissions while improving thermal efficiency:

International Organization for Standardization (ISO) Metrics	Average Effect
Thermal Efficiency	19%
Carbon Monoxide Emission Factor	-68%
Particulate Matter Emission Factor	-90%

ARC and ASAT (a for-profit sales organization owned by ARC) have partnered with C-Quest Capital (CQC) to sell 300,000 Jet-Flames in Rwanda, 200,000 in Zimbabwe, and 50,000 in Malawi in 2022 and 2023. The stoves will be sold with a substantial reduction in cost to the household, supported by carbon credits. The Jet-Flame is also included in CQC's five-year program that will bring clean cookstoves to 6 million rural and peri-urban households in India, supported by carbon credits.

ATEC* INTERNATIONAL DEVELOPMENT AND LAUNCH OF ITS MAGNETIC INDUCTION COOKER

ATEC* International, a biodigester and electric cooking company operating in Cambodia and Bangladesh, launched its second patented PAYGO product range — eCook — in 2021, after two years of R&D and the successful launch of PAYGO biogas.

Bangladesh and Cambodia each now have more than 80% of households connected to the grid, and this is expected to be close to 100% in the next few years. Yet up to 80% of households still cook with biomass. With rapid grid rollout and expanding off-grid solar capacity, ATEC* International sees a combination of biogas and electric cooking as the most viable current long-term clean cooking offering in these markets. At a business level, it also means ATEC* International can spread its risks and costs across multiple product lines, which has the added benefit of increasing the company's resilience to changing customer needs.

Other Emerging **TRENDS**

In addition to the insights derived from the Industry Snapshot data collection, CCA is tracking six trends that are shaping clean cooking markets, and it will continue to track these trends in the years ahead:

- Metering technology products are being developed to track real-time consumer usage data, and methodologies for verifying usage will continue to be updated accordingly.
- More companies are tapping into potential revenues from carbon markets, and the number doing so is expected to grow.
- Product diversification across fuel types is a key growth strategy for several companies.
- Access to consumer financing for clean cooking remains scarce.
- On average, clean cooking companies are getting closer to other energy subsectors on measures of customer satisfaction and loyalty, but the results vary widely.
- Adjacent sectors are expanding into clean cooking.

Metering technology products are being developed to track real-time consumer usage data and methodologies for verifying usage will continue to be updated accordingly

Several companies, spanning various fuels and technology types, have developed clean cooking devices with the ability to track usage data. Metered LPG canisters first emerged about five years ago. More recent metering innovations include the introduction of metered biogas, electric, and gasifier pellet stoves in market pilots.

Metering technologies enable companies to offer consumers PAYGO solutions, which can help overcome customer affordability barriers. Another significant implication of metered technologies for company business models is their potential role in verification for carbon programs and results-based financing programs (for an illustration of this, see "New method for remotely monitoring carbon abatement accepted by the CDM Executive Board"). The generation and provision of timely, clean, accurate data is a key element of the monitoring, reporting, and verification activities on which revenue-based financing programming depends. Companies, program managers, and impact buyers are dependent on this data for the fair and timely disbursement of agreed funds.

Gold Standard, a voluntary carbon offset program, has recently approved a new methodology that allows verification using metered devices. Some companies are also exploring how to leverage real-time tracking to get instant credits from carbon buyers. Smart metering allows more reliable verification of actual usage of stove and clean fuel than unmetered "traditional" clean cooking carbon credit projects that are based on sales of improved cookstoves, which rely on usage assumptions and sporadic verification visits or interviews with beneficiaries. Manufacturers of new smart cookstoves are experimenting with the implementation of blockchain technology to remotely generate unfalsifiable usage data for validation purposes. The move toward more reliable verification of actual usage will help reassure carbon buyers that the carbon credits associated with the products are reliable and cannot be double counted, resulting in a premium price for these carbon credits.

More companies are tapping into revenue from carbon markets, and the number doing so is expected to grow

Assuming that barriers around setting up and monetizing carbon programs are reduced in the future, carbon programs will become more accessible to more companies, which may result in a significant increase

in demand for carbon credits going forward. In the next two years, the number of clean cooking carbon programs being registered may increase as new methodologies that significantly reduce verification costs become more mainstream.

Carbon revenue is not new in the clean cooking sector. Voluntary and regulated markets have been a source of carbon credits for clean cooking companies for more than 12 years. Carbon finance contributed an average of US$ 17 million per year during the 2016–19 period, predominantly toward improved cooking solutions, according to SEforALL's Energizing Finance report.[22] Carbon programs have been dominated by improved biomass stoves. However, there is an increasing trend to register carbon programs for other clean cooking solutions, beyond improved biomass stoves. For example, more than half of the 30 companies in CCA's Venture Catalyst portfolio have active carbon programs or are in the process of setting up new programs.

In terms of generating carbon revenue, smart clean cooking products may allow sellers of carbon credits to connect more directly with buyers through blockchain smart contracts and other distributed ledger technologies. However, successful demonstrations of this kind of transaction in the clean cooking sector are likely to be a few years away.

In terms of how companies are using carbon revenue, some are reducing price barriers for low-income households. KOKO Networks, a last-mile ethanol distributor and technology firm, has been able to lower the purchase price of ethanol stoves in its "tool-and-fuel" business model. Greenway, a manufacturer of improved biomass cookstoves, has partnered with its last-mile microentrepreneurs and agents — who are mostly women — to share a portion of carbon revenue with them, incentivizing sales.

Overall, carbon markets can drive much-needed capital into the clean cooking sector. To attract debt investors to the sector, it could become more common for carbon credit revenue, in addition to accounts receivable revenue, to be used as collateral for lenders.

However, the prospect of clean cooking companies depending on carbon revenue in perpetuity for their business models to be viable is a risk. Any reliance on carbon credits should be viewed by clean cooking companies primarily as a means to accelerate toward creating economies of scale and unit cost reductions on the supply side, as well as urbanization and poverty reduction on the demand side. This convergence of supply and demand should ultimately eliminate a company's dependence on potentially volatile revenue sources such as carbon credits.

Product diversification across fuel types is a key growth strategy for several companies

CCA has observed several companies expanding their product ranges into other technologies and fuels to increase their customer base and enter new markets. BURN Manufacturing, traditionally a charcoal stove manufacturer, has recently launched electric pressure cookers for grid-connected consumers in Kenya. Bboxx, known for its solar home systems, has added LPG solutions to its product portfolio in Congo and Kenya. ATEC* International, originally a biodigester company operating in Cambodia and Bangladesh, has added magnetic induction cookers as an offering to grid-connected consumers.

Existing off-grid solar companies, such as Bboxx, already have last-mile distribution networks, established partnerships with telecom companies, experience in leveraging mobile money payments, and more robust balance sheets and better access to finance — offering easier access to research and development funding. These competitive advantages facilitate the integration of new customer offerings, such as PAYGO LPG, in Bboxx's portfolio. The company has also received guarantees from the Multilateral Investment Guarantee Agency, a subsidiary of the

World Bank Group, to cover its solar home system investments in several African countries. The guarantee helped to derisk projects and attracted additional investment. Such mechanisms could reduce the risk profile of investing in clean cooking companies, especially in rural areas.

Access to consumer financing for clean cooking remains scarce

Consumer financing in the clean cooking sector is in its early stages, with a handful of companies exploring consumer financing initiatives. Catalytic funding is needed for companies to be able to sustainably finance products for their customers.

To date, the most common approaches used by companies in consumer financing are to offer one or both of the following:

- Creating "in-house" payment plans, potentially with PAYGO technology to align payments with customer usage.
- Partnering with financial institutions to implement payment plans.

Consumer financing through in-house financing or partnerships has a much wider application for last-mile distributors. Typically, partnering with local banks to finance clean cooking products has been difficult due to small ticket sizes and "nonproductive use" classification of loans. A few pilots that leverage the bundling of products or use guarantees have been conducted with mixed results. CCA's Haiti Clean Cooking Fund is conducting a pilot that provides consumers in the Caribbean country with product loans backed by credit guarantees.

Biogas systems, with a higher price tag, has had greater success than other clean cooking products. Some clean cooking companies are focusing more on making their credit departments robust while also exploring transitioning their credit book off their operating company's balance sheet.

In-house financing comes with its own challenges for clean cooking companies, as they must develop their own credit teams, processes, systems, and risk management guidelines. Embarking on these changes can distract companies from focusing on their core capabilities. Furthermore, creating financial products associated with PAYGO financing is complicated; bringing in other product lines besides clean cooking products is one way to offset the costs. M-KOPA, an asset financing platform offering life-enhancing

products and services to millions of underbanked customers, is taking this approach.

The recently launched Spark+ Africa Fund is specifically aiming to encourage consumer financing intermediaries, such as microfinance institutions, to extend loans by providing capital for customer on-lending. A growing pipeline of intermediaries is engaged in this sort of lending across Africa. This disintegration of the value chain is more capital-efficient and operationally effective, allowing organizations to leverage their strengths and optimize individual aspects of the value chain rather than attempting to do everything.

On average, clean cooking companies are getting closer to other energy subsectors on measures of customer satisfaction and loyalty, but there is a large range

In 2021, CCA commissioned 60 Decibels, an impact measurement company, to deliver a series of studies

across CCA's Venture Catalyst portfolio. At the time of publication, 60 Decibels had interviewed more than 3,000 clean cooking customers using its Lean Data approach. The goal of this work is to provide critical insights into customer profile, experience, the impact of the Venture Catalyst portfolio's products and services, and customer satisfaction and feedback.

Analysis from 60 Decibels indicates that measures of customer satisfaction and loyalty recorded in a subset of CCA's Venture Catalyst portfolio[23] are getting close to the scores that 60 Decibels typically see in its Energy Benchmark.[24] At the time this report was published, the average Net Promoter Score (NPS)[25], which ranges from -100 to +100, for the clean cooking companies in the Venture Catalyst portfolio was 40/100. That is short of 60 Decibels' Energy Benchmark NPS score of 50/100, but it should be noted that there is wide variability on this metric across clean cooking companies, with one clean cooking company scoring 80/100, and the lowest-performing company having a NPS of -12. These preliminary results are encouraging and point to the need for clean cooking companies to continue to improve on measures to boost customer satisfaction and loyalty, such as ease of use, reducing challenges, and issue resolution, in turn driving up consumption rates among existing customers and penetration rates among new consumers.

Preliminary results indicated that Venture Catalyst companies are reaching an underserved customer base, with 82% accessing a clean cooking product for the first time, compared with the 60 Decibels' Energy Benchmark of 66%.

Companies are also providing an opportunity for a segment of their customer base to transition to cleaner fuels from less-polluting sources. This transition contributes to reducing harmful emissions from inefficient cookstoves and has a positive impact on customers' well-being. In fact, 82% of customers say that their quality of life has improved due to the purchase of a clean cooking product, which is in line with the 60 Decibels' Energy Benchmark of 81%. The main outcomes experienced by customers are reducing expenses (34% of customers), saving on cooking time (30%), and increasing savings (23%).

Adjacent sectors are expanding into clean cooking

Bboxx's entry into clean cooking from off-grid solar home systems gave the company exposure to an additional source of recurrent revenue from a regular activity: cooking. Today, other sectors, including larger electric utilities, are considering entry into clean cooking.

The emergence of electric cooking as a viable proposition for customers could draw large utilities, distributed energy service companies, mini-grid developers, and other solar home system providers into clean cooking, with electric cooking appliances potentially contributing to increased electricity demand as part of a suite of productive use appliances. Several joint studies between Energising Development (EnDev) and Modern Energy Cooking Services (MECS) (a five-year program funded by UK Aid which aims to spark a revolution through rapidly accelerating the transition from biomass to clean cooking on a global scale) also found that strategic interventions raising consumer awareness, developing supply chains, and creating an enabling environment could accelerate adoption of e-cooking solutions in markets where the majority of the population is electrified. Kenya Power and Lighting Company (KPLC), Kenya's national utility, **set up such a program to promote e-cooking**.

Outside of electric cooking, Jibu, a federation of last-mile distribution franchises that produce, bottle, and sell affordable drinking water to underserved urban consumers, is experimenting by supplementing its customer portfolio offerings with cooking services. Other non-clean cooking companies may follow suit in expanding their product ranges to include clean cooking.

IN FOCUS

TAXES, TARIFFS, AND TRADE

One of the major challenges in the sector is trade barriers and policies for taxation and duties. Based on the data collected for the 2021 Clean Cooking Industry Snapshot, almost half (46%) of the 37 respondents expressed their belief that lowering the tax and tariffs on clean cooking products or raw materials through tax exemptions or reductions would be most beneficial to them. Taxes and duties increase the price for the consumer of products sold in the formal sector. However, fuels and stoves sold in the informal sector become relatively cheaper, encouraging the lowest-income customers to turn away from cleaner fuels and technologies toward informally produced charcoal and artisanal stoves.

To address these challenges, CCA is exploring a series of activities aimed at improving access to data and information on trade, duties, and taxation in the clean cooking sector. The outcomes of this work would provide important market intelligence for clean cooking enterprises, enhance awareness of clean cooking within the trade community, build capacity of governments and implementing agencies, support design of policy interventions, and contribute to an improved enabling environment for the clean cooking industry.

PAYGO GROWTH IN THE CLEAN COOKING SECTOR

Over the past few years, PAYGO business models have transformed the off-grid solar industry. Consumer financing of energy access products is poised to do the same for the clean cooking industry. Based on data provided by Angaza, a software platform that supports more than 200 distribution partners in over 50 countries, PAYGO cookstove sales registered on the platform have been growing at a compound annual growth rate of over 140% since 2017. Angaza tracks 18 different cookstove products for sale, totaling more than 26,000 units. The two leading stoves on the Angaza platform accounted for almost half of sales tracked by Angaza in 2021. The largest proportion of stoves was sold in Zambia (38%), followed by Uganda (21%), and Mozambique (20%). As of December 2021, Angaza has been tracking cookstove sales in eight countries (Bangladesh, Cambodia, Kenya, Mozambique, Sierra Leone, Tanzania, Uganda, and Zambia) by eight distributors.

Cookstove repayments tracked by Angaza have an average repayment rate of 46% historically, and 76% for 2021, suggesting strong collections, particularly in 2021. Portfolio quality for cookstoves has generally been very good; Portfolio at Risk 30+ (the proportion of customers who are more than 30 days late on meeting their repayments) has never exceeded 11% in a month since 2020 and is averaging just under 4% of the outstanding portfolio.

MECS AND CLIMATE CARE HAVE DEVELOPED A NEW METHODOLOGY FOR CERTIFYING EMISSIONS REDUCTIONS APPROVED BY GOLD STANDARD

Certification agencies have been designing frameworks to simplify certification procedures for carbon credits, using digital reporting. Gold Standard recently approved a new methodology proposed by Climate Care, a provider of carbon offset services, and MECS for certifying emissions reductions based on directly measuring in real time the amount of energy used for cooking. The methodology is applicable to a range of cooking methods, including electrical appliances, PAYGO LPG systems, and other metered devices.

This new methodology replaces the need for relatively expensive emissions reduction surveys and should increase the reliability and transparency of reporting, two major obstacles to donors supporting impact payments. Further work in refining and demonstrating the methodology will be required, which CCA, MECS, and Climate Care will support going forward. Several Venture Catalyst companies are already registering carbon programs under the new methodology.

BBOXX'S TECHNOLOGY AND REAL-TIME DATA ENABLE A SUCCESSFUL PILOT LAUNCH

Bboxx, a UK-based next-generation utility, launched its Bboxx Cook operations in Congo and Kenya in 2021. The company has already reached 8,000 LPG customers since its launch. The key to this successful start has been Bboxx's ability to leverage innovative technology and develop long-term relationships with customers.

Bboxx has built its LPG business by digitizing the value chain from filling station to end customer. Knowing the location of its cylinders and customers enables Bboxx to optimize logistics through timely deliveries to shops and warehouses, along with planning deliveries for customers. Bboxx leverages these innovations to serve customers at an affordable price and understand their needs.

Bboxx's relationship with its customers has helped it identify key services to accelerate LPG adoption. Bboxx manages the entire customer experience, from sales and installation to educating customers refilling their cylinder. This provides first-time LPG users with the confidence they need to cook with a fuel that often faces misperceptions around safety. The company has also lowered cost barriers to cooking with LPG by offering equipment financing plans ranging from three to 36 months. Bboxx manages its portfolio through a combination of PayGo Energy's Tag and Trace platform along with Bboxx's own comprehensive management platform, Bboxx Pulse®, which ingests mobile money payments and monitors customers' progress toward paying off their loans.

Bboxx plans to scale this approach to millions of customers across Africa as part of its mission to transform lives and unlock potential through access to energy.

NEW METHOD FOR REMOTELY MONITORING CARBON ABATEMENT ACCEPTED BY THE CDM EXECUTIVE BOARD

In early 2022, the Clean Development Mechanism (CDM)[26] Executive Board approved a proposal by Inclusive Energy for a new way of monitoring and reporting carbon abatement in biogas digesters. The approval means that new, remote metering solutions can be used by Gold Standard and the United Nations Framework Convention on Climate Change to monitor and report carbon abatement.

Inclusive Energy, a company bringing remote sensing technology and software to energy companies serving last-mile customers, is field-testing the new methodology in Kenya and Uganda across 100 biodigester units. The field trial intends to ground-test the new remote monitoring–based carbon methodology, allow direct comparison with status quo monitoring methodologies under the Voluntary Gold Standard (VGS) and the CDM, and will create a like-for-like comparison in monitoring costs for projects applying VGS or CDM methodologies.

An intended outcome from this work is to lower the costs to small biogas operators of accessing carbon results-based financing. Lowering barriers to accessing carbon dollars should help off-grid rural end users benefit from carbon markets, from which they are largely excluded at present. Ultimately, this work could unlock carbon finance for smaller biogas operators, potentially helping them to make their products more affordable to poorer, rural customers who lack access to clean cooking options.

SISTEMA.BIO IS CREATING SPECIAL PURPOSE VEHICLE TO AID CONSUMER FINANCING

Sistema.bio, a biogas technology company that has installed its product on more than 30,000 farms since 2010, is developing a first-of-its-kind off-balance sheet financing structure for biodigesters. Sistema.bio started the development process for a special purpose vehicle (SPV) in 2020 to raise dedicated funding for an in-house, lease-to-own program in Kenya.

The process improvements to create the SPV allowed the company to dramatically grow its lending base in existing markets and to expand its distribution networks into new regions. Sistema.bio saw clear improvements in its credit portfolio within 12 months of the SPV's launch, with its Kenyan PAR 90 (the proportion of customers with payments more than 90 days late) falling by half.

JIBU IS EXPLORING POTENTIAL EXPANSION INTO LAST-MILE LPG DISTRIBUTION

Jibu, a federation of last-mile distribution franchises that produce, bottle, and sell affordable drinking water to underserved urban consumers, is exploring adding LPG to its portfolio of customer offerings. Jibu franchises produce thousands of liters of bottled water each day, while its microfranchises buy bottled water in bulk from a franchise before selling individual bottles from a small retail space. Jibu is exploring if this hub-and-spoke model can be used to bring LPG to more neighborhoods.

Jibu is piloting distribution models in Uganda and Rwanda, one being where consumers come to the franchise and top up their canisters with as much gas as they can afford. The other pilot uses a subscription service for doorstop deliveries. Jibu's diversification of its portfolio offers more resilience to consumer demand and branching into energy distribution potentially increases fundraising opportunities.

METHODOLOGY

For the *2022 Clean Cooking Industry Snapshot*, CCA used self-reported data on investment, financial, and operational performance from clean cooking companies. A survey was sent to over 700 contacts working at companies that are part of CCA's company database. Although many of the contacts CCA reached out to are employed by the same company, this approach was taken to minimize the risk of depending on a single person to give company data. In addition to the contact database, CCA shared the survey form with four partner organizations: GET.Invest, RVO, Global Distributors Collective, and Ashden. A validation step in the online survey tool notified respondents if someone else in their company had already started or submitted a survey response.

To look at long-running trends back to 2014, some reporting gaps were supplemented with investment data on four additional companies from past surveys, and publicly available data, including press releases and news articles, to increase the number of companies that could be included in the analysis.

The annual self-reporting process has data reaching back to 2012 and has served as an important database to track sector progress. Partners voluntarily submit their data online, with CCA providing technical support. Clean cooking companies reporting to CCA are the following:

- Biomass cookstove manufacturers, including industrial and semi-industrial producers.
- Producers of processed biomass fuel, such as briquettes and pellets, for household use.
- Companies that combine stove sales with ethanol, pellets, briquettes, and other fuels.
- Prefabricated biogas system companies.
- Last-mile LPG distributors, whose technology or business model intends to increase access among consumers in low- and middle- income countries, through solutions such as PAYGO.
- Distributors of electric and solar solutions.
- Companies that provide specialized services that focus on optimizing specific aspects of the value chain, such as providers of consumer finance, technology, or last-mile distribution services.

Companies producing stoves that are targeted for recreational markets, other non-household–oriented fuel producers, larger upstream and midstream fuel companies, and infrastructure developers and operators are excluded from the scope. One company that provided data to CCA was removed from the analysis for being an LPG bottling facility (i.e., a midstream fuel player).

As a "snapshot," this report is meant to provide an abbreviated understanding of a situation based on a particular range of time. As such, the data may not be representative and there will be inherent gaps and limitations around the depth, scope, and rigor of the information.

The company data that were received and tracked were rich in providing insights but not robust or consistent in quantity nor geography. This also illuminates the need to develop better and smarter data sources, tools, publications, and informational resources that will increase transparency into markets, technologies, business models, companies, consumers, and impacts. This type of market intelligence is an important catalyst for stimulating investment and sector development.

DATA CONSISTENCY AND GAPS

The voluntary nature of the self-reporting survey comes with challenges in data consistency and completeness. Some long-standing partners have reported every year, while others have been less consistent. New companies have entered the market, while others have downsized or ceased operations. As CCA's partner database grows, there are new respondents each year, not all of which are at the beginning phase of operations. There are also companies that have not reported each year. Yearly variation in responses suggests that much sector activity is unreported every year, even among CCA partners.

For 2020, CCA received data from 63 companies and supplemented it with publicly available data and other surveys. This report relies only on reported data in addition to publicly available data. Hence, the investment and financial performance data of many companies in the sector is not captured.

Each survey response has been carefully reviewed to ensure completeness and has undergone one round of data validation with the companies directly on anomalous data points that are reported in the survey.; however, CCA does not engage in any due diligence with the data. The online survey form contains some basic automated data validation and verification checks. From this and other CCA knowledge, the report's statistics and narrative were developed.

Although every effort is made to gather complete data from key companies operating in CCA's focus countries and beyond, there are always unavoidable gaps in reporting. These gaps and strategies to address them, along with several assumptions made when analyzing the data, are described below.

DATA GAPS

Consistency of company reporting

This report received data from 63 companies that reported to CCA varying amounts of financial and investment data. These self-reported data have been supplemented with investment data on four companies compiled from past surveys and publicly available sources, including press releases and news articles. The survey was sent to more than 700 contacts at clean cooking companies. Given that each year different companies send in data to CCA, absolute comparisons between years should be avoided.

Regional gaps

For 2020, companies whose primary country of operations is in Africa and South Asia (32 and five companies, respectively) have reported far more information than those based in Central and South America (one company). CCA has attempted to acknowledge and account for regional bias in its reporting and narrative. When other countries of active operations are considered, the 63 companies providing data covered seven countries in West Africa, 10 in Central and Southern Africa, seven in East Africa, four in Central and South America, 13 in Asia, and seven in North America, Australasia, or Europe.

Based on self-reported data, East Africa attracted the most significant share of investment from 2017 to 2020. While this may be influenced by CCA's large regional network, based on discussions with those with extensive knowledge and networks across other regions, CCA discerns that there is greater private sector activity in this region than in others.

In this report, investment in Kenya alone accounted for 72% of total investment in 2020. Just 22% of companies responding to the *Industry Snapshot* survey in 2020 indicated Kenya as their primary country of operation. The East Africa region (specifically, Kenya, Uganda, and Ethiopia) accounted for 73% of total investment in 2020. This is much more concentrated than investment in the off-grid solar sector, where East African companies received 22% of the total funding in 2020.[27]

Gaps in financial and operational performance data

Data on the financial and operational performance of sector companies remain limited, and, in many cases, inadequate for drawing substantial conclusions. Understandably, many companies are reluctant to provide sensitive information when they are not under consideration for an investment or grant. This is particularly true in the early stages of growth, when sometimes large amounts of grant money or even debt or equity have not produced commensurate business growth. That said, CCA has received consistent, reliable, and meaningful annual data from 32 companies (two of which are no longer operating and three of which started operating since 2019). Accordingly, all analysis of financial performance has reflected this subset of companies.

DATA ANALYSIS ASSUMPTIONS

Investment Data

Annual investment data is based on reported investment flows each year and is not adjusted for inflation.

Investment data is reported at the firm level. Fewer than five companies providing data for this report have additional, non-clean-cooking-oriented business activities. CCA has attempted to segregate investment data by business line in some cases, where possible. In one case, this segregation has not been possible. However, most companies in the analysis are primarily focused on clean cooking, with most of their sales from clean cooking products.

For classifying the investment's funder type, the direct investor has been considered relevant. For example, a philanthropic foundation making a direct investment in a business is reflected as a philanthropic foundation. An investment of capital from a philanthropic foundation that has invested as a limited partner in a fund managed by an impact investor, which has then invested in a business, would be reflected as a private investor. Investment data includes various types of debt, equity, and grant funding. It does not include carbon-related revenue, but it could include debt that prefinances such carbon revenue.

Financial and Operational Performance Data

Several clean cooking companies have additional business lines beyond cookstoves, while others sell products in recreational markets as well. Including sales data from these additional lines of companies would overestimate clean cooking revenue. For companies with multiple business lines or in developed markets, only clean cooking–related revenue in developing markets has been included. Reasonable estimates and assumptions such as past year trends or comparable company analysis were used where data was unavailable.

For two companies with sales data missing for certain years, CCA conservatively estimated based on earlier volume trends and previous survey responses.

For more detailed information on this subject, contact: investment@cleancookingalliance.org.

NOTES

1 The Energy Access Relief Fund (EARF), launched in September 2021, was designed to provide up to 3.5-year tenure, subordinated, unsecured, and low-cost subsidized loans to energy companies that had viable business models prior to COVID and that are facing liquidity challenges due to COVID-19. As of end of November 2021, the Energy Access Relief Fund has approved relief funding to 38 companies across 14 countries.
2 Why COVID-19 is Leading to Increased Cookstoves Sales for one Kenyan Manufacturing Company; New payment technology empowers families to sustain clean cooking during COVID-19 pandemic lockdown in Kenya.
3 SEforALL, Energizing Finance: Understanding the Landscape 2021.
4 Gogla.org, Access to Finance; Investment Data.
5 SEforALL, Energizing Finance: Understanding the Landscape 2021.
6 CCA analysis, based on Gogla.org, Access to Finance, Investment Data.
7 Energy 4 Impact's Clean Cooking Funder's Survey.
8 CCA tracks capital at the company level. Hence, the source of capital is determined based on the entity providing the capital directly to the company. Some private sector sources may be raising capital from public sources. This implies that share of public capital is underreported.
9 CCA analysis of Climate Policy Initiative, Global Landscape of Climate Finance 2021. Public sources include government budgets, development finance institutions, multilateral funds, state-owned financial institutions, and state-owned entities.
10 Gogla.org, Access to Finance; Investment Data.
11 CCA has tagged companies as being female-led only if it can confirm that the company has a female CEO, COO, CFO, or founder during the year of the investment being raised.
12 Inspiring Innovation report, Female Founders Forum, Aria Babu, October 2021.
13 Defined as "businesses which, via innovation, are helping the environment."
14 Generating Success: How Flexible Grant Financing Builds Sustainable Companies, EEP Africa, 2022.
15 These 32 companies include two companies that are no longer trading and three that started operating since 2019.
16 One of the criteria the Organization for Economic Cooperation and Development (OECD) uses to define "gazelles" is if their average growth is greater than 20% per annum over a three-year period. The age of the company is also part of OECD's definition, but this aspect has been ignored in CCA's analysis, as none of the six companies identified in CCA's analysis is less than five years old.
17 Matthew Shupler, et al., Pay-as-you-go liquefied petroleum gas supports sustainable clean cooking in Kenyan informal urban settlement during COVID-19 lockdown, *Applied Energy*, Volume 292, 2021.
18 This analysis was done by compiling a list of the top 10 clean cooking companies by total funds raised and by examining the WIPO Patentscope database.
19 Vivid Economics and Open Capital Advisors analysis of GOGLA's deal database was the basis of identifying the top 10 companies by total investment commitments since 2012 (accounting for 78% of total investments in off-grid solar).
20 CCA analysis of Figure 51, The 2020 Global Off-Grid Solar Market Trends Report, February 2020, Lighting Global.
21 Carbon neutrality is a state of net-zero carbon dioxide emissions. A growing number of national and local governments and business leaders are making commitments to reach net-zero emissions within their jurisdictions or businesses by setting net-zero targets. Carbon projects, such as those established by BURN, can assist these entities to achieve their carbon emission reduction commitments by creating carbon credits for purchase on the voluntary market.
22 SEforALL, Energizing Finance: Understanding the Landscape 2021.
23 The results of eight companies have formed the averages referenced in this report. By the end of 2022, CCA will have results for 19 Venture Catalyst portfolio companies, and 60 Decibels will have interviewed more than 5,000 clean cooking customers.
24 The 60 Decibels Energy Benchmark comprises 100+ energy companies around the world providing solar home systems, mini-grid connections, solar lanterns, and cooking products or services, and appliances. Data is from more than 45,000 customers across 30 countries.
25 The Net Promoter Score® is a gauge of satisfaction and loyalty. The score can range from -100 to 100 with anything above 50 being considered very good. A negative score is considered poor. Averages have been created by giving equal weighting to each company (rather than by weighting by the number of customers surveyed).
26 The CDM, as defined in the Kyoto Protocol, allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol to implement an emission-reduction project in developing countries. Such projects can earn saleable certified emission reduction (CER) credits, each equivalent to one ton of CO_2, which can be counted towards meeting Kyoto targets.
27 Gogla.org, Access to Finance; Investment Data.

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