



Off-grid renewable energy solutions and their role in the energy access nexus

Key takeaways from the 5th IOREC

Fifth International Off-grid
Renewable Energy Conference

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About IRENA

The International Renewable Energy Agency (IRENA) serves as the principal platform for international co-operation, a centre of excellence, a repository of policy, technology, resource and financial knowledge, and a driver of action on the ground to advance the transformation of the global energy system. An intergovernmental organisation established in 2011, IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity.

www.irena.org

About IOREC

The International Off-grid Renewable Energy Conference and Exhibition (IOREC) is a flagship event of the International Renewable Energy Agency (IRENA) and acts as the global platform for sharing experience and best practices on design and implementation of enabling policies, tailored financing schemes, innovative business models and technology applications for stand-alone and mini-grid systems. It is convened every two years, with the first four editions of the event taking place in Accra, Ghana in 2012, Manila, Philippines in 2014, Nairobi, Kenya in 2016, and Singapore in 2018. The fifth edition of IOREC was held virtually from December 7 to 9, 2021.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank	IRENA	International Renewable Energy Agency
CCA	Clean Cooking Alliance	MUNISMA	United Nations Multidimensional Integrated Stabilization Mission in Mali
CIP	Climate Investment Platform	NDCs	Nationally Determined Contributions
CORE	Cornerstone for Rural Electrification	PAYG	pay-as-you-go
DRE	distributed renewable energy	PPAs	power purchase agreements
DUN	Delivery Units Network	PV	solar photovoltaic
ESF	Entrepreneur Support Facility	REA	Rural Electrification Agency
FAO	The Food and Agriculture Organization of the United Nations	RBF	results-based financing
GAVI	Global Alliance for Vaccines and Immunization	UN	United Nations
GGGI	Global Green Growth Institute	UNDP	United Nations Development Programme
GHG	greenhouse gas	WHO	World Health Organization
GOGLA	Global Off-Grid Lighting Association		
IOREC	International Off-Grid Renewable Energy Conference		

IOREC OUTCOMES: TAKEAWAYS FROM IRENA'S FLAGSHIP CONFERENCE ON OFF-GRID SOLUTIONS AND THEIR ROLE IN ENERGY PROVISION

7-9 DECEMBER 2021

INTRODUCTION

The International Off-Grid Renewable Energy Conference (IOREC) is a flagship biennial event convened by the International Renewable Energy Agency (IRENA). It is a gathering of international stakeholders – primarily those working on extending energy access, as well as those across sectors where energy is critical to the provision of the most essential services. The summit provides for in-depth discussions on energy access. The subject expertise and regional experience of key speakers foster further understanding of the factors driving the expansion of energy access, and what is needed to navigate in the right direction, gain the required momentum and overcome challenges while creating opportunities for universal access. The event helps to assess progress, tracking the pathways taken thus far.

The 5th IOREC was held virtually on 7-9 December 2021 due to the constraints posed by the on-going COVID-19 pandemic. The three-day event included interactive, thematic plenary and deep-dive sessions providing the opportunity for experts to deliberate on the design and implementation of enabling frameworks; policies; tailored financing for accelerated off-grid renewable energy deployment; emerging and innovative business models; and technology advancements for stand-alone and mini-grid systems. The IOREC places a special focus on the socio-economic aspects of off-grid renewable energy, exploring the nexus of off-grid renewable energy and key development priorities such as clean cooking, education, food security, health care, economic development and livelihoods.

Parallel conversations on clean energy and climate action converged in discussions on how off-grid solutions can help to achieve countries' Nationally Determined Contributions (NDCs). Deliberations explored business models to procure clean energy for peacekeeping missions and sustain distributed renewable energy (DRE) systems to electrify remote and indigenous communities. IRENA's partner organisation, the Alliance for Rural Electrification (ARE), provided services that helped participants network across sectors and regions through online platforms.

This outcome document captures key lessons from the 5th IOREC. The following sections summarise the deliberations on the key topics presented at the event.

IOREC AT A GLANCE

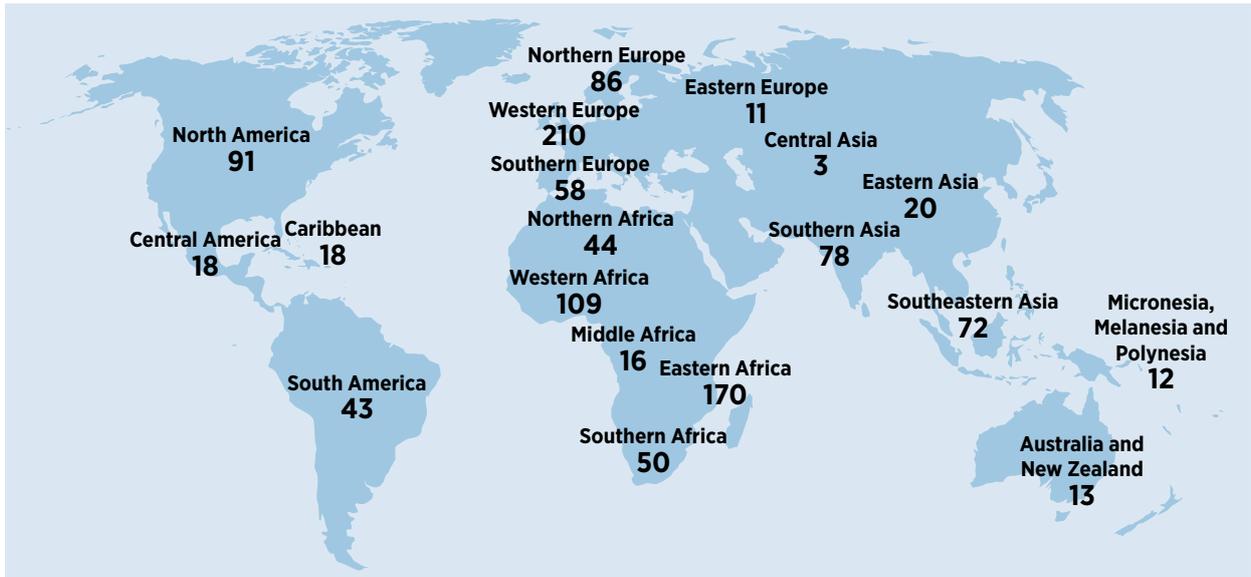
Table 1 and Figures 1-5 provide information regarding the events' attendees, their roles and the organisations they represent, as well as session topics that drew their interest, centred on themes deliberated during the three-day event.

Table 1 Conference agenda

🕒 7 DECEMBER		🕒 8 DECEMBER		🕒 9 DECEMBER				
12:30	Opening event and keynote speeches	13:00	Keynote speeches	13:00	Keynote speech			
13:00	High-level dialogue on accelerating universal energy access to achieve the 2030 agenda	13:15	Decentralised renewable energy solutions for accelerating universal health access	13:10	Decentralised renewable energy (DRE) solutions for supporting equitable, quality education			
14:00	Enabling policies and regulations for scaling up DRE solutions for access	14:30	Off-grid renewables for driving climate action through Nationally Determined Contributions (NDCs)	14:10	Advancing clean cooking access with DRE solutions			
15:00	Signing of an IRENA–Alliance for Rural Electrification memorandum of understanding			15:10	Presentation by the Cornerstone for Rural Electrification (CORE)			
15:30	Innovations to foster off-grid renewable solutions in developing countries	15:30	DRE solutions for adding value in the agri-food and water sectors	15:30		Harnessing decentralised renewables for socio-economic development objectives		
16:30	Mitigating investment risks in energy access							
17:30	Virtual networking (60 mins)*	Deep dive: IRENA's support and services for project facilitation (45 mins)	16:30	Virtual networking (120 mins)	Deep dive: Supporting skills development and entrepreneurship for DRE (60 mins)	16:30	Virtual networking (120 mins)	Deep dive: Towards a private sector-led, service-based model to scale up sustainable electrification of public institutions (60 mins)
					Deep dive: Decentralised renewables for supporting peace-keeping and humanitarian assistance (60 mins)			Deep dive: Decentralised renewables for advancing the energy transition in remote communities (60 mins)

Note: DRE = Distributed Renewable Energy.

Figure 1 Regional representation of participants



Note: regions defined as per the United Nations' geo scheme.

Figure 2 Sectoral representation of participants

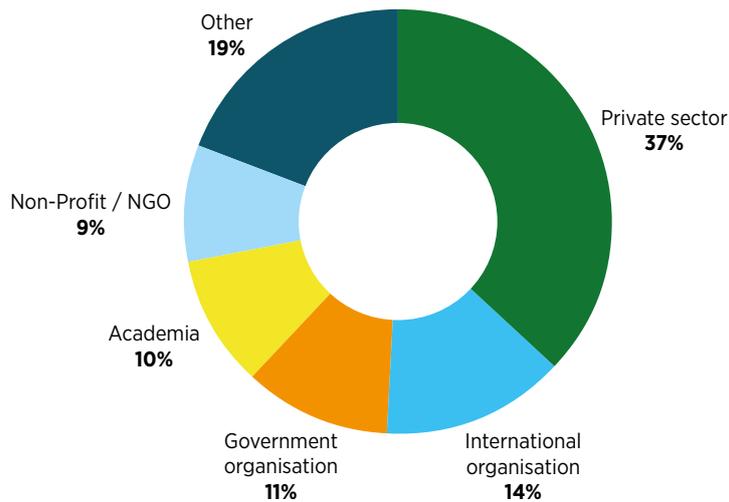


Figure 3 Participants' fields of activity

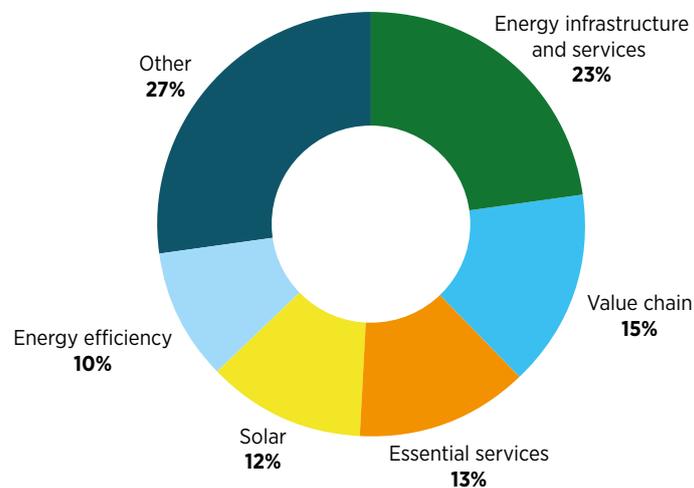
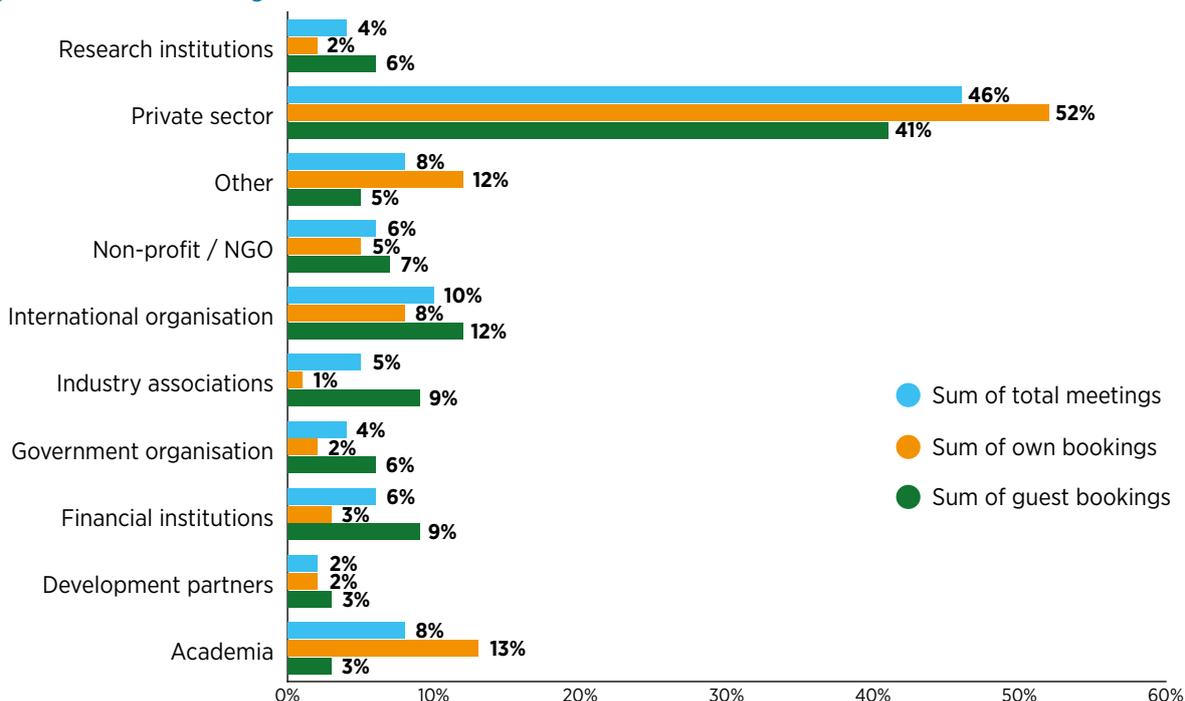
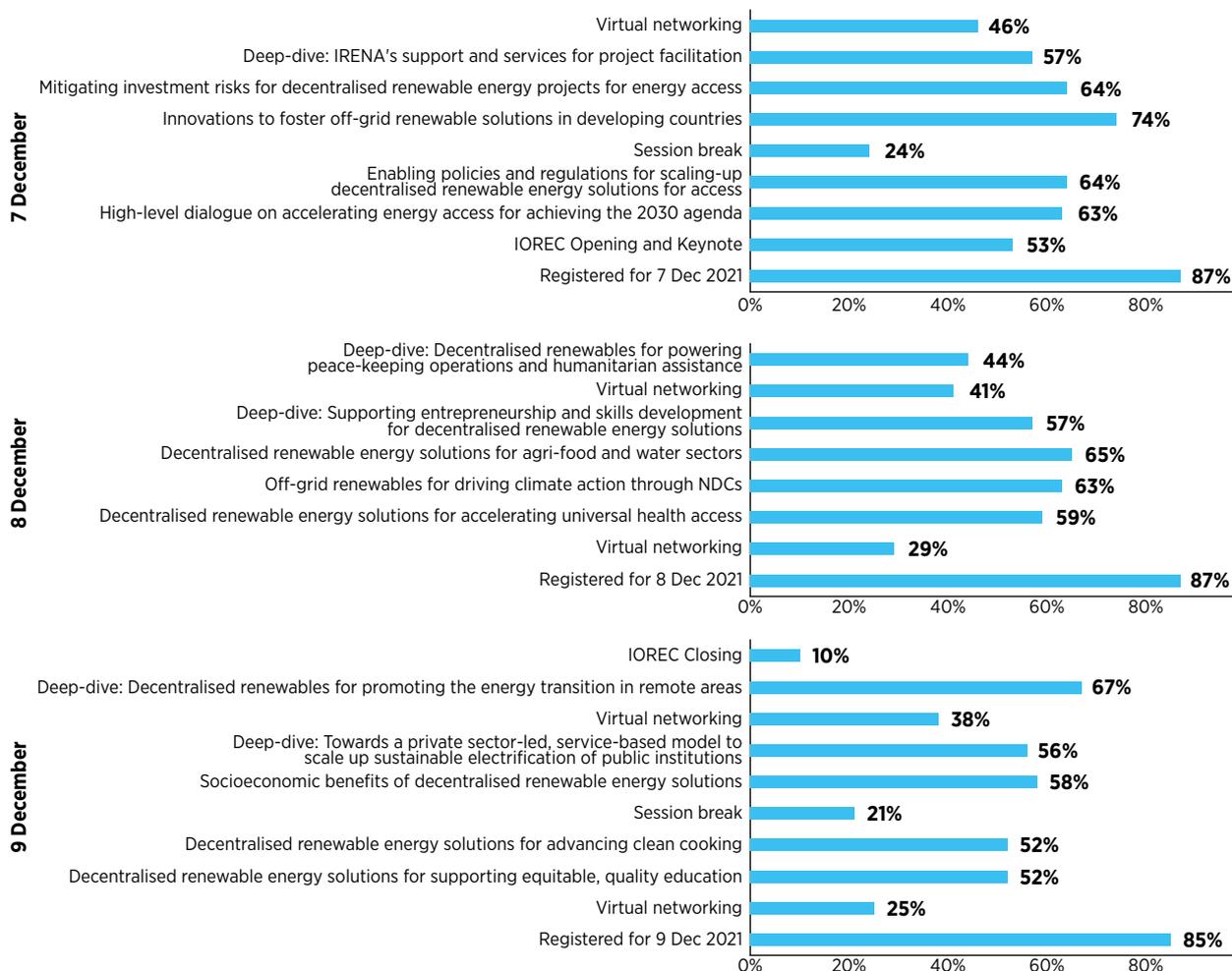


Figure 4 Networking facilitation

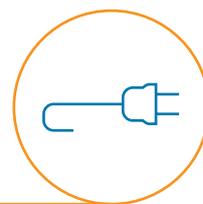


Note: Guest bookings refer to the meetings where the sectoral participant was invited for an online meeting by another delegate, whereas 'own bookings' refer to the sectoral participant proactively inviting another delegate (the guest) to a meeting.

Figure 5 Participants' interest in session content



Note: Session percentages represent the proportion of total participants who had registered for the IOREC event.



THE ENERGY ACCESS NARRATIVE: SCALE AND SPEED

Background

An estimated 785 million people are in dire need of access to electricity, and for another 2.6 billion provision is unreliable. Aspirations to achieve the Sustainable Development Goal (SDG) 7 of affordable, reliable, sustainable and modern energy for all by 2030, calls for a tripling of current annual investments.¹

Given the context, the energy access narrative weaves in a positive thread; the Sub-Saharan countries – most of which are deprived of access at 40% electrification overall – are showing promise: renewable energy capacity has grown to 3% of total installed capacity. Kenya remains an emerging hub for innovation and adoption in stand-alone systems and several countries, including Tanzania, Nigeria and Sierra Leone, have introduced dedicated policies and regulations. The momentum required to achieve the SDG 7 targets is high; the private sector is being enabled to deliver an additional 500 million power connections to address electricity access. In turn, this will help catalyse and create at least 5 million green jobs and, in so doing, avoid emissions of at least a billion tons of carbon dioxide (CO₂) equivalent.²



WHAT THE LEADERS HAD TO SAY...

“The pronouncements made in Glasgow to real action on the ground – to real kilowatt hours, megawatt hours on the ground for real people, communities and so on – this is why this IOREC is important as it comes right on the heels of Glasgow. It’s about implementation, it’s about action on the ground and making meaning out of all the commitments that governments have made... we can be on a good trajectory towards a 1.5-degree world, but more importantly, we can electrify those 700-800 million people that have zero access to electricity”.

Kandeh Yumkella - Sierra Leone

“We risk that in 2030 we can have still 650 million people without access to electricity. So that’s the reason for accelerating our path... the direction of travel is clear but the scale and the time of this is still not acceptable, not aligned with the Paris Agreement, not aligned with the promises of the Sustainable Development Goals”.

“IRENA’s Climate Investment Platform [is a] new facility that already has 400 million in the basket, but we are waiting for further contributions from actors, so we expect to have in this year already 1 billion [for] the facility and we think that we can leverage up to 3 billion”.

Francesco La Camera - IRENA

¹ *Net Zero by 2050 A Roadmap for the Global Energy Sector – Summary for Policy Makers (International Energy Agency, Paris, May 2021).*

² *“CEO David Lecoque announces ARE’s Bold Energy Compact at the UN HLDE2021 ministerial forums” (Alliance for Rural Electrification, 23 June 2021, <https://www.ruralelec.org/press-releases/ceo-david-lecoque-announces-ares-bold-energy-compact-un-hlde2021-ministerial-forums>).*

"[The] Government of Zimbabwe enacted the rural electrification fund act in 2002... it comes with a 100% subsidy for electrification of public institutions. We are looking at primary, secondary schools, public clinics, government buildings in various rural communities [and] extension workers' offices. So, with the subsidised electrification programme we have so far, for the public institutions, [we] achieved about [a] 74% electrification rate".

Dr. Gloria Magombo - Govt. of Zimbabwe

"At COP26 we presented a document which was called the Health Argument for Climate Action. For us, this is the health argument for the energy transition and it's huge and it's positive and it is rewarding for the health professionals. It is easy to measure, it is easy to quantify the health benefits... to use that health argument in the best possible way to motivate more [climate] action".

Maria Neira - World Health Organization

"I think industry will play an important role as an accelerator. We've seen that both in Africa, but obviously also in Asia and in Latin America, where industry is really the key element that drives decentralised power solutions that can then be connected also to the main grid - with decentralised hybrid solutions in combination with larger scale or mid-scale deployment, development of the networks both in countries but also between countries in Africa".

Nadja Haakansson - Siemens Energy

"...highlight the importance of also working through financial intermediaries... we created an incubator through the facility for energy inclusion... because it is for us, as a large-scale development finance institution, from a transaction cost perspective just not economically feasible to support some of the smaller-scale projects directly, and this is why we created the facility for energy inclusion... [to] expand [enterprises'] business... and doing that in local currency financing, which I think is another important area that we need to provide - local currency financing to wholesale projects as companies".

Daniel Schroth - African Development Bank

"...with [a] locally sourced affordable reliable source of electricity, you are not subject to other sorts of market volatility for oil, for diesel generators... So, on the one hand it empowers our communities; on the other hand, for other RE companies, it also bolsters the business case... [making it] easier to attract finance but also to attract affordable finance... women entrepreneurs... are important agents of change because they're investing much more of their earnings in the local communities... it comes out that it's up to 90% [for women and] 35% for men and so that's why we very much put the onus on the gender lens investing".

David Lecoque - Alliance for Rural Electrification



ENABLING POLICY AND REGULATIONS

Background

Policies and regulations for stand-alone systems and mini-grids need to be tailored to the local context, accounting for cost recovery and viability gap funding for the decentralised solutions that are offered. It is also important to extend the opportunities that grid-interactive mini-grids can provide, and define the kind of institutions required, frameworks for implementation and all that goes with process delivery – licensing, data, monitoring and fiscal support. Policies encompass cross-sectoral synergies to sustain interventions. Going beyond deployment, policies influence local capacities and supply chains. They ensure that energy access serves domestic and commercial needs in equal measure; inclusivity addresses the needs of women and marginalised communities.

Policies need to account for grid interoperability and address market development

The challenge of off-grid regulations lies in having to address the fluid relationships across three modes of electrification – grid extension, mini-grids and stand-alone systems.

The long-term viability or sustainability of off-grid projects hinges on policy considerations that account for grid interoperability, supply lines, asset ownership and financing of the infrastructure. Key considerations include:

- economic sustainability in the local ecosystem;
- affordability for consumers;
- the market segment targeted by relevant interventions;
- political concerns, where upgraded solutions are cheaper off-grid; and
- policies that develop local skills in manufacturing and assembly.

Energy policies must consider off-grid solutions in energy planning, provide for DRE solutions to address cross-sectoral needs and set up tax frameworks to open up new markets.

Energy policies must consider off-grid solutions in planning the energy mix. Where countries see off-grid systems as an interim solution until they have the resources to carry out grid connections, policies need to incentivise developing systems for this interim period, and provide assurance that assets will not become stranded so that there is a business case for the deployment of off-grid solutions. Integrating electrification plans with ambitious targets, in addition to tax frameworks that enable private sector players' entry into new markets with exemptions on import duties, provide for affordability, building a wider consumer base and improving the unit economics for the private sector.

Fiscal policies – benefits of supply-side and end-user subsidies; grants for operations

Supply-side subsidies encourage operators to enter new markets or expand their business lines; end-user subsidies reduce the viability gap for costs and improve the affordability of systems. There is a need for more parity between grid and off-grid subsidies in establishing consumer-driven approaches. Systems operation grants support the speed and flexibility of deployment by ensuring the sustainability and long-term viability of businesses.

Regulations must allow market forces (where possible) to regulate

Regulations must avoid stepping into market dynamics, or capping prices and margins, and instead allow for market forces to regulate the costs of systems and services.

Innovative tools allow for effective disbursement of subsidies

Innovations in administering fiscal policies such as subsidies include the digitisation of the subsidy value chain and machine learning algorithms to define poverty indices and thus help to target subsidies across different communities.

QUOTES



“I find regulations of off-grid electrification particularly challenging because of the difficult environments; because of the multiple agents that are involved; and because of the fluid interrelationships between the three modes of electrification – grid extension, mini grids and standalone systems”.

Ignacio Perez-Arriaga - Global Commission to End Energy Poverty

“What we think is crucial is the policy leaders to help drive last-mile access... a much bigger focus on affordability is important. Especially due to COVID, we know that 200 million people will be pushed back into poverty across the continents”.

Tessa Lee - Bboxx



BRINGING IN FINANCE AND REDUCING RISKS

Background

The 5th edition of Sustainable Energy for All's (SEforALL's) Understanding the Landscape report finds that investment in off-grid energy solutions in 20 assessed countries across the globe (mostly in Sub-Saharan Africa, where the energy deficit is the highest) is only 1% of the total finance raised for electrification projects. To address the huge investment deficit, it is important to ask several questions:

1. Is the lack of available funding sources and in some cases mismatched financial solutions for projects a constraint?
2. How do early-stage ventures, as early-stage funders, go about assessing risks in markets that they wish to invest in, and what are the challenges financiers face?
3. From a public financing perspective (among donor agencies), what are the risks foreseen by stakeholders?
4. What financial instruments help close the viability gap for the private sector in challenging markets, such as remote communities with poor energy infrastructure?
5. Does microfinance have a role in funding off-grid solutions?

Sustain de-risking of renewable energy projects all the way with suitable tools

The bundling of small-scale projects, thereby reducing the transaction costs of private companies, has attracted financing. Another important task is to sustain the de-risking of projects all the way in developing countries, where governance challenges underline the importance of supporting sustainable de-risking tools.

Early-stage venture investors assess the viability of solutions, and their ability to navigate markets, manage stakeholders and business models that can go the distance.

Early stage venture investors assess risk in the markets they intend to invest in from the perspective of the nature of the provided solutions – these need to be sustainable, commercially viable, and supported by a regulatory and policy framework in the hosting countries. The use of market intelligence allows investors to understand the risks as well as the rewards, and mitigate the risks. Other issues investors consider include the ability of entrepreneurs to navigate the markets, and whether or not they have the right skill sets to manage stakeholders, and serve in a sector that historically belonged to the public sector. Data-driven decisions (e.g. based on macroeconomic and security data) ensure that a business model's foundations are solid and commercially viable. Guarantee facilities such as SITA of Sweden protect investors, similar to the facilities seen in project financing.

Off-grid solutions pose a risk to the status quo where existing policy landscapes allow incumbent (grid-based) models to thrive

Yet the foreign direct investment dedicated to off-grid solutions represents a small portion of the overall flows. Key obstacles to address include the opacity of the regulatory and policy landscapes, which have been designed to the advantage of the incumbent business model, hindering the prosperity of many developers active in the off-grid space.

Innovative instruments such as DRE certificates help corporations with carbon targets to offset their emissions

A DRE certificate is a third-party, certified tradable market instrument that represents one kilowatt-hour of distributed renewable electricity. Corporations with climate targets purchase it to offset their emissions.

Varied financial instruments help to improve the private sector's ability to expand energy access in challenging markets

Instruments that can improve the private sector's ability to provide energy access in remote and challenging markets include loans, preferably in hard currency, concessional terms dispersed in tranches, financing through special purpose vehicles of receivables, grants received through results-based financing (RBF), access to local currencies, finance from local commercial banks and revenues from carbon credits. DRE certificates help to offer a better price to the customers and crypto currencies help to fund the sector's operations. Facilitation services, as under the IRENA's Climate Investment Platform,³ provide project proponents with tailored technical assistance while a partnership hub⁴ provides the resources – technical, financial and any support that will help the proponents to realise their projects.

Pay as you go model serves as a microfinancing facility

Most off-grid companies (Solar home system ones) can be considered as micro financing institutions since they pre-finance the unit/asset giving it to the customer at different levels of credit, repaid under the pay as you go model.

³ Of the 33 project requests received under the platform, 50% have capacity of less than 5 megawatts (MW) and more than 60% come from the private sector. If they are all to materialise, the predicted total installed capacity would be almost 500 MW and the total predicted capital mobilisation would be USD 1.1 billion, resulting in a reduction in GHG emissions of 5 million tons of CO₂ equivalent.

⁴ This comprises of 320 partners, including financial institutions, technical advisory providers, manufacturing, sub-manufacturers, suppliers and service providers, and other similar platforms.

QUOTES



“We need all of us to support what we call sustainable de-risking tools; I would say, this is the issue that we need to see and to discuss today”.

Ahmed Badr - IRENA

“...making sure that we’re generating electrons to spur productivity and thereby make sure that people can build livelihoods from the use of electricity, not just lighting, not just to say that they have it, not to count them as a percentage number for energy access but actually to see livelihoods created”.

Elizabeth Biney - Amisshah

“Nearly 24 gigawatts of new renewable capacity being installed in the ground as a direct result of corporate agreements... multinational corporations essentially mobilising something on the order of \$40 billion in new renewable capacity to power [through] their operations”.

Ricky Buch - D-REC

INNOVATIONS IN THE SECTOR



Background

Systemic innovations in DRE encompass technological and digital aspects (storage, electric vehicles, etc.), business models (peer-to-peer electricity trading or PAYG models), regulations and market design (flexibility of system assets) and system operations (which are adapting to all these new developments) for the sector to prosper and evolve. The integration of systemic innovation has been a focus of attention particularly in advancing off-grid solutions in the rural areas of developing countries.

The PAYG model is best tailored to specific country contexts

Innovative strategies to deploy commercially viable PAYG model have included the following:

1. building strong local partnerships in each region, and avoiding a direct entrance into remote communities;
2. empowering grassroots agents and company representatives on the ground with proper training;
3. choosing the right type of equity and tapping into capital that gives room for trial and error in a volatile market;
4. engaging with customers (e.g. through call centres) to get feedback on needs, usage patterns and the impact of products; and
5. embracing flexibility in designing solutions, by looking at what products are available in the market, at customer management platforms and at payment channels (e.g. the growing mobile money sector in Ethiopia), in anticipation of expansion of the business.

Sales margins are driven by the communities that are served and their repayment capacities; competition equalises pricing to match other products available in the market

For private off-grid companies, margins on sales are influenced by the communities they serve and the partnerships that support the business. For displaced and refugee communities, for example, where there are third parties subsidising the products, a company can take the smallest of margins within a short repayment period. In communities with a low risk of defaulting payments and getting displaced, repayment times can be extended against much higher sales margins received. Pricing is influenced by the competition and existing products in the market that serve the targeted communities.

Efforts to support the uptake of energy for productive uses include emphasising it in policy frameworks, increasing the efficiency and affordability of equipment in use, and financing relevant assets

Rural communities can benefit from electricity for a growing list of productive uses, improving livelihoods and regional economies. To support the uptake of energy for productive uses, policy and regulatory frameworks can incentivise the use of energy for livelihoods, technology innovation that leads to equipment being efficient and affordable, and improved access to finance from new financial instruments and blended financial solutions for the purchase of productive-use technologies.

For DRE installations in remote locations, it is important to mitigate weather-inflicted damage

DRE systems installed in remote locations are impacted by (1) severe but short-lived weather events such as storms or flash floods and (2) meteorological patterns unfolding over the operating lifetime of the systems, as in dust storms or extreme temperatures. Measures to mitigate such impacts begin at the design stage – based on historical weather data – to embed protection features and put in place standard installation procedures in response to different types of events. Standard operating procedures include preventive maintenance measures, insurance and quality assurance using standardised components. Investors ensure through their due diligence that such measures are in place and policymakers influence compliance with national and international standards supported by accreditation testing laboratories.

Off-grid supply to remote communities requires integrated planning, partnering with local distribution networks, a robust supply chain and demand modelled on current usage patterns

Integrated planning at the national level accounts for livelihood and social services, complemented by planning at the community level. It leads to design, development and ownership of energy projects by communities, as they partner with the local utility agencies to accommodate renewable energy systems within the existing diesel-driven infrastructure. A robust supply chain that provides year-long fuel supply and spares of system components is essential. Scaling deployment by aggregating micro-grids or nano-grids in an area has a notable financial impact, bringing down costs by an estimated 40%. Electricity demand is based on pilot studies on tiers of service, modelled on typical household appliances in use. Initially, these can meet 75% of demand, with the balance met through diesel and subsequent scale-up of renewable energy systems.

QUOTES



“With renewable energy micro-grids to address remote needs for renewable fuels and community ownership, we need to have more ambition, more aggregation and new arrangements to really scale up and accelerate the process... we believe there need to be new pathways of implementing micro grids so that we’re learning with each other with new tools, on how to form partnerships, how to reform policy to allow renewable energy micro-grids... And, finally, we think that the design of renewable energy micro grids – it’s essential to integrate them with the Sustainable Development Goals”.

Chris Henderson - Executive Director, Indigenous Clean Energy

SKILLS DEVELOPMENT AND ENTREPRENEURSHIP SUPPORT



Background

The deployment and long-term operations of DRE and off-grid systems for last-mile communities require local capacities that are enabled by entrepreneurship promotion and skills enhancement. Maturing local enterprises will develop alongside the sustainable supply chain that further strengthens operations.

Nurturing entrepreneurs through technical and financial training is important, as is mentoring from industry experts

Incubation facilities target registered small and medium enterprises and provide them with training in technical (e.g. feasibility studies, design of systems, energy efficiency management) and commercial (e.g. market risks, business plan development) skills. Training modules are tailored to the requirements of the enterprises as stated in their applications. A mentorship programme provides for engagement with experienced industry players.

Financial institutions learn about business models driving markets and how to assess risks

Training sessions that target financial institutions enhance understanding of how different types of business models drive market dynamics, and offer guidance on risk assessment, appraisal and due diligence.

Some programmes support new enterprises in their growth stage

An enterprise’s growth stage follows its incubation and is the focus of the United Nations Development Programme’s (UNDP’s) Growth Stage Impact Venture⁵ programme. The programme identifies and sports growth-stage enterprises that have achieved scale, and whose products or services could further progress toward the SDGs while achieving commercial success. Ventures that are placed to tap into international capital are nominated by third parties to participate in the programme.

⁵ IRENA is on the panel along with other UN agencies, investors and corporations that selects ventures among nominees for the programme.

Growth-stage enterprises are best supported through access to investment and strategic partnerships that help in scale-up and connecting with technical providers

Three types of facilitation are provided under the programme – (1) access to investment (primarily within the European investment community), (2) partnership engagements with city corporations, UN agencies and UNDP country offices that provide access to new markets or government contracts to help scale-up and (3) connections with technical service providers.

Initiatives that support each stage of skill building can build capacities across the spectrum – from policy making to field operations

The sustainability and commercial success of an enterprise weighs on its operations, defined by the skill set of its workforce. The Cornerstone for Rural Electrification (CORE) initiative seeks to close in on a key gap in the energy sector by leveraging the skills of the domestic and local work force on technical aspects of rural electrification. The multifaceted nature of CORE⁶ allows it to engage with stakeholders across the spectrum. It can build capacity at the policy-making level, training government agencies, while it trains field operators to run a DRE system. CORE engages at a number of levels, through national and regional certification programmes, universities and TVT institutions. At government levels it provides ad hoc support on demand and at the community level, serves the grassroots.

An entrepreneur trained through such facilities gains specific sectoral skills, mentorship, twinning with like companies and linkages with global partners

These facilities offer focused, specific training in the renewable energy sector, mentorship from industry experts, and twinning with companies that have a similar business model. Even grassroots enterprises get linked with global partners who otherwise would have been out of reach.

QUOTES



“Women entrepreneurs are particularly strong agents of change; we have some studies showing they’re more likely to reinvest earnings in the local communities, less likely to leave them... So it just makes a lot of business sense – both business and social sense – to focus both on youth initiatives and women-led initiatives, because they create more multiplier effects. So, CORE specifically aims to support these segments with capacity building for micro enterprise”.

Jens Jaeger - CORE

“We have linkages now; we have direct access to IRENA for example... also one of the mentors that we got is linking us with a GOGLA (Global Off-Grid Lighting Association), in the World Bank, which is a direct result of the ESF (Entrepreneur Support Facility) support that we got... in addition to linkages with other enterprises that are being supported. So, overall I would say we have missed out on making the mistakes, because of the training... leap frogging a lot of the positives that would have taken a number of years to learn”.

Lawrence Hoba - ENRAPOWER

⁶ Foundational partners of CORE include the International Copper Association, ARE, IRENA, SEforAll, United Nations Industrial Development Organisation and United Nations Environment Programme; the initiative was launched at the 26th Conference of the Parties (COP26) in Glasgow.

RURAL LIVELIHOODS: SOCIO-ECONOMIC BENEFITS FROM SOLUTIONS



Background

End-users need systems that provide for the needs of their livelihoods. This is core to the ecosystem approach, which extends beyond generation units to consider the efficiency of appliances in use, training and capacity building, market linkages, policies and financing, all of which matter in meeting end-users' needs in a timely and sustainable way.

Supply-side interventions match and can be provided swiftly for a well-established and stable demand-side ecosystem

There is a lot of emphasis on supply-side interventions. But these are relevant only if energy demand is established and stable. Incentives that result in energy demand and enabling conditions at the end-user level support solutions that match the need, including the swifter delivery of supply.

DRE solutions for community-driven needs take time and long-standing engagement

Need-based community-driven DRE solutions cannot be delivered at the blueprint speed of a typical project. They call for patience, as seen in government interventions. Sustained hand holding is required as technology solutions, suited to the needs of the community, are deployed. Upscaling of interventions must go in hand with efforts to inform community members of the intended outputs.

Informal DRE jobs are less affected by the pandemic, and show growth

The last-mile, informal side of the DRE sector has been less hit than its formal counterpart by the pandemic. Employment projections for the coming years surpass the pre-pandemic levels, mostly which are commission based⁷ and contractual. Skilled force is developed and located closer to where services are provided, resulting in both direct and indirect employment.

Skilling goes beyond technical aspects to finance, legal and delivery services

The DRE ecosystem must now look at skilling not only technicians but also consider financing services, legal aspects and most importantly end users. End users will be able to make informed decisions, if details of the renewable energy technology, how to use it and key benefits are known to them.

QUOTES



"...it's not just about incomes... There is significant drudgery removal. [In] All the cases [processes] actually go a lot from manual to mechanization. And for most of them solar is kind of their first entry into the carbon space... they [have] never really entered the grid or diesel [space]... [It leads to] Beyond that, whether it's reduction in time productivity, diversifying solutions, increasing market channels most critically, avoiding emissions or displacing emissions, one way or the other".

Huda Jaffer - SELCO Foundation

⁷ Informal and contractual work includes installation, maintenance and repairs in off-grid systems.

“They [are] also aware about the energy efficient appliances, because they also have limited, electricity supply... they will buy the electricity appliances with small wattage. Interestingly, in this small island they have built their own term for energy efficiency appliances; they say *beldeskwah* which literally means appliances that can be affordable with limited electricity... and this term is kind of famous in this area, ... appliances seller know and all of the local community know about this term... this knowledge is building by doing”.

Dintani Naimah - NZ Mate

CLIMATE ACTION: ACHIEVING NDCS THROUGH DRE DEPLOYMENTS



Background

Adoption of off-grid renewables is the adaptive response of remote and vulnerable communities to the growing impacts of climate change. The growing scale and sustainability of such systems contribute significantly to the NDC targets of nations towards climate action.

Nepal has integrated off-grid renewables into its NDC targets

Various approaches are being adopted by Nepal to achieve its NDC targets through off-grid deployments using clean energy – 5-10% contribution from off-grid, small-scale renewables to:

- achieve 15 gigawatts of total installed capacity by 2030;
- boost distributed renewable energy generation⁸;
- engage with energy service providers and tap into the captive power (from renewable energy sources) of businesses who feed into the grid, making reserves reliable and resilient;
- account for ambitious targets through big hydropower projects, now under construction;
- increase electricity consumption in the domestic and transport area – by 2030, targets are set for 25% of households to use electric cooking stoves, and 90% of old passenger vehicles and 60% of four-wheel public vehicles to be replaced with electric ones.

NDCs help governments engage with the international community, set strategies, and strengthen (private sector) stakeholder involvement

The NDC partnership comprises 105 countries and 95 international agencies. It focuses on collective climate action (adaptation, resilience, and mitigation) co-ordinated across the international community.

It is important to ensure that finance and environmental ministries have the means to work with the international community to translate ambitions into needed investments. Ethiopia, for example, developed a funding strategy for off-grid energy sectors, including the development of a financial model for the private sector engagement and funding strategy for mini-grids. One option is to bring in the private sector with local solutions. In the case of Namibia, a solar revolving fund was scaled up to support the private sector to roll out energy access points, micro- and mini-grids.

⁸ Undertaken through the recently launched Sustainable Energy Challenge Fund.

NDC targets are met as more of a country's energy-intensive sectors cut down on their emissions

Zambia's unconditional emissions mitigation target is 25%, which it will extend to 47% conditional on external support. A step forward is broadening the sectors that need to cut down on their emissions – starting with energy, forestry and agriculture, to include liquid waste, coal and transport. The low level of national grid connectivity, at 30%, needs to be complemented with decentralised energy access for rural regions.

QUOTES



"...the NDCs are the opportunity for governments to unpack and make sure [they] know the entry points for action on renewable energies [are] made and that the international community in a coherent and scaled up manner is addressing those needs and off-grid solutions, as well as, of course, cross-cutting solutions play quite a role".

Romeo Bertolini - NDC Partnership

"...connectivity in Zambia is quite low. We are still below 30% in terms of connectivity to the national grid. That means that if you are to improve access to energy for the bulk of our rural population, off-grid renewable energy solutions become key... [for] our NDCs and in fact we've just broadened our sectors in terms of mitigation from three to six. We initially were focusing on energy, forestry and agriculture but we've added liquid waste, coal and also transport, and so, of course, off-grid energy is an important part of that".

Ephraim Mwepya Shitima - Zambia

ENERGY ACCESS FOR PEACEKEEPING AND HUMANITARIAN ASSISTANCE



Background

The United Nations supports about 100 000 uniformed personnel and about 15 000 civilians in various locations around the world involved in peacekeeping missions. Their power needs are primarily met by diesel-powered generators. The annual global consumption of fuel from missions is in the region of 160 million litres of diesel, with an annual procurement cost of about USD 100 million especially with the very long supply routes. The United Nations plans to make a sustainable transition in power provision having set a target of generating 80% of electricity by 2030 from renewable energies.⁹

⁹ Scene setting presentation by Christian Saunders, Assistant Secretary General, United Nations Office for Project Services.

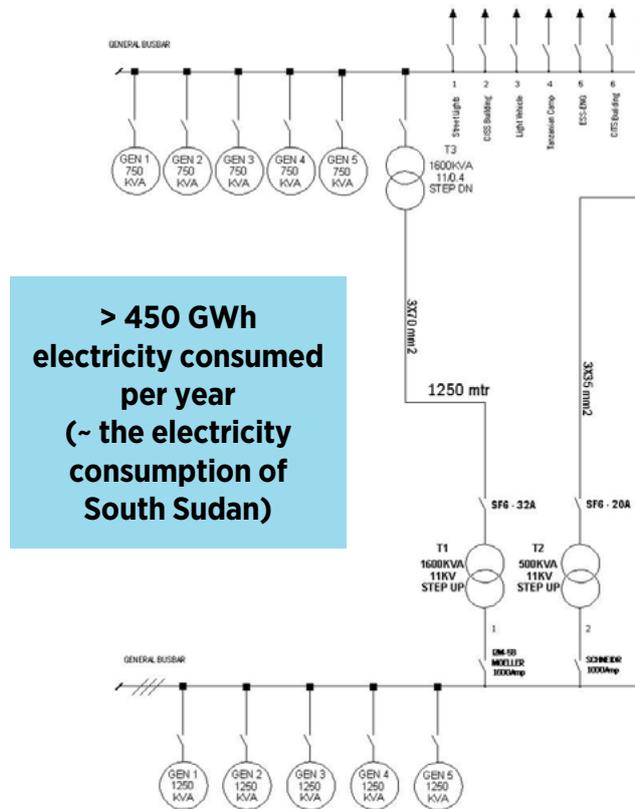
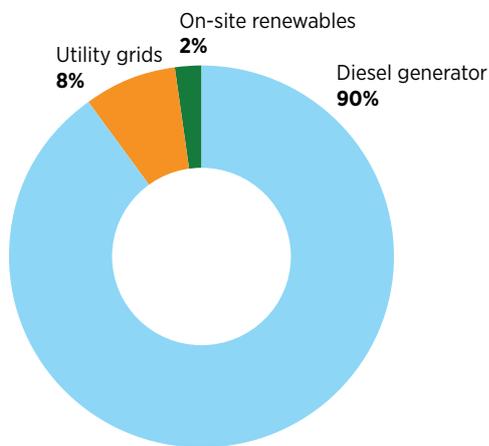
Figure 6 Peace mission electricity consumptions – in the magnitudes required by a country such as South Sudan



Energy Infrastructure

Largest Missions

- MINUSMA (Mali) – 75 GWh .p.a.
- UNMISS (South Sudan) – 71 GWh .p.a.
- UNSOS (Somalia) – 59 GWh .p.a.
- MINUSCA (CAR) – 48 GWh .p.a.
- UNIFIL (Lebanon) – 48 GWh .p.a.
- MONUSCO (DRC) – 40 GWh .p.a.



Transitioning to renewable energy sources may be benefited by lease-to-own contracts and power purchase agreements (PPAs) with private providers

The United Nations adapted new internal processes for doing business, with the ability to sign PPAs and leasing contracts. MUNISMA is one example of a large solar photovoltaic (PV) and energy storage project in Bamako, with a lease-to-own contract.¹⁰ A DRE project in Somalia centres on a partnership between the local government and a private provider.¹¹

Private sector involvement in the humanitarian space is required; investment risks are mitigated by the United Nations signing PPAs and serving as an anchor client

Only 10-20% of the world’s displaced population has access to clean energy for electricity and cooking. Private sector involvement in the humanitarian space, which is chronically underfunded, is required. The high demand is met with low transaction costs, as the dense populations of camps are concentrated on a small plot of land. Demand is also raised by consumers on the camp fringes. Realising a target of 80% from renewable energy sources by 2030 requires a wallet investment of USD 250 million with attractive payback periods of two to five years. De-risking mechanisms for power providers include the United Nations signing purchase agreements and serving as a guaranteed anchor client in fragile areas.

¹⁰ The vendor owns and operates the system, and MUNISMA will pay for its electricity over a period of three to four years, following which the assets and operations are handed over to the mission.

¹¹ Under the contract, the United Nations has committed to buy a certain amount of power at a defined rate over a period, and after 15 years the plant is given to the host state.

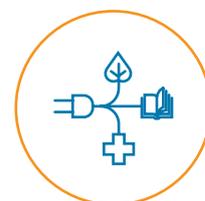
QUOTES



“...we are very large energy consumers, and we consume up to 20 or 30% of the host country’s electricity consumption in the locations where we are based; this is not something that we are proud of, but it does give us the opportunity to implement renewable energy projects within the host country and, as I said, to help promote peace, but also to leave a positive legacy when the peacekeeping operation comes to a close”.

“...We are also completely open to working with the private sector and the main reason I am here today is to deliver that message that the UN is open to any suggestions from the private sector, on how we can improve our use of renewable energy in our peacekeeping operations and particular how we can leave a positive legacy when those peacekeeping operations wind down”.

Christian Saunders - UN DOS



CROSS-SECTORAL CONNECTIONS WITH ENERGY

A. HEALTH

Background

An estimated 1 billion people use healthcare facilities without electricity provision,¹² and in those where it is available, the supply is not reliable. Electricity, along with clean water and sanitation are essentials to run a healthcare facility. Accelerating access to power is the intent of a high-level coalition, the Health Energy Platform for Action, focused on innovative and common-sense initiatives. Utilising clean energy sources in the process will help further countries’ efforts in decarbonising and developing climate-resilient facilities.

Policy frameworks can open the doors for development partners and investors to step in to finance mandated services; policy formulations call for innovation

The healthcare sector is considered a non-revenue one; governments’ formulated policy frameworks help to ensure that all health centres in both urban and remote zones have reliable sources of electricity, clean water, hygiene and sanitation. This opens doors for international organisations such as the World Bank and other development partners to finance the policy-mandated services and developments. When policies extend to off-grid areas, this allows for private sector investors and various donors to engage through different business models. Policy formulations can also call for the innovation crucial for providing electrification.

The ecosystem approach looks beyond solar PV installations to strengthen other drivers that help a health facility run at its optimum level

The ecosystem approach¹³ looks beyond providing solar panels (i.e. electrification) which on its own will not provide better health services, to consider the proper electrification of staff quarters, greater efficiency and

¹² <https://www.irena.org/offgrid/Healthcare>.

¹³ SELCO Foundation plans to electrify 30 000 health facilities in the coming five years, working with various state governments in India

utilisation of medical equipment and faster and more reliable services. The long-term gain is better health workers who are trained, reliable and motivated.

It is important to consider the efficiency of the extended supply chain for health services, and to thus drive innovations in areas beyond health – efficient equipment, livelihoods and education

Beyond a health facility, strengthening the ecosystem calls for looking at the supply chain at large. There is an upward movement of care seekers entering through the first referral, into the primary clinic, then sent to the secondary clinic, and followed up with tertiary facilities that provide for large populations covering an extended rural area. Demand aggregation of electricity needs and all the medical equipment that would be used. The delivery of health services through the chain is not only sustainable but it also motivates the private sector to start innovating not only in health and efficiencies but also in livelihoods, in education and in other sectors, which makes the health the anchor load for innovation.

Reaching the last mile and sustaining cold chain operations require technology innovations, monitoring performance data, strategic partnerships with governments and the World Health Organization (WHO), project management execution and service bundling; industry engagement to train healthcare staff

In having to reach the last mile and sustain cold chain operations, GAVI has learnt the need for innovations on the technology front, performance data, monitoring of the performance and maintenance of fridges. Partnerships and their benefits with agencies such as the WHO, to accommodate health commodities that require refrigeration or energy harvesting. Project management helps with planning to the implementation and post implementation lead by monitoring, and service bundling. Post installation and the importance of engaging with the industry partners to train healthcare workers, so that quality equipment is put in the right place in time.

Private sector actors can take up bigger roles in the provision of electricity services

Engaging the private sector in the operation and maintenance of off-grid systems providing for health facilities helps ensure that these remain operative across their lifespan. Private institutions can also contribute to the finance and investment costs of the entire package, earning these back from the services provided. Governments in turn play a critical role in this process, engaging with donors for capital expenditure financing, sourcing sufficient operational budgets and taking ownership of assets.

For the private sector to provide for public services requires a mindset change. Capital must be utilised efficiently to stretch it as far as it can go. This requires preconditions, and business models that showcase flexibility in meeting the changing needs of growing facilities. Bundling facilities' needs across sectors (education, drinking water, sanitation, healthcare) can help. This calls for government champions who will engage with the private sector, and for donors and investors to be involved in the ongoing deliberations, to help bring about the needed shift in mindset.

QUOTES



“Clearly, our health is very much in the hands of the energy sector. I don’t want to put too much pressure, but I don’t know whether you realize that you have on your hands the health and the well-being of so many people; that’s why this cooperation is so fundamental”.

Dr. Maria Neira - WHO

“Innovations in health, innovations in delivery of health, efficiency of appliances and social delivery... which will be so much [more] economically viable that we don't need to work on [them]. See, a lot of us all of us here on the webinar, we enjoy subsidized airports, we enjoy subsidized roads. And then we talk about financial liability for the poor, and that I think we need to be differentiating, how can health services be provided so those citizens of humanity can then work and pay taxes, leading to a better world? Overall, I think that's the holistic way of looking at it”.

Harish Hande - SELCO Foundation

“When the school and health centre starts owning the solar system there's also an expectation that the doctors and the teachers will also become solar technicians. We also say that we have to build their capacity to maintain the solar systems, we expect that the doctors in addition to hearing patients will also cure solar systems and replace the batteries... Within two to three years, it stops [working], then new donors come in with new money to fund the same systems and hence we are not extending the number of schools which are electrified, we're only keeping those schools and health centres electrified with the new money, I mean... The same solar system, same technology, but at the same time, we can use some innovations and that has happened in the sector, bringing sustainability”.

Raihan Elahi - World Bank

B. AGRICULTURE: ENERGY NEXUS WITH FOOD AND WATER SECTORS

Background

Globally, the agri-food chain from farm to marketplace consumes 30% of the total energy generated. A 20% global increase in energy consumption by the sector led to increased food production in the years 2017-2020, showcasing a clear linkage of energy influencing growth in the agricultural sector. It is the disparity in energy use across regions, and lack of access, that needs to be addressed. DRE solutions may equalise provision, expanding access to the most remote of locations in a reliable and environmentally sustainable form.

Local and spatial data to assess energy needs for agri processes

Studying food value chains and processes helps to locate their energy entry points. This in turn helps assess energy demand for the agriculture sector at a local level. Geospatial satellite data help to identify irrigated cropland. This helps energy planners at a macro level, and private developers and development institutions at a subregional level in selecting cultivable locations and focusing investments.

DRE electricity supply is feasible where energy demand is aggregated, and its use diversified

Strengthening demand to make DRE solutions viable, seasonal agricultural demand can be combined with other energy needs such as those of local health clinics, or water pumping stations. Aggregating demand to a sizeable volume can also be done by grouping farmers (and their energy requirements) in cooperatives.

Scalability and reach make DRE systems most suited for agricultural needs in off-grid, remote regions

The viability of renewable energy technologies in agriculture, be it solar-powered coffee dryers, irrigation pump sets, and those used for other post-harvest processes, is proven from its scalability. Off-grid, remote areas undergo an economic transformation in putting such systems to use. For the scale of harvests produced in mountain regions, labour costs are high for post-harvesting tasks. DRE solutions will help with mechanisation and reducing manual labour and its related costs. In turn, local communities can be reskilled in the operations and maintenance of DRE plants, creating new livelihoods for the local work force.

Cross-sectoral engagement and service-based models can get the best of DRE solutions

The true positive impacts from DRE solutions can be seen when the energy and food sector engage with each other – government ministries or private companies. Private mini-grid operators have diverse models, starting with selling electricity, followed by selling services driven by it – pumped water and cooling compartments, including e-mobility to transport agricultural goods.

Mapping (renewable) energy resources along with energy demand ensures supply

While food value chains are being studied for energy demand, local renewable resources such as agricultural residues for producing bio-energy need to be mapped. An assured supply of fuel provides year-long energy, unlike the variable nature of solar or wind resources.

Factoring other drivers along with energy for increased yield provides true cost-benefit values

A comprehensive cost-benefit analysis in line with the energy demand for increased production takes into account other factors that influence productivity – soil quality, water use, land use, resulting greenhouse gas (GHG) emissions; social aspects of time saving and reduced drudgery for the labour force; and the economic value from resulting value-added services.

QUOTES



“Our... cost benefit analysis shows that actually from a purely financial point of view, very often, the investments are not profitable... but from an economic point of view, they become very interested in terms of the value added for the farmers in terms of pollution reduction, in terms of job creation, and so on, but also in terms of health benefits, because you have less food losses... this is for me justification for the private sector to talk to the public sector through public private partnerships”.

Olivier Dubois - FAO

“In the southernmost tip of the Philippines, which is two hours away from Malaysia, but 18 hours away from mainland [Philippines]... The value it will see... to be integrated into the manufacturing order of Malaysia. To imagine the opportunity of our service farmers [that] will not just produce rice, [but] will eventually have their products, processes value added and integrated into the food manufacturing industries of Malaysia... being able to leverage... renewable energy for agricultural value”.

Romeo M. Montenegro - Philippines

C. EDUCATION

Background

Underdeveloped and developing nations fare poorly when it comes to electricity access for schools. In Sub-Saharan Africa, approximately 70% of primary schools are deprived of electricity and the services it can provide. The urgency of attending to electricity access for education is due to an unacceptable level of deprivation – an estimated 200 million children around the world attend schools with no lights, no running water, no refrigerators and no phones, and lack digital literacy because of lack of power.

Electrification of tertiary institutions helps students benefit from an interconnected world through the digitalisation of services

In Nigeria, the Energizing Education Programme provides reliable clean power to 37 long standing and 7 teaching hospitals around the six geopolitical zones of Nigeria. Dedicated captive power plants are deployed (solar hybrid plants) that provide reliable and consistent power. This is provided at educational institutions and renewable energy training centres, and powers campus streetlights to ensure safety. The first phase of the three-phase project commissioned 28.4 MW capacity of power plants. The first phase was financed by the federal government and the second phase is taken up by the World Bank.

Rooftop solar installations can help power schools

A secondary education improvement project in Sindh, Pakistan, is financed through USD 75 million by the Asian Development Bank (ADB). Of the 23 million children in Pakistan who do not attend school, 28% are in the Sindh Province. The loan will finance the construction of 160 new secondary school blocks, with rooftop solar power. The approach is to start with small pilots (100s of buildings) and scale up (to 1000s) to convince governments to take the lead by example. Regulations are needed to help drive the electrification and provide solutions in a holistic manner with energy-efficient products, considering required safety measures such as earthquake proofing. Lack of data on energy needs (in the absence of electricity meters), and an inability to conduct energy audits on school buildings that remain closed deter the provision of optimal DRE solutions.

Private enterprises have set up solar PV systems connected to the grid on the rooftops of school buildings. Students witness how such systems are installed, learn the functionalities of inverters and batteries by physically seeing them, and learn to operate them. Working in the education sector offers opportunities to educate students and staff about renewable energy and how it works. This in turn helps build more knowledge and momentum for the energy transition.

Pilot projects that use ground heat and passive solar along with other measures in off-grid schools can help mitigate GHG emissions

Households' coal consumption for power and heat account for about 11% of total GHG emissions in Mongolia, so it is imperative to change to renewable energy technologies and improve efficiency. Use of a ground source heat pump in an off-grid school in Ulaanbaatar, was a pilot that Global Green Growth Institute (GGGI) helped conduct the feasibility study for, and the Mongolian government invested in system costs. Another of its pilots, financed by ADB, was the design of a green kindergarten, using passive solar heating, better insulation, improved efficiency in lighting and a water recycling system, that saves water resources and reduces GHG emissions.

QUOTES



“If you think about the world that we live in, now it’s fairly digitalized... we need to be trying to move towards advancing modern learning in the developing world, particularly so that they can compete with an ever-competitive global workforce, and now they are not able to do that, not able to use multimedia resources access and electronic information that’s available... and so it really stunts their growth in that regard”.

Funmi Jones - REA Nigeria

"...at the heart of the potential to scale up energy efficient building and renewable energy technologies is really [that] the incentives in the system don't really support saving operational costs [from operating conventional systems] because you lose your operating budget if you spend less the next year... so as a public institution you can't really use the savings to finance these sort of investments and so there's lots of interest in these technologies, there's more pilots being done by different organisations, in different locations, increasing interest from the government".

Annaka Peterson - GGGI

D. CLEAN COOKING

Background

An estimated 2.6 billion people have no access to clean cooking across the globe, and in regions where access has been extended it is mainly through liquefied petroleum gas. Three challenges can be reversed into opportunities in improving access to clean cooking: (1) clean cooking is an integral part of electricity access and ought to be considered as such rather than as a separate issue, (2) it is important to rethink strategies to transform millions into billions of dollars of investment, and (3) governments need to build their own pathways and chart the course of national clean cooking transitions.

What is required from governments, the private sector and consumers for clean cooking uptake

In the case of Nepal, the government has in place a fiscal policy, financial incentives, equipment standards and benchmark guideline manuals. These in turn need to be complemented with vibrant private sector involvement, consumer awareness of the impact of indoor air pollution and efforts to strengthen the value chain of fuel supply.

The biogas digester, a technology suited for rural communities, must be affordable and have a strong business case to encourage the switch from traditional methods

One of the leading technologies that can provide clean cooking fuel in the rural scenario, the biogas digester faces three key obstacles. The first is financial affordability, given that a typical system sells between USD 600 to USD 900 where families are unable to make the upfront investments. Recognised as a reliable technology, it requires daily operation and maintenance and households thus require proper training. Also, a strong business case is needed to encourage the shift from free firewood. That said, tangible benefits can be seen from the start – reduced air pollution, manual drudgery, and greater food security.

Electric stoves in urban households can tap into electricity supply (grid) and in rural households can create electricity demand (mini-grids)

Electric stoves are the most promising alternative for urban households since they are connected to the grid and subsidised tariff rates make it viable. For rural households, provided with energy access, the use of electric stoves increases the demand for mini-grids, bringing down the overall cost of supply.

Financing: Studying correlated impacts, to develop impact bonds; develop local markets and encourage innovations by matching grants for country projects

A USD 500 million clean cooking fund is housed with Energy Sector Management Assistance Program of the World Bank. A related study by the agency on the correlated impacts – climate, health and gender helps to develop an impact bond market. In matching grants to suit country specific projects, it helps to develop a local market that attracts private sector investments. This in turn should encourage business and technology innovations and help to tap into traditional sources of revenue for different players along the value chain.

Results-based financing is an effective way to leverage investments that can look beyond stoves to cooking appliances

As seen in a programme-level intervention in Rwanda, RBF is proving to be one of the effective instruments in leveraging investments. While subsidies are linked to the socio-economic categories of households, the criteria for eligibility of RBF is based on performance of the technology and the fuels used. RBF could also look beyond stoves to cooking appliances; multiplier effect across a whole range of different appliances would help to enhance electricity demand for both on- and off-grid systems.

Studying social and cultural cooking practises and rating it based on cooking happiness factor

Cooking Diaries was a study taken up for 12 countries, which assessed and described how people cook, the amount of fuel they use, and the types of meals consumed. Another aspect evaluated is the different types of cooking and the kinds of benefits it brings to different users with a focus on gender. The cooking happiness factor was rating indicator.

QUOTES



“...an initiative to help overcome these challenges that’s emerged from the clean cooking system strategy is the Delivery Units Network, or DUN. The DUN will help to establish dedicated teams within a national president’s office whose only job is to think about clean cooking. Members of the DUN would be tasked with a clear mandate to deliver ambitious clean cooking transitions in their country, and as envisaged they would be operating in close coordination with other government ministries, agencies and would serve basically as a first stop for private sector and other actors, active in addressing clean cooking challenges within that country”.

Ronan Ferguson - Clean Cooking Alliance (CCA)

“There is a massive urban clean cooking challenge, where, for example, you take the case of Nairobi; 70% of the population of Nairobi are still to a significant degree using biomass for their cooking. So in that case, we also know that as the population grows there’ll be 2 billion more people by 2050... the use of efficient electric cooking devices is often the cheapest alternative within those areas, even with higher rates of the cost of electricity”.

Ed Brown - Loughborough University

CONCLUSIONS AND CLOSING REMARKS

"716 million people are still without energy access, which is the main reason behind this event. You know that energy is the only option to close this unacceptable gap."

"Energy access is the main enabler of social, economic development; it should be considered more and more as a means for improved livelihood and social services."

"Integrating energy in the agriculture and water sectors, for example, advances energy access and contributes to food and water security, thereby creating millions of livelihood opportunities."

"Electrification is accelerating many sectors and can save lives. As an example, think about electrified cooking versus traditional cooking practice."

"It is encouraging to see that many in the energy and health sectors are working towards accelerating the electrification of health facilities through off-grid renewables."

"Finally, investment is key to achieving results and scale in deploying off-grid renewables for energy access. Financial offering needs to match sectorial needs. Off-grid can be the first step to creating a local market and scaling up."

"In the context of peacekeeping and humanitarian assistance, decentralised renewables can address the urgent energy needs in this critical operation at the same time creating the backbone for a future national grid in closing."

Francesco La Camera - IRENA

TECHNICAL SESSIONS AND SPEAKERS

TECHNICAL SESSIONS	SPEAKERS
<p>IOREC OPENING AND KEYNOTE</p> <p>IOREC opening and high-level dialogue on accelerating universal energy access for achieving the 2030 agenda</p>	<p><i>Opening remarks</i> Francesco La Camera, Director-General, IRENA</p> <p><i>Keynote address</i> Hon. Soda Zhemu, Minister for Energy and Power Development, Government of Zimbabwe</p> <p><i>Welcome remarks</i> David Lecoque, Chief Executive Officer, Alliance for Rural Electrification</p>
<p>HIGH-LEVEL DIALOGUE ON ACCELERATING ENERGY ACCESS FOR ACHIEVING THE 2030 AGENDA</p>	<p><i>Moderator</i> Dr. Kandeh Yumkella, Member of Parliament, Sierra Leone, Former UN Under-Secretary and SRSG SEforAll</p> <p><i>Panellists</i> Hon. Soda Zhemu, Minister of Energy and Power Development, Zimbabwe Francesco La Camera, Director-General, IRENA Maria Neira, Director, Environment, Climate Change and Health, WHO Nadja Haakansson, Managing Director for Africa, Siemens Energy Daniel Schroth, Acting Director, Renewable Energy and Energy Efficiency, African Development Bank David Lecoque, CEO, Alliance for Rural Electrification</p>
<p>ENABLING POLICIES AND REGULATIONS FOR SCALING UP DECENTRALISED RENEWABLE ENERGY SOLUTIONS FOR ACCESS</p>	<p><i>Moderator</i> Ignacio Perez-Arriaga, Visiting Professor, MIT</p> <p><i>Panellists</i> Jon Exel, Senior Energy Specialist, World Bank Joyce DeMucci, Deputy Team Leader, ACE TAF Olu Aruike, Nigeria Country Manager, Husk Power Tessa Lee, Global Head of Policy, Bboxx</p>
<p>INNOVATIONS TO FOSTER OFF-GRID RENEWABLE SOLUTIONS IN DEVELOPING COUNTRIES</p>	<p><i>Moderator</i> Arina Anisie, Associate Programme Officer, IRENA</p> <p><i>Panellists</i> Fatma Ben Abda, Principal Distributed Energy Officer, AfDB Wilhelmina Diop, Customer Care and Marketing Director, HelloSolar Louise Mathu, Gennis Consulting Elly Kevin Oriko, Solar Projects Engineer, SpenoMatic Group</p>
<p>MITIGATING INVESTMENT RISKS FOR DECENTRALISED RENEWABLE ENERGY PROJECTS FOR ENERGY ACCESS</p>	<p><i>Moderator</i> Olivia Coldrey, Head, Energy Finance & Clean Cooking, SEforAll</p> <p><i>Panellists</i> Ahmed Badr, Director, Project Facilitation and Support, IRENA David Riposo, Energy Access Specialist, USAID Power Africa Ricky Buch, Co-Lead D-RECs Initiative Steven Fleurus, Chief Finance Officer, ENGIE Energy Access</p>
<p>DEEP DIVE: IRENA'S SUPPORT AND SERVICES FOR PROJECT FACILITATION</p>	<p>Jennifer Ifeanyi-Okoro, Head, Technical Assistance, IRENA Job Mutyaba, Programme Officer at IRENA</p>

<p>DECENTRALISED RENEWABLE ENERGY SOLUTIONS FOR ACCELERATING UNIVERSAL HEALTH ACCESS</p>	<p><i>Moderator</i> Gurbuz Gonul, Director, Country Engagement and Partnerships, IRENA</p> <p><i>Panellists</i> Dr. Bassirou Ouedraogo, Director, Ministry of Health, Burkina Faso Dr. Maria Neira, Director, Public Health, WHO Raihan Elahi, Lead Energy Specialist, Africa Region, World Bank Harish Hande, Founder, SELCO Foundation Karan Sagar, Director Health Systems & Immunisation Strengthening, GAVI Luc Severi, Programme Manager, Powering Healthcare, SEforAll</p>
<p>OFF-GRID RENEWABLES FOR DRIVING CLIMATE ACTION THROUGH NDCS</p>	<p><i>Moderator</i> Amjad Abdulla, Head, Partnerships, IRENA</p> <p><i>Panellists</i> Bärbel Höhn, Federal Ministry for Economic Cooperation and Development (BMZ) Nawa Raj Dhakal, Deputy Executive Director, AEPC, Government of Nepal Ephraim Mwepya Shitima, Ministry of Lands, Natural Resources and Environmental Protection, Government of Zambia, Chair, African Group of Negotiators on Climate Change Romeo Bertolini, Deputy Director of Country Engagement, NDC Partnership Gulshan Vashistha, Regional Investment Lead - APAC at Global Green Growth Institute (GGGI)</p>
<p>DECENTRALISED RENEWABLE ENERGY SOLUTIONS FOR AGRI-FOOD AND WATER SECTORS</p>	<p><i>Moderator</i> Benson Ireri, Energy Access Lead, Africa, World Resource Institute</p> <p><i>Panellists</i> Romeo M. Montenegro, Deputy Executive Director, Mindano Power Development Program, Philippines Olivier Dubois, Senior Natural Resources Officer & Leader Energy Programme, FAO Pugazenthi Dhananjayan, Energy Analyst, ICIMOD Aditi Mukherji, Principal Researcher & Lead, IIWM Rebecca Bregant, Pineberry Services</p>
<p>DEEP DIVE: SUPPORTING ENTREPRENEURSHIP AND SKILLS DEVELOPMENT FOR DECENTRALISED RENEWABLE ENERGY SOLUTIONS</p>	<p><i>Moderator</i> Kamlesh Dookayka, Regional Programme Officer – Sub-Saharan Africa, IRENA</p> <p><i>Panellists</i> Kornelia Lipinge, Project Coordinator, SADC Renewable Energy Entrepreneurship Facility, SACREEE Jens Jaeger, Director of Policy & Business Development at Alliance for Rural Electrification, Manager, Cornerstone for Rural Electrification</p>
<p>DEEP DIVE: DECENTRALISED RENEWABLES FOR POWERING PEACEKEEPING OPERATIONS AND HUMANITARIAN ASSISTANCE</p>	<p><i>Moderator</i> Elizabeth Press, Director, Planning and Programme Support, IRENA</p> <p><i>Panellists</i> Dr. Nawal Al-Hosany, The United Arab Emirates’s permanent representative to IRENA Hans Olav Ibrenk, Special Envoy, Climate and Security, Norway Christian Saunders, Assistant Secretary-General for Supply Chain Management, UN DOS Clark Toes, Director of Mission Support, United Nations Support Office in Somalia Thomas Fohgrub, Coordinator, UNITAR / Global Plan of Action on DRE in humanitarian settings</p>
<p>DECENTRALISED RENEWABLE ENERGY SOLUTIONS FOR SUPPORTING EQUITABLE, QUALITY EDUCATION</p>	<p><i>Moderator</i> Carlo Starace, IRENA</p> <p><i>Panellists</i> Funmi Jones, Component Lead, Energizing Education Programme – Phase III, Rural Electrification Agency (REA), Nigeria David Morgado, Senior Energy Specialist, ADB Annaka Peterson, Mongolia Country Representative, GGGI Tara Marie Kurtinecz, Solar23 GmbH</p>
<p>DECENTRALISED RENEWABLE ENERGY SOLUTIONS FOR ADVANCING CLEAN COOKING</p>	<p><i>Moderator</i> Ute Collier, Deputy Director, Knowledge Policy and Finance Center, IRENA</p> <p><i>Panellists</i> Paul Mbuthi, Deputy Director of Renewable Energy at Ministry of Energy, Kenya Ronan Ferguson, Senior Manager, Private Sector and Investment, CCA Ed Brown, Research Director, Modern Energy Cooking Services Programme, Loughborough University Jean-Marc Sikka, Senior Programme Manager, Hivos Shubha Laxmi Shrestha, Senior Technical Officer, AEPC Nepal Alisha Noella Pinto, Energy Specialist, ESMAP, World Bank</p>

<p>SOCIO-ECONOMIC BENEFITS OF DECENTRALISED RENEWABLE ENERGY SOLUTIONS</p>	<p><i>Moderator</i> Rabia Ferroukhi, Director, Knowledge Policy and Finance Center, IRENA</p> <p><i>Panellists</i> Rachita Misra, Associate Director- Knowledge and Advocacy, SELCO Foundation Anshuman Lath, Co-Founder, Gram Oorja, Geoffrey Rohno, Strathmore Energy Research Centre, Kenya Dintani Naimah, Specialist, NZ Mates</p>
<p>DEEP DIVE: TOWARDS A PRIVATE SECTOR-LED, SERVICE-BASED MODEL TO SCALE UP SUSTAINABLE ELECTRIFICATION OF PUBLIC INSTITUTIONS</p>	<p><i>Moderator</i> Jem Porcaro, Senior Advisor, SEforAll</p> <p><i>Panellists</i> Irene Bateebe, Permanent Secretary, Ministry of Energy and Mineral Development, Uganda Raihan Elahi, Lead Energy Specialist, World Bank Carolina Barreto, Off-Grid Director, TetraTech</p>
<p>DEEP DIVE: DECENTRALISED RENEWABLES FOR PROMOTING THE ENERGY TRANSITION IN REMOTE AREAS</p>	<p><i>Moderation</i> Ali Yasir, Programme Officer, Decentralised Renewable Energy, IRENA</p> <p><i>Panellists</i> Ryan Cobb, Energy Director, Ministry of Public Utilities, Energy and Logistics, Belize Andrée Doucet, Manager - Clean Energy for Rural and Remote Communities - BioHeat, Natural Resources Canada Avishek Malla, Energy Specialist, ICIMOD Chris Henderson, Executive Director, Indigenous Clean Energy Remi Cerdan, Consultant, Renewable Energy Innovation, IRENA</p>



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