



ASCHES

ADVANCING SUSTAINABLE CHARCOAL
ENTERPRISES AT SCALE



REPORT
2018
CONVENING
NAIVASHA
KENYA



MIT D-Lab
designing for a more equitable world

the
CHARCOAL
project

March 2019

MIT D-LAB

MIT D-Lab works with people around the world to develop and advance collaborative approaches and practical solutions to global poverty challenges. The mission is pursued through our academics program of more than 20 MIT courses and student research and fieldwork opportunities; our research groups spanning a variety of sectors and approaches; and a group of participatory innovation programs we call innovation practice.

D-Lab's Biomass Fuel and Cookstoves Research Group helps biomass fuel and cookstove users climb the energy ladder by scaling solutions with field practitioners.

THE CHARCOAL PROJECT

The Charcoal Project (TCP) is a US non-profit that promotes, facilitates, and advocates for the widespread adoption of clean burning technologies, sustainable fuel alternatives, and policies that support energy-poverty alleviation for people around the world, especially in sub-Saharan Africa, who depend on wood and charcoal as their primary fuel, .

ACKNOWLEDGMENTS

The organizers of ASCHES would like to thank the following people who helped to make this workshop a success: all of the workshop participants for taking time from their schedules, families, and businesses to join us in Naivasha for six days; Amy Smith for her many contributions to the design of this workshop and the charcoal briquette sector overall; Sher Vogel for helping to create our vision and goals, and putting us up on our feet as we began creating ASCHES; Catherine Njeri for helping us take care of our minds and bodies throughout the workshop; Erika Desmond for joining our team on short notice, administering and analyzing the monitoring and evaluation surveys, and taking notes during every activity; Heewon Lee for his excellent design work on all of our materials and swag; Nancy Adams for her invaluable work on the report design and communications tools; the staff at MIT D-Lab for finance and administrative help; Nancy, Joy, and the rest of the Burch's Resort team for accommodating our many requests and letting us take over their hotel during the workshop; Laura Budzyna for supporting the M&E for ASCHES; Ren Dietel for being an advocate for our sector and an active participant in our community; and finally the anonymous donor whose generous contribution has enabled the ASCHES family to unite and burn bright (and hot, long and clean)!

Dan Sweeney, MIT D-Lab, and Sylvia Herzog, The Charcoal Project, ASCHES Lead Organizers

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Left to right: ASCHES organizer Dan Sweeney (MIT D-Lab) and ASCHES participants Lydiah Njung'e (Eversave Briquettes, Kenya) and David Nkwanga (Adapt Plus Uganda), and an Eversave employee behind a roller press at the Eversave Briquettes factory.

I. SUMMARY OF GENESIS, STRUCTURE, AND GOALS OF THE CONVENING

Advancing Sustainable Charcoal Enterprises at Scale (AScHES 2018) was a five-day workshop held in Naivasha, Kenya in October 2018, during which entrepreneurs from 20 enterprises gathered to share their experiences in producing charcoal briquettes from sustainable and waste biomass feedstocks, learn about state-of-the-art production methods and business models, align around common goals and approaches, and establish a community, which following the convening, remains connected through exchange and dialog.

AScHES was born from a long-standing collaboration between [MIT D-Lab](#) (Massachusetts Institute of Technology) and [The Charcoal Project](#), which has carried out technology research and development, market research, advocacy, enterprise incubation, and broad sharing and exchange among producers in the global charcoal briquette sector.

Members of the AScHES community serve their communities with affordable and sustainable alternatives to traditional woodfuels for household and institutional cooking. In communities where charcoal has long been the only affordable option for cooks, briquettes are now gaining popularity and market share; however, supply must continue to grow, quality must improve, awareness must be spread, and new policies must enable these socially-driven enterprises to thrive.

Though the program focus at AScHES was on technology and business, the environment was fun, creative, relaxed, and adventurous, which helped create lasting memories and connections for all involved.

AScHES participants were selected through an objective selection process where applicants

were evaluated based on criteria related to their level of experience in the sector, the scale of their business, and willingness to participate and share.

Participant Application

The three primary goals of AScHES 2018 were:

- » Cultivate the community of at-scale charcoal briquette producers for an exchange of knowledge and best practices, and the formation of new partnerships.
- » Equip charcoal briquette producers to be more informed micro-ambassadors for a formalized and connected industry.
- » (Re)Inspire charcoal briquette producers with new ideas and tools for alternative business models, entrepreneurship skills, leadership skills, and production methods.

The five-day program consisted of presentations by invited speakers and attendees, hands-on skills building and demonstrations, and events and excursions to share culture and build community.

The following report is a brief summary of the workshop activities and a discussion of the operation of the AScHES community moving forward.



Example of charcoal briquettes.



ASchES 2018 morning circle.

II. CONVENING SESSION SUMMARIES

DAY 1

SESSION 1: THE BIG PICTURE CHARCOAL BRIQUETTES AT MIT D-LAB AMY SMITH & DAN SWEENEY, MIT D-LAB

It's not uncommon to see smudges of black dust on workbenches, or catch the scent of freshly fired maize stalks as you walk through MIT D-Lab's laboratory where students, researchers, and members of our global community collaborate to design creative solutions to global challenges. They say that charcoal flows through the veins of D-Lab and it does. This has been true from the start when Founding Director Amy Smith taught D-Lab's original course, a hands-on experience where students worked with community members in rural Haiti to design a cooking fuel that could be produced locally and did not use forest resources.

Over the following years, Amy and her students collaborated with communities in Haiti, Ghana, India, Pakistan, Nicaragua, El Salvador, and Zambia

to improve and document the *Fuel from the Fields* process further. Ten years later, the Scale-Ups program at D-Lab launched the Harvest Fuel Initiative (HFI) in partnership with The Charcoal Project with the goal of supporting small businesses that were aiming to scale charcoal briquette production to provide an affordable alternative to wood charcoal in their communities.

Through HFI, D-Lab and The Charcoal Project partnered with several producers in East Africa to provide technical and business support, as well as capital for scale-up. Three of those businesses were represented at ASchES 2018, and we were excited to finally meet so many more charcoal lovers in person.

This workshop has been a dream of ours for over 15 years, and we are thrilled that it finally became a reality.

[Amy Smith Presentation](#)

[Dan Sweeney Presentation](#)

A (MOSTLY AFRICAN) PERSPECTIVE ON COOKSTOVES & FUEL

KIM CHAIX, THE CHARCOAL PROJECT

Alternative solid biomass fuel producers are a nascent impact industry in sub-Saharan Africa and have the potential to significantly mitigate environmental, social, and economic risks of using traditional solid biomass fuels (such as wood and charcoal). Briquette-making from discarded biomass will play an important role in meeting sub-Saharan Africa's projected solid biomass (wood and charcoal) energy needs by 2040.

For this reason, it is important that current briquette producers in SSA consider their ventures as long-term energy suppliers that will need to adapt and evolve based on shifting energy and financial flows that are bound to emerge in coming years. As such, it is important that each entrepreneur integrates clean feedstock, efficient carbonization, high-quality fuels, and end-user consumption in their business models.

Due to their current volumes of biomass consumption, East and West Africa are poised to be the greatest beneficiaries of briquette businesses that evolve into efficient and integrated biomass energy companies.

For the sector to succeed, it must first organize and become a cohesive sectoral voice that can advocate for new policies and changes that recognize the role that briquette makers can play on a national and regional level as clean energy suppliers.

[Kim Chaix's Presentation](#)

CHAR BRIQUETTES IN INDIA

PRIYADARSHINI KARVE, SAMUCHIT ENVIRO TECH

From 1997-99, I led a project focused on developing the technology for converting waste from sug-

arcane farming into char briquettes, and using the char briquettes as a cooking fuel. This work was carried out with colleagues at Appropriate Rural Technology Institute (ARTI). This work led to ARTI winning the Ashden Award for Renewable Energy in 2002. The award money allowed us to create a business model based on the technology package, and also further experiment to improve upon the charring technology. Technology trainings were provided to NGOs and individuals, and a few initiatives were started. Several organizations, including our own group, successfully experimented with a variety of biomass wastes (e.g., pine needles, rice husk, and garden and tree wastes in urban areas, etc.) as feedstock for char production. A variety of uses have also been found for the char, going beyond household cooking. Use of charcoal in itself is relatively limited in India, and therefore the scope for char briquettes as fuel is even more limited. However, there are interesting possibilities with non-fuel use of the char produced from waste biomass. The current focus of my own work is on developing char-based products for a variety of non-fuel applications.

HEALTH, ENVIRONMENTAL, AND CLIMATE BENEFITS OF SUSTAINABLE CHARCOAL

DAN SWEENEY, MIT D-LAB

Most of us working in the charcoal briquette sector understand that there is a large unmet demand for affordable alternatives to conventional cooking fuels like firewood and wood charcoal, which drives us to produce and sell these in our markets. Understanding and communicating the benefits of charcoal briquettes beyond the value that they offer to customers can be challenging because information is limited and the science can be difficult to understand.

This presentation focused on providing a foundation for understanding the effects that using

household fuels can have on health, the environment and global climate. We mapped the pathways for health and environmental effects in terms of the fuel life cycle, or the complete set of stages that make the life of the product, and discussed examples of risks and benefits at each stage.

For health and climate, an area of particular importance is the use phase, which can affect levels of combustion emissions (e.g. carbon dioxide, particulate matter, carbon monoxide) that have been shown to affect respiratory health and contribute to climate change.

D-Lab's laboratory and field testing of charcoal briquettes have shown that they often emit similar or lower levels of harmful pollutants during use compared to conventional wood charcoal, and significantly lower levels of respirable particulate matter (PM_{2.5}) compared to firewood. The actual reductions depend on the composition of the briquette and to some degree the density, but more importantly the type of stove that is used. However, carbonized fuels such as charcoal can emit high levels of carbon monoxide (CO) which can present significant health risks to users if they are cooking with inefficient cookstoves and in poorly ventilated indoor kitchens.

An effective means of reducing CO emissions is insulating the fire to achieve a combustion temperature above the ignition limit for CO (609°C). Wood fires often emit high levels of black carbon (BC), a powerful greenhouse emission. D-Lab's testing has shown very low levels of black carbon from burning of charcoal briquettes compared to woodfuels. However, emissions of BC and other health and climate pollutants are likely very high during production of char in unimproved kilns in which the emissions are not recycled (e.g. retort) or flared.

Fuel producers are encouraged to have their

products tested with tests similar to those used by cookstove manufacturers to measure performance. D-Lab and our partners have developed a set of simple tests that manufacturers can use at their factories to estimate product performance and experiment with new recipes and/or production methods ([link to draft protocol](#)). During this session it was agreed that more effort should be put into testing and understanding the potential impacts of charcoal briquette fuels.

[Dan Sweeney's Presentation](#)



Charcoal briquettes in a ceramic jiko cookstove.

CHAR: THE SECRET WEAPON AGAINST CLIMATE CHANGE

PRIYADARSHINI KARVE, SAMUCHIT ENVIRO TECH

The presentation focused on the benefits of charring of waste biomass in the context of mitigation of and adaptation to climate change. This is particularly relevant in terms of the Paris Agreement, in which nations have pledged to move towards

a fossil fuel free world. Growth and decay of biomass is part of the natural carbon cycle, and therefore inherently carbon neutral. If biomass is used for producing any substitutes for fossil fuel based products, the end result is net reduction in carbon emissions leading to carbon negativity. Thus, conversion of waste biomass into char for use as cooking fuel (or as a substitute for any other fossil fuel based service) is a carbon negative process, which contributes to climate change mitigation.

The production and use of char is based on locally available biomass resources and is typically carried out by local small businesses using relatively low-tech processes. Thus, use of char as a source of energy is also a useful climate change adaptation strategy, as it reduces dependence on a mostly imported and non-renewable resource. The presentation also provided a template for char briquette entrepreneurs to assess the impacts of their businesses on climate change, environment, and health.

[Priya Karve's Presentation](#)

[Notes from Big Picture Sessions & Presentations](#)

SMALL GROUP SESSION: SUPPLYING FUELS IN HUMANITARIAN SETTINGS FACILITATOR: DAN SWEENEY, MIT D-LAB

Globally there are 70 million forcibly displaced people, more than at any other time in history. In many cases, refugee populations rely on local forest resources to meet their energy needs. This has resulted in devastating deforestation, conflicts with host communities, and gender-based violence.

Humanitarian organizations are increasingly seeking solutions that mitigate these challenges, meet the energy needs and preferences of settlement communities, and can offer livelihood opportunities for refugees. This small group discussion aimed to promote sharing of experiences and

opportunities for providing fuels to settlements and host communities. The information gathered was reported to the instructors of the D-Lab: Humanitarian Innovation course for consideration as a focus for future efforts in that program. Some of the ASCHES enterprises are already working in humanitarian settings distributing briquettes to camps, employing refugees to produce briquettes in settlements and host communities, providing training to refugees to produce their own briquettes, and consulting to determine the feasibility of briquettes in specific refugee settlements. Experiences from the group were varied and specific to the context and partners involved, however some of the main takeaways from the discussion were:

- » Uptake and adoption are generally high when briquettes are affordable, though in some urban refugee settings briquettes are not affordable.
- » Building capacity and employing refugees in briquette production can be challenging if there is a culture of dependency on free provisions from aid organizations.
- » The cost of distributing briquettes to settlements is prohibitively high and needs to be subsidized by humanitarian organizations.
- » Partnering and contracting with other briquette producers can help to meet fuel demands that exceed the production capacity of individual enterprises. There are several cases of ASCHES enterprises collaborating to meet orders from settlements.
- » Contracting and working with humanitarian organizations is challenging due to a variety of reasons such as high staff turnover rates, and the long and resource-demanding contracting process.

[Session 1 Notes](#)

SESSION 2 PRODUCTION, QUALITY AND SCALE

DAN SWEENEY, MIT D-LAB; BETTY IKALANY, AEST; CARLO FIGÀ TALAMANCA, SGFE; RYAN DELANEY, CARBON ROOTS INTERNATIONAL

Charcoal briquette production is not so different from other businesses in that it is necessary to reach a threshold scale of production and sales in order to be financially sustainable. However, there are a number of business model and manufacturing challenges that most briquette enterprises are faced with as they scale their businesses. This session highlighted several AScHES enterprises and their journey toward achieving production of a quality fuel at scale.

Betty Ikalany from Appropriate Energy Saving Technologies (AEST) shared her experiences of working with Ugandan artisan fabricators, known as “juakali” (Swahili for “hot sun”), designing and manufacturing equipment for carbonizing waste feedstocks, crushing and mixing char, and pressing briquettes. Through their partnership with the Harvest Fuel Initiative, AEST and their juakali partners collaborated with engineering and design students at MIT D-Lab to iterate on machine designs that have helped them to reach steady production at scale. However, these iterations have

been costly in terms of finances and time, but Betty feels that building capacity in juakali fabricators is worthwhile for her company in the long run.

Carlo Figà Talamanca from Sustainable Green Fuel Enterprise (SGFE) shared their experience building a state-of-the-art factory at scale through rigorous and painstaking attention to detail and by exploiting all opportunities to improve efficiency of their production process. SGFE has leveraged partnerships with Italian university industrial engineering departments to use advanced engineering tools to achieve innovations in briquette pressing and drying, and a streamlined process with matched material and personnel flows through each step. Ryan Delaney from Carbon Roots International shared their journey in which they found it necessary to shift away from the do-it-yourself approach to scaling, and instead make use of efficient technology solutions from global suppliers including reliable process equipment from China and continuous pyrolysis technology. This approach is capital intensive, but has enabled Carbon Roots to put less attention on production and focus more effort on distribution and sales.

[Session 2 Notes](#)

[Betty Ikalany's Presentation](#)

[Carlo Figà Talamanca's Presentation](#)

[Ryan Delaney's Presentation](#)



AScHES 2018 participant Betty Ikalany (AEST, Uganda) and a team of Ugandan fabricators inspect a briquette press at AEST's factory in Soroti.



Charcoal briquette production line at Carbon Roots International. Photo: Carbon Roots International

SMALL GROUP SESSION: LEVERS FOR ACHIEVING PROFITABILITY

SYLVIA HERZOG, THE CHARCOAL PROJECT

In this session we talked about the importance of focusing on profitability in your business. Many briquette producers are focused more on the “social” impacts of their business, but need to make sure the businesses are financially sustainable. It’s important to include the benefits of a profitable business in the “impact” story, as providing employment at a decent wage is very important to economic development. The importance of using financial statements to track profitability was emphasized. Two ways to improve profitability are to raise prices or lower costs. We discussed the need to scale to lower costs, but also ways to monitor/control other costs. Other tools discussed were margin analysis, ratio analysis, benchmarking, and break-even analysis. Pricing needs to be more thoughtful and not just a reaction to the competition; find other ways to compete, not just on price. The ultimate goal should be to get to a scale where you can operate profitably without external subsidies. Financial projections are a very important tool for planning and should be used to look at upside and downside scenarios, as both have a profound impact on cash flow.

[Small Group Session Notes](#)
[Session Presentation](#)

SMALL GROUP SESSION: NON-COOKING APPLICATIONS OF CHAR

PRIYADARSHINI KARVE, SAMUCHIT ENVIRO TECH

Organic Deodoriser is just a cloth bag filled with char powder for hanging in toilets, closets, cars, etc.

Manufacturing char briquettes has now become an organized industry. However, marketing char briquettes as cooking fuel generally means competing with charcoal, which is typically produced by cutting down trees and with no upfront cost other than labor. The products highlighted were - non-cooking thermal applications like space heating briquettes (that would burn for 6 to 8 hours), incense sticks, etc., use of biochar for improving soil quality for farming, char as an ingredient for making sponge iron from iron ore, as well as products like deodoriser, waterless urinal, water filter, etc., that use the porosity of char. The discussions brought out other potential applications where char made from biomass can replace industrially manufactured activated charcoal such as soaps and cosmetics. The advantage of such products is that for many of these applications, there are no equivalent competitor products in the market.

Session Presentation



Organic deodorizer is just char powder in a cloth bag, for hanging in toilets, closets, cars, and other settings.

DAY 2

SESSION 1 INNOVATIVE SOLUTIONS TO MEET YOUR CUSTOMERS' NEEDS

FACILITATORS: ELLEN FINN, BRAND LEARNING, A DIVISION OF ACCENTURE, AND SYLVIA HERZOG, THE CHARCOAL PROJECT

In this session, we shifted to an external focus on our various customer segments, their needs and wants, and how customer-centricity can lead to truly meaningful innovations. The group was seated in 6 table teams, each one named for a specific charcoal briquette customer type*, and asked to build a customer persona describing the beliefs, behaviors and motivations of their customer. We then introduced customer journey mapping, using an example of buying a laptop computer and what we do, think, and feel all along the process. In table teams again, the participants mapped their customer's buying journey, identifying pain points and opportunity areas along the way. These exercises helped participants "walk in the shoes" of their customer and elicited some excellent insights into where along the journey we have the opportunity to influence or improve their behavior. Finally, we used "Can If" thinking to ideate on possible innovative solutions around these barriers and opportunities, considering the different levers of branding/packaging, communications, pricing/value, distribution, and product.

*The six customer segments: Mirella: meal maker in low-income home; Miriam: meal maker in middle-income home; Sandra: administrator in a school; Charles: a chicken farmer; Hector: manager of a hotel/lodge.

[Session 1 Notes Presentation](#)

SESSION 2 ADVANCES IN CHAR PRODUCTION DAN SWEENEY, MIT D-LAB, WITH PRESENTATIONS BY JAMES JOYCE, KEVIN KUNG, CHRIS ADAM, DAVID NKWANGA AND TEDDY KINYANJUI

Most AScHES enterprises have indicated that the lack of available and efficient carbonization technology has limited their ability to scale and access additional waste feedstocks, and in some cases reduced the quality of their product. In this session we highlighted three emerging and advanced carbonization technologies that could help to improve this step in the briquette production process. Dr. Kevin Kung from MIT and Takachar presented his research on a new kiln design that uses a mild pyrolysis process, called "torrefaction," to achieve a char product with optimized properties for the end-use application (e.g. cooking fuel, fertilizer). Kevin's mobile torrefaction unit is designed so that the operator can control the pyrolysis conditions and time that the feedstock is in the reaction environment to achieve the desired char properties. This technology is still in the proof-of-concept stage and is planned to be demonstrated during 2019. Dr. James Joyce from Pyrocal presented on their continuously-fed retort kiln. The Pyrocal technology captures pyrolysis gases and combusts them separately to produce process heat, which can be used for a variety of purposes, including recycling as an input to the pyrolysis zone or for drying briquettes. The Pyrocal units can be configured for different feedstocks and capacities and come with engineering support to help businesses install and operate the units. Carbon Roots International has replaced a large array of drum kilns with several Pyrocal carbonizers. Dr. Chris Adam spoke about the design of the Adam Retort Kiln, which can be constructed by skilled masons at relatively low cost, and carbonizes a variety of materials. Similarly to the Pyrocal

technology, the Adam Retort recovers energy from the pyrolysis gases by recycling them back into the kiln to improve efficiency and reduce harmful emissions. Adam Retort kilns are in use in many locations around the world. David Nkwanga, one of the AScHES entrepreneurs from Uganda, discussed his experience using gasifier technology, which provides his operation with supplemental biochar, powers his generator, and boosts his production capacity. David also discussed his experiences supplying refugee settlements. Most of the AScHES participants were eager to learn about how these technologies could benefit their businesses, but there were concerns regarding cost and complexity. Following this session Teddy Kinyanjui led a drum carbonization demonstration and participants showcased their products during the evening Ring of Fire.

[Kevin Kung's Presentation](#)

[James Joyce's Presentation](#)

[Chris Adam's Presentation](#)

[David Kwanga's Presentation](#)

DAY 3

SESSION 1 TECHNICAL SESSION ON BRIQUETTE DRYING

DAN SWEENEY, MIT D-LAB; ZIWA HILLINGTON, GREEN BIO ENERGY; CARLO FIGÀ TALAMANCA, SGFE; PAUL MUTHUI, BURN

For many of the AScHES enterprises, drying continues to be a bottleneck and major limitation for scaling production. Most companies rely on open sun-drying using mesh racks, which requires few inputs and low capital cost, but which also requires large amounts of area and can be ineffective during inclement weather. This session highlighted a couple of approaches to improved drying that AScHES enterprises are using.

Ziwa Hillington from Green Bio Energy presented on their sun-drying system that uses mesh racks on top of which several layers of wet briquettes are placed. The racks are covered with thick, ultraviolet (UV) light resistant polyethylene (PE)



Green Bio Energy briquette sun drying with canopy. Photo: Ziwa Hillington, Green Bio Energy.

film, similar to the material used in greenhouse structures, to protect the briquettes from rain. In addition, the pitched plastic canopy is arranged such that rainwater is captured in the valleys and routed into large tanks for use in the briquette production process.



SGFE Tunnel Dryer. Photo: Carlo Figà Talamanca, SGFE.

Carlo Figà Talamanca presented SGFE's system which is a large sheet-metal tunnel containing wheeled trolleys stacked with trays of briquettes. Heat is generated from top-lit, updraft (TLUD) gasifiers fueled by coconut shells and is routed into the drying tunnels to rapidly dry the briquettes. Stacks at the outlet of the tunnels help to increase flow through the system. Carlo pointed out that SGFE's tunnel drying design is complicated and expensive to construct, but simple oil drum-based TLUD gasifiers can also be used as a good heat source in simpler dryer designs.

Paul Muthui, Quality Assurance and R&D Testing Manager for BURN Manufacturing, presented on their cookstove manufacturing operation in Ruiru, Kenya and results from cookstove and fuel tests that he is carrying out in their lab. Given recent Kenyan national policies restricting wood charcoal production and the increasing price, BURN's estimates show that briquettes are more cost effective than wood charcoal and that there is an annual market of 500 million USD for charcoal.



Figure 1: Charcoal price in Kenya (KSH/4kg tin). Source: Paul Muthui & Kenyan Burueau of Standards

Therefore, BURN is piloting co-branding and selling of briquettes along with their cookstoves.

[Ziwa Hillington's Presentation](#)

[Carlo Figà's Presentation](#)

[Paul Muthui's Presentation](#)

DAY 4

SESSION 1

ACCESS TO CAPITAL

PREPARING YOUR BUSINESS FOR SCALE

KERRY NASIDAI, OPEN CAPITAL ADVISORS

This session was included to give participants an overview of the capital raising process. Open Capital Advisors is a Nairobi-based firm that works with organizations across Africa to improve investor readiness. Kerry Nasidai, an Associate at OCA, gave an overview of different types of investors and their suitability for businesses in different stages. The types of investors she discussed were grant-giving organizations, early venture capital funds, angel investors, non-traditional debt providers, and peer-to-peer investors. For companies new to raising capital, their top three goals should be developing a business plan, preparing financial projections, and understanding the capital raise process. Kerry talked about the importance of a strong business plan and the basic tenets of a good one. She also described the step-by-step process during the capital raise, which includes the initial meeting, due diligence process, term sheet proposal, second round of due diligence, closing and investment. Kerry felt the outlook for companies that make charcoal briquettes was good because they fall under multiple sectors including energy, clean cooking, and sanitation, which give producers a chance to communicate different value propositions.

[Session notes](#)

[Kerry Nasidai's Presentation](#)

CAPITAL RAISING

LAMUSIA ANZAYA, TRANSFORMATIONAL BUSINESS NETWORK (TBN)

In this session, Lamusia Anzaya of TBN talked about raising capital. TBN, with offices in Nairobi, Singapore and London, focuses on helping purpose driven businesses in frontier markets. Lamusia's presentation focused on recognizing business stage, need, and types of capital, and identifying investors. Companies have different capital needs depending on their stage: seed, start-up, growth, mature or exit/decline. Whether a company needs capital for growth, restructuring or realization of goals will determine the type of capital they should consider. Funding options for companies include debt, equity, quasi debt/equity and grants. Lamusia discussed each instrument structure/terms and what requirements a company could expect. He also discussed valuation and how different investors approach this. Identifying investors was also discussed with tips on how to approach investors and what to expect once initial contact has been made.

[Session notes](#)

[Lamusia Anzaya's Presentation](#)



Sanivation's Makaa Ya Jamii briquettes being packaged for market.

SESSION 2 BRANDING AND CONNECTING FOR A GREAT CUSTOMER EXPERIENCE

FACILITATOR: ELLEN FINN, BRAND
LEARNING, A DIVISION OF ACCENTURE;
PRESENTATIONS: ZIWA HILLINGTON,
GREEN BIO ENERGY; CHEBET LESON,
BRIGHTGREEN RENEWABLE ENERGY

In this interactive session, we explored the importance of long-term brand building for a sustainable charcoal briquette business. As a team, we drew out the defining qualities of a great brand, citing examples such as Coke, Apple, and Patagonia.

The benefits of strong branding are establishing a set of associated ideas, memories, and feelings in the mind of the consumer that keep your brand top of mind to provide a competitive advantage. Strong brands succeed by being purposeful, relevant, and distinctive; and, they connect with consumers at the right time, in the right place, and with the right message.

We explored each of these criteria, and then spent time working on each participant's own Brand Positioning Framework. The participants were asked to think back to the consumer journey exercise from Day 2 and come up with an Insight about their own consumer – a fresh perspective that guides their branding efforts. They then completed the framework, defining the functional and emotional benefits their product offers, the reason to believe (proof), the brand personality, and importantly, the overall brand purpose. This is not a simple exercise, and participants were encouraged to continue to complete the Brand Positioning Framework with their own teams. Ziwa Hillington and Chebet Lesan shared their branding activity and learnings for Green Bio Energy/Briketi, and BrightGreen/MOTO, respectively.

To note, many of the participants have dual brandings for 1) their umbrella organization targeted to financial investor audience, and 2) their charcoal briquette product targeted to the end user. They



Ellen Finn and ASCHES participants during the brand building workshop.

need to ensure that their focus on the corporate brand in the website and social media does not inhibit the development of a strong consumer brand. In addition, a common challenge among the participants is finding the right articulation of “briquette”, with producers using various words and descriptors for the product. While this can work for the individual producer, there may be an opportunity to build industry familiarity through consistent terminology that isn’t being realized.

We also introduced the role of social media in this session, as an important branding tactic, discussing the benefits and watch-outs for Facebook, Twitter, WhatsApp, and Instagram. While the group had varying levels of experience with these platforms, there was an overall concern about the time and social media savvy required to keep up with a social media effort. We provided tips to help encourage more active participation: i.e., be honest and authentic, have the intention of stimulating (not discouraging) two-way dialogue, favor video posts (which can be made with their phones), and demonstrate their expertise by curating content for their audience rather than pushing their own message. This session was followed by breakout sessions on Facebook and Twitter to help the participants set up their own accounts.

Session Notes

Ellen Finn’s Presentation

SKILL BUILDING SESSION: SETTING UP A TWITTER ACCOUNT

FACILITATOR: SYLVIA HERZOG, THE CHARCOAL PROJECT

In this session we focused on the benefits of using Twitter for personal or business use and how to set up an account and engage. Twitter can be used for brand building, customer engagement, and customer service. Spend some time developing your Twitter profile so that it reflects your

brand, either personal or business. Engagement should reflect your brand identity. If you are using Twitter for business, steer clear of polemic, political statements that can be easily found on Twitter. You can develop organized lists by type of account (industry, entertainment, economic, etc.) to organize your content. For details on how to set up a new account, view the slide presentation for this session.

Sylvia Herzog’s Presentation

SKILL BUILDING SESSION: OPTIMIZING YOUR FACEBOOK BUSINESS PAGE

FACILITATOR: ELLEN FINN, BRAND LEARNING

In this hands-on session, we helped participants set up or optimize their existing business Facebook page, counseling them to avoid using their personal Facebook page for business. We started by looking at the profile and cover photos as prime branding opportunities, suggesting they always use their logo as the profile image, and add a video cover photo. Once set up, they should develop a content calendar and start sharing and engaging with confidence – asking questions, doing product demos, crowdsourcing ideas and feedback, etc. On a regular basis, they should review Facebook Insights, to see the reach and engagement of their activities, and optimize their content calendar using the best-performing activities. They could also test “paid promotions,” targeting specific locations, interests, age, and gender. Lastly, they should recruit friends, family, and existing customers to “follow” their business page, and, they should follow and actively engage with other businesses and organizations from their business page, in order to create a vibrant, interactive community. For details on how to set up a new account, view the slide presentation for this session.

Ellen Finn’s Presentation



A Sanivation employee operates a briquette agglomerator machine.

DAY 5

FIELD TRIP TO SANIVATION: TOUR OF FACILITY & DISCUSSION

FACILITATOR: CATHERINE BERNER, SANIVATION

On the morning of our final day at ASChES 2018, the group traveled down the road from the workshop venue for a tour of Sanivation's production facility in Naivasha. Sanivation provides municipal waste treatment services and makes fuel briquettes out of poop. They provide modern, container-based toilets to households and municipalities at a small monthly fee and then collect and processes the waste. This provides a relatively simple and effective sanitation solution for consumers without access to municipal services (e.g. sanitary sewer) and also utilizes the by-

product for household energy purposes. Waste is collected from Sanivation's purpose-designed toilets in bags and transported to their demonstration factory where an innovative solar pasteurizer eliminates harmful microorganisms and odor. The pasteurized poop is mixed with charcoal fines and serves as a binder for Sanivation's Makaa Ya Jamii (Charcoal for the Family) briquettes, while the unusable portion of the waste is incinerated. Sanivation also produces uncarbonized briquettes for industrial applications that are made from sawdust and poop binder. Sanivation's products are sold in Nairobi and Naivasha. In addition to touring the facility, ASChES attendees had a chance to meet Sanivation staff and learn about their journey to develop a hybrid sanitation and fuel business model and design a process to execute this safely and at scale.

DESIGNING OUR COMMUNITY OF PRACTICE

FACILITATORS: DAN SWEENEY, MIT D-LAB AND ZIWA HILLINGTON, GREEN BIO ENERGY

During our final session at AScHES 2018, the group gathered to discuss how we will continue to operate as an AScHES community and what types of activities and structures would be useful. Each participant had a chance to contribute their ideas. In general, everyone agreed that given the usefulness of this workshop, there would be a lot of benefit in remaining connected and continuing to share following the workshop.

Since AScHES 2018 participants come from different regions around the world, a global organization should be created to organize events and initiatives for the whole group. Many participants thought it would also be useful to organize country or regional AScHES associations, or join existing biomass fuel associations, to address issues specific to those areas (e.g. informing charcoal and fuel policy, VAT, available biomass feedstocks, aggregating product). Catherine Berner from Sanitation discussed their involvement in the Container Based Sanitation Alliance, which has benefited all member companies through development of common messaging for advocacy, combined fundraising efforts, and attracting attention and support for their sector from large global institutions.

Most participants agreed that regular discussions over conference calls would be useful for learning and sharing on specific topics.

The following is a summary list of other ideas that were proposed during this session:

- » Through regional AScHES association, influence policy at the regional scale (e.g., East African Community) where those policies would be adopted by all member countries.

- » Develop standards for charcoal briquettes. These could include standard methods for determining environmental impacts, quality standards for product export, e.g., to the Middle East.
- » Establish char aggregator companies that purchase from multiple producers and manage distribution and sales.
- » Establish a forum for problems and solutions.
- » Share grant and funding opportunities.
- » Create an AScHES online presence, e.g., Facebook group or website, which represents all of the member companies. Includes resources that are useful for briquetting companies.
- » Train and mentor women entrepreneurs.
- » Provide assistance to entrepreneurs in making decisions about manufacturing as well as technical challenges.
- » Document and share cases where common challenges were overcome, e.g., with production technology.
- » Advocate for global funding programs for which briquette companies would be eligible, similar to Ashden's clean cooking competition.
- » Draft a policy brief for charcoal briquettes that explains the benefits of the solution.
- » Conduct study visits to other AScHES community members.
- » Engage briquette companies that did not attend the AScHES Workshop, possibly through a mentorship program for startups.
- » Design competitions around common challenges (e.g., briquette drying).

Session Notes

III. SUMMARY OF MONITORING AND EVALUATION RESULTS AND FINDINGS

LAURA BUDZYNA AND ERIKA DESMOND, MIT D-LAB

At the convening, the team conducted a [pre-survey](#) and a [post-survey](#) to assess participants’ goals, takeaways, and connections from the week. These surveys yielded three main findings:

1. Above all, participants valued the community of practice fostered by AScHES.

Participants felt that the most valuable takeaway from AScHES was the community of practice that it fostered among alternative fuel producers, most of whom had very little previous connection to other businesses in the industry. One participant commented, “It’s rare that I meet anyone working in this field, and it can feel quite insular at times, so I’m very excited to collaborate with oth-

ers working through similar problems and towards similar goals.” Before the convening, participants reported connections with an average of just 3 other participating organizations. After the convening, participants planned to follow up with an average of 13 other organizations. Encouragingly, 100% of participants reported that they intend to stay active in the community of practice after the event.

2. Participants prioritized – and took advantage of – the unique opportunity to gain technical knowledge specific to the alternative fuel industry.

Participants recognized industry-specific technical knowledge as the unique value-add of this event, as compared to other more generic busi-

On a scale of 1-10, how knowledgeable do you feel about the following topics?

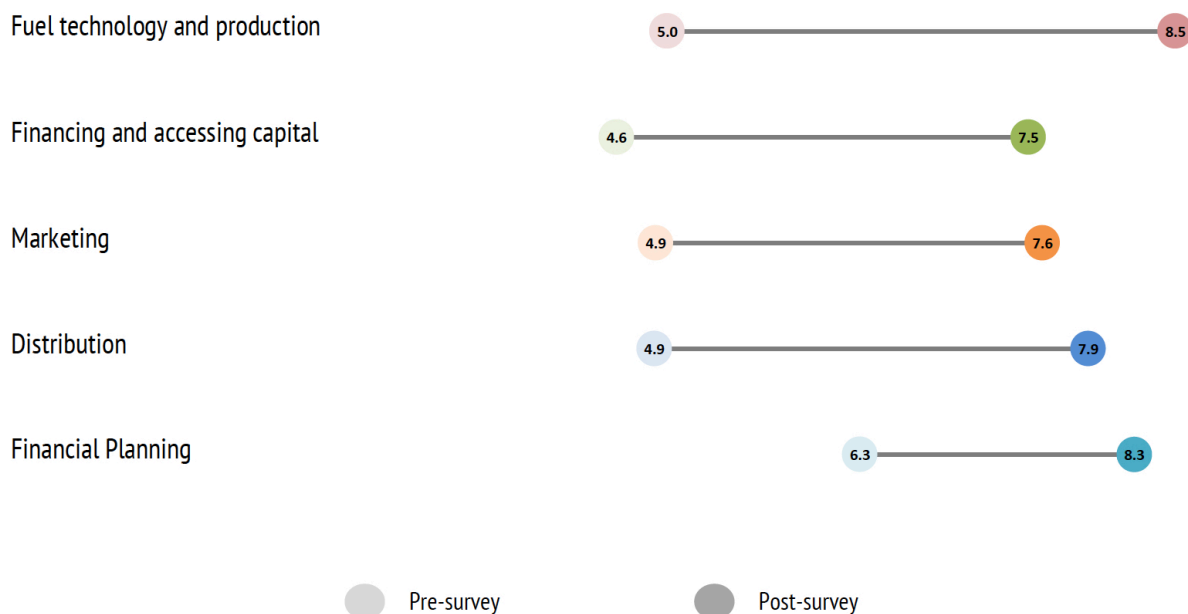


Figure 2: Self-Assessed Knowledge in Pre and Post Surveys.



Sanitation Manager of Product Catherine Berner welcomes AScHES 2018 attendees to their factory.

ness trainings. In the surveys, participants ranked fuel technology and production as the most important knowledge area to improve and the most valuable topic featured at the event. This is also the area in which participants reported the greatest improvement in knowledge, which increased from a self-ranked 5.0 out of 10 in the pre-survey to a 8.5 out of 10 in the post-survey [see Figure 2]. Within this topic area, participants reported the most growth in their knowledge about choosing equipment for scaling production, efficient drying methods, and quality control measures. After the event, 94% of participants planned to apply technical skills learned at the event, and 89% planned to implement quality control measures to improve their projects.

3. Participants felt that the event was responsive to their needs for business skills.

Participants also ranked financing, distribution, and marketing as highly important knowledge

areas to improve, and they reported substantial gains in knowledge in all three areas [see Figure 2]. Within these topics, participants reported the greatest amount of learning in understanding the requirements of lenders and equity investors, approaching investors, and using social media marketing with Twitter. One participant said that the event “forced [us] to challenge our beliefs, and reevaluate our organization, models, and strategies.” After the event, 89% of participants plan to implement business skills learned at the event, 78% planned to leverage social media marketing to reach new clients, and 56% planned to take steps to access new capital.

The full pre-survey and post-survey results can be found in the appendix of this report. In six months, the team will conduct a follow-up survey to assess the extent to which the events’ takeaways have translated into action.

[Complete Survey Responses](#)

IV. CONCLUSIONS AND THE WAY FORWARD

DAN SWEENEY AND SYLVIA HERZOG, WITH INPUT FROM KIM CHAIX, AMY SMITH, AND REN DIETEL

AScHES 2018 established a global community where previously there were only small pockets of local experience and introductory how-to content on the Internet. One participant commented that never before had they been to a conference where all of the content felt so relevant and people could actually relate to their experiences as an entrepreneur. In addition, this workshop aimed to quickly build community and establish a comfort and rapport among participants that often takes much longer. Being able to remember and reference not only key information gathered but also memorable moments and people has helped AScHES to continue as an active and engaged virtual community. The workshop content described above and in the notes and presentations (linked in digital versions of this report) represents a fraction of the knowledge that has been exchanged within the AScHES

community in the months following the workshop. Now, the AScHES Community of Practice is maintaining that connection and exchange through a closed WhatsApp group and regular conference calls. Several focused conversations have emerged including the organization of a response to upcoming Kenyan regulatory changes on household fuels, and provision of fuels in humanitarian settings. During the coming months these conversations will continue and evolve into specific actions and/or deliverables that will be distributed through the MIT D-Lab and The Charcoal Project websites (d-lab.mit.edu, www.charcoalproject.org). While the workshop and initial actions have focused on only those that were selected to attend AScHES 2018, the organizers and members are eager to provide mentoring and outreach to the broader community of sustainable charcoal enterprises and startups. We invite those interested to request being added to the AScHES email list by contacting the organizing team at asches@mit.edu.



Community of Practice discussion at AScHES 2018.

Sanivation		
PRODUCTION SALES		
	TOTAL TONES PRODUCED	TOTAL TONES SOLD
2015		0
2016		50.5
2017	50	55.9
2018	761	62.2
2019		
2020		

Sanivation racks up sales of briquettes.



Bukheti Juma and Betty Zizinga Kaddu enjoy trying out different cookstoves and briquettes on barbeque night.



The group gets an introduction to Sanivation's operations on their trip to visit the company.



Cookswell Jikos charring demonstration.

V. APPENDICES

1. LIST OF PARTICIPANTS, PRESENTERS, AND ORGANIZERS

PRODUCERS

RONALD ANGURA	GREEN HEAT UGANDA LIMITED	UGANDA
SARAH BASEMERA	RAISING GABDHO FOUNDATION	UGANDA
MICHAEL DELANEY	CARBON ROOTS INTERNATIONAL	HAITI
CARLO FIGÀ TALAMANCA	SFGE	CAMBODIA/ITALY
GRACE GITIHA	GREEN ECO SOLUTIONS LTD	KENYA
ZIWA HILLINGTON	GREEN BIO ENERGY	UGANDA
BETTY IKALANY	AFFORDABLE ENERGY SAVING TECHNOLOGIES	UGANDA
PRIYADARSHINI KARVE	SAMUCHIT ENVIRO TECH	INDIA
CHEBET LESAN	BRIGHTGREEN RENEWABLE ENERGY	KENYA
PIERRE JOSEPH LOUISSAINT	H.E.D.O-HAITI	HAITI
ALISTAIR NICKLIN	LA TERRE CLEAN ENERGY AND IKOMOTO CHARCOAL	KENYA
LYDIAH NJUNG'E	EVERSAVE BRIQUETTES LTD	KENYA
DAVID NKWANGA	ADAPT PLUS LTD	UGANDA
CHARITY OGETO	SINOKA BIOENTERPRISE COOPERATIVE SOCIETY LTD	KENYA
JAIRUS OMWANZA	SANIVATION	KENYA
YAKMUT SALEH JABRIL	XPEDIANT GLOBAL VISION LTD	NIGERIA
VIRGINIA SSEMAKULA NYAKAIRU	GOODFIRE LTD	UGANDA
BUKHETI JUMA SULEIMAN	MKAA POA HALISI	ZANZIBAR, TANZANIA
NICOLAS THONUS	CHARCOAL BRIQUETTES TANZANIA LTD	TANZANIA
SAID TWAHIR	KENCOCO LTD	KENYA
BETTY ZIZINGA KADDU	BEST OF WASTE LTD	UGANDA

GUEST PRESENTERS

CHRIS ADAM	ADAM + PARTNER	ETHIOPIA
LAMUSIA ANZAYA	TRANSFORMATIONAL BUSINESS NETWORK	KENYA
CATHERINE BERNER	SANIVATION	KENYA
JAMES JOYCE	PYROCAL	AUSTRALIA
TEDDY KINYANJUI	COOKSWELL JIKOS	KENYA
KEVIN KUNG	MIT/TAKACHAR/SAFI ORGANICS	US
PAUL MUTHUI	BURN MANUFACTURING	KENYA
KERRY NASIDAI	OPEN CAPITAL ADVISORS	KENYA

US ORGANIZERS

J. KIM CHAIX

REN DIETEL

ELLEN FINN

SYLVIA HERZOG

AMY SMITH

DAN SWEENEY

THE CHARCOAL PROJECT

DIETEL & PARTNERS

BRAND LEARNING

THE CHARCOAL PROJECT

MIT D-LAB

MIT D-LAB



Group outing to Hell's Gate National Park.

2. DETAILED ASCHES 2018 PROGRAM

SUNDAY SEPTEMBER 30

2:00-5:00pm	Reception	Arrival & Registration
6:30-7:30pm	Restaurant	Informal Meet and Greet
7:30-9:30pm	Restaurant	Dinner

MONDAY OCTOBER 1

6:30-7:30am		Yoga
7:30-8:30am	Restaurant	Breakfast
8:30-10:00am	Restaurant Lawn	Welcome and Introductions - Morning Circle - Logistics and Introduction to Venue - Workshop Format, Goals, and Norms
10:00-12:30pm	Conference Hall	The Big Picture - Why are We Here? - Charcoal Origins at MIT D-Lab, TCP, and ARTI - Future of Charcoal - Benefits of Charcoal Briquettes
12:30-2:30pm	Restaurant	Lunch and Personal Time
1:30-2:30	Conference Hall	Optional Group Skill Building - The Challenge of Suppling Fuel to Refugee Camps
	Restaurant	Optional One-on-One Coaching (half-hour sessions)
2:30-5:30pm	Conference Hall	Technical session: Production, Quality, and Scale - MIT D-Lab Experience with Testing and Quality (Dan Sweeney) - Working with Local Fabricators to Design Production Solutions (Betty Ikalany & Dan Sweeney) - SGFE's Production Model (Carlo Figà Talamanca) - Shifting from DIY to a Fuel Enterprise at Scale (Ryan Delaney) - Models for Scale (Amy Smith)
5:30-6:30pm	Conference Hall	Optional Skills Building Session - Levers for Achieving Profitability
	Restaurant	Optional One-on-One Coaching (half-hour sessions)
6:30-8:30pm	Restaurant	Dinner and Personal Time
7:30-9:30pm	Restaurant	Evening Activity - Cultural Show

TUESDAY OCTOBER 2

6:30-7:30am		Yoga
7:30-8:30am	Restaurant	Breakfast
8:30-9:00am	Restaurant Lawn	Morning Circle
9:00-12:30pm	Conference Hall	Innovative Business Models (Ellen Finn & Sylvia Herzog) - What's Your Customer Journey? - Knowing Your Customers Needs and Preferences - Innovative Ways to Address Customer Needs and Wants
12:30-2:30pm	Restaurant	Lunch and Personal Time
1:30-2:30pm	Restaurant	Optional One-on-One Coaching (half-hour sessions)
2:30-5:30pm	Conference Hall	Technical Session: Advances in Char Production - Intro to Char Production Methods (Dan Sweeney) - Pyrocal Carbonizer (Dr. James Joyce) - Torrefaction of Agricultural Residues (Dr. Kevin Kung) - The Adam Retort (Dr. Chris Adam) - Gasification for Char Production (David Nkwanga) - Hands-on Char-Making (Teddy Kinyanjui)
5:30-6:30pm	Restaurant	Optional One-on-One Coaching (half-hour sessions)

6:30-8:30pm	Restaurant	Barbecue Dinner and Personal Time
6:30-9:30pm	Restaurant Lawn	Evening Activity - Market Place and Ring of Fire
WEDNESDAY OCTOBER 3		
6:30-7:30am	Restaurant	Breakfast
7:30-2:00pm	Off site	Group Safari Trip to Hell's Gate National Park
2:00-3:00pm		Return and Personal Time
3:00-6:00pm	Conference Hall	Technical Session: Briquette Drying
		- Intro to drying approaches (Dan Sweeney)
		- Green Bio Energy (Ziwa Hillington)
		- Evolution of Drying at SGFE (Carlo Figà Talamanca)
		- Manufacturing and Fuels at BURN (Peter Scott)
6:30-8:30pm	Restaurant	Dinner and Personal Time
8:00-10:00pm	Restaurant	Evening Activity - Game Night
THURSDAY OCTOBER 4		
6:30-7:30am		Yoga
7:30-8:30am	Restaurant	Breakfast
8:30-9:00am	Restaurant Lawn	Morning Circle
9:00-12:30pm	Conference Hall	Access to Capital Workshop
	-	- Investor Readiness (Kerry Nasidai, Open Capital Advisors)
		- What To Expect From an Equity Investor (Lamusia Anzaya, TBN)
		- Ins and Outs of Climate Finance (Tom Owino, Climate Care)
		- Panel Discussion with Speakers
12:30-2:30pm	Restaurant	Lunch and Personal Time
1:30-2:30pm	Conference Hall	Optional Access to Capital Q&A with Kerry Nasidai
	Conference Hall	Optional Access to Capital Q&A with Lamusia Anzaya
	Conference Hall	Optional Climate Finance Q&A with Tom Owino
	Restaurant	Optional One-on-One Coaching (half-hour sessions)
2:30-5:30pm	Conference Hall	Branding and Connecting for a Great Customer Experience (Ellen Finn & Sylvia Herzog)
		- Branding & Marketing Challenges
		- Social Media Marketing
		- Best Practices - Participants Sharing
5:30-6:30pm	Conference Hall	Optional Skills Building Session - Setting up a Twitter Account
	Conference Hall	Optional Skills Building Session - Optimizing Your Facebook Business Page
	Restaurant	Optional One-on-One Coaching (half-hour sessions)
6:30-8:30pm	Restaurant	Dinner and Personal Time
8:00-10:00pm	Restaurant	Evening Activity - Talent Show
FRIDAY OCTOBER 5		
6:30-7:30am		Yoga
7:30-8:30am	Restaurant	Breakfast
8:30-9:00am	Restaurant Lawn	Morning Circle
9:00-1:00pm	Off site	Field Trip to Sanivation
		- Factory tour
		- Designing our Community of Practice
		- Lunch
2:00-4:00pm	Off site	Boat Trip on Lake Naivasha
4:30-5:30pm	Conference Hall	Future Collaborations and Post-Workshop Survey
6:30-9:30pm	Restaurant	Final Dinner Celebration
SATURDAY OCTOBER 6		
Morning		Departure and transport to Nairobi

AScHES

ADVANCING SUSTAINABLE CHARCOAL
ENTERPRISES AT SCALE 2018, NAIVASHA, KENYA

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