ETHOS 2020 Abstract Catalog

Paul Anderson

Juntos Energy Solutions NFP

Title: Utilizing Internet of Things (IoT) and Artificial Intelligence (AI) Technologies for Impact Analysis and Tracking of Cookstove Distributions

Abstract: The Clean Cookstove Sector is plagued by promises not kept and results not delivered. Thousands if not millions of delivered stoves go untracked and remain unconfirmed as to their ongoing usage and impacts. These stoves range from short-lived, inexpensive clay charcoal burners to sophisticated units that may have embedded and/or attached electronics. Additionally, millions of give-away LPG stoves go unused due to fuel costs and supply.

Important actions to remedy this condition include:

- At least four companies developing sensors and data trackers for stoves.
- One NGO tracks visits to and usage data from placed stoves every 28 days with digitally transcribed, immutable records in a blockchain-enabled verification system.
- Numerous funders are using Results Based Financing (RBF) to promote record keeping through the first (or several) verifications.
- Two entities are proposing an IoT/AI system to extend the above-mentioned verification system to collect and utilize readily available data that is abundant from shipping/placement sources, stove sensors, periodic visits, maintenance visits, etc.

This ETHOS session defines (and questions) the value of using modern technologies to ensure that clean cookstoves are serving their purpose and are worthy of financial support.

Dale Andreatta

SEA, Ltd.

Title: Use of Solar Energy for Household Energy Needs

Abstract: This presentation concerns the use of solar energy for the non-cooking portion of household energy needs. This includes wash water heating and space heating, also water purification, wood drying, grain drying, clothing disinfection, and possibly other tasks. These low temperature tasks are well suited to diffuse solar energy, and very simple solar collectors can be used.

A new type of inexpensive solar water heater is also presented, appropriate for people or businesses (such as small hotels) that have piped cold water and want to have piped hot water without the use of electricity. "

Learning objectives:

- That solar energy and very low cost solar collectors are well-suited to many household energy tasks.
- That these tasks can be very energy intensive.
- That if you already have piped water, a number of methods are available for low cost solar water heaters.

Sam Bentson

Aprovecho Research Center

Title: Using Simple Outdoor Air Pollution Models

Abstract: Using cookstoves indoors poses a great threat to human health. When stoves have chimneys that threat is largely removed from the room, but how much pollution can the air surrounding the home take before it leads to dangerous indoor air? An existing Rollback model was used to illustrate how cookstove emissions would have a minimal effect on outdoor air PM2.5 concentrations in Oakridge, OR, and one was developed for Chittigong, Bangladesh to show the cookstove and other emissions inventory reductions needed to achieve reasonable outdoor air quality. The Chittigong model showed that clean burning biomass cookstoves with chimneys can be used in cities and not lead to dangerous outdoor air concentrations when other human sources are also minimized.

Learning objectives:

Understand the contribution to outdoor air pollution when clean burning biomass cookstoves with chimneys are used by concentrated populations of people.

Tami Bond

University of Illinois at Urbana-Champaign

Title: Can we get there from here? Emission reduction potentials and air quality and climate goals

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Mark Bryden

Iowa State University

Title: Crowdsourcing village energy modeling

Abstract: ETHOS was founded as a forum for people to come together to work on the challenges of small cookstoves in the developing world. This talk builds on this heritage by presenting a unique crowd sourcing effort to model and understand village energy and the potential impact of various interventions on village energy. Too often interventions occur without understanding their benefit, impact, and cost beyond a simple need analysis and a hope that they will make a difference. The village energy model provides a starting place for including a complete view of village energy and village life in the decision making process and provides a holistic view of the impact of proposed interventions. The goal is a crowdsourced effort to develop a more complete and usable village energy model. This talk presents a cloud based platform which desegregates the current monolithic village energy model into a set of simple single purpose models that can be federated together. This creates an extensible village energy modeling platform which can be modified, explored, extended with new models, and linked to data sources. The talk will end with a call for others to join in the effort to better understand village energy.

Wyatt Champion

US EPA (ORISE)

Title: An update on the U.S. EPA Cookstove Test Facility's on-going research

Abstract: Household air pollution is the world's leading environmental health risk factor and contributes significantly to ambient climate-forcing. In an effort to characterize the emissions of dozens of stove designs (representing hundreds of stove models), the U.S. EPA's Cookstove Test Facility (CTF) has historically provided baseline emissions and performance test data for a suite of cookstove/fuel combinations. It has also served to provide stove emissions samples (typically in the form of filter sampled fine particular matter) for use in chemical (e.g., particle-phase polycyclic aromatic hydrocarbons) and biological analyses (e.g., mutagenicity, gene expression). In the past year, three primary studies have been employed at the CTF: (1) a comparison of emissions metrics between former and current standardized cookstove test protocols (WBT and ISO 19867-1, respectively) for a suite of stove/fuel combinations, (2) an assessment of the mutagenicity of PM from pellet-fueled cookstoves, and (3) an implementation of an oxidative flow reactor in the CTF to assess the chemical and biological characteristics of cookstove secondary organic aerosol (SOA). Data analysis is on-going for all three studies, and therefore

study methodologies and objectives (alongside limited preliminary data) are the focus of this presentation.

Wyatt Champion

US EPA (ORISE)

Title: Pellet-fed Gasifier Stoves Approach Gas-stove Like Performance during In-home Use in Rwanda

Abstract: Nearly all households in Rwanda burn solid fuels for cooking. A private firm in Rwanda is distributing forced-draft pellet-fed semi-gasifier cookstoves and fuel pellets. We measured in-use emissions of pollutants including fine particulate matter (PM2.5), organic and elemental carbon (OC, EC), black carbon (BC) and carbon monoxide (CO) in 91 uncontrolled cooking tests (UCTs) of both pellet and baseline (wood; charcoal) stoves. We observed >90% reductions in most pollutant emission factors/rates from pellet stoves compared to baseline stoves. Pellet stoves performed far better than gasifier stoves burning unprocessed wood, and consistent with ISO tiers 4 and 5 for PM2.5 and CO, respectively. Pellet stoves were generally clean, but performance varied; emissions from the dirtiest pellet tests matched those from the cleanest traditional stove tests. Our real-time data suggest that events occurring during ignition and the end of testing (e.g., refueling, char burnout) drive high emissions during pellet tests. We use our field data to estimate potential health and climate cobenefits from stove adoption. This analysis suggests that pellet stoves, when operated correctly, have the potential to provide health benefits far above previously tested biomass stoves and approaching modern fuel stoves (e.g., LPG).

Emily Conant

Nexleaf Analytics

Title: What Women Want: A Data-driven Approach

Abstract: In April 2019, Nexleaf Analytics in collaboration with Rural Women Energy Security (RUWES) and the Climate and Clean Air Coalition (CCAC) began an improved cookstove (ICS) pilot study in Nigeria. This 6 month pilot involved observing cooking behavior of 50 households by using sensor devices to monitor cooking on both the ICS and traditional cookstove (TCS). Two biomass stoves and three clean fuel stoves were considered as candidates for scaling up to 100 households. Following the pilot, extensive qualitative survey data was collected from households regarding their preferences, experiences, lifestyles, and community involvement. This study brings together quantitative and qualitative data in order to determine which stove model(s) are the strongest candidates for scale-up during the next phase of the project

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Kathy Cox

City University of Seattle

Title: Pellet Feeder Gasifier Stove in Guatemala

Abstract: We are Enactus City University of Seattle and Green Energy Center (GEC) is one of projects. We created a clean cook gasifier stove that uses biomass as fuel. With our stove we provide a healthier alternate solution to open fire cooking in villages in in Guatemala, Puerto Rico and Gabon.

Currently we are partnering with Hands for Peace Making, a non-profit organization that help us to manufacture the stove and distribute them in Guatemala. After testing our stove at the village we found that fueling the stove with wood wasn't the best option because villagers needed to refuel the stove several times before finishing to cook and their wood was often wet. Plus, deforestation causes soil destabilization. Therefore we devised a solution of a pellet feeder to extend the cooking time of our gasifier stove. The GEC stove uses pellets made with agricultural waste to make it more sustainable and reduce the amount of wood used. We will report on our successful trial with the villagers on the prototype and our plans to invest in a pelletizer and training program for the villagers to produce their own fuel for the stoves.

Learning objectives:

- To learn how to improve a gasifier stove with a pellet feeder.
- To understand local Guatemala villager needs.

Samantha Delapena

Berkeley Air Monitoring Group

Title: Evaluation of Clean Cooking Behavior Change Communication Interventions in Kenya, Bangladesh and Nigeria

Abstract: From 2016-2019, the Clean Cooking Alliance selected four behavior change communication (BCC) interventions in Bangladesh, Kenya, and Nigeria. The program aimed to pilot established BCC techniques to enhance demand for cleaner household cooking. Together, the campaigns reached over 13 million people. Coincident with the roll-out of the BCC campaigns, the Alliance funded the impact evaluation that is the subject of this presentation. Due to the real-world nature of the assessment we relied on a quasi-experimental design featuring a dose/response index to compare participants based on levels of exposure to the BCC interventions. The assessment examined the effects of the interventions on the purchase of modern cooking stoves and fuels and changes in determinants of behavior, such as

knowledge, attitudes, beliefs, and intentions - with the goal of using BCC to accelerate clean cooking markets by increasing awareness and adoption of clean cooking solutions, thus reducing health and environmental impacts of traditional fuels. Results showed evidence of effectiveness in achieving intended outcomes across the four BCC intervention projects: the BCC boosted awareness and in some cases intention to purchase, with suggestive impacts on actual purchase of promoted stoves.

Learning objectives:

Attendees will learn about the effectiveness of the four BCC intervention projects, across three countries, in achieving intended outcomes. They will also hear about the lessons learned from the BCC interventions and why they should be treated as large-scale pilots that will inform future efforts.

Ken Ekegren

Title: Rocket stoves and solar powered LED home lighting in four African countries.

Abstract: During the summer of 2020, Professor Ken Ekegren from North Central State College took four engineering students to Kenya, Tanzania, Uganda and Malawi to demonstrate construction of bucket and clay-type rocket stoves along with a simple solar charged LED lighting and phone charging system. A low-cost institutionally sized stove was also designed and built. Ken will present the results of this EPA grant funded trip.

David Evitt

ASAT Inc. (Aprovecho Research Center)

Title: Forced Air Mixing With The Jet-Flame

Abstract: Is there an add-on accessory that can dramatically improve the performance of basic cookstoves using local materials? YES! With the Jet-Flame any cookstove can be a high-performance fan stove. This talk shares the development of the Jet-Flame, how and why it works, and performance benchmarking.

Alison Filler

International Lifeline Fund

Title: The Do's and Don't's of Adoption

Abstract: At the 2019 ETHOS Conference, we collectively discussed the formula I = A x P, where (I)mpact is reflected in the relationship between (A)doption and (P)erformance. The clean cooking sector has thus far placed great emphasis on technological performance with the mindset that the highest tier stoves should be prioritized to drive the greatest environmental, economic, and health benefits. Why, then, are we are still grappling to achieve market penetration decades later?

International Lifeline Fund (ILF) will discuss the "do's" and "don't's" to achieve successful rates of technology adoption based on our lessons learned over 13+ years of design, manufacturing, and implementation experience in refugee/displacement settings, as well as emerging markets.

Together with session participants we will identify gaps in the clean cooking sector and the alignment of industry incentives that lead to failures in technology adoption, as well brainstorm techniques to bridge these gaps. With case studies examining ILF's own successes and, more valuably, our own failures over the years, we will share our methods to adapt and learn based on community feedback.

Learning objectives: We are presenting on this topic to bring self-awareness to our community by acknowledging the internal challenges and bad habits we struggle with in the clean cooking space, and thinking creatively about how we can overcome them. Together, we will review an implementer's best practices checklist to understand:

- Who is the user? What are their interests and priorities?;
- Who ultimately is the client, and who are we ultimately serving?;
- What is and is not the role of the donor/funding partner?; and
- What can we learn from the differences between willingness to pay and effective demand?

In doing so, we aim to move from good intentions to better partnerships & practices and more collective successes.

Gemara Gifford

Trees, Water & People

Title: The Justa Cookstove turns 20: Lessons Learned, and the Future in Honduras and Beyond

Abstract: The "Justa" biomass cookstove was developed in the late-nineties after Hurricane Mitch hit in late 1998, and within one year, Trees, Water & People (TWP), Aprovecho Research Center, and the community Aldea de Suyapa had debuted the Justa Stove, named after Justa Nuñez – the woman who most contributed to its design. Twenty years later, the Justa Stove remains the flagship improved cookstove in Central America, and dozens of additional designs have sprung from its original iteration. Approximately 250,000 Justa cookstoves installed in Honduras so far, with a half-a-dozen recent scientific publications backing the cookstove's success in the region made possible by a 2014-2018 collaboration between Colorado State University, Trees, Water & People, and the Asociación Hondureña para el Desarrollo (AHDESA). This talk will dive into the recent scientific studies examining public health benefits of the Justa cookstove, as well as take a look back at the last 20 years of the Justa cookstove and what made this a success story. We will have an opportunity to discuss what opportunities and challenges still remain. We're grateful to the ETHOS family for being part of the early days of the Justa Stove, and look forward to years of collaboration to come.

Learning objectives:

1) Sector experts, professors and students will understand the transformation of the Justa cookstove since 1998, including the latest scientific research carried out by Colorado State University, and Trees, Water & People including seven peer-reviewed articles from 2018 and 2019.
2) Newer members to the cookstove sector will understand the founding story of the Justa cookstove in Honduras, as well as the unique community-based development and participatory design approaches that were used, and how that model translated into a success story over 20 years later
3) A friendly discussion with the ETHOS group around how to scale-up and expand this successful community-based cookstove approach in Central America, as well as how this approach can be translated to other geographies around the world.

Grace Gius

California Polytechnic University San Luis Obispo

Title: Insulated Solar Electric Cooking

Abstract: We started a company in Ghana to build solar-electric cookers with thermal storage capacity. Because of the declining cost of photovoltaic solar panels, directly connected DC solar

cookers have the potential to greatly reduce the use of biomass cooking and electrify rural low-income communities. Our simple and inexpensive Insulated Solar Electric Cooking technology optimizes the power delivered from a solar panel over a wide range of solar intensities. A phone or small battery charger (for a light source) can be attached directly to the cooking system, improving cookstove adoption. By storing energy in a phase change medium our new design increases available power and allows the user to cook after sunset. After exploring building and applications in the unelectrified village of Agbokpa, Ghana, we are currently preparing the production of our cookers in Ghana for a larger scale test dissemination with MECS funding through UKAid. SolarElectricCook.com is our company site with access to videos and publications.

Learning objectives:

1) Awareness and understanding of our technology as an alternative to biomass cooking that provides inexpensive electrification.
2) To invite collaboration within the cooking community.
3) To continue the dialogue about dissemination methods.

Samantha Hing

UC Berkeley

Title: Measuring Long-term Adoption of Improved Biomass Cookstoves in Households in Rural India

Abstract: Providing accurate and reliable data on cookstove usage is necessary for cookstove engineers, sponsors, and health scientists to better understand the effectiveness of their cookstove designs and improve their approach for increasing the sustained adoption of improved cookstoves. However, survey data alone inaccurately represent actual cookstove usage and long-term cookstove usage data is not readily available for understanding the barriers to achieving widespread adoption. In this presentation, I will discuss preliminary results from Berkeley Lab's 1.5-year study, on measuring the long-term adoption, with temperature sensors, of an improved biomass cookstove (developed by LBNL) in 100 households in Maharashtra, India. The improved cookstove significantly reduces fuelwood usage and smoke emissions by ~50%, compared to traditional three-stone fires. Thus, there is the potential to significantly reduce stress on local forests and burden on the women and children, who are the primary cooks and collectors of fuelwood.

Learning objectives:

In this session, we will present the study design and preliminary results of the study that is still in progress. By attending this session, participants will:

- Learn about the experimental plan of the 1.5-year study to measuring long-term adoption of improved biomass cookstoves in households in rural India.
- Understand and discuss the value of sensor data on cookstove usage in understanding cookstove design and adoption.
- Discuss preliminary results from the study, and give feedback on future plans for the study.

Caleb Inman

Oregon State University

Title: Capturing Waste Energy from Stove Exhaust Using Thermoelectric Generators

Abstract: Oregon State University students partnered with Hydrobee SPC for their senior design project to create a thermoelectric generator (TEG) that harvests waste heat from the chimney of a clean cookstove to power small electronics. This project tests the designs of previous senior design teams and improves upon their research and analysis. The TEG modules produce electrical power due to a temperature drop created by hot air on one side and room-temperature water on the other. The team's testing, research and modelling has focused on four important parameters: heat sink design in the chimney, cold-water reservoir fluid thermal analysis, TEG performance and selection, and design for manufacture. This session will compare various extended surface heat sink designs based on their ability to capture waste heat; the dynamic response of contained water with a constant heat flux on one side; difference between TEG modules related to temperature tolerance and power output; and design methodologies with cost, acquisition, and assembly considerations. Future development will explore the cost-effectiveness of this energy production method and possibility of scaling power performance to address different power needs.

Learning objectives:

Attendees will understand the concept of thermoelectric generation (TEG) using a power differential and discover the objective qualifications of commercially-available TEG modules (comparing hot-side and cold-side temperature ranges to power outputs. A discourse will be held on the design of heat sinks that capture thermal energy from a hot air source and move this energy to a colder surface. The attendee will learn about heat transfer characteristics of a finned heat sink in laminar and turbulent flow conditions and see thermal modelling data for different heat sink designs. Lastly, an explanation for the travel of heat through a TEG system will be given, explaining where heat is lost and highlighting the response of a container of water to a one-sided heat flux.

Maksim Islam

North Carolina State University

Title: Lessons learned from a multi-year cookstove intervention trial in rural India: indoor PM2.5 level and its link with cookstove emissions

Abstract: In this study, we aim to improve links between estimates of cookstove emissions and indoor PM2.5 concentrations during a cookstove intervention trial in two rural areas in India (Kullu in Himachal Pradesh; Koppal in Karnataka State). The study had three ~3-month-long measurement periods (baseline, follow-up-1, follow-up-2) in each location. Indoor PM2.5 concentration showed a significant reduction in intervention households relative to control households only in follow-up-1 in Koppal implying that intervention with options led to limited success. In general, Kullu households had ~50% lower PM2.5 concentration than Koppal, which can be explained by higher estimated air exchange rates and lower cooking times in Kullu compared to Koppal. Indoor PM was ~1.5-2 times lower in households with LPG than those without. We applied multilinear regression modeling using household ventilation characteristics, ambient conditions, cooking characteristics, stove types, and presence of other emission sources as predictors to identify the factors contributing to indoor PM2.5 variability. Model indicates that ventilation and cooking characteristics have a large influence on indoor PM. Finally, we applied a Monte-Carlo single box model - used for setting world health organization (WHO) standards – to link measured emissions rates and PM2.5 concentrations, and found that model greatly overestimates kitchen concentration.

Learning objectives:

This cookstove intervention trial is unique in the sense that it looked into socio-economic (stove adoption, fuel choice, and use) and technical (emission, indoor air quality, and exposure) aspects of an intervention. This trial had the largest cookstove emission measurement campaign to date. In this presentation, we mostly discuss indoor air quality aspects of the intervention and its link with cookstove emissions. The attendees will learn

- How different were the indoor PM2.5 concentrations in two study sites in India?
- How effective was the intervention?
- What are the factors influencing indoor PM2.5 concentration variability?
- How important is the household ventilation characteristics in improving indoor air quality?
- How does the Monte-Carlo single box model –used for setting world health organization (WHO) standards– perform in predicting kitchen PM concentration?

Aimee Jenks

United Nations Institute for Training and Research (UNITAR)

Title: Global Plan of Action for Sustainable Energy in Humanitarian Settings

Abstract: Energy plays a critical role in human development and has significant impact on the environment, yet, most of the 135 million people in need of humanitarian assistance lack access to affordable energy products, negatively impacting their health, livelihoods, safety, and well-being. In response to the need for coordinated and effective collaboration on sustainable energy in humanitarian settings across stakeholders, geographies and sectors, the Global Plan of Action was created by key humanitarian and development organisations in 2018 as framework for collective action to enable SDG7 for displaced people, host communities and humanitarian organisations. The GPA Framework is a sector wide and joint agenda, containing 60+ recommendations that enable sustainable energy access at scale in humanitarian settings, to be delivered in partnership by different agencies and partners (UN/INGOs, development orgs, host governments, private sector, research institutions, civil society). The Global Plan is coordinated by a team at UNITAR, who are working to connect to delivery partners to support the humanitarian energy agenda. We hope to share our experience with the practitioners at ETHOS 2020 and connect existing energy expertise to fill energy capacity gaps in the humanitarian sector.

Learning objectives:

- Raise awareness about the Global Plan of Action for Sustainable Energy in Humanitarian Settings, priority activities for 2020, and how practitioners and can plug into the action
- Facilitate dialogue around how experience in the energy access space can be learned from and leveraged in the humanitarian sector
- Discover opportunities for collaboration between engineering professionals and humanitarian partners, including opportunities to work on sustainable energy in humanitarian settings

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Ron Larson (Presented by Kevin McLean)

Sun24, Inc.

Title: Low Cost - No Cost. (1) Char-making, below-ground, plancha-type cook stoves. (2) Can in TLUD to make char

Abstract:

A. The standard TLUD is modified as follows: (1) To achieve more draft and cut costs, the lower pyrolysis portion is placed below ground. (2) The chimney/pot is to the side of the pyrolysis unit. The pyrolysis unit and chimney are separated by a traditional (but moveable) plancha above a horizontal flame. This allows for a taller chimney and therefore higher power flames (faster boiling or cooking on 2 or more cook pots).

B. A different low cost means of char-making - exterior heating of a can only slightly open at the bottom (not known to be used in combination with a TLUD). If possible, experimental results will be included.

Learning objectives:

We hope the attendees will critically consider:

1. In TLUDs,

- Incorporation of the ground to cut costs,
- Use of a horizontal flame to heat a plancha,
- Use of a taller chimney to create higher power flames.
- Low cost TLUD that heats multiple cookpots.

2. How to make char by placing a can in a TLUD.

Olivier Lefebvre

Climate Solutions Consulting

Title: New tools and methods to understand complex Cooking Energy Systems.

Abstract: This session will present the new additions to CSC line of sensors dedicated to clean cooking impact assessment. Since last ETHOS, we added 2 sensors to the ecosystem:

- A compressive FUEL sensor (developed in partnership with OSU) tailored to weight LPG cylinders.
- A small and quiet constant flow pump for PM gravimetric measurements (capable of up to 2LPM for 24h)

In additions to those more mature sensors we also have a few new prototypes:

- An electricity power meter that logs Voltage, Current and Power consumption for electric stove (and/or solar home systems).
- A $10 meal counter, that simply counts cooking events;
- A small wearable pendant integrating a 0.25LPM pump, a cyclone and wireless overnight charging.

Beside this new hardware, we will also present a case study where we used stove use monitors (EXACT) and PM datalogger (HAPEx) together to do source apportionment and assess the fraction of the cook's personal exposure coming from each stove type or outside of cooking events. We will focus on the methodology used and show how having an integrated suite of sensor was essential in pulling this off since this required a minute by minute analysis across several sensors deployed.

Learning objectives:

We are presenting this topic to get comments from the audience on the new hardware we recently added or are planning on adding to our suite of integrated sensors. Getting feedback from the sector at a very early stage in the development process in essential to assure that we are working on useful and relevant tool for the sector.

The second half of the presentation will show how we can leverage the integrated nature of our sensor suite to get insights that would be difficult to get otherwise.

Randy Lewis

Brigham Young University

Title: Analysis of Low-Cost Optical Particle Counters (copresented with Brady Hales)

Abstract: Harms associated with air pollution have led many to seek tools capable of monitoring individual exposure to gaseous pollutants and particulate matter (PM). Thus, several groups have developed portable, low-cost air-quality monitoring systems. These systems frequently adapt off-the-shelf sensor technologies with no consideration of proper installation or calibration procedures. The rapid adoption of these low-cost systems has left research and regulatory agencies behind, and there is a high probability that unverified and improperly interpreted data will lead to poor decision making at all levels. Thus, there is an urgent need to develop independent testing regimes and standards that ensure that these systems produce data with quantifiable accuracy and acceptable uncertainty estimates.

Low-cost (<$50) Optical Particle Counters (OPCs) are an example of off-the-shelf components that are being incorporated into air-quality monitoring systems. A thorough review of OPC literature has shown that there are inconsistencies of low-cost OPC systems with research grade instruments. This presentation will describe the basic operating principle of an OPC. The response of an OPC due to light scattering by PM10 has been modeled using Mie Theory and a typical photodetector response curve. Limitations regarding the accuracy of these devices in combustion diagnostics will be discussed.

Learning objectives:

1) Learn the basic theoretical and operating principles of Optical Particle Counters (OPCs).
2) Identify limitations regarding the accuracy of OPC devices in combustion diagnostics.

Kevin McLean

Sun24, Inc.

Title: Low Cost - No Cost. Rock beds to improve traditional wood cookstoves.

Abstract: A bed of rocks (5-10 cm) placed in traditional wood cookstoves (such as three-stone) improves efficiency by a third. SNV has demonstrated this efficiency improvement by WBT, KPT and CCT testing. This simple and free cookstove improvement requires no purchase or construction. Cooks only need to learn about the effectiveness and collect rocks. Training is quick and easy. In less than a year of training, millions of households are using rock beds.

Learning objectives:

We hope the attendees will critically consider how to expand training on rock beds to compliment the dissemination of other clean cooking initiatives (necessitated by stacking) and to reach households missed by these initiatives."

John Mitchell

EPA

Title: US EPA CCAC's (Climate and Clean Air Coalition) Activities to Reduce Short Lived Climate Pollutants from the Household Energy Sector

Abstract: CCAC/s mission is to help the world realize the opportunity that household clean/low-emission energy solutions can play in climate mitigation and air quality improvement as the household energy sector is the single most important controllable source of black carbon worldwide.

The overall goal of the Household Energy Initiative is to speed up the reduction of SLCP emissions, especially black carbon, alongside reductions of long-lived greenhouse gases (GHG), from the sector globally, to mitigate climate change, save lives, improve livelihoods, empower women, and protect the environment in the near-term and the long-term. Working with its large consortium of experts and committed partners and actors, the initiative aims to achieve this goal by supporting inclusion of SLCP considerations and climate change and air pollution linkages into household energy international and national policy instruments, i.e. international

agreements, financing mechanisms, programs, projects, action plans, policies, strategies, laws, regulations, standards, etc. This will be done through provision of advocacy action, research and development, tailored support to targeted large-scale efforts, and peer to peer exchange.

Learning objectives:

Have participants understand the important role that the Household Energy Community can play in reducing SLCPs; and why they might want to incorporate the reduction of black carbon into their organization's objectives.

Gavin Ray

Burn Design Lab

Title: Evaluating Ceramic Materials: Small-Scale Production and Testing

Abstract: Cookstoves can be an expensive commodity in developing countries; the initial investment can easily overshadow their potential for future fuel savings and health benefits. In an effort to help make this investment more worthwhile, Burn Design Lab is seeking to extend a charcoal cookstove's lifetime by replacing its combustion chamber material, stainless steel, with a ceramic. Burn Design Lab would like to share its experiences testing ceramic materials in the hope of building a "library" of protocols and properties conducive to a long-lasting, efficient ceramic combustion chamber, so the world can breathe easier.

Learning objectives:

Burn Design Lab has been exploring ceramics as an alternate material for a little while; we would like to share some of our mistakes and experiences in small-scale production and testing.

1. Metal vs Ceramic crack propagation mechanisms
2. Obstacles in moulding and de-moulding
3. Attempts at finding testing protocols which help predict combustion chamber lifetime (Spoiler: this is mainly about quench testing)

Madeleine Rossanese

Berkeley Air Monitoring Group

Title: Impacts and Effects of Improved Wood Burning Stoves on Time Use and Quality: An Experimental Study in Rural Kenya

Abstract: Among the impacts of interest when studying populations without access to clean, modern, and efficient energy for household energy needs, recent evidence has revealed an

undue time burden, particularly for women. This "time-poverty" and a persistent drudgery trap can arise from the constant demands of fuel collection, preparation, and cooking on an inefficient, polluting stove. Over the course of this 18-week study, starting March 2017, we evaluated 55 households in rural Kiambu County, Kenya, before and after the distribution of a modern wood-burning stove. Through stove use monitoring (SUM), surveys, kitchen observations, participatory research exercises (including photo elicitation), and focus group discussions, we aimed to understand the impacts of improved cooking technologies on time-use patterns, time quality, and perceived levels of drudgery for the main cook and her family members. At a high level, we found a reported reduction in time spent on cooking, fuel preparation, and fuel collection, as well as a reported reduction in perceived level of drudgery for the same three activities. The qualitative methods, such as photo elicitation and focus group discussions revealed co-benefits that we did not intentionally seek, such as an underlying economic story and a redistribution of labor amongst members of the household.

Learning objectives:

1.) An in-depth examination of how intervention technologies can change the time use of the recipient and their family
2.) An examination of the displacement of technologies required to realize various intervention benefits beyond personal exposure and health
3.) An exploration of the richness and unexpected information that can be attained through qualitative methods in conjunction with quantitative measurements

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Christa Roth

Food and Fuel consultants

Title: Thermal Energy for Productive Use - example of GIZ EnDev support to the fish processing sector in Malawi

Abstract: Fish processing (smoking, frying, drying) along the lakeshores of Malawi is estimated to use over 60,000 metric tons of dry wood equivalent every year, mostly coming from live trees in natural forests. In 2019, GIZ Energising Development (EnDev) started getting involved in R&D of firewood-saving technologies in cooperation with other stakeholders in the sector. Early successes include special stoves for efficient frying of fish on shore. Fish drying and smoking in the rainy season are up next. This intervention is part of a global initiative by EnDev to deliver more efficient biomass energy solutions for small and medium businesses.

Learning objectives:

This session aims to sensitize the audience for the huge potentials for climate impact that are so far mostly untapped in firewood-using small businesses in developing countries. It is high time to invest more effort into tackling this field as…

- In productive uses of firewood, baseline technologies are extremely wasteful.
- The specific saving potentials of large firewood consumers are much higher than household stoves
- Commercial firewood users are much more able and willing to invest into efficient technologies as it directly improves their business case.
- This session shall initiate more cooperation between experts to jointly address this multi-dimensional field of work.

Ryan Thompson

Mountain Air Engineering

Title: Biogas Project

Abstract: The session will describe the biogas project we are conducting in Nepal to a) improve the performance of existing household anaerobic digesters, and b) expand the current range of biogas by installing cold-climate digesters in higher mountain regions. We will present the project plan, current progress, digester designs, and the novel data platform we have developed to monitor biogas performance.

Learning objectives:

Attendees will learn about the current success of biogas systems in Nepal, the potential for improvements, considerations for biogas in cold climates, and why they want to donate to this project.

Danny Wilson

Title: FireFinder: A Simple Open-Source Algorithm for Cooking Event Detection

Abstract: Finding cooking events in temperature time series data from SUMS can be surprisingly challenging. This talk will discuss FireFinder which is a simple open-source algorithm that is good at detecting cooking events in time series data. FireFinder is one of several analytics functions available in the SUMSarizer R library. The SUMSarizer library is implemented in the Geocene web application which allows you to import and analyze SUMS data for free online.

Learning objectives:

- Learn how FireFinder detects cooking events
- Learn how to find documentation and source code for FireFinder on GitHub
- Learn how to use FireFinder for free at geocene.com