CLEAN ENERGY SOLUTIONS CENTER
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Efficiency for Agricultural Technologies: An Expert Conversation on Latest Findings, Remaining Gaps and Future Outlook

—Transcript of a webinar offered by the Clean Energy Solutions Center on 19 February 2019—
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Webinar Panelists

Makena Ireri
Kat Harrison
Yasemin Erboy Ruff

This Transcript

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Philip Voris

Before we begin, I'll quickly go over some of the webinar features. For audio, you have two options. You may either listen through your computer or over your telephone. If you choose to listen through your computer, please select mic and speakers' option in the audio pane. If you want to dial in by phone, please select the telephone option and a box on the right side will display the telephone number and audio PIN you should use to dial in.

If you would like to ask a question, we ask that you use the questions pane, where you may type in your question. The audio recording and presentations will be posted to the Solutions Center training page within a few days of the broadcast and will be added to the Solutions Center YouTube channel, where you will find other informative webinars, as well as video interviews with thought leaders on clean energy policy topics.

Finally, one important note to mention before we begin our presentation is that the Clean Energy Solutions Center does not endorse or recommend specific products or services. Information provided in this webinar is featured in the Solutions Center Resource Library as one of many best practice resources reviewed and selected by technical experts.

Today's webinar agenda is centered around the presentations from our guest panelists, who have joined us to discuss ways that remaining gaps can be assessed and leveraged for successful commercial viability. This webinar is

part of the Efficiency for Access Coalition's—Coalition's Efficiency for Agricultural Technologies Communication Campaign.

Before we jump into the presentations, I will provide a quick overview of the Clean Energy Solutions Center, and Yasemin Erboy Ruff will provide an overview to Efficiency for Access and the Efficiency for Ag Tech Campaign. Then, following the panelists' presentations, we will have a question and answer session where the panelists will address questions submitted by the audience. At the end of the webinar, you will be automatically prompted to fill out a brief survey as well, so thank you in advance for taking a moment to respond.

The Solutions Center was launched in 2011 under the Clean Energy Ministerial. The Clean Energy Ministerial is a high-level global forum to promote policies and programs that advance clean energy technology, to share lessons learned and best practices, and to encourage the transition to a global clean energy economy. Twenty-four countries and the European Commission are members, contributing 90 percent of clean energy investments, and are responsible for 75 percent of global greenhouse gas emissions.

This webinar is provided by the Clean Energy Solutions Center, which is an initiative of the Clean Energy Ministerial. The Solutions Center focuses on helping government policy makers design and adopt policies and programs that support the deployments of clean energy technologies. This is accomplished through support in crafting and implementing policies related to energy access, no cost expert policy assistance, and peer to peer learning and training tools, such as this webinar.

The Clean Energy Solutions Center is cosponsored by the governments of Australia, Sweden, and the United States. The Solutions Center provides several clean energy policy programs and services, including a team of over 60 global experts that can provide remote and in person technical assistance to governments and government-supported institutions, no cost virtual webinar trainings on a variety of clean energy topics, partnership building with development agencies and regional and global organizations to deliver support, and online library containing over 5,500 clean energy policy related publications, tools, videos, and other resources.

Our primary audience is made up of energy policy makers and analysts from governments and technical organizations in all countries, but we also strive to engage with the private sector, NGOs, and civil society.

The Solutions Center is an international initiative that works with more than 35 international partners across its suite of different programs. Several of the partners are listed above, and include research organizations like IRENA and the IEA, programs like SEforALL, and regionally focused entities like the ECOWAS Center for Renewable Energy and Energy Efficiency.

A marquee feature that the Solutions Center provides is the no cost expert policy assistance known as Ask an Expert. The Ask an Expert services

matches policy makers with one of the more than 60 global experts selected as authoritative leaders on specific clean energy finance and policy topics. For example, in the area of energy, food, and water, we are very pleased to have Jennifer Daw, professional engineer, serving as one of our experts.

If you have a need for policy assistance in energy, food, and water, or any other clean energy sector, we encourage you to use this valuable service. Again, the assistance is provided free of charge. If you have a question for our experts, please submit it through our simple online form at cleanenergysolutions.org/expert. We also invite you to spread the word about this service to those in your networks and organizations.

Today's webinar is co-moderated by Yasemin Erboy Ruff, who is a senior associate at CLASP. In her role at CLASP, Yasemin manages the Efficiency for Access Coalition's donor roundtable, and leads stakeholder engagement, materials development, and communications across the coalition ecosystem, as well as its flagship program, Low Energy Inclusive Appliances, LEIA, supported by UK AID.

Now I'd like to provide brief introductions to today's panelists. First up today is Makena Ireri, who is senior associate at CLASP, leading research on the Low Energy Inclusive Appliances program, an initiative of the UK government's Department for International Development.

Following Makena, we will hear from Kat Harrison, who is director of impact at Lean Data, leading the impact work of Acumen's energy portfolio and Lean Data partners through Lean Data.

And our final speaker today is Abishek Bharadwaj, who is the program manager advisor for Energy 4 Impact. Abishek has over ten years of experience in facilitating social and economic development through rural electrification and PUE activities.

And with those introductions, I'd like to welcome Yasemin to the webinar. Yasemin?

Yasemin Erboy Ruff Good morning and good afternoon, everybody. Thank you so much for joining our webinar today. Let me just pull up my slides, and then we can get started. Can you see my slides okay?

Philip Voris Could you repeat that?

Yasemin Erboy Ruff Are you able to see my slides okay?

Philip Voris Yes, we are. Thank you.

Yasemin Erboy Ruff Okay. Thank you. Thank you, everybody, for joining. I will be giving a very brief introduction to our Efficiency for Access Coalition as well as our Efficiency for Ag Tech campaign, which will provide a broader context for our discussion today. We would really like this webinar to be more of a discussion, so I am going to ask our experts to give about five minutes of

introductions as well as context to their own work following my brief introductions, and then we'll have a moderated Q&A where we will hopefully delve bit deeper into some of the emerging opportunities as well as remaining barriers that we see in efficient agricultural technologies for off-grid settings, and we will follow that by opening up the conversation to our audience.

So the Efficiency for Access Coalition brings together about 13 donors in philanthropies that are interested in accelerating global energy access through energy efficient appliances. You can see our current coalition members here.

And the Efficiency for Access Coalition is a larger ecosystem beyond our donor roundtable. We do have the donor coalition, of course, co-chaired by UK AID and Power Africa. We also have our new efficiency for access investor network that brings together actually currently over 20 leading impact investors in this space. Acumen is actually one of our donor coalition members, as well as our co-lead for the investor networks. We'll be looking forward to hearing from Kat later today.

And in terms of our partners, we at CLASP, along with our colleagues at the Energy Saving Trust, serve as the secretariat for the donor coalition, as well as this broader ecosystem, and we work with program partners where we can, and Energy 4 Impact is actually one of our program's partners, so we're very much looking forward to hearing from Abishek later today as well.

And here is a quick map that shows our donor coalition's activity across different regions and different technologies. It is a very detailed map, so there's a quick link to a larger image on our website, if you're interested in seeing this. But hopefully, it gives a quick glimpse into the breadth and depth of our donors' interest in the efficient appliances space. We're looking forward to continuing to update this map and hopefully growing the activity on it as we move forward with the coalition.

And now about our topic at hand, Efficiency for Agricultural Technologies is a communications campaign that the Efficiency for Access Coalition launched at the end of January to look at improving livelihoods through efficient off-grid agricultural technologies. Some of you who have been with us since our inception may have noticed that we've been doing month-long mini-campaigns on social media, so this is sort of a growth and next step from that. We will be looking at agricultural technologies across different facets and perspectives in the next few months, and we'll be transitioning into another campaign as we move forward.

So our thinking around these communications campaigns is not to look at different topics that are relevant to off-grid energy access and efficiency and efficient appliances in silos, but rather look for the connections, look for connections to other sustainable development goals in other sectors as well.

So here's a quick look at our communications campaign details. We're obviously towards the end of February now. We are looking at agricultural technologies broadly, but we will be looking to do a deeper dive into solar water pumps in the next month, and then we will be transitioning into our

cooling communications campaign in April. So we hope that you will join us for this campaign, as well as our future campaigns.

Here is a quick sort of list of ways that you can get in touch with us. All of these will be hyperlinked for you in the training webpage, so you can hopefully find us quickly. And you can always visit our website, efficiencyforaccess.org, for quick links to ways in which you can engage with us as well.

With that, I'm going to turn it over to Makena.

Makena Ireri

Thanks, Yasemin. If you could just put on my slides. Thank you. Thank you. So I'm going to speak today about two of our projects that are related to the ag tech sector. So as was mentioned before, I lead the research team of the LEIA program. Kind of this is the latest bit of research that are coming out of that workstream.

So the first one is I'm going to talk about solar water pumps in Tanzania and the horticulture sector, and then I'm going to speak a little bit about the aquaculture challenge.

So the main objective of this study was to kind of get new information from the ground at the farmer level in Tanzania to understand what's happening to the solar water pump sector, and to provide any actionable research for actors in this space. We also were trying to test a methodology around segmentation of farmers and market sizing.

So in this first slide here, it just shows you the breadth of our sample size. So we went to the Arusha region, and then more central in Singida, and then south in Morogoro. And actually, we interviewed 400 farmers. We also had 81 focus groups and 667 stakeholders. So these are a government level or at a district level, so regional government and local government.

And so these are kind of some of the findings from this research. We collected data on the location, farm size, the irrigated crops, current usage of irrigation systems, what are the barriers to growth or access to other irrigation systems that people may be interested in. And actually, one of the things that we quickly found out was when we tried to classify our farmers, we found that most of them were actually very commercially orientated, as you can see with infographics on your right, and the crops cultivated were, as we had expected, horticulture, with tomatoes being quite high. And because we know tomatoes actually require a lot of water, this was a really interesting finding. Next slide, please.

So here, kind of a brief look at what the farmers look like and their characteristics. Like I mentioned before, these farmers are really very market oriented, more so than what is anticipated for small scale farmers, and they are small scale, because on average, they had two hectares of land. So about 70 percent of the population had two hectares or less of land.

But you can see that up to 70 percent of them sell their produce. And then on average, we had high levels of commercial activity. We had a lot of sales at farm gates, but also accessing local markets, not as much as kind of the sales at the farm gate, but also really interesting. Another interesting finding was that 78 percent of these farmers actually hired extra labor for the farm. And so despite them being more market oriented, it seems like whatever they're getting economically from the farm isn't enough to warrant it being the sole source of income, because at least 50 percent of them were also engaging in off farm activities.

And below, you can see highlighted there the split between the type of irrigation technologies they were using, and interestingly, none of the farmers in our segment or in our sample size had solar water pumps. And we unpack that later on in our study around what could potentially be the reasons for this, and the barriers. And next slide, please.

So after kind of characterizing the farmer, we thought it would be interesting to kind of segment them, so we can understand the different approaches that we might need to access them in terms of increasing adoption of solar water pumps.

So first of all, we sized the market, and I'm going to present a little bit on what we found there. But then we also tried to just—we tried two methods of segmentation. So we tried to segment the farmers according to their market orientation, and also according to the current irrigation technology they use. But what we quickly found out was none of these approaches in themselves gave us any significant differentiation between the groups to the point that we could call them real segments. And actually, what they didn't account for was things such as purchase drivers. So in the end, instead of looking like the one homogenous mass that we kind of knew from anecdotal evidence, but also from the open ended questions of the survey, that there were differentiators.

So what we did was combine the two approaches, and once we combined the two kind of segments, we were able to draw out six distinct typologies of the farmers. So next slide.

So here are the typologies that we drew out of our sample. We have the cost-driven farmer, the distribution reliant farmer, water conscious, effortless, unaware, technical. So these are based on—mostly on the purchase driver, but also on elements around how they are characterized.

So for example, the cost driven farmer spends very little on cap-ex. He uses manual irrigation, he or she uses manual irrigation, and very much cost was at the top front, when we did a correlation in terms of what they perceived to be the biggest barrier. These are the group of farmers that had the highest correlation with cost and affordability being their biggest barrier. We also note that this farmer represents the largest market share.

I won't go through each of them in detail, but I'll mention where you can get more information on this. But maybe just to touch on one more, for example, the distribution reliant farmer, this is a farmer who's very market oriented, so

he gets a lot of his or her information from the market and from wholesalers, and is highly commercial, but has very little irrigation needs. So when we computed irrigation, _____ quite low, and they're using diesel pumps because that's what's available to them. And there is a kind of strong correlation with the lack of availability of options for this farmer, who might otherwise choose a different pumping option, right? But they have a strong correlation with kind of mentioning that availability was the biggest barrier. Next slide, please.

So here, just a glimpse at the market sizing piece of the research. So we found that the market—our projection is that the market will grow. We think that solving the barriers for this specific typology of farmer, the specific barriers or the specific pain points will lead to an increase in the market.

So for example, solving the cost barrier or the perception of cost as a barrier for the cost driven farmer could lead to quite a significant increase in that specific portion of the market. And you can dig a little bit deeper into all these results in a report that we're about to launch. So in two weeks' time, we'll have the report available that digs a little bit deeper into all these typologies, what the market size is, what are our suggestions for how to approach these segments, because actually, their pain points are a little bit different, and although the overall need for irrigation and the type of technology could be the same, the approach to acquire these customers might need to be tailored to kind of hit their pain points. Next slide, please.

So just to segue a bit, then, from solar water pumps, another one of our projects that we're running at the minute is called the off-grid cold chain challenge. And this is a big focus on the cold chain. Now we all can't underestimate the effect of the cold chain in terms of availability of the food, food security, prevention of loss, health impacts, and economic growth impacts for the agricultural sector. We know that cold chain is essential. But we also know cold chain is complicated and has very many bits.

So to tackle maybe the more, quote/unquote, low hanging fruit, we focused on cold storage as one of the parts of the efficient cold chain, and we are trying to incentivize here highly efficient cold storage technology that also has interesting business model that hit affordability for the end consumer.

So we ran a competition, and we had ten finalists selected. And these finalists are now going to deploy their pilots in targeted countries. So we have four countries still in the running, so Kenya, Uganda, Rwanda, and Nigeria. They're going to deploy these technologies which we are going to monitor for the next five or so months, and kind of start to have a better understanding of what it means to have an efficient cold storage that's off the grid and that actually provides a service at an affordable level for the end consumer. Next slide.

So these are our finalists, and I think this can be the last slide, because the rest is just _____ more questions. But these are the finalists for the off-grid cold chain challenge, and we are kind of really excited to see what comes out of

this on the ground and collect some baseline and also end line results of what happens when we at least hit one part of the cold chain.

Of course, there's a recognition that there are other bits of the cold chain to hit, but we've got to start somewhere. So thanks. That can be my last slide. Thank you.

Philip Voris Thank you very much. And now I'd like to pass the presentation to Kat.

Kat Harrison Great. Amazing. Thank you. So can you guy see my slides?

Philip Voris Yes, we can. It looks great.

Kat Harrison Awesome. Thank you. So high, everyone. Thanks for joining the webinar. I'm really look forward to the questions and discussions very soon. But first, as Philip mentioned, I'm the director of Lean Data, which was created and developed at Acumen, and in case you're not familiar, Acumen is a nonprofit impact investor investing _____ capital in businesses whose products and services are really focused on enabling the poor to transform their lives.

So just first a quick introduction to Lean data, to give you context on what I'll be talking about. So Lean Data is an approach to impact measurement and management, and actually, this year, we're spinning out to be an independent entity, which is very exciting. But we're really focused on cost effective data collection that helps companies understand their customers and value proposition and gives us all a better understanding of customer value and impact. So we focus on listening to customers' voices and capturing their experience and their feedback. And we use the low cost technology and methods to gather high quality data quickly and efficiently, focusing on doing the end to end work of designing the surveys, data collection, analysis, and then the results sharing.

And actually, we created the sector's first social impact benchmark, which provides opportunities to look at the relative performance of company's products and technologies to provide these deeper insights through context and additional information.

At present, we've worked with 15 partners, 160 companies, listening to over 78,000 customers in 34 countries with a strong focus on energy, so lots more to share and learn.

But the focus of this webinar is particularly on solar water pumps. In the last three years, the Lean Data team have conducted projects talking to customers of Sun Culture, Future Pump, Solar Now, and Semi Solar. So that we're able to aggregate and learn from all this data, CLASP have asked us to create a report that can be shared publicly from the analysis of the data, and this data is collected with solar water pump customers across Kenya, Uganda, and Tanzania. And a quick shout out to my colleague _____ Kahn, who's actually working on pulling all this together. She's on the call.

So just as context, this is based on a mix of one-off interviews with the solar water pump customers, as well as deep dives, so a baseline follow-up set of interviews to provide deeper insights. So all the impact, the behavior, and usage information represents customers who've had their water pump for at least five months.

So onto the good stuff. A few early results, many validating what Makena shared in the Tanzania research, actually. The report will be coming out in a month or two, and will contain way more information, so have a look out for that. But what we did is collected data on customer profile, usage, behavior, impact, and feedback, to give us real insights around the solar water pump uses.

For example, in Kenya, a quarter of the customers were living below the poverty line compared to 53 percent at the same income line of the Kenyan national population, so that suggests, perhaps unsurprisingly, that solar water pump companies are serving a relatively wealthier subset of the population, and we think that's emphasized by those education levels as well.

The majority of the customers we spoke to had regular income that wasn't affected by seasonality, so that might suggest that customers are likely to be—not likely to be, sorry, subsistence farmers, or to rely on agricultural produce as their main source of income, which is interesting. And since solar water pumps are new technology and at present quite expensive, this matches with the theory behind the model of the market, so the early adopters or innovators tend to be higher income, better educated, and willing to take more risk on trying new things.

So you can see the top users of the solar water pumps were for farm and crop irrigation, not surprisingly. Quite a few customers used their points for domestic use, and many for feeding animals more generally, as well.

The _____ we found the top motivators for purchasing a solar water pump were economic efficiencies and time saving, so it's really important to understand if these expectations are being met, and if not, that marketing perhaps needs to be adjusted so as not to create disappointment. In a market where word of mouth and recommendation is key, a key way for customers to hear about many of these products, it's super important.

And while those previously using generators for irrigation may shift to more solar water pump use and reduce regular spending on fuel as well as hopefully reducing pollution, those using manual irrigation mentioned saving money from hiring casual labor. So there may be some negative livelihood implications of solar water pump use in the community, which is something else to consider more broadly.

And lastly, links to income and affordability, we found that seven in ten of customers got a loan to purchase their water pump, and for nearly two-thirds of those customers, it was their first time purchasing a product on credit, so that demonstrates the critical role financing plays in access.

Now on to the fund stuff, the impact of using water pumps. So three quarters of farmers reported that productivity has increased since they started using the solar water pump, and mostly due to efficiencies and time savings. So that motivation is actually—to purchase is actually being seen in terms of the benefits, which is great news.

The majority of these customers sold the additional produce to bolster their income, so also great news. And on average, customers experienced a 91 percent decrease in their expenditure on water pumping after purchasing the water pump. That doesn't include the repayments but tells you of the longer term economic implications of that.

What's interesting is the vast majority of those who said they hadn't seen changes in their productivity, so you can see the pink in the charts, they said it was too soon to tell. So unsurprisingly, we may see that the impact of agricultural related products have a longer time lag between adoption and results, which isn't the case for other energy products, like solar home systems, where we tend to see changes in behavior and impact quite quickly. So that may have implications on consumer awareness, on marketing and sales pitches.

Now what's also important to review is the challenges customers may face using their new water pump. It's critical for satisfaction and recommendations which may affect new customer uptake, as well as being influential _____ impact and benefits. Perhaps unsurprisingly, it's a new technology, almost half of customers said they experienced challenges. You can see in the chart the common challenges there.

What's important is that often the customers themselves won't know what the challenge is, so you can't be specific about the issue, and so you can see that in the first bar on the left. It's quite sort of a generic answer.

Now of course, each company may be aware of these challenges on the whole, but it's really key feedback from real users in the field, and so it's really critical to address in product design and development, in targeting and marketing, and training and after sales support.

Then lastly, I wanted to share some more outcomes related things, so what customers talked around the changes for them from using their solar water pumps, and changes in terms of their quality of life, so the value proposition or the benefits that customers themselves have identified and experienced. So you can see, happily, eight in ten customers said that their quality of life had improved as a result of accessing the solar water pump, and the top reasons, so you can see at the top of the page going down, was—the most common reasons were around increased income and standard of living, cost savings on fuel and hired labor, and better farming yields.

And now let me just read out one of the quotations, one of our favorites. So this is from one of the customers in Kenya, I think. So I managed to grow a bigger garden last year. This has increased my income, which I've used for

paying school fees, adding more cattle, and paying for more basic needs for my family. Also, I've bought a new farm.

So one of the things Lean Data focuses on is capturing all these lovely insights a little more deeper than just the numbers which we're presenting to you, and there's so much more that we can learn from this. We're very much looking forward to sharing the report around soon, but more imminently, looking forward to your questions and ideas.

Philip Voris Thank you so much, Kat. I'd like to remind everybody who's tuned into our webinar this morning that you have the opportunity to ask questions to all of our panelists by using the questions pane. I'd like to now pass the presentation to Abishek.

Abishek Bharadwaj Thank you. Can I get the screen on? Thank you so much. Can everyone see the screen?

Philip Voris Looks great. Thank you.

Abishek Bharadwaj Hello, everyone. I'm Abishek Bharadwaj. I'm the programs manager and product reviews expert at Energy 4 Impact. Energy 4 Impact is a nonprofit supporting businesses operating in sub-Saharan Africa to _____ energy access and raise the responsible use of energy _____.

We recently, in collaboration with Efficiency for Access Coalition and CLASP, conducted a market scoping and a literature review study for the solar milling market in Africa. This presentation is a short summary of the report, focusing on some key highlights and challenges observed on the uptake of solar in the milling sector. Next slide, please.

Philip Voris Hello. Are you controlling—

Abishek Bharadwaj Yes. Okay. The scope of the study was limited to four countries, Kenya, Uganda, Tanzania, and Zambia. The sector in these countries is very similar. They have a large maize milling potential, with maize being a staple in all four countries, have an ease of operating a business, have a large need for alternate energy source to conventional—compared to conventional _____, such as diesel, and mature market for the produce.

So we interviewed over 32 stakeholders, comprising of existing mill operators, so these mill operators are the ones operating on both diesel engines and electric motors. Then we also interviews technology providers and farmer cooperatives.

With the existing knowledge of solar equipment on the ground, which has predominantly been solar lighting systems, agro-mill operators have a perception that solar as a technology cannot power mills. This was found through the survey, and as you can see in the graph, this resulted in the milling capacity cost and efficiency—when I say efficiency here, I'm referring to the rate of productivity. So milling capacity, cost, and efficiency as the most important parameters in the selection of mills. And this would be

the same parameters when they are thinking of solar mills as well. The main challenges that we see on solar milling are high up-front costs as compared to the diesel engine counterparts.

Two options exist on technology. One is a retrofit model, where solar can power a motor that drives an existing mill through a pulley, or an electric mill itself. Retrofit models are often low in efficiency, where a whole new electric mill is expensive as compared to the diesel engine counterparts.

The second challenge is that there is a lack of technical knowledge to install such systems. Those systems are usually over or undersized. A deep understanding of the agro sector is essential. Currently, the energy and agro sectors work independently in silos.

The third challenge is that most entrepreneurs we interviewed had imported electric mills from China, often because of low prices and better quality. The challenge, however, with this, _____ is that there is minimal after sales support and minimal availability of spare parts. This they perceive would be a challenge with solar milling as well. These parameters will definitely need to be considered in designing an effective solution for the sector.

Some of the key takeaways was that the majority of the mill owners that we surveyed did confirm that they preferred electrical mills to diesel-based systems, so this was quite surprising, and for the reason—they said this was due to the ease of operations, especially because it is a push button start, as opposed to cranking in diesel engines. Another reason is that they are operationally less _____, and less expensive operationally as compared to diesel, and the ease of maintenance.

A few respondents also highlighted that the customers prefer electric mills, since they perceive the quality of the output is superior. So while we were serving different mills within the same community, we noticed that there were more customers willing to mill their product in an electric mill as compared to a diesel mill, though the price of milling was the same in both areas. So this was a very interesting learning for us while we were on the ground surveying.

Most communities mill in the late afternoon or early evening after work. When using diesel, this is not a challenge, but then now while milling with solar, solar capacity is greatest in mid-morning, early afternoon. Therefore, the model may have to be altered, where the clients could drop off their grains, and mill them after a few hours or a day, which allows operators to maximize the milling schedule on the _____ solar output. So this is something that we tested in India, and it worked, where we had to foresee this behavioral change, and eventually, solar-based mills were more efficient than the diesel counterparts.

And solar mills, when coupled with battery bank and power alternate loads with availability of say unutilized energy during certain seasons or certain days, where the million demand wasn't much. So overall, our economic

analysis also showed that solar-based mills do have a higher upfront cost, is cheaper in the long run.

So going forward, in collaboration with the _____ provider, we are planning to install and test ten pilots and learn from the data collected on the pilots to inform the _____ sector. So by September, we would have enough information to—from these pilots to—yes, _____ from the larger sector, and then probably _____ that can be used to convince other uptakers on the benefit of solar milling as opposed to conventional sources of energy. Thank you.

Philip Voris Thank you so much, Abishek, and thank you to each of our panelists for those outstanding presentations. Now we'll proceed to our moderated discussion and Q&A portion. And before we do so, I'd like to remind our attendees to please submit questions using the question pane at any time, and we'll keep several links up on the screen throughout for quick reference that point to where you find information about other upcoming webinars and how you can take advantage of the ask an expert program, as well as ask those questions. Now I'd like to pass the presentation control over to Yasemin. Yasemin?

Yasemin Erboy Ruff Thank you so much, Philip, and thank you to our panelists for these great overviews of some very exciting research outputs that are coming down the pike, so we are also very much looking forward to reading the full reports but thank you so much for those quick teasers.

Now I would like to take a few minutes to maybe delve a bit deeper into some of the opportunities and barriers that have been presented by all of our panelists. It's been great. We've had some information on solar water pumps, solar mills, cold chain, so we have quite a few technologies, and obviously with different perspectives and methods attached to them that we can discuss. I would also very much encourage our audience to ask any questions that you might have that I may not be asking, or if you want to follow up on any of them, we definitely want to make sur that we answer all of your questions about these exciting research pieces.

So maybe we can start with a quick question on what the biggest surprise or takeaway was for each of you from the recent research that you have presented. Makena, do you want to take it first?

Makena Ireri Sure. Thanks, Yasemin. So for me, one of the biggest surprises was when we asked customers or consumers what was the main factor for their purchase, or what was the biggest kind of decision factor for them to purchase, well, they did mention cost and availability and kind of the things that we're used to, but also what stood out for me was the fact that village dynamics ranked way higher than savings in labor and time, and also savings—sorry, increased productivity. So those two things ranked lower than village dynamics, where we got questions or responses like everyone in my village uses this method, we actually don't—we have a different method that we use, and this is what is commonly used in this area.

And for me, this was really surprising, that kind of—we don't tend to focus a lot on the social/cultural aspects of technology adoption, and perhaps that can be quite a significant driver to purchasing, maybe not for continuous use once the technology has proven itself, but for that first encounter, I think the need to focus on that part of the equation really stood out for me.

Yasemin Erboy Ruff Interesting. So consumer behaviors is a big component in adoption. And I think Abishek also mentioned something to similar that in the solar mill research that you had done. Is that right, Abishek? Did you want to follow up on that, or provide another—

Abishek Bharadwaj _____, sure. I think mine is similar as well. What shocked us is that the consumers, when we were surveying them, they didn't realize that milling by electric motors is far more efficient and cleaner. So when asked about whether they will switch to solar milling, they were very excited because of their perception that, well, solar _____ systems _____ kerosene lamps, which _____ smoke in the houses. So they perceive solar as a cleaner technology and more widely accepted.

So they believe that solar milling can have the same effect, and this was quite—it was quite a shock for us to hear that perspective from them, though they did of course ask about the cost implications, but it was gratifying to understand that they are more than willing to switch to solar-based mills, and they believe that their own customers will prefer solar-based mill over say a diesel-based engine operating _____.

Yasemin Erboy Ruff That is indeed very interesting. I'm going to get to that in a second with a specific question for you around solar mills, but Kat, did you want to chime in?

Kat Harrison Yeah. Sure. I think just one surprising point I actually mentioned around customer impact or effect, I guess, is that the solar water pump users that we talked to, on average, they decreased their expenditure on fuel, hired manual labor, by 91 percent, and that's pretty significant. The degree to which farmers had decreased their expenditures demonstrates that customers are likely to almost completely eliminate their further—sorry, their former sort of water irrigation methods, and replace it with the solar water pump, rather than stacking different methods. And that's quite different to what we often see in solar lighting, where customers, while reducing use of kerosene lamps or torches, they tend to continue to use their former lighting sources to supplement their solar lanterns or their solar home systems.

And so it could be two things. We don't know yet. It could be that the solar water pumps meet all of their irrigation needs, or it could be that these farmers can't afford to supplement because the pumps are a little more expensive than a solar lantern or a home system, and therefore, people are having to change their behavior related to affordability. So still more questions. Research often raises just as many questions as it answers. But really interesting.

Yasemin Erboy Ruff Definitely. I want to delve a bit deeper into a few of—basically, some of the things that you've already mentioned, and also another big surprise to me, actually, from what Makena presented. Makena, do you want to tell us a bit more about the low penetration rates of solar water pumps that we saw in the study that you presented? Out of all of the farmers, there were 400 or so, none of them actually used solar water pumps. Do you want to talk a bit more about what you think the reasons are for this?

Makena Ireri Yeah. I mean, perhaps that was also a very interesting and surprising outcome of this research. We expected to find at least some people using solar water pumps, but I guess when we look at this particular region in Tanzania, what came out strongest was that people were not aware that solar water pumps were an option for them, and also, they were just not available. So it's not something that they have seen in the local vicinity or have ever encountered, right? And that came out really strongly when we asked about like why not solar water pumps.

And I think obviously, there's also this perception around cost, so even when we introduced the idea of solar water pumps, the first question, kind of like what Abishek is saying, the first question that everybody asks is, yeah, but what about how much is that going to cost me, right? How much is that going to cost me beyond what I'm already using right now?

So actually, that kind of lack of awareness and availability of the technology and the perception around cost, once the idea is introduced, I think together contribute to kind of seeing this very low penetration. But obviously, the upside is that we think, especially for horticulture, which has high, high income potential for the individual farmer, there is really massive potential in this region, and potentially in other regions as well.

Yasemin Erboy Ruff That is a great point, and I actually wanted to go back to Abishek to talk a bit more about the positively surprisingly findings about how consumers, once they were exposed to solar mills or electric mills in general, preferred those. Abishek, do you want to say a bit more about how you see solar mills working in terms of commercial viability? You mentioned high up-front costs, lack of financing options, and a little bit of lack of awareness, of course, also. And so far, it's not really a technology that's been proven maybe to the point of solar water pumps or other _____ agricultural technologies. So how do you see us being able to _____?

Abishek Bharadwaj Sure. That's a great question, Yasemin, and analysis shows that solar milling is much cheaper than _____ in the long run, but this analysis is based on the economic drivers that we _____. So there is very little that is being tested in the market.

So that being said, there are of course impediments to a successful model. A few things is a _____ absence to finance, as you already pointed out, customer behavior, access to market, maintenance, and other _____ spare parts, etcetera. So the perception in the market is that the business model does not work, most obvious reason could be that we do not have enough data to prove its commercial viability.

So we, along with Makena and CLASP, are piloting solar mills in the phase two of this project. Phase one was the study, but then phase two, we are piloting solar mills to exactly answer this question. So what we hope we'll achieve is to analyze the pilot data to recommend penetration strategies for a successful implementation of a solar milling project or even successful scale-up going forward.

Yasemin Erboy Ruff That'll be very exciting indeed. I'm very much looking forward to seeing how that project turns out. Kat, since Abishek and Makena have mentioned financing as being a big issue, maybe we can tie consumer research with impacts and turn to you to ask what do you think investors have in mind as their top considerations when deciding to invest in ag tech technologies or companies? What is Acumen's perspective? Obviously, you've been investing in the energy access sector heavily for some time, especially in the solar home system companies. But how does one move to the larger, more complicated systems, such as agricultural technologies?

Kat Harrison Yeah, great question. So Acumen, the team thinks about impacts across three dimensions, so being about breadth of impact, how many people are being reached by this product or service or this company, or have the potential to be, so thinking about scale. We think about poverty focus. Acumen specifically focuses on serving low income populations, so we think about is this company able to serve low income families? Is the product or service going to enable positive impact for them? We look at cost and price and affordability.

And then the third dimension is around depth. So you can think about how many people you reach and who they are, but how transformative or important is this technology going to be in affecting their lives? So we think about the impact potential. We look at companies beyond proof of concept and those who have some market traction and demonstration of demand in the market. There's people already using these products. There's some demonstration of the ability of the company to kind of interact and respond to those needs.

We obviously think about financial sustainability of the company, so is the business model viable and realistic, and what levers can we push to achieve financial and impact success? And then for Acumen as well, we think about the stage of growth of the company. So is our capital going to be transformative? Will our investment be catalytic? So we're really focusing on sort of the impact and the financial side of things, but really making sure that we're looking at directing our capital in a way it can be most effective and most positive, and part of that is obviously thinking about who the social entrepreneurs are. Are they people that we absolutely believe in and have faith in and know that we can work together to support their growth and their opportunity to scale and reach many more people?

Yasemin Erboy Ruff That was great. Thank you so much for sharing all that. Let's see. Maybe we can pivot to a more general question to all of you around some of the barriers, perhaps, so what you might have seen _____ your research and your ongoing work in the sector as being the biggest barriers for reaching market scale for

agricultural technologies. How might this differ across different technologies that we've discussed today or others that we haven't touched on yet? And what we might need beyond technology innovation to achieve market readiness?

Makena Ireri Maybe I can start, Yasemin, and I'm going to be a bit more general and try to separate the technologies between those that are in the really early stage, so these are technologies that haven't been proven commercially, that may be a pre-pilot stage, and then the ones that are a bit more beyond that, which are beyond the commercial pilot, and have kind of started to prove the potential, right? The commercial potential.

And for me, the early stage ones, exactly like Kat was detailing about the impact, and we've talked a lot about financing, but that's such a key area, especially in ag tech, because it is expensive. The asset itself is going to present a huge risk for especially consumers who are towards the bottom of the pyramid. So that kind of financial support for the end user I think is super important, as well as R&D for the companies, who are kind of iteratively trying to design the most appropriate solutions. Many of the solutions are really nascent, and they need a lot of push to kind of get them to a point where they're appropriate.

And with the more proven technologies, for me, I feel like the more commercial pilots we can do, the more on the ground research we can—data we can gather, the better to prove their case, to help them support kind of de-risking the proposition for any distributors that may want to distribute that technology, or any financers who might want to come up and finance these companies, the more data and the more real world data that we can get, I think that's going to be a really interesting way to kind of reach—grow the market to scale.

[Crosstalk]

Yasemin Erboy Ruff Go ahead, Abishek.

Abishek Bharadwaj Yeah, I can probably add to what Makena said. I mean, very similar observation, and probably—I would probably repeat what Makena said.

But one interesting aspect is when we are helping ways of—companies to deploy ag tech, we always have this conundrum. Like does one develop a product first, _____ the market? Developing a product will help figuring out the potential market but finding a market for the developer _____.

So _____ generally a strong design thinking approach will help, where the product development cycle _____ feedback from the market, and then when it comes to financing, _____, we really need investors to infuse more risk _____ capital. We need a lot of market data, so access to information and data is lacking in this sector, especially when it comes to the ag tech market.

Finding the right partner and customer for the product is extremely important, and probably quite challenging. So having strategic partners who are either ag experts or have a strong community presence is always—is almost mandatory.

One thing that would help the ag sector is an experienced entity who has sufficient data to recommend _____ solutions for these different markets. And finally, I think what would be important and relevant which doesn't exist in the market is standard risk management procedures for each of these technologies. And we need to first have our own perceptions of what those risks are, so having this risk matrix which is agreed upon and is relevant to most geographies would be quite helpful in the sector.

Yasemin Erboy Ruff Thank you, Abishek. So Kat, both Makena and Abishek have mentioned de-risking and patient capital, so I wanted to turn it over to you to see from a financing perspective how you would recommend that we ensure more patient capital is available in the sector for agricultural technologies, with so many efforts in motion, as we've discussed today, in terms of data collection and proving these concepts, but still very little commercial viability or sales. How do we make sure that the industry as a whole is more patient than risky?

Kat Harrison Yeah, I think that comes in from how people are funded. So we need to be—we need to have more evidence and more confidence to be able to talk about the potential impact and how transformative this kind of investment can be for companies, and therefore, more importantly, ultimately for end users and customers, so that we can demonstrate the need to have slightly more flexible financing terms, slightly longer term horizons for expecting sort of scale and growth, and I think tied to that, because there is obviously some risk with financing, that's the absolute ultimate barriers for end users for these populations we're trying to reach.

At present, solar water pumps, for example, and many of the technologies we're talking about, they're really new, and they're too expensive for the majority of populations of the countries where the companies are working. And there's different ways to think about making—financing makes these products more affordable, but what's critical is that often, low income customers can't actually access that credit.

So there's ways to think about where financing can help to reduce risk or have slightly lower sort of expectations on capital, so thinking about offering lower deposits, longer term loan terms, considering payment holidays, or developing lower end products, they're all things that we need to consider and support and explore more, with this real balance of making sure that the costs and risks involved are balanced for this financial sustainability of companies.

Honestly, if I knew the answer to that question, I think we could solve many challenges in the sector. So I may not have answered that particularly well. It's quite a bit one to tackle. But I think It's keeping on going in the direction we're going, making sure we are building a strong enough evidence base to demonstrate the potential impacts, as well as making sure that we truly are listening to customers or consumers or end users. There's many a sector who

makes decisions sitting in boardrooms in New York or London, and we've got to make sure their voices are really feeding into the design, the delivery, the application, and the end development of these products and services. That's ultimately where we will see demands increase, when we're reaching people's needs, and that obviously helps with scaling and economies of scale.

Yasemin Erboy Ruff Definitely. Thank you so much for that. So you've mentioned impacts, and we've talked a lot about the financing side and the companies, _____, retailers, and all that, but there are other stakeholders in the energy access sector that probably should be brought into this discussion about impacts, and maybe we can talk a bit more in depth about the potential impacts of scaling an agricultural technology like solar water pumps or mills or cold chain technologies. How do we make sure that we weave the impacts that you're finding in your respective research to influence design innovations, ways to communicate to policy makers and governments, make sure all of this is packaged in a way that also helps raise customer awareness, so that they are aware of these technologies, and we don't have situations in which a large group of farmers don't use solar water pumps because they're not aware that that is an option for them?

Kat Harrison Yeah, that's a great question. I do want to—I think one of the key findings around farmers not using solar water pumps because they weren't aware of them, I think there's another massive critical piece, which is affordability of them. So I don't think we should undermine—like I don't think it's just purely a lack of awareness that is affecting uptake of solar water pumps. And so I think we need to be really cognizant of how we actually make these more accessible and available to consumers.

But I guess the first thing we need to do is make sure we're actually collecting that customer feedback to really understand this behavior, this usage, capture feedback and impact. And we really need to use that insight to better design and deliver and market for future customers. This information, as you mentioned, can be used for R&D, for design alterations, it can be used for reviewing and assessing marketing and targeting. Are we actually reaching and pitching to the appropriate audience? Could we be doing a better job?

And I think when we look at—so one of the slides—I showed you our customer challenges. At Lean Data, we've delivered asked this in quite a broad way, because we're interested in customer experience, which affects satisfaction, likelihood to recommend usage and adoption, and ultimately impacts on value. But there are three types of challenges that can be faced which will be addressed in different ways, and I think we need to think about that when we're thinking about how to use these insights.

So there's technical issues, which is going to be about design and manufacturing, and you're going to go to that stakeholder to address that. Then there's mismatched expectations, where a customer isn't getting what they expected from the products, and that's often about marketing or better and more accurate sales pitches, and that's the responsibility of the company sales team.

And then there's customer misuse. So where a customer is not getting the full benefit out of the products, because perhaps they're putting the panel in the shade or something, rather than in the sun, and so that's affected by training, after sale support, and awareness and education. So you can see each one would be addressed in different ways. And so we need to make sure we're using all the information we do have to—use it for absolute effect, for action, for insights, for decision making, for addressing things.

And besides that, we also need to be talking to the potential customers, so these consumers, because, of course, customers have already demonstrated that this product is interesting to them. It's affordable. It's accessible. It's going to meet some of their needs. But there's a much wider population that isn't being served and understanding what their needs are that aren't being met by the current technology or offering, and what their reservations are, enable us to better address this or design for this.

And I think the third piece we've talked about a little bit is around this kind of awareness and sharing and building an evidence base. So I think it's around this collaboration piece, making sure we're coordinating and collaborating our findings and our learning, and that we aren't working in siloes, but we're leveraging what each other are doing whilst then duplicating or working in different areas.

And of course, we have to be a little careful about that. There are—these are social enterprises trying to create competitive advantage, and that's their way of scaling and growing, so we need to be sensitive to what information we share. But I think we need to be making sure that there is a broader awareness and discussion with a broader group to make sure that we're actually moving towards a sector that's supported and flourishing.

Yasemin Erboy Ruff Thank you so much, Kat. Makena, Abishek, did you have anything to add?

Makena Ireri Yeah. I think that was a very comprehensive kind of assessment by Kat of how to weave our impacts and information we have around impacts. I just want to add two things.

One is just to kind of underscore this need for alignment across the industry, right? Just even in the way we measure the impacts, we report them. That kind of alignment helps us to kind of reinforce the message, and not to actually cross-message each other because we're not using the same kind of—we don't need to _____ the _____, but just kind of reporting and talking about things in the same manner.

And then the other piece is just a need for longitudinal studies, because this evidence base that we're building, at this point, and as Kat mentioned earlier, sometimes the impacts for agricultural tech in particular will take some time to develop.

And actually, maybe we can't just—we can do a sort of beginning kind of study, do a little bit of follow-up, but actually, we need to be patient to see these kind of longitudinal changes or eventual changes and impacts that

happen in populations. So I would call for more investment in that kind of further-reaching studies that can bring evidence and impact.

Yasemin Erboy Ruff That is a great point. The energy access sector is such a fast-paced, fast-moving sector. We all tend to just want to see results right away, but it is a great point, that with this kind of work we do need to be patient, both in our financing and in terms of our results. Abishek, would you like to add anything?

Abishek Bharadwaj No, I think that summarized everything pretty well. Thanks, Kat and Makena, for making _____.

Yasemin Erboy Ruff So I am aware that we are running low on time, and I want to make sure that we have enough time for our audience to ask questions as well, so I think I'm going to wrap up with one sort of more forward-facing question, just to get us thinking beyond what we've discussed today as well. So I would like to ask each one of you, based on your work and your research and your knowledge of the sector, what you see as maybe the next horizon off-grid appropriate appliance or market development innovation that could be highly impactful for the agricultural processing sector or productive use in general, and then we can open it up to the audience.

Makena Ireri I can start. So for me, the next—maybe I'll talk about the next technology that is really exciting me for the agricultural sector, and for me, that's brushless DC motors. So there are ubiquitous _____ in many of the appliances we class under agricultural technology is kind of really interesting, and the fact that if we could do something that reduces the cost, helps them be more standardized so that they are easily included in technology, increases efficiency of BLDC motor, we will be affecting a whole bunch of other technologies that rely on these motors.

So to me, that's exciting, and it's exciting to see what's being done around that, and around interoperability of systems and appliances. So that's exciting for me.

And one of the next steps that I feel like—and I feel like I've talked about this a lot, but it's a little bit of a hobby horse for me, is the need for more evidence, the need for more field testing, sales experiments, commercial pilots, and of real world data that tells us whether an appliance or a technology is going to work or not.

Abishek Bharadwaj Yeah. I just have a quick two points to add to what Makena said. The first thing, which is going to be very important for the future of these ag tech technologies, probably Kat can speak more about that, is the presence of data and what we can do with the data that will probably be collected in the sector. So that's extremely important, especially—one is to learn more about the sector we, but also, which brings me to the second point, is convincing policy changes.

So we've seen quite a few programs _____ East Africa and other markets, for instance, when you talk about lighting and efficiency in India, where I come

from, it was a big move by policy makers to say for the entire country over a year and a half to change from incandescent lamps to CFLs and now LED lamps.

So this sort of impact, we need to see more of this impact in the ag tech space, because agriculture is still probably the prime most occupation in most of the developing countries that we are talking about. So there is very—there is not much traction happening on the policy side, so I would think learning from data and presenting this to policy makers and convincing them to probably infuse some subsidies or at least help technology providers scale up in the space, would be like—both benefit _____ for the country as well as the entrepreneurs on the ground.

Kat Harrison Yeah, that's great, Makena and Abishek. So totally agree with that kind of focus on making sure that there is a role for different entities to play and making sure we're coordinated and better communicating. I think from a technology point of view, I think the next focus really has to be around I think there's increased value in the supply chain. So things like processing Abishek knows way more than me about, mills and dryers and things that enable farmers and communities to move up the value chain, which ultimately means higher prices and income, where value can be added at a local level. More income stays in the local economy. And the Acumen and the Lean Data team, we've had some great conversations and done projects with interesting cold chain storage companies as well. So thinking about ways to preserve and improve quality of produce also gives farmers more control over when to take produce to market to get fair prices.

And then I think the last thing, and I'd love to hear of anyone in the office having ideas, but I think there's going to be developments we haven't even thought of yet, and that's what's really exciting about the sector, the innovation, the ideas and opportunities not just to kind of replicate what has happened in the industrial world but thinking about ways to automate and create more efficient processes for people's lives and people's opportunities to be effective and efficient.

Yasemin Erboy Ruff Great. Thank you all so much for this amazing discussion. I am going to now turn it over to Philip to see what questions we may have received from the audience as well but thank you so much for all of your insights and this lovely discussion today.

Philip Voris Thank you so much, Yasemin. We have a number of questions from our attendees today, and I'd like to start with one that's asking about the technical aspects of the program. A number of people asked about the bore hole diameters and depth of pumps used for this type of work. I wonder if somebody could expand on that, perhaps Abishek?

Abishek Bharadwaj Sorry, can you please repeat the question?

Philip Voris Our question was what are the range of bore hole diameters, depths of pumps—just expand upon the technical aspects of the program for a little bit.

Abishek Bharadwaj Okay. So our program was more on solar milling. Makena, can you answer that through your _____?

Makena Ireri Yeah. Thanks, Abishek. Yeah, just to clarify, yeah, we're working with Abishek and E4I on the solar milling work, and a separate partner on the solar water pump.

So we—I don't have the numbers with me on the exact bore hole diameters, but in the report, we do have estimates of depths of wells for all the—as a water source. So we do ask the consumers what water source they use, and those who mentioned a bore hole, we asked how deep the bore hole was. So we do have an estimate of the average bore hole size, and actually, the average well size for each of those typologies, and kind of the data cut in various ways.

So I don't know—there's not one answer I can give, because there were a whole range of depth of bore holes that were used, and even this—we didn't really dig deep into the size of the diesel pumps that the consumers were using, so we don't have that data on kind of the capacity of the diesel pumps that were being used, but at least on the bore hole depth, we do have that data in the report. So I will refer you to that for more detail. Yeah.

Philip Voris Thank you. Okay. I have a question here that's actually directed towards Kat. It says, has any gender perspective taken from the research led by Lean Data—has there been any gender take on this research, and what would be the outcomes that you've seen so far?

Kat Harrison Yeah, that's a great question. So we're still in the middle of doing a lot of the analysis _____ insights for us, but what we did see, that the average solar water pump use does serve all the people that _____ was male and in their forties, not massively surprising, either. I think—I can't remember the exact number, but—oh, here it is. In the majority of the households, three-quarters of households, the male adult made the decision to buy the product.

So we asked quite a lot of gender—well, we can disaggregate all of our data by gender, but asked specific questions around decision to purchase, motivation in the household, and then can look at usage, and then—in our analysis. So a bit more to do, but perhaps unsurprisingly, this is reasonably male heavy of product and decision making for these water pumps.

Philip Voris Thank you so much. Let's see. We have another question here. It says—let me see. What is the biggest cost component of the solar mill unit? Is it the tech, the energy source, distribution, customer service? I believe this one—

[Crosstalk]

Abishek Bharadwaj Yeah, the capital expenditure, basically, the tech itself, because you have the solar panels, and then there needs to be a battery, a minimum battery storage. So battery storage I think is obviously quite expensive. That being said, this is not too far away from diesel-based solutions and electric mills say running on the mini-grid. The only challenge I see with such technology is—such solar

technologies is that the productivity or the output is less than what—lesser than the solutions that are available in the market.

For instance, it is not a fair comparison, truly, because the average diesel engine we've seen in our surveys that are powering these mills are close to 15 or 20 HP engines, and the output rate is say 200 kilograms on an average per hour. But the solar counterparts are quite less. So we have systems which are—where the output is as low as 40 kgs per hour to a maximum of 100 kgs per hour.

So there needs to be a shift in the way the customers view these technologies. They are expensive, but then they can—with six hours of sunlight in this part of the world, they can definitely produce at least 400 to 500 or a half a ton a day of _____ processing.

Philip Voris Great. Thank you. And I'd actually like to tag another question onto the end of that, and it is could you expand upon any grants that are available for ag tech?

Abishek Bharadwaj Yeah, thank you. So there is a grant—I mean, _____ grant. For any ag tech provider, there is something called the Powering Opportunity Partnerships. We call it POP. It is one of the constituent projects of DFID's Transforming Energy Access Initiative. So it's supporting Clean Energy Partnerships program.

So POP _____ demonstrate how the off-grid energy can stimulate local jobs and create local economic value in sub-Saharan Africa via a _____ supporting proposals that demonstrate innovation, partnerships, and the potential scalability and impact.

So this grant fund is _____ _____ grant fund is open till the end of February, and there's—the grant support is _____ access to those projects and partnerships that can create and drive productive electricity demand and operate it as _____. So if you are an active company looking for grants, please apply to the POP fund. You can find it online, and just remember, at the end of applications for at least the expression of interest is 28th of February.

Philip Voris Great. Thank you so much. I have a question here for Makena, and that is when repaying loans for solar water pumps, how long was the tenure? How often were the installments? What are the terms of these loans?

Makena Ireri I'm going to refer this to Kat, because she's the one who's done the work on the impact and the payments. So my sample size for the project that I presented on do not have solar water pumps. So they haven't purchased the solar water pumps. So maybe, Kat, you can give us a little bit more on the financing side.

Kat Harrison Sure. I don't know loads about it, because of course, we do the research with the customers, and it's the companies who are obviously working on the financing. I think in general, it tends to be 12 to 24 months repayments.

There's obviously some defaults, so customers who are not able to make payments. I think in general, most—I think sometimes the companies do do repossessions, so if you default on your repayments for a certain amount of time, the company may come and take the products back, and that's sort of their asset. And I think there are some customers who are higher income. I think we said 70 percent purchased on credit, so that's 30 percent that were buying straight up in cash. And there's definitely some higher income customers who will pay before the end of the loan term. But I think it tends to be 12 to 24 months, depending on the financing, the product, and the company.

Makena Ireri And just one thing, maybe actually that's relevant from our study, that though we didn't have anyone using solar water pumps, when we asked people whether they got financing for their irritation systems that they use right now, actually, the majority said that they didn't, so they either saved up and bought it on cash, but they didn't use any form of financing. And I think that was up to 90 odd percent that didn't use any formal financing to acquire their irrigation system.

Philip Voris Thanks to both of you.

Kat Harrison Can I ask a question, Philip? Sorry, that's super interesting, Makena. I hope you don't mind me asking a question.

Makena Ireri Sure.

Kat Harrison Was it available—is part of the reason—that seems like a really low percent of people who took financing. Was it because it wasn't available? Did the companies offer it? Or was it a preference of the customers? I think that would be really insightful.

Makena Ireri Yeah, so we didn't dig deep as to why, but what's really interesting is that the ones that did take financing, it was typically from the local SACO or farmers' group, co-op type of an arrangement, right? So there's nobody who got financing from the end—from the distributor or the manufacturer of the systems. It was all through kind of like self-help groups and SACOs, so that small minority. So I'm inclined to think it's more about availability, but that's something that we need kind of a deeper dive to kind of unpack.

Kat Harrison Oh, super interesting.

Philip Voris Thank you. And I have one more general question to everybody before we go to our closing remarks, and that is are there any specific types of policies that you've seen to help encourage cold chain technology adoption and scale-up? Feel free to jump in, anybody.

Kat Harrison Can you ask the question again real quick, Philip?

Philip Voris Yeah. We're looking for specifics types of policies that you've seen that help the adoption and scale-up of cold chain technology.

Kat Harrison Sure. So I think something that is pretty critical, but not just for cold chain, so if we're talking about off grid, is making sure that there is an attractive policy environment which—sorry, effectively talking about import and export—import tariffs. So one of the biggest challenges for off grid energy access is often the cost of importing either components of solar panels or the actual solar panels themselves. So if we're talking solar, that's often the biggest challenge, which means of course the costs then end up getting passed down to the customer, which makes it less affordable.

So I think any country where there is a recognition of the value that renewable energy can play, not only from an environmental point of view and from a sort of reliability of energy access point of view, but also from a _____ quality of distribution point of view, i.e., reaching the base of the pyramid who perhaps don't have grid access, I think that it tends to be much easier to develop these kind of business models and these types of products and technologies and to scale, so ways to essentially reduce cost that could be passed down to customers, so less about sort of discounting in the market, and more about just recognizing the value it plays, and making sure there aren't additional costs placed on bringing those products or components into the country.

Makena Ireri Maybe I can just add here, and I think what Kat is saying is really crucial around the energy production side of the technology, but also on the value chains of the produce that is going to be used in this cold chain. I feel like policies that, for example, create a _____ that is viable, where there is value for chilled _____, a policy like that would automatically have a knock-on effect on the desirability or even the commercial viability of, for example, cold technologies that have to do with dairy farming.

So I think we also need to invest—and when we're talking agricultural technologies, we have to really think in this kind of energy, agriculture kind of nexus, and even actually to water, when you're talking about solar water pumps, and think around policies on that other end of the spectrum that have knock-on effects on how the technology is actually desired, able to be commercially viable, and even has kind of potential for scale and adoption. That's kind of what—

[Crosstalk]

Abishek Bharadwaj I mean, similar _____ to add to what Makena and Kat mentioned, the value chain in agriculture and the value chain itself is quite complex, like if there is—the market dynamics are complex. For instance, often, if you're talking about low cost technologies in the value chain, they have a _____ benefit over various stakeholders, so not one stakeholder gets all the benefit, which raises the point that—I mean, whether one particular stakeholder will be interested in that particular benefit. So overall, avoiding the _____ storage is far better than low cost ag tech, especially _____ value chains.

So this is what policy makers are starting to think about when it comes to benefits to entrepreneurs on the ground, rather than fixing this entire complex value chain with multiple stakeholders.

Yasemin Erboy Ruff Thanks, Abishek. I also just wanted to end by mentioning that this is not necessarily a policy that exists, but I also wanted to mention that the Efficiency for Access Coalition is looking to publish a series of policy briefs, hopefully coming up starting in a couple of months. And our first one is going to be on quality assurance, but in general, we're hoping that these policy briefs will be helpful to policy makers' and governments' considerations for adopting different off-grid appropriate energy efficient appliances. So stay tuned for those. Hopefully, we will be able to share those within a few months.

Philip Voris Great. Thank you again to all of our panelists for that informative Q&A session. For any questions we didn't have time to get to, we'll connect with those attendees offline after the webinar. Now I'd like to provide just a moment for our panelists to provide any additional or closing remarks they'd like before we close the webinar. Let's start with Yasemin.

Yasemin Erboy Ruff Thank you so much, Philip. I would just like to thank everybody for joining us today. Hopefully, this was a useful discussion for everyone. We will be, with the help of our Efficiency for Access Coalition members, investor network members, program partners, other industry stakeholders, hopefully, we'll be putting out more research along the lines of what's been discussed today as we move forward. It is such an exciting sector and very interesting sort of data that's coming through, not only about efficient agricultural technologies, but also other off-grid appropriate efficient technologies as well, so stay tuned. Visit our website and join our conversation on Twitter through the Efficiency for Access Coalition, and we will be hopefully hosting another webinar similar to this one when we come to our _____ communications campaign, so stay tuned for that as well.

Kat Harrison And hi. This is Kat. Yeah, I don't have anything to add, just to say thanks so much for everyone joining. We look forward to sharing the solar water pump report really soon, and please do reach out if you guys—anyone on the call has ideas or questions or would like further discussion. Like we said, that's the best way to move the sector forward, collaborating and sharing and exploring ideas together. So thanks so much.

Makena Ireri And this is Makena. Thanks. Yeah, thank you so much for attending, and please engage with us. We are continuously looking for partners or new ideas of areas of research that will move the sector forward. It is an exciting time to be thinking about ag tech and the intersection with off-grid energy, and I just, yeah, want to encourage people to engage with us, to kind of direct resources where they're most needed, and especially in the research _____.

Abishek Bharadwaj Hi. This is Abishek. Thank you as well. I echo what everyone said. We are happy to—please feel free to reach to us. We are happy to help. So all—you have four options now, so we can help each other. And obviously, for the sector, like _____ create _____, so thank you for joining again, and have a great evening, day, wherever you are.

Philip Voris Great. Thank you again. On behalf of the Clean Energy Solutions Center, I'd like to extend a thank you to all of our expert panelists and to our attendees

for participating in today's webinar. We very much appreciate your time and hope in return that there were some valuable insights that you could take back to your ministries, departments, or organizations.

We also invite you to inform your colleagues and those in your networks about Solutions Center resources and services, including no cost policy support through our ask and expert service. I ask you to check the Solutions Center website if you'd like to view the slides and listen to a recording of today's presentations, as well as previously held webinars. Additionally, you will find information on upcoming webinars and other training events.

We are also now posting webinar recordings to the Clean Energy Solutions Center YouTube channel. Please allow for about one week for the audio recording to be posted.

Finally, I would like to kindly ask you to take a moment to complete the short survey that will appear when we conclude the webinar. Please enjoy the rest of your day, and we hope to see you again at future Clean Energy Solutions Center events. This concludes our webinar.