

## Breaking Down Silos: What does linking renewable energy, energy access and energy efficiency really look like?

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### Webinar Panelists

**Hannah E. Murdock** REN21  
**Matt Jordan** CLASP  
**Aaron Leopold** Practical Action

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### Katie Contos

Hello, everyone. I'm Katie Contos with the Clean Energy Solutions Center, and welcome to today's webinar, which is hosted by the Solutions Center in partnership with Renewable Energy Policy Network for the 21st Century. Today's webinar is focused on Breaking Down Silos: What does linking renewable energy, energy access and energy efficiency really look like?

Before we begin, I'd quickly like to go over some 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 the mic and speakers option in the audio pane. Doing so will eliminate the possibility of feedback and echo. If you choose to dial in by phone, please select the telephone option and a box on the right side will display the telephone number and an audio PIN you should use to dial in.

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other informative webinars as well as video interviews with thought leaders on clean energy policy topics.

Finally, one important note of 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's resource library as one of many best practices resources reviewed and selected by technical experts.

Today's webinar agenda is centered around the presentations from our guest panelists Hannah Murdock, Matt Jordan and Aaron Leopold, who have joined us to discuss REN21's newly released renewable 2017 Global Status Report and a look at Nexus of Renewable Energy Access, Energy Efficiency and What Progress Has Been Made to Date. Before we jump into the presentations, I will provide a quick overview of Energy Solutions Center. Then following the panelists' presentations, we'll have a question and answer session where the panelists will address questions submitted by the audience. At the end of the webinar, you'll 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 covering 90 percent of clean energy investment and 75 percent of global greenhouse emission.

This webinar is provided by the Clean Energy Solutions Center which focuses on helping government policy makers design and adopt policies and programs that support the deployment of clean energy technologies. This is accomplished through the support and crafting and implementing policies related to energy access, no cost expert policy assistant and peer to peer learning and training tools such as this webinar. The Clean Energy Solutions Center is co-sponsored by the governments of Australia, Sweden and the United States with in-kind support from the Government of Mexico.

The Solutions Center provides several clean energy policy program services including a team of over 60 global experts that can provide remote and in-person technical assistance to the 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 an online library containing over 5000 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 private sectors, NGOs and civil society.

The Solutions Center is an international initiative that works with more than 35 international partners across a suite of different programs. Several of the partners are listed above and include research organizations like IRENA and

the IEA and programs like SE4ALL and regional-focused entities such as ECOWAS Center for Renewable Energy and Energy Efficiency.

A marquee feature of the Solutions Center provides no-cost expert policy assistance known as Ask an Expert. The Ask an Expert service matches policy makers with more than 50 global experts selected as authoritative leaders on specific clean energy finance and policy topics. For example, in the area of enterprise development, we are very pleased to have Catherine Diam-Valla, founder of Accessible Energy, serving as one of our experts. If you have a need for policy assistance and enterprise development or any other clean energy sector, we encourage you to use this valuable service. Again, this 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](http://cleanenergysolutions.org/expert). We also invite you to spread the word about this service to those in your networks and organizations.

Now I'd like to provide brief introductions for today's panelists.

First up is Hannah Murdock, who is a project manager and analyst at Renewable Energy Policy Network of the 21st Century. She is also REN21's energy efficiency data collection efforts for 1 Gigaton Coalition, a joint initiative by UNEP and the Norwegian Ministry of Foreign Affairs.

Following Hannah, we'll hear from Matt Jordan who is the Director of Market Development at CLASP where he leads the organization's Clean Energy Access portfolio.

And our final speaker today is Aaron Leopold who is the Global Energy Representative at Practical Action. Aaron is responsible for leading policy and engagement with global processes and partners relating to energy and for coordinating advocacy work across Practical Action's offices.

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

### **Hannah Murdock**

Thank you. I'm Hannah Murdock, the Project Manager for the REN21 Renewables Global Status Report at REN21, and I'd like to thank the Clean Energy Solutions Center for hosting us today. As mentioned, the 2017 edition of the Global Status Report was launched yesterday at the Clean Energy Ministerial in Beijing and so today, I will take you through some of the highlights of the report, urging renewables, energy efficiency and energy access.

First for some background. REN21 is the global renewable energy policy multi-stakeholder network that connects a wide range of actors with the goal of facilitating knowledge exchange, policy development and joint action towards a rapid global transition to renewable energy. The REN21 renewables global status report of GSR provides an annual look at the tremendous advances in the renewable energy market, policy framework and industries globally. And where you do this using both formal and informal data to provide the most up to date information available. This year's GSR marked 12 years of REN21 reporting and over the past decade, the GSR has

expanded in scope and depth of its thematic and regional coverage, but also the refinement of data collection. This year is also the first time we've included a new chapter on enabling technologies and energy systems integration, which includes technologies that share the potential to facilitate and advance the deployment and use of renewable energy. The chapter covers energy storage, heat pumps and electric vehicles.

So many records were achieved during 2016. 176 countries had renewable energy targets and renewable energy auctions were held in 34 countries, more than double the year before. A record 161 gigawatts of newly installed renewable power capacity was added with Solar PV accounting for nearly half of total additions. For the fifth consecutive year, investment in new renewable power capacity was roughly double the investment in fossil fuel generating capacity. And for the third consecutive year, global energy-related CO<sub>2</sub> emissions from the energy sector remain stable despite a 3% growth in the global economy and increased energy demands.

So it was another extraordinary year for renewable energy. Total global renewable energy capacity was up 9% compared to the year before, to 2017 gigawatts by the end of the year. Solar PV saw a record addition and for the first time accounted for more additional power capacity than any other generating technology.

As of 2015, renewable energy provided an estimated 19.3% of global final energy consumption. Of this total share, traditional biomass used primarily for cooking and heating in remote and rural areas of developing countries accounted for about 9.1% and modern renewables, not including traditional biomass, made up approximately 10.2%. It was roughly the same as the year before.

The overall share of renewable energy in total final energy consumption has increased only modestly in recent history despite tremendous growth in the renewable energy sector, particularly for Solar PV and wind power. The primary reason for this is the persistently strong growth in overall energy demand, which counteracts the forward momentum for modern renewable energy technologies. In addition, the use of traditional biomass for heat, which makes up half of all renewable energy use, has increased, but at a rate that has not kept up with growth in total demand.

Now going by sector. The world now adds more renewable power capacity annually than it adds net capacity from all fossil fuels combined. In 2016, renewables accounted for nearly 62% of net additions to global power generating capacity and represented a far higher share of the capacity added in several countries around the world. By the end of the year, renewables comprised 30% of the world's power generating capacity, which is enough to supply 24.5% of global electricity up from 23.7% the year before.

Modest improvements were achieved in the heating and cooling sector, but renewable heating and cooling remains constrained by low fossil fuel prices and lack of policies for it. Modern renewable energy supplies approximately 9% of total global heat demands. The vast majority of renewable heat

continues to be supplied by biomass in 2016 and while additional capacities in modern bioheat and solar thermal were installed during the year, growth in both of these markets has slowed.

In the transport sector, liquid biofuels remain the primary focus, but electrification has continued to expand. Biofuels continued to represent the mass - the vast majority of the renewable energy contribution to the transport sector providing about 4% of world road transport fuels, which count for the majority of transport energy use. Electrification of the transport sector expanded during the year while direct links between renewable energy and electric vehicles were limited. The share of renewables in electrified transport is rising as the share of renewables in grid power increases. And while there was increased attention to decarbonization of transport at the international level in 2016, direct links with renewable energy were still limited.

Policy support specifically for renewable energy in 2016 as in past years was focused mostly on power generation. For the past few years, regulatory policy, development in heating and cooling and transport has been virtually stagnant.

Global new investment in renewable power and fuels, not including large hydropower, was \$241.6 billion dollars in 2016, as estimated by Bloomberg New Energy Finance. And although this represents a decrease of 23% compared to the previous year, the decline accompanied a record installation of renewable power capacity worldwide in 2016. Investment in renewable power and fuels has exceeded \$200 billion dollars per year for the past seven years, and while developing and emerging economies overtook developed countries in renewable energy investment for the first time in 2015, developed countries retook the lead in 2016.

Trends in renewable energy investment varied by region with investment up in Europe and Australia, stable in India and down in the other markets in China, the United States, Middle East, Africa, Latin America and Asia Oceana, except Australia.

In 2016, renewable power technologies continued to attract far more investment dollars than did fossil fuel or nuclear power generating plants. An estimated \$249.8 billion dollars was committed to constructing new renewable power plants. This compares to approximately \$113.8 billion dollars committed to fossil fuel-fired generating capacity and \$30 billion dollars for nuclear power capacity. So overall, renewable energy accounted for about 63.5% of the total amount committed to new power generating capacity in 2016.

And for the sake of time, I'll now go through some of the highlights from solar PV and wind, as these technologies have seen the most rapid growth, but I encourage you all to check out the full report for details on all of the renewable energy technologies which are all detailed in the full report which you can find on our website. So looking at solar PV during 2016, at least 75 gigawatts of capacity was added worldwide, which is the equivalent to the installation of more than 31,000 solar panels every hour. Global capacity

totaled at least 303 gigawatts by the end of the year. More solar PV capacity was installed in 2016, which was up 48 percent over 2015, than the cumulative world capacity five years earlier.

In 2016, China added 34.5 gigawatts, increasing its total solar PV capacity 45% to 77.4 gigawatts, far more than that of any other country. The record increase came despite downwards adjustment in China's target for 2020, which was made in response to a slowdown in the growth of electricity demand.

Looking now at when, almost 55 gigawatts of wind power capacity was added during 2016, increasing the global total about 12%, nearly 487 gigawatts. Growth additions were 14% below the record high in 2015, but they represented the second largest annual market to date. By the end of 2016, over 90 countries had seen commercial wind power activity and 29 countries representing every world region had more than 1 gigawatt in operation.

A significant decline in the Chinese markets following a very strong 2015 was responsible for most of the market contraction in wind. But even so, China retained its lead for new installation, followed distantly by the United States and Germany with India coming in fourth.

Turning now to energy access, approximately 1.19 billion people, about 16 percent of the global population, lived without electricity in 2014. And this is about 15 million people fewer than the previous year. Also about 2.7 billion people are without clean cooking facilities, 38 percent of the global population. And while numbers and trends differ greatly by region, the vast majority of people without access to electricity and clean cooking are in the Sub-Saharan Africa and Pacific - Asia Pacific regions, and most of them live in rural areas.

Across the distributed solar industry, sales in four of the top five countries, India, Kenya, Ethiopia, Uganda and Tanzania, increased in the first half of 2016 compared with the second half of 2015. Sales were the highest in Sub-Saharan Africa, although sales in that region decreased for the first half of 2016 compared to the second half of 2015.

The deployment of renewable mini-grids accelerated in 2016 as well. And this market now exceeds \$200 billion dollars annually. Renewable mini and micro-grids are either emerging or mature in markets on almost every continent. Mini-grid products are being implemented with an increasing interest in interconnection, both to centralized grids but also to other mini-grids.

In 2015, some 20 million clean cook stoves were distributed, an 18% increase from the 17 million distributed the year before. China continued to lead installations in 2015, followed by, distantly, by India, Ethiopia, Nigeria and Bangladesh. Outside of China, Sub-Saharan Africa and South Asia were the two main markets for clean cook stoves, accounting for 24% and 20% of the units distributed respectively.

The use of biogas for cooking also continued to increase in 2016. Asia leads in total installations of domestic biogas plants, most of which are in China with 42.6 million units and India with 4.7 million units, but there's an estimated 620,000 units installed elsewhere in the region.

Investment in off-grid solar PV continued to grow in 2016, dominated mainly by investments in pay as you go companies. Some \$223 million dollars was raised by pay as you go solar PV companies, which is an increase of about 40 percent from the previous year.

Investment in clean cook stoves increased 28% to \$11.5 million dollars between 2014 and 2015, although this was still well below the high of \$18 million dollars that we saw in 2012 and 2013.

Now in terms of energy efficiency, in 2015, global primary energy intensity improved by 2.6%. That is the average rate that needs to be achieved between 2010 and 2030 to meet the sustainable development goal's seventh target of doubling the rates of improvements in energy efficiency, but between 2010 and 2015, energy intensity declined by only 10.2% overall, which is an average annual rate of 2.1%, over the same period, the total primary energy supply grew by 1.3% per year, amounting to a total increase of 6.8%.

By the end of 2016, at least 149 countries had enacted one or more energy efficiency targets and 56 of these countries also adopted a new target in 2015 or 2016. Similarly, many countries have enacted some kind of energy efficiency policy reaching 137 countries by the end of 2016 and 48 of these countries adopted a new or revised policy during the year.

Looking now at some enabling technologies that supported increased development of renewables taking from the new chapter that we've included in the GSR this year, global grid-connected and stationary storage capacity in 2016 totaled an estimated 156 gigawatts, including 6.4 gigawatts of new, advanced storage. More than 6 gigawatts of pump storage capacity was commissioned in 2016 for a year-end total of approximately 150 gigawatts. And grid-connected battery storage grew by 50% in 2016.

Global deployment of electric vehicles, particularly passenger vehicles, has grown rapidly in recent years. More than 2 million passenger EVs were on the world's roads by the end of the year. And the EV passenger car market, including hybrid vehicles, accounted for about 1% of global passenger car sales in 2016. The top five countries for total passenger EV deployment in 2016 were China, the United States, Japan, Norway and the Netherlands, and together these countries accounted for 78 percent of the year's global sales.

Finally, while power systems have always had to accommodate variability in both supply and demand, the growing adoption of variable renewable energy is changing how traditional established power systems are planned, designed and operated. In such cases, traditional base load generators such as coal and nuclear are beginning to lose their economic advantage and may no longer be the first to dispatch energy. In areas where demand is growing, notably in developing countries, there is an opportunity for new and less developed

power systems to grow in concert with higher shares of renewable generation as more flexible systems are developed, rather than getting locked into the baseload paradigm. A number of countries and regions including Denmark, Germany, Uruguay and Cape Verde have already integrated high shares of variable renewable energy from 20 to 40 percent, demonstrating the potential to shift away from the traditional base load paradigm. Improved forecasting, electricity storage and coordination and trade of electricity supply across larger balancing areas are among the flexibility options that can be employed to integrate variable renewable and decisions regarding which options are most appropriate and cost effective vary according to different institutional technological and economic contexts. The ease of grid integration also varies from country to country. And there's many more details about this and how countries can shift between the different - from the paradigm to the early transition and the new paradigm in our feature chapter in the latest edition of the GSR.

So in conclusion, this year has shown that a global energy transition is well under way. There were record new additions of installed renewable capacity and rapidly falling costs, particularly for solar PV and wind power. There was decoupling of economic growth and energy related CO2 emissions for the third year running. There are innovative and more sustainable ways of meeting our energy needs through better integrated, sectorial planning, the adoption of new business models and more use of enabling technologies. These developments are accelerating the paradigm, shift away from a world run on fossil fuels, but the share of renewables in total, final energy consumption is not growing as quickly as it needs to be.

Climate commitment. Can only be reached if the majority of remaining fossil fuel reserves are kept in the ground, and both renewable energy and energy efficiency will have to be scaled up dramatically. But to accelerate to the transition to a healthier, more secure climate safe future while increasing energy access, we need to build a smarter, more flexible system that maximizes the use of renewable energy and accommodates both centralized as well as decentralized and community-based generation.

So with that, I would like to thank you again and encourage you all to join the REN21 network today. You can subscribe to our newsletter to get regular updates about renewable energy development globally and contact us if you would like to pick a space in the next edition of the GSR. You can also download REN21 reports, infographics and videos form our website, REN21.net. Thank you.

**Katie Contos**

Wonderful. Thank you for that presentation, Hannah. Now we'd like to have Matt Jordan present his presentation. Thank you.

**Matt Jordan**

Thank you very much to the Clean Energy Solutions Center for having us and a very big thanks to Hannah and the team at REN21 for coordinating this webinar and all they're great work. I'm Matt Jordan, Director of Market Development at CLASP. I also lead our portfolio on clean energy access. For those of you who don't know us, CLASP is an international NGO Founded in 1999. Our mission is to improve the environmental and energy performance



of the appliances and related systems we use every day, facilitating our transition to a more resilient and sustainable world. The core of our work focuses on providing impartial but ambitious technical assistance to policy makers, manufacturers, utilities, governments and other stakeholders of all stripes on all aspects of appliance energy efficiency policy and market transformation. We've worked in over 60 countries on nearly every appliance product or equipment technology, supporting everything from standards development to labeling, from market analysis to then bench marking, to tax reform, from Procurement to monitoring, verification and enforcement. CLASP's work on clean energy access has emerged from these core competencies and focuses on elevating the role of energy efficiency and energy access in sustainable development, whilst it's improving the affordability and social environmental benefits of access to clean energy of access to clean energy throughout the developing world. We're working towards a world where energy efficiency is a foremost strategy in sustainable development and in which high quality, highly efficient modern energy services are the default for communities everywhere.

A good deal of our work focuses on supporting the development of the global market for off-grid solar. The problems of off-grid clean energy access are simply - I'm sorry, are similar to those that many young markets face, particularly those in emerging economies. Many of the largest barriers can, I think, be distilled down to the interrelated economic issues of ability to pay, willingness to pay and cost. The market for high quality super energy efficient appliances directly address these last two issues, willingness to pay and cost, while market forces and emerging financing options like microfinance, mobile banking and pay as you go consumer finance help address ability to pay. By providing the reliable, meaningful energy services that off-grid consumers' demand, high quality and appropriately designed appliance products create and sustain demand for off-grid clean energy, increasing off-grid consumers' wiliness to pay. And by reducing the amount of energy needed to provide meaningful energy service, super-efficient appliances dramatically reduce cost and the upfront prices consumers pay. What we see here is an analysis supported by globally from friends and researchers at Humboldt State University, Lawrence Berkeley National Laboratory and the University of California. This analysis found that the upfront cost of a typical off-grid energy system can be reduced by as much as 50% if super-efficient appliance and right-size solar PV and batteries are used, while delivering equivalent or greater service. And I think it's important to keep in mind that generally speaking, off-grid consumers are very poor consumers and so they're very, very price sensitive. And this dynamic has very much proven out in the off-grid lighting market, this dynamic of super efficiency driving priced reductions and improvements in market capacity. GLOGO at the Global Off-Grid Lighting Association recently announced that nearly 24 million lighting global quality assured off-grid lighting products were sold between July 2010 and December 2016, and a third of those, 8 million, were sold in 2016 alone. The off-grid solo lighting market simply doesn't exist as it does today without the LED. And that's not that the LED is a special technology, it's that it's a super-efficient technology. The energy savings enabled by super-efficient LEDs have fundamentally changed the

economics of off-grid energy and made the off-grid solar business model much, much more viable. I like to point out here that it's worth noting that in the analysis illustrated here, the super-efficient appliances are more expensive. Nevertheless, the savings reaped from the avoided energy supply cost and the price differences that result more than make up for that additional appliance cost. And I also think it's important to note that research shows that energy efficiency is not necessarily price determinant. It does not necessarily have an impact on a client's pricing. It's often bundled with other advanced costly features, functions and technologies, making energy efficient products appear often more expensive than they actually need to be. But the main point here is simple. Energy access is a fundamentally economic question and energy efficiency fundamentally changes the economics of energy access.

The energy-efficient off-grid appliances aren't simply about the bottom line; they're also highly relevant to the value and service that off-grid households and businesses get out of their energy investments. Nobody wants a watt or a kilowatt or a megawatt. Very, very few people actually care about access to energy, but nearly everybody cares about access to what energy can do for them. I think it's important for the donor community, governments, investors and organizations implementing programs in the field to always bear in mind that 99 times out of 100, what we're talking about when we're talking about energy access, what we actually care about is access to energy services.

What we see here - excuse me - what we see here is a recent preliminary analysis of a prominent government-backed solar home system program. Simply by packaging their solar home system bundles with cost effective efficient off-grid appliances that are already on the market, this program could dramatically improve the amount of energy service its beneficiaries receive. So what we've seen in this slide and in the previous slide is that holding service levels constant, super-efficient off-grid appliances dramatically reduce the cost of off-grid solar and holding energy levels constant, they can dramatically extend run time and service value. In reality, more often than not, the outcome is probably going to be somewhere in the middle. Better service cheaper.

So we can begin to see how a well-functioning competitive market for high quality efficient and appropriately designed appliances is critical to the long-term success of broader off-grid clean energy access goals and to the achievement of global energy access and sustainable development goals more broadly. By inspiring and enabling demand, efficient, high quality appliances support markets for off-grid clean energy. These scaling off-grid clean energy markets strengthen business models, invite market entry and increase competitions, and this in turn leads to stronger innovation ecosystems, better and better appliances and services and again, in turn, enhance demand for off-grid clean energy. Supporting exactly this sort of virtual circle is at the heart of off-grid clean energy market support programs like Global LEAP and Lighting Global.

But the contributions of energy efficiency to energy access aren't limited to distributed renewables. Energy efficiency can play a colossal role in making

the most out of existing grids and helping build the utility sectors of tomorrow. What we see here is an analysis done for United for Efficiency of the potential benefits of India adopting globally benchmarked minimum energy performance standards for only five appliances: lights, household refrigerators, air conditioners, transformers and industrial motors. Just these five relatively easy to implement tried and true policies would in 2030 be enough to reduce India's electricity use by 175 terawatt hours per year, obviate the need for 500 megawatts of new power generation or extend grid connectivity to 87 million households. Now this isn't looking at the entire Indian energy system soup to nuts, generation to distribution to consumption. We're not talking about transport. We're not talking about buildings. This is just five appliances. And it's not even using the best available technology. It's just five extremely cost effective appliance policies using relatively unambitious global benchmarks. And it would change India's energy access and energy sector development landscape dramatically. Now think of what energy efficiency, deployed optimally, could do for energy access in India and around the world. Now think of how many power plants are going to be built in the coming years in the name of development and energy access, how much bad technology is going to get locked in when energy efficiency isn't deployed optimally.

Energy efficiency is the cleanest, cheapest and most abundant resource in energy access and sustainable development, but for some reason, it's hardly ever recognized and utilized as such, greatly inhibiting energy access goals and making a farce of the concept of sustainable development. To try to do something about this, we're working with a coalition of partners to better define the opportunity to utilize energy efficiency as a first fuel in energy access and sustainable development, to provide practical and strategic guidance on how exactly the global community can do this and work with stakeholders around the world and throughout the global value chain to put efficiency first in energy access strategies. This is a very young effort and we're seeking partners of all kinds and if you're interested in learning more, please do be in touch.

Thanks again to the Clean Energy Solutions Center and Hannah and the team at REN21. Looking forward to the Q&A.

**Katie Contos** Wonderful. Thank you so much, Matt, for that presentation. Now we'd like to welcome Aaron.

Aaron, it seems like your mic is muted. You might want to unmute it.

**Aaron Leopold** I'm sorry about that. [Laughs]

**Katie Contos** Okay, we can hear you. Wonderful. Thank you.

**Aaron Leopold** Great. Yeah. So thank you so much for the previous two presentations and for the Energy Solutions Center for hosting this. You know, the REN21 report has really become a global benchmark in understanding where the sector is going, but I really liked how Matt kind of just presented where this space could be going if we made a few simple changes. And I wanted to just talk a

little bit about kind of the energy access and energy efficiency landscapes from the poor person's perspective and from the perspective of businesses that are working in energy-poor regions on these issues. So while Matt mentioned that the energy-poor regions of the world are also economically poor, meaning that they're very, very sensitive to price changes, we have to remember that the poorer people in the world actually pay the highest price per kilowatt hour for energy. There are regularly instances where the national price per kilowatt hour of kerosene or the equivalent of kilowatt hour price for kerosene for lighting is between \$20 and \$50 USD per kilowatt hour. Meanwhile, in OECD countries, it's normally below 15 cents. So, so it's literally hundreds of times more expensive to run the lights or run an appliance if you are poor than it is if you are rich. And of course, energy efficiency is fundamental to if not reducing the cost of the energy itself, to reduce the cost of the service provider, which as Matt mentioned, is what people really care about in the end.

So what I wanted to basically build on is some of the points made before around how the small solar industry, particularly as we've seen in Eastern Africa in recent years, has really taken off, primarily because of super-efficient LEDs and other appliances that are coming online. And one of the challenges that these businesses face at the moment is that they are on the one hand, they've been really, really successful in selling these solar lighting products which also now incorporate fans, mobile chargers, some televisions, et cetera, but because of the small capacity of these systems and the inability of people to pay for larger systems at the moment, we've really seen a constraint in sort of the ability for these businesses to resell to the same customers larger, more productive kind of appliances and things that they could use to earn money. And what we would really love to see is for there to be research that is publicly funded by either wealthy country donors or universities and larger national businesses into super-efficient appliances and productive products. But we need to see these investments in efficiency as is just that, an investment. These are not costs. These are investments in future cost reductions and investments into building future energy markets. The sooner that you can get something into a rural community where people can earn money using an appliance powered by a super-efficient power source, the sooner that that rural community that is now earning money is able to again purchase new things and they are then able to pull themselves slowly out of the vicious cycle of poverty and also to become available to participate in newer markets and therefore kind of build in a virtuous circle of rural economic development.

Some companies are already working on this on their own. One great example that I love to give is the company called Mobisol. They work in East Africa and they were challenged by Power Africa, the U.S. flagship energy support program for Africa, to they said basically it was kind of a small conversation where the head of Power Africa said, "I bet you can't make a welder to run on your tiny, little 20 watts solar system." And they took that as a challenge and six months later, they came up with an arc welder to weld metal that's running on their little system, and of course is running on a battery that is the lead acid battery that was shown in Matt's slides, and it's

something that's never really been done before. And this is just an example of the type of research that is, it's easy to do if you have a dedicated team working on it, but there is not really much support for it at the moment. And those companies that are working in the space are instead being really incentivized to work on their business model of kind of building out what they can sell given the current state of technology rather than instead moving to the next level of technology and developing those technologies themselves. We are starting to see some of this with examples like Mobisol, but this is a kind of one of a kind example, and CLASP, for instance, is one of the only organizations in the world that's really running these types of competitions and encouraging this type of innovation from the - at the bottom of the pyramid, so to say.

And I just wanted to close to mention something about the slide that you're seeing here. And this is the Poor People's Energy Outlook. This is Practical Actions annual flagship publication. And this year, we are continuing with the second part of our series on bottom up national energy planning, which began last year. So we wrote the Poor People's Energy Outlook last year on flipping energy planning on its head to look at how would national energy systems be planned if you took the needs of rural communities as the starting point rather than the end point, which is currently the practice. Currently, energy systems are planned on kind of a hub and spoke model where you have the centralized needs and a spider web of a transmission that goes out, out, out. But if you take the perspective of the end users of most of these countries that are truly energy poor where energy poverty rates are, between 50% and 70% or 80% of the population. If you took the real needs of the country first, first of all you would see fundamentally different plans, obviously; but secondly, these plans would be calling for fundamentally different technologies. And we found that they would be primarily distributed energy technologies such as the ones that I was just speaking about with the case of Mobisol and these off-grade companies. You say, well, these energy service or these energy technologies can't offer a high level of service. But, indeed, people have no service right now and self-identifying what would be most appropriate and what they would need, the type of solar home system level of power is actually what people want right now. So in this year's edition, we're looking at how to finance a bottom up approach to energy access planning. And we, of course, look directly into some of these issues around how can you finance consumer finance to get these solar home systems into people's houses, and this is precisely the type of finance that would be required to also bring productive appliances to these communities. So we're looking not only at how do you bring energy, but how do you bring the services from the bottom up. So, I'd hope you can all look out for that after you're finished reading the Global Status report. In about a month's time, we'll be publishing that one.

So with that, I thank you very much for your time and I will close there.

**Katie Contos**

Thank you so much, Aaron. And thank you to each of the panelists for those outstanding presentations. As we shift to the question and answer, I'd like to remind our attendees that please submit your questions using the question pane at any time. We also keep up several links up on the screen throughout

for a quick reference. That points where you can find more information about upcoming and previous webinars and how to take advantage of the Ask an Expert program.

We have some great questions and I'd like to begin with, "What are some examples of policies that integrate renewable and energy efficiency?"

**Hannah Murdock**

I guess I can tackle that one. In the Global Status Report you'll find several examples and some of the key statistics that many countries are using to integrate both renewables and energy efficiency and in some cases applying them for energy access. But for some specific examples, you can look at in Europe, for example, Portugal has adopted two new incentive mechanisms over the past year to promote energy efficiency in the building sector, which also includes grants for up to 60% of the cost for solar thermal systems in residential buildings and up to 35% in commercial buildings. Also, Bulgaria relaunched an energy efficiency loan scheme supported by the European Bank for Reconstruction and Development that provides support to a wide range of efficiency improvements and solar water heaters. But in general, you see more and more countries addressing energy efficiency and renewables within the same government agency. In 2016, that reached 103 countries and 81 of these countries had policies or programs that combined renewables and energy efficiency.

**Katie Contos**

Thank you, Hannah. Our next question is for Matt. "What resources are there for those interested in learning more about this access and efficiency issue in the market?"

**Matt Jordan**

Thank you. It sort of depends. If the question is sort of about the broader topic area of sort of how these themes integrate, there's been some writing on this subject. Lawrence Berkeley National Lab does a lot of good analysis looking at these sorts of questions. There have been some very good reports coming out of the World Bank over the last couple of years sort of probing this issue a little bit and if you dig into the, you know, work cited in those reports and papers, you can get much deeper into these questions. So there is some good literature out there to read. And when it comes to product market, you know, I would probably refer people to Lighting Global, to the, you know, Global Alliance for Clean Cooks Stoves, to Global LEAP and the work that, you know, USAID's Global Development Lab is doing in the scaling off-grid energy challenge with their refrigeration products, et cetera. When it comes to sort of product markets that perhaps aren't targeting off-grid consumers, there's lots and lots of resources out there. You know, Top Ten is a good program. There's labeling schemes and standard schemes all over the world for traditional appliances. I would just point out that one of the sort of challenges with a lot of procurement programs, you know, is and it's, you know, procurement programs for efficient appliances is that it often, they're often structured to sort of function on a sort of technology specification first and then price second structure. And that doesn't necessarily lock in the best energy efficiency gains in technologies, like a least total cost, a least life cycle cost approach, in my opinion, would sort of be smarter and sort of would put efficiency first in a more substantial way. And so, I guess I would just say

that it's not enough just to look at the technical specifications in the price. The life cycle costs are really, really important to keep in mind.

**Katie Contos**

Thank you so much. Our next question is for Aaron. "Aaron, how can energy-poor governments incentivize work on energy efficiency in a way that both promotes business and is helpful to poor people?"

**Aaron Leopold**

Thank you. That's a really good question. It's of course kind of complicated. But at the end of the day, the first thing that needs to happen is that governments need to have sort of a clear definition of what is efficient and why they want them in their country. So working on creating efficiency standards and requirements together with industry is fundamental and there are lots of really good efficiency standards templates out there that governments can work with.

The other thing that is very simple but very controversial in many energy-poor countries is to reduce or eliminate import tariffs on super-efficient energy products and appliances. And it's controversial, although it seems quite logical to reduce a financial barrier, but most energy-poor countries actually receive the vast majority of their income from import tariffs. Energy-poor countries don't have many people in the formal economy, so most of the subsistence farmers never have paid a penny of income tax because there's not really much to tax. So the governments get their own money from taxing imports and these of course, this of course, kind of creates a challenge for and a tradeoff for governments who are trying to do the best thing for their citizens in different respects.

Another thing that they could do is as I mentioned with the finance piece at the end of my presentation, is to really support microfinance organizations to work on energy and on lending energy products, but also lending for the efficient appliances, which are all pretty new, and so a lot of MFIs, microfinance institutions, they're not really familiar with loaning these products and they're sort of unsure about how to do it. And finally, there's just that kind of a lack of awareness in many countries on the private sector side, on the government side that, you know, these very, very energy efficient sort of agricultural products, such as a rice husker or a solar dryer, there is a lack of awareness that these exist at affordable prices. So really, awareness raising campaigns are also extremely fundamental. And that'll help both the consumers and the businesses themselves, and they're all fairly easy to do and they're all fairly inexpensive, and so I would encourage donors to really work on those four things as well.

**Katie Contos**

Wonderful. Thank you, Aaron. And a quick follow-up question. "Will the report also look at electric cooking on battery charging systems?"

**Aaron Leopold**

The Poor People's Energy Outlook looks at all energy, but it does not at the moment - So it does look at cooking. It quite extensively looks at cooking. But it does not look at electric cooking using battery systems, so we're not quite there yet. We do look at induction cooking. But basically, we are, the technology isn't quite there yet. So on the cooking front, as Hannah mentioned, you know, the vast majority of renewable energy in most

developing countries that is used, and indeed nearly half worldwide, is still biomass for cooking. So that's both bad for indoor air pollution, it's bad for the forests. But it's because we don't have a really viable, cheap alternative that's extremely efficient on the electricity side.

**Katie Contos**

Wonderful. Thank you very much. Hannah, "What are their - are there any leading countries integrating renewables and energy efficiency?"

**Hannah Murdock**

Yeah, you see this in a lot of developed countries. As I've already just mentioned a few examples in Europe. There's also the European Parliament in 2016 adopted a resolution on renewable heating and cooling that was designed to promote the adoption of energy efficiency measures to provide a framework for policy makers to better integrate renewable heating and cooling in the buildings industry and electricity sectors. In terms of developing countries, although many countries have adopted energy efficiency targets and renewables targets, several particularly in developing countries are lacking energy efficiency policies to achieve these targets and generally, policies that support both energy efficiency and renewables together are not sufficiently integrated globally. So I mean in general, a systems approach in policy would be needed across all sectors and this would be also including energy access. If you can couple renewables and energy efficiency as Aaron and Matt have both mentioned, it can go a lot further than if you're addressing them by themselves, just speaking to the whole breaking down silos theme.

**Katie Contos**

Very good. Thank you, Hannah. Aaron and the panel, going back to your earlier points about government incentive work, we had a question about a Pakistan community where they're trying to encourage the use of micro-grids, especially the fact that they're better for the future integration. They're unable to make them popular. Based on your experiences, what would you suggest?

**Aaron Leopold**

This is a really common problem because there is generally on the side of regulators, energy regulators and energy ministries, there's a lack of understanding of how to do interconnection. And you also need slightly different technologies to create a micro-grid that is isolated on its own compared to a micro-grid that is ready to connect with the grid. But it is completely possible and it's been done tens of thousands of times around the world. And you have at the moment, a real issue where there are kind of, there's a lack of awareness and a lack of willingness amongst mostly regulators and utilities themselves, because the utilities will bear the cost of kind of creating this change. But there's the technological solutions are there and kind of working with international organizations, so I know in fact in Pakistan, I know that the Asian Development Bank right now is working to create quite a large new portfolio of mini-grids and or to financially support them. And Pakistan is among the countries that they want to roll out financing for hundreds and hundreds of new mini-grids. Now the, of course the Asian Development Bank will not support micro-grids that are not going to be kind of grid ready, so to say. So really getting in touch with some of the international players who are working on mini-grids, and also there is an international association of small hydro producers and there's also the



Alliance for Rural Electrification, which is an industry association for companies working on mini-grids. Getting in touch with some of these international players to see how these challenges have been overcome in other places would be a place to start as well.

**Matt Jordan**

One quick thought of this if I can jump in. This is Matt. You know, with respect to the question of sort of the popularity of micro-grids and mini-grids, looking at it from the consumer perspective, you know, a lot of mini-grids and micro-grids vary greatly, sort of business model to business model, location to location, but many of them don't offer much in terms of energy service and a lot of times it's simply a light, it's simply a mobile phone charger. Without naming any names, because I'm not sure how much of this information is public, I've seen some recent data from a very, very interesting pilot looking at what the deployment of super-efficient appliances that are sort of up the energy ladder a little bit from lights and mobile charging sort of does to underwrite these business models. And the outcomes were, I found, profoundly interesting. That, you know, there was a much greater uptake, not just of higher tariff rates, and greater energy consumption, not just to support these appliances which then, of course, supports the business model of these mini-grids, but also new connections to mini-grids and more demand from new customers for mini-grids when sort of right-sized and appropriate appliances were made available by the mini-grid, developers and energy service companies. So I think there's a little bit of a balance to be made, because obviously, we're talking about energy-poor, largely poor consumers, and so you want to keep costs as low as possible for them. However, you also want sort of revenues to be as high as possible for mini-grid developers. And, you know, super-efficient appliances, I think, will continue to play a larger and larger role sort of in that dynamic.

**Katie Contos**

Great, thank you. Our final question if for Hannah. "What would be some of your recommendations for countries wanting to integrate renewables and energy efficiency more?"

**Hannah Murdock**

Thanks. I guess to follow up on what I was saying previously, if, I mean, in general a systems approach and policy would be needed across all sectors. There's not enough support in the heating and cooling or transport sectors and much of it is - much of the policy support is going to the power sector. There should be planning conducted across sectors and across government departments and ministries, also in close dialogue with the public and private sectors and to ensure complementarity across the different levels of government and efforts to increase energy access. Renewables and enabling technologies should be aimed at maximum system flexibility. That should be prioritized and the most energy efficient technologies should be used. But generally, you can find - you'll be able to find a lot more of our recommendations in a new document that we've produced this year, also for the first time, that complements all of the data that we found that we've reported in the Global Status Report, which is called "Highlights of the REN21 Renewables 2017 Global Status Report in Perspective," which is putting our findings in perspective of the global energy transition. This is also available on our website. So you can find out more at REN21.net.

**Katie Contos** Thank you again to the panelists for that informative question and answer session. For any questions we didn't get to, we will connect with those attendees offline after the webinar. Now I'd like to provide the panelists with an opportunity of any additional or closing remarks you'd like to have before we close the webinar. Hannah, would you like to begin?

**Hannah Murdock** Sorry. The sound cut out and I didn't hear the question.

**Katie Contos** Oh. No worries. We were just going to have, would you like to provide any additional or closing remarks to today's webinar?

**Hannah Murdock** Yeah. I could just reiterate that, you know, despite that we're seeing a lot of progress in the global energy transition. Over the past decade a tremendous amount of advancement has occurred in renewables and we're seeing more of this in energy efficiency and energy access as well. But the shared renewables and the total final energy consumption is just not growing as quickly as it needs to be and we will not be able to reach climate commitment if the - unless the majority of fossil fuel reserves are kept in the ground and renewable energy and energy efficiency are scaled up and renewables and efficiency need to be applied more to energy access if all of the international goals are to be achieved.

**Katie Contos** Wonderful. Thank you very much. Matt, would you like to add any additional remarks to this webinar?

**Matt Jordan** Yeah, just one thing. You know, traditionally, the way that energy efficiency intervention and policy has sort of developed and evolved are sort of in the latter stage of a developed world's - a developed world economy's sort of energy sector. You know, policy makers, et cetera, realize, you know, "Uh-oh, we've made some mistakes and now this energy sector is problematic and so we need to do something about that," and often it results in sort of, you know, top-down regulatory approaches to energy efficiency. That timeline, that order of operations, those mistakes don't need to be made [laughs] in a lot of emerging economies and emerging energy and utility sectors. You know, we've learned those lessons and we can apply them in many of the sort of energy-poor economies that, you know, that we're talking about. And, you know, if we're going to take concepts like sustainable development seriously, I think it's very, very important that we do take those [laughs] lessons and transfer them at the start of these energy sectors' development. Beyond that, I just want to thank the Solutions Center again and thank Hannah and her team and thank Aaron. This was a lot of fun.

**Katie Contos** Wonderful. Thank you, Matt. Aaron, would you like to add anything else today?

**Aaron Leopold** Sure. Just to kind of reiterate my last point, you know, that there's a lot that could be done at the national level and there's a lot for different players all along the value chain and whether you're an [inaudible].

**Katie Contos** I'm sorry, go ahead. We can hear you. Oh. We lost you, Aaron. Are you still there?

**Aaron Leopold**

Hi. Can you hear me now?

**Katie Contos**

Yes, we can. Yeah, you're back.

**Aaron Leopold**

Okay, sorry. I was just saying that there's really something that everyone can do and that this is a really important topic. And so businesses can work with governments to help create these efficiency standards. Governments can work with MFI [inaudible] better understand how they can support these things. And at the end of the day, again, consumer awareness is a massive driver. If people aren't asking for it, it's really not going to happen in many cases. So just getting out there and understanding what it is that people want and need and figuring out how to address those needs is going to just illustrate again and again that efficient appliances are the name of the game moving forward. So, yeah, thank you very much for this opportunity and to REN21 for providing a great report to base the conversation around.

**Katie Contos**

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 was some valuable insights that you can 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 through our Ask an Expert service. I invite you to check the Solutions Center website if you would like to view the slides and listen to the recording for today's presentation as well as previously held webinars. Additionally, you'll find information on upcoming webinars and other training events. We are also now posting webinar recordings through the [Clean Energy Solutions Center YouTube channel](#). Please allow about a week for the 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 for future Clean Energy Solutions Center events. This concludes our webinar.