The ROCKEFELLER FOUNDATION

Powering an Inclusive Covid-19 Recovery

Putting green and distributed energy infrastructure at the heart of rebuilding a better world

Table of Contents

Foreword

The Covid-19 crisis has already caused enormous human hardship. Without coordinated and concerted action, the ongoing deep global recession has the potential to reverse hard-won development gains against energy poverty, food insecurity and health. However, past crises have also heralded periods of opportunity to rebuild a better world, and it is in our power to determine which path is followed.

For much of the world's poor, the key impediment to their entry into a modern economy is a lack of access to reliable electricity. Families without power cannot light their homes, charge their cell phones, or power appliances that would save hours of household chores each day. Communities cannot ensure modern healthcare services, education, or safety for their inhabitants. Farmers struggle to increase their crop yields with irrigation, protect its value with cold storage, or increase their returns through post-harvest processing. Small businesses stand little chance of connecting into increasingly integrated supply chains and markets at home and around the world. Indeed, electricity is the foundation on which modern businesses run and thrive.

Yet, 134 years after Thomas Edison's dynamos first lit up New York City, more than 800 million people still live without access to electricity, including half the population of sub-Saharan Africa. Another 2.8 billion suffer from some form of energy poverty, meaning that their access is so limited or unstable that their income and livelihoods are seriously constrained.

To meet this moment, we have an opportunity to set in motion a global green stimulus that can revitalize growth, address climate change and create millions of jobs. A truly inclusive recovery involves building a climate-friendly energy system for every global citizen, focused especially on those currently left behind.

This once aspirational dream is now a realistic objective.

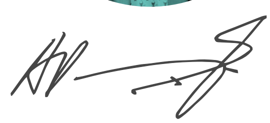
Technological breakthroughs in solar PV panels, battery technologies and other renewables over the past decade mean that climate-friendly power has become increasingly cost-competitive. The International Energy Agency's World Energy Outlook, published in October 2020, heralded solar PV's potential in particular, declaring it the "cheapest source of electricity in history". Furthermore, renewable projects are labor-intensive and can be rapidly deployed, thereby opening up a new recovery and development pathway for low-income countries.

These technologies now have the potential to bring hundreds of millions of people into the modern economy, yet their potential is too often overlooked by governments, investors and the international community. This is particularly the case for distributed renewables such as minigrids, which The Rockefeller Foundation knows from direct experience have the potential to bring cost-effective power to hundreds of millions of people. Yet this sector remains critically underinvested.

In this paper, we set out the vision for distributed and renewable energy as a key component of a green and inclusive recovery. We highlight the enormous investment gap that must be closed, identify key barriers, and propose innovative approaches for moving forward. Over the coming year we will work with partners to scale up investment in distributed and renewable energy in key markets, building on our extraordinary commitment to invest $1 billion of the Foundation's resources in Covid-19 recovery over the next three years.

The prize that awaits is a world with universal access to clean energy. This is a world in which every child can read and study at night and every citizen has access to modern healthcare services. It is a world where the door to increased wellbeing is open for currently locked out communities. It is a climate-resilient world far more insulated to the systemic shocks that are likely to be a defining feature of the century ahead.

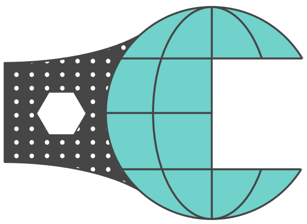
Raj Shah
President,
The Rockefeller Foundation



Ashvin Dayal
Senior Vice President,
Power & Climate Initiative,
The Rockefeller Foundation

Executive Summary
A key moment to rebuild a better world

The world faces the largest peacetime shock to the global economy in a century, compounding the enormous suffering caused by Covid-19 illnesses and deaths. Almost every country is projected to enter into recession this year, with hundreds of millions of people already made jobless and facing the prospect of a return to extreme poverty.



Past crises opened windows of opportunity to transform entrenched systems and build a better world.

The pandemic has exposed the vulnerabilities and inequities of the pre-Covid-19 world. Past crises opened windows of opportunity to transform entrenched systems and build a better world. Given the scale and depth of the current crisis, this window is now wider than it has been for decades.

A crucial part of a just and equitable recovery involves building a global energy system that helps resolve the two great challenges of the modern era: poverty and climate change. For many of the world's poor, the key impediment to their entry into a modern economy is a lack of access to reliable electricity. For the planet, the type of energy sector investments made over the next five years will determine whether the world can address the climate crisis.

Renewable energy is rapidly replacing fossil fuels as the most cost-effective building block for powering economic development. Distributed renewables in particular have become a faster, more nimble and more cost-effective solution for driving inclusive growth and reaching under-served populations in many contexts.

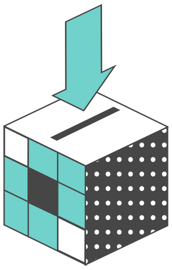
Technological breakthroughs over the past decade open an unprecedented opportunity to construct a modern, inclusive power system on a foundation of distributed and renewable energy solutions. Despite these shifting economic fundamentals, however, energy investments remain misaligned with the world's future needs, and the massive potential for distributed and renewable energy technologies to drive gender inclusion and unlock broad economic development for the world's poor remains unrealized.

A decisive shift in global investment trends is needed to set in motion a green, inclusive and resilient recovery. To make this happen government leaders, investors and donors must put distributed and renewable energy infrastructure at the heart of collective efforts to rebuild a better world.

Building the power systems of the future requires a mobilization of public and private investment capital on a previously unimagined scale, and the wholesale reallocation of capital away from legacy fossil fuel technologies. This is an opportunity worth more than one trillion dollars per year, encompassing grid-scale renewables, clean distributed generation and enabling grid investments. Renewable generation technologies alone need to attract more than $630 billion of investment every year between now and 2040 to reach global climate and development goals, which is roughly twice the current level of investment.

In this report we put the spotlight on the **distributed** renewables sector in particular, where the investment gaps are widest, the potential to spur an **inclusive** economic recovery is greatest, and the opportunity to bring power to those with little or no access is enormous.

To achieve success we need to:

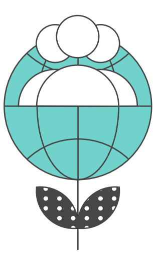


01

Close the investment gap

To meet the basic needs of 800 million people with no access to electricity in Africa and Asia we must quadruple global investments in distributed renewables. This means increasing annual investment from $4.5 billion to $17.5 billion globally, including an eight-fold increase in sub-Saharan Africa alone, from $1.5 billion to $12 billion each year over the coming decade.

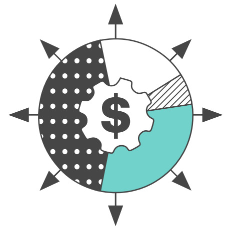
The true potential of distributed renewables extends beyond this core group to an additional 2.8 billion people who either have unreliable power access or are underserved. Delivering clean, reliable power to this cohort using distributed renewables would require investment of over $103 billion per annum up to 2030. Of this about $85 billion per annum needs to flow to Asia and $18 billion to sub-Saharan Africa.



02

Establish a new global partnership

A new global partnership focused on ending energy poverty with clean energy is needed to close the investment gap, involving donors, private investors and national governments. This partnership could provide a forum for these actors to advance specific solutions in a coordinated manner, accompanied by a suite of enabling actions.



03

Create specific investment vehicles

New investment vehicles will be required to overcome specific barriers to investment. For example, there is need to:

- Harness cost disruptions in storage and renewable generation technologies via ambitious pooled market commitments
- Mobilize blended financing to expand capital available to private sector developers
- Scale up a results-based Universal Energy Fund to optimize public sector support

In the short term, scaling up investment in distributed and renewable energy will help alleviate the immediate jobs crisis by providing local employment in construction and installation, by boosting the productivity of local businesses, and by providing power to health centers gearing up for expanded testing and vaccine delivery.

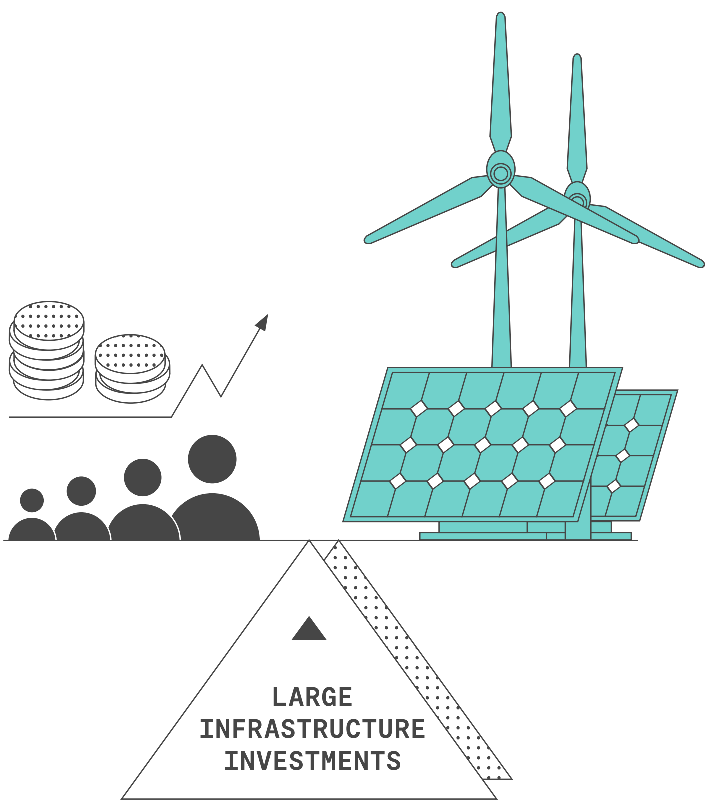
In the medium term, the lives of hundreds of millions of people will be transformed by access to clean power, which can light homes, refrigerate food, and provide cooling in the face of rising temperatures.

In the long term, building a new energy system around renewables will make a major contribution to global efforts to avert a climate crisis while building resilience to future impacts.

The world today

The Covid-19 pandemic has given rise to a human crisis on an enormous scale. By November 2020, almost 50 million people had been infected worldwide, with a confirmed global death toll exceeding one million people.[1] The lockdowns imposed to control the spread of the virus brought economic activity to a near-standstill in many countries, triggering the largest peacetime shock to the global economy in a century, with almost all countries projected to enter recessions this year.

Unlike wealthy countries, low-income countries have inadequate social safety nets and limited fiscal space to respond to the economic fallout.[2] Depending on the magnitude of the economic shock, between 80 and 395 million additional people will fall into extreme poverty globally, while the severity of poverty is also likely to increase.[3] The latest World Bank forecasts suggest a sobering picture for low-income countries in Asia and particularly India, where stringent measures to restrict the spread of the virus have abruptly curtailed economic activity.



History has shown that without concerted action, deep recessions can reverse hard-won gains against energy poverty, food insecurity, and health, eroding the foundations for human wellbeing. But such crises can also open windows of opportunity to transform entrenched systems and rebuild a better world. Important decisions made by international institutions and national governments over the coming months will determine which of these paths is followed.

By June 2020, governments of the world's 50 largest economies had already committed nearly $12 trillion to coronavirus recovery efforts.[4] The primary focus has thus far been to protect public health and provide financial support for vulnerable households and businesses. But as recovery transitions toward rebuilding, infrastructure will become a central focus of stimulus plans. Increasing investment in infrastructure can crowd in private investment, thereby driving aggregate demand and job creation in the short-term. In the medium-term, the availability of reliable infrastructure boosts the productive capacity of countries and provides the fundamental basis for prosperity.

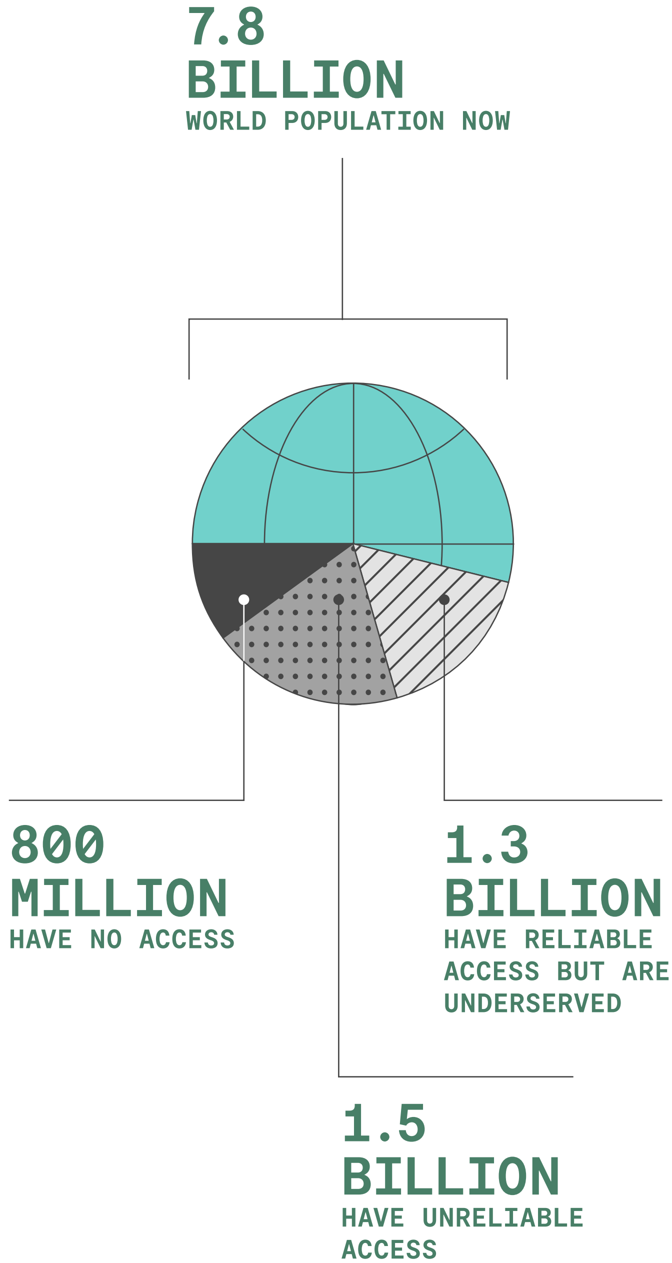
But delivering a clear poverty impact from large infrastructure investments is challenging to achieve, particularly when inclusion and poverty-reduction are not prioritized. As the World Bank has noted, "*the results of any trickle down [from large infrastructure investments] have been slow*". This is particularly true for power infrastructure projects, which have often bypassed the most vulnerable communities. Billions of people in Asia and Africa remain unconnected to the kind of affordable and reliable electrical service that is essential for economic activity and human development in the modern world.

A changing energy access landscape

Power has become central and indispensable to modern life: nothing is more predictive of extreme poverty than lack of access to electricity, and nothing does more to alleviate poverty than access to electricity. It is for this reason that energy access has been described by the International Energy Agency as the "golden thread" that weaves together economic growth, human development and environmental sustainability.

For a country to achieve lower middle-income status requires average per capita power usage to reach about 1,000 kilowatt hours per annum, which is ten times the standard definition of energy poverty. Using this threshold, we estimate that approximately 3.6 billion people still live in energy poverty today. Among them, about 800 million people have no electricity whatsoever, almost 600 million of whom live in sub-Saharan Africa. An additional 1.5 billion people have unreliable or unstable access, while an additional 1.3 billion people have reliable access but are underserved.[5] Without a change in energy infrastructure investments, the number of people in sub-Saharan Africa living without power could actually grow by 2030.

Of the 1.2 billion people who gained access to electricity since 2000, nearly all did so by connections to the main grid. However, 70 percent of the power generated for these new connections came from fossil fuels, adding significantly to regional air pollution and greenhouse gas emissions.[6] While these connections have been transformational for the lives of hundreds of millions, relying on fossil fuels is no longer the most economically viable, technically feasible or sustainable option to deliver universal and reliable electricity in many places.



Fortunately, an inflection point has been reached since the financial crisis of a decade ago. The cost of solar PV panels and battery technologies have both declined by more than 85 percent. The cost of electricity from bioenergy, hydropower, geothermal, and onshore and offshore wind has also declined rapidly.[7] These breakthroughs have already made renewables the cheapest options for new power in more than two-thirds of the world. By 2030, renewables will undercut fossil fuels almost everywhere.[8] Renewable and distributed energy technologies that are already mature can supply the overwhelming majority of new power required by 2050, while investments in transmission and distribution systems and system integration technologies can allow for the optimal balancing and deployment of these generation assets.[9]

These changing economic fundamentals mean that the goals of ending energy poverty, combating climate change and driving inclusive growth are not just aligned, they have become mutually reinforcing.[10] Given the billions that will be allocated to power infrastructure over the recovery period, imminent investment decisions will have a decisive impact on whether the world has a chance of meeting these interconnected objectives.

The growth of an off-grid sector

The energy system of the future will be built around three pillars: grid scale renewables; distributed renewable generating assets;[11] and a modern transmission and distribution system, supported by smart grid balancing tools.[12] While all three pillars of this energy system remain underinvested, the distributed renewables sector is perhaps the most critically overlooked, especially considering its enormous potential to deliver access to electricity in low-income and emerging markets.

For this reason, The Rockefeller Foundation has joined with multiple partners over the past decade to promote solar minigrids and other distributed renewables as a key solution for driving economic opportunity in the world's poorest communities. The Foundation's portfolio of over 300 operating minigrids, primarily in India, has already had a direct economic impact on the lives of almost 500,000 people. In 2019, our partner, Tata Power, launched an ambitious venture to bring solar minigrids to 10,000 villages over the next 7 years.

Across the developing world, there are already more than 1,000 firms within the off-grid sector employing around 500,000 people.[13] The firms range from small companies offering solar panels to power residential lighting to large utilities. These developments have convinced us that distributed renewables can be a principle driver of sustainable recoveries in emerging economies across Asia, Africa and Latin America.

While the deployment of off-grid and minigrid systems has accelerated in recent years, the power sector, like many others, has been damaged by the Covid-19 crisis. As a result, many of the nascent companies operating mini grids and providing off-grid solar services face financial hardship, or even insolvency in some cases.

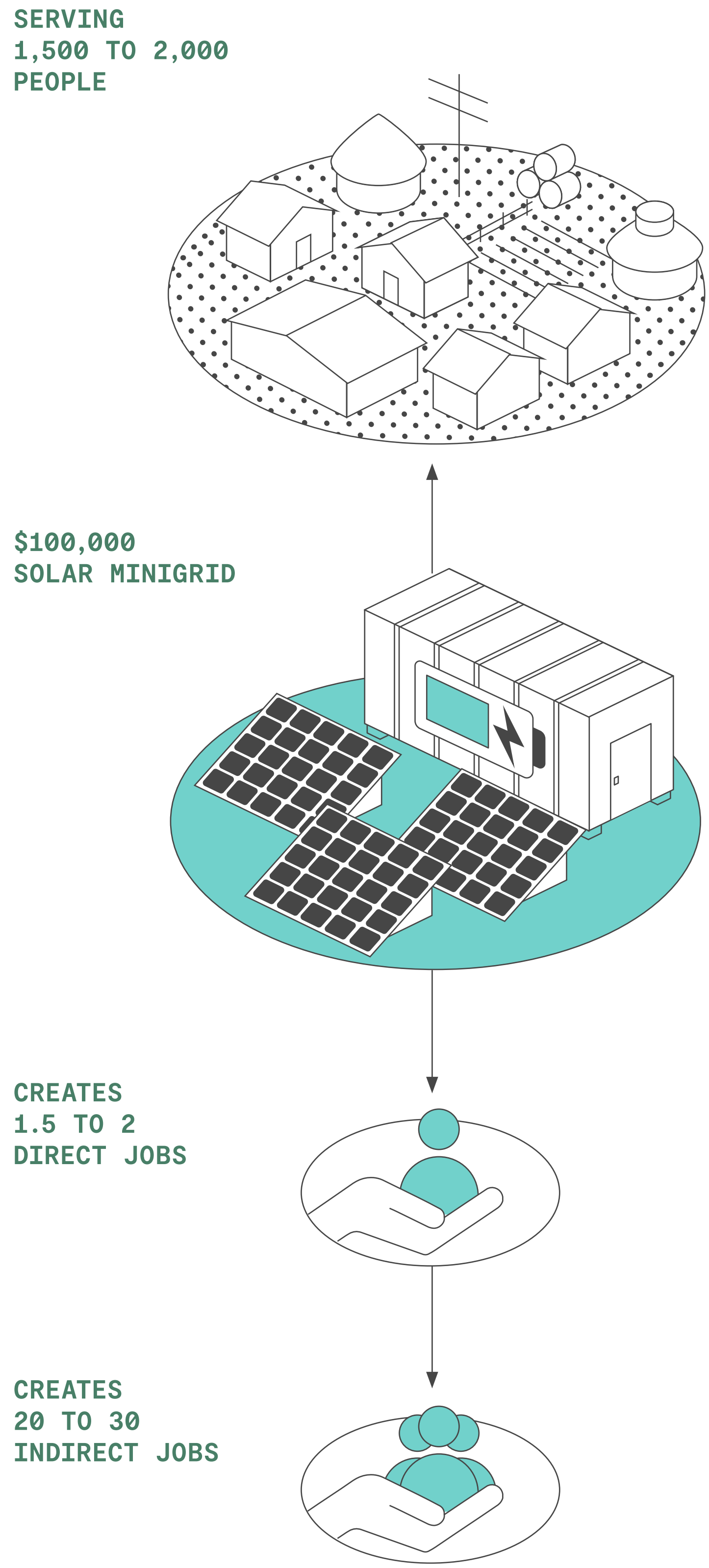
The value proposition of distributed renewables

Distributed renewable projects have several characteristics that make them a key infrastructure priority for a sustainable recovery. The first is cost-effectiveness: depending on location and population density, distributed renewables are often highly competitive with grid-based solutions. In fact, the World Bank estimates that off-grid solutions are the most economical solution for over 70 percent of un-electrified rural populations, or 490 million people.[14]

Distributed renewables projects can be nimbly and rapidly deployed. Standardization in specifications and regulations has already accelerated project development timelines considerable. A typical 50 kilowatt solar minigrid serving a single village up to 3 kilometers in radius can now be installed in under two months. With more plug-and-play components, sophisticated procurement systems, and experienced contractors, project timelines are declining every year. For these reasons, distributed renewables quickly boost local economic activity, which is an important characteristic during an economic downturn.

Distributed renewables also create jobs.[15] Green power projects in general create almost three times as many jobs as fossil fuels projects, but distributed renewables are particularly labor intensive.[16] Through its Smart Power India program, The Rockefeller Foundation has found an investment of $100,000 in a minigrid that serves between 1,500 and 2,000 people creates between 1.5 and 2 permanent direct jobs, and 20 to 30 indirect jobs in small and medium-sized enterprises in the community.[17]

Increased access to distributed renewables can also help close the gap on women's equity. Women tend to gain the most from increased electricity access because of improved indoor air quality and the enhanced safety provided by public lighting. Electricity access also reduces the amount of time devoted to labor-intensive chores,[18] freeing up time for

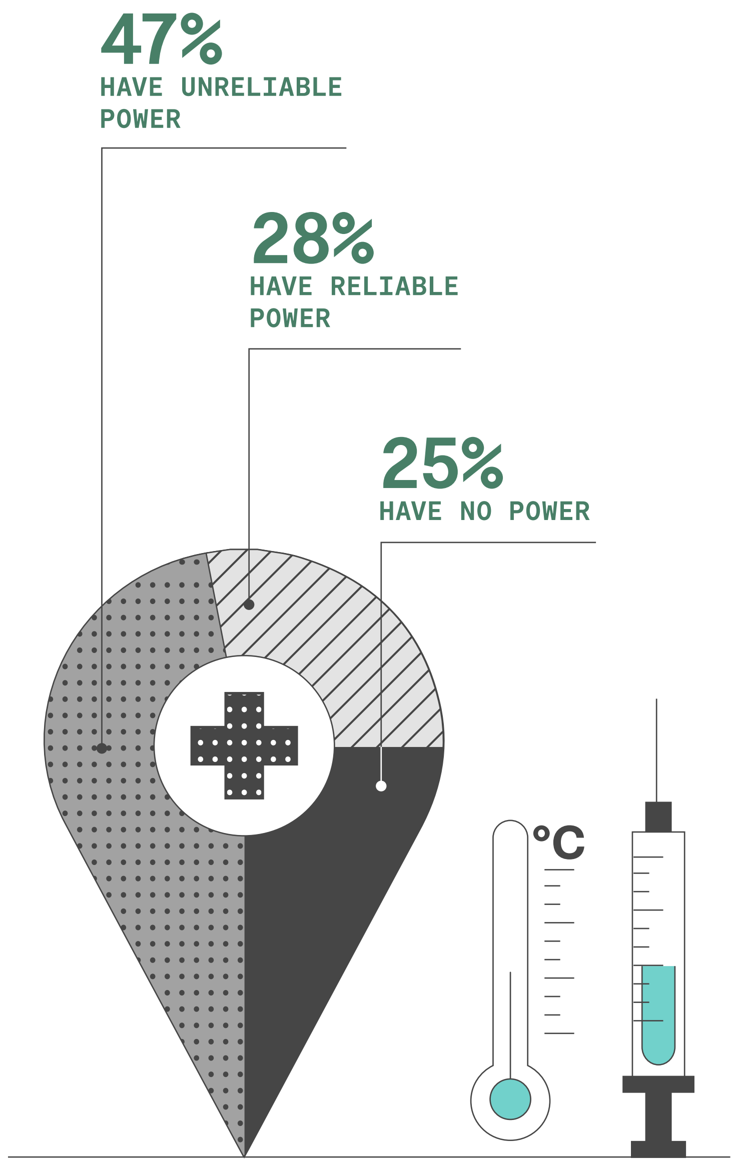


microenterprises and work outside of the home.[19] By creating the space for women's economic inclusion, scaling investment in distributed renewables can yield a "gender dividend" by enabling economies to tap into the latent economic potential of women, which in turn drives faster economic development.[20]

Deploying distributed renewables to serve those with unreliable access can increase system-wide resilience and reliability in a number of ways. For example, grid reliability is enhanced when distributed projects circumvent transmission and distribution constraints. New projects also distribute the location, source and risk of failure across many smaller assets and offer centralized system operators important tools for voltage control and blackout prevention. Since distributed renewable projects are often developed at the edge of the distributions system, they can also defer or replace costly grid repairs and investments.

Distributed renewable systems can also provide grid-like power that opens new opportunities across key business sectors in low income countries. In sub-Saharan Africa, for example, 25 percent of health facilities have no electricity and only 28 percent have reliable power, which creates an insurmountable barrier to the provision of many modern healthcare services, including vaccine delivery. Many of the Covid-19 vaccines under development require reliable refrigeration to retain efficacy, so a recovery from the pandemic could be slower and cost more lives without an urgent and immediate campaign of rural electrification across Africa and parts of Asia.

Minigrids and other distributed renewables can also transform the agricultural sector, a critical source of income for billions of people. In sub-Saharan Africa, a $11.3 billion investment could power efficient solar-based appliances to provide irrigation, cooling and processing capabilities to 12 million farms, boosting incomes and transforming the lives of farmers and their families.[21] In Ethiopia alone, a $380 million investment in power and appliances would yield $4 billion in new farm income over five years – a 10-fold return.[22] Finally, distributed renewables can play a significant role in providing reliable electricity to rural small and medium-sized enterprises, another crucial economic sector in many low-income countries.[23]



The investment gap

Despite the rapid shift in the economics of green power prior to the pandemic, global investment trends have moved only incrementally.[24] A more profound shift in investment trends is required to meet global development and climate goals.

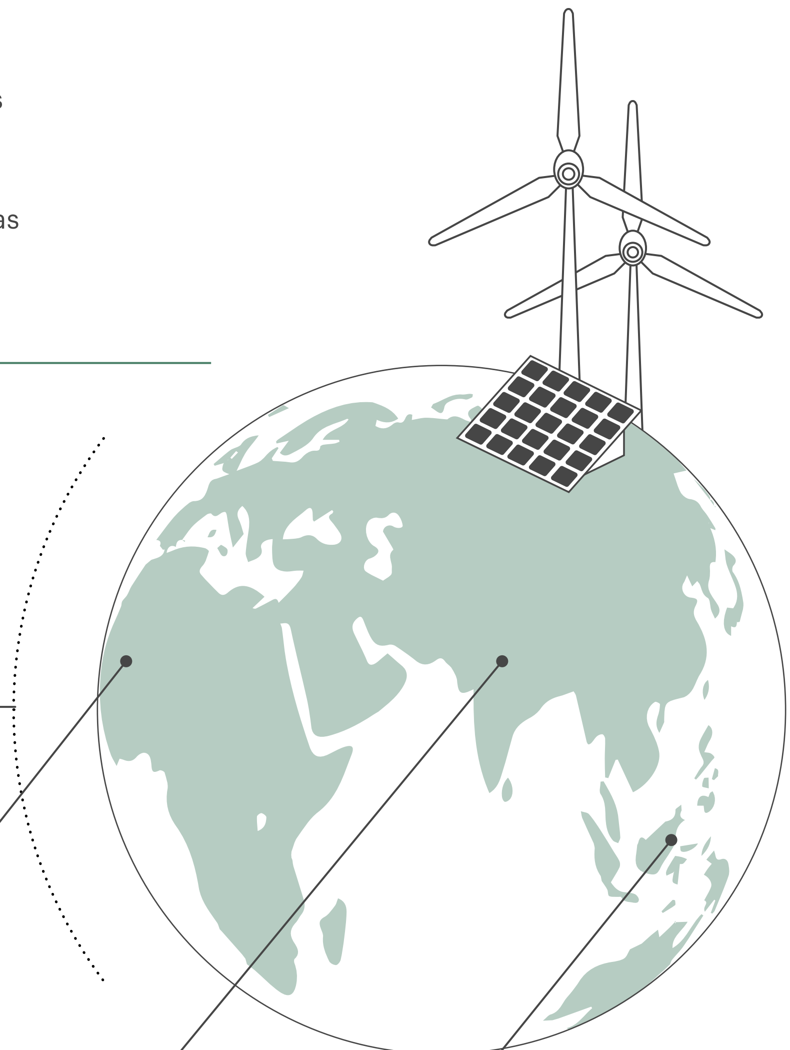
The IEA's Sustainable Development Scenario describes a least-cost pathway for the world to:

- ensure universal access to affordable, reliable, sustainable, and modern energy services by 2030 (SDG 7);
- substantially reduce the air pollution that causes deaths and illness (SDG 3.9); and
- take effective action to combat climate change as described in the Paris Agreement.

The IEA's analysis suggests that under present trends (Stated Policies Scenario), about $370 billion would be invested in renewables per annum in the period to 2040. To achieve the three SDGs above, annual investment would need to increase to $631 billion per annum (see below). This is almost double the $320 billion actually invested in 2019. In addition, another $520 billion will be necessary each year to fund the transmission and distribution infrastructure. In other words, total annual clean power investments need to exceed $1 trillion for the next 20 years to transition to a sustainable development pathway.

ANNUAL INVESTMENT GAPS IN RENEWABLE POWER

(2020 – 2040, US$ billions)

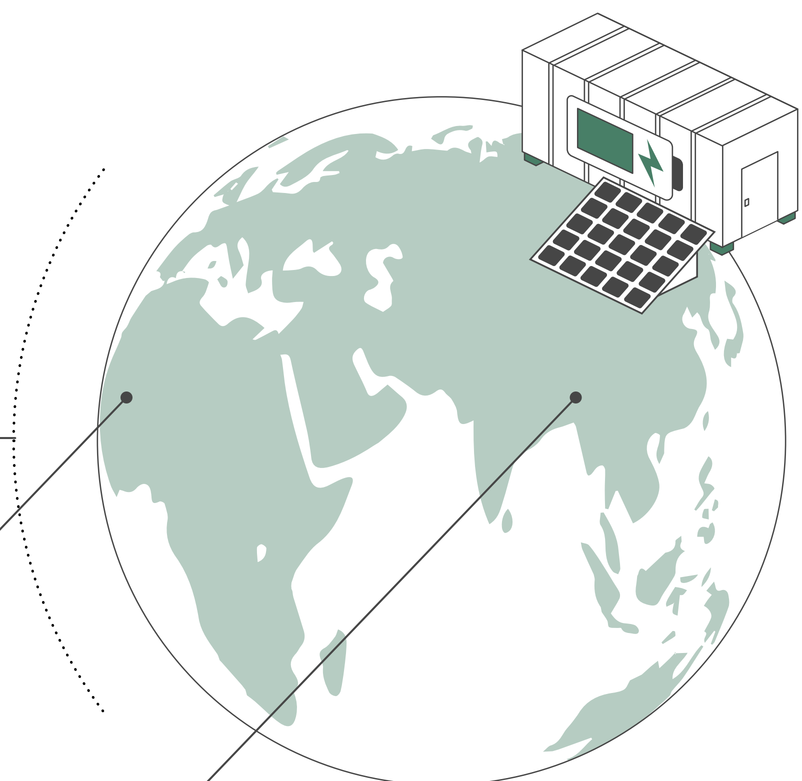


Source: IEA WEO (2020)

Turning to the investment gap associated with ending energy poverty, today only $4.5 billion annually is invested in distributed renewables to provide electricity access to poor communities in low-income and emerging markets. To achieve energy access goals, investments in distributed renewables must reach $17.5 billion annually over the next 10 years. In sub-Saharan Africa alone, an eight-fold increase is needed from the current level of $1.5 billion per annum. In Asia, investment must increase from about $3 to $5 billion per annum to deliver access in low-income countries including India, Myanmar, Cambodia and Papua New Guinea (see below).

ANNUAL INVESTMENT GAP IN DISTRIBUTED RENEWABLES FOR ACCESS

(2020 – 2030, US$ billions)



Global Investment Gap

13

SSA Investment Gap

10.5

Developing Asia Investment Gap

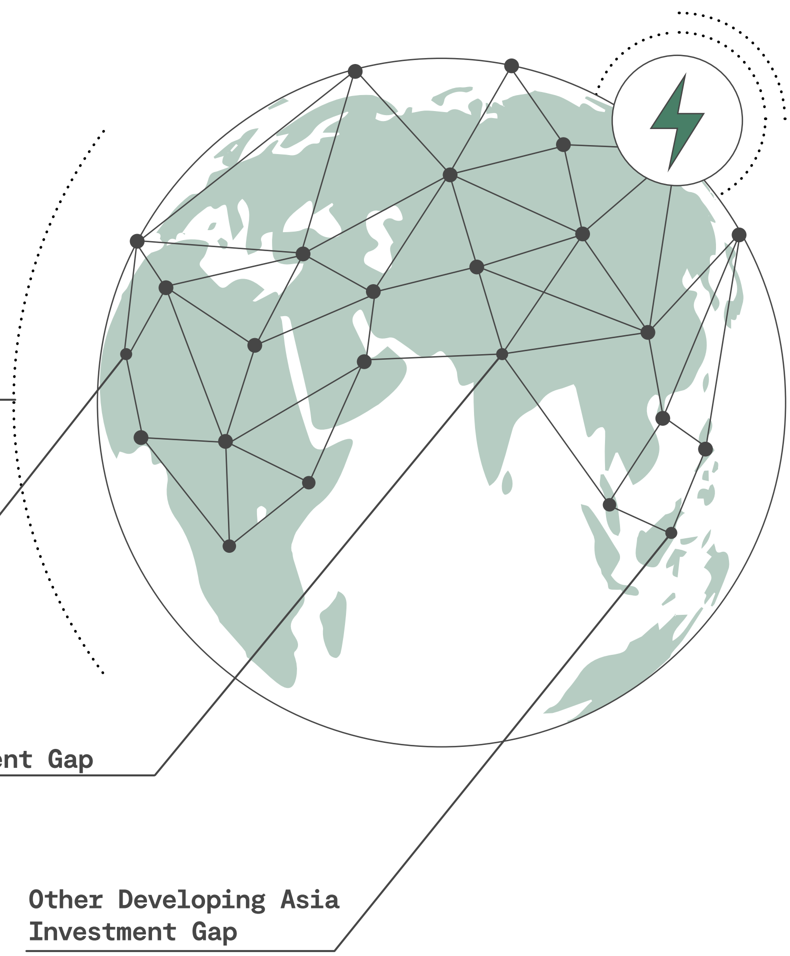
1.8

Source: IEA WEO (2020)

The true potential of distributed renewables extends beyond this core cohort of 800 million people. An additional 2.8 billion people have an electricity supply that is so unreliable or unstable that their livelihoods are seriously constrained, or they are underserved by their existing connection. There is a tremendous opportunity to deploy a wide range of distributed technologies in order to build a truly smart, integrated and reliable power system to meet the needs of this cohort. Initial modelling for The Rockefeller Foundation, undertaken by Catalyst Off-Grid Advisors, has outlined a scenario where distributed renewables play a central role in bringing reliable power to this wider group. In this scenario,[25] delivering reliable power requires $103 billion to be invested in distributed renewables every year from now until 2030 (see below).[26]

ANNUAL INVESTMENT IN GRID-CONNECTED DRE FOR UNDERSERVED COMMUNITIES

(2021 – 2030, US$ billions)



Source: Catalyst Off-Grid Advisors (2020)

Barriers to scale

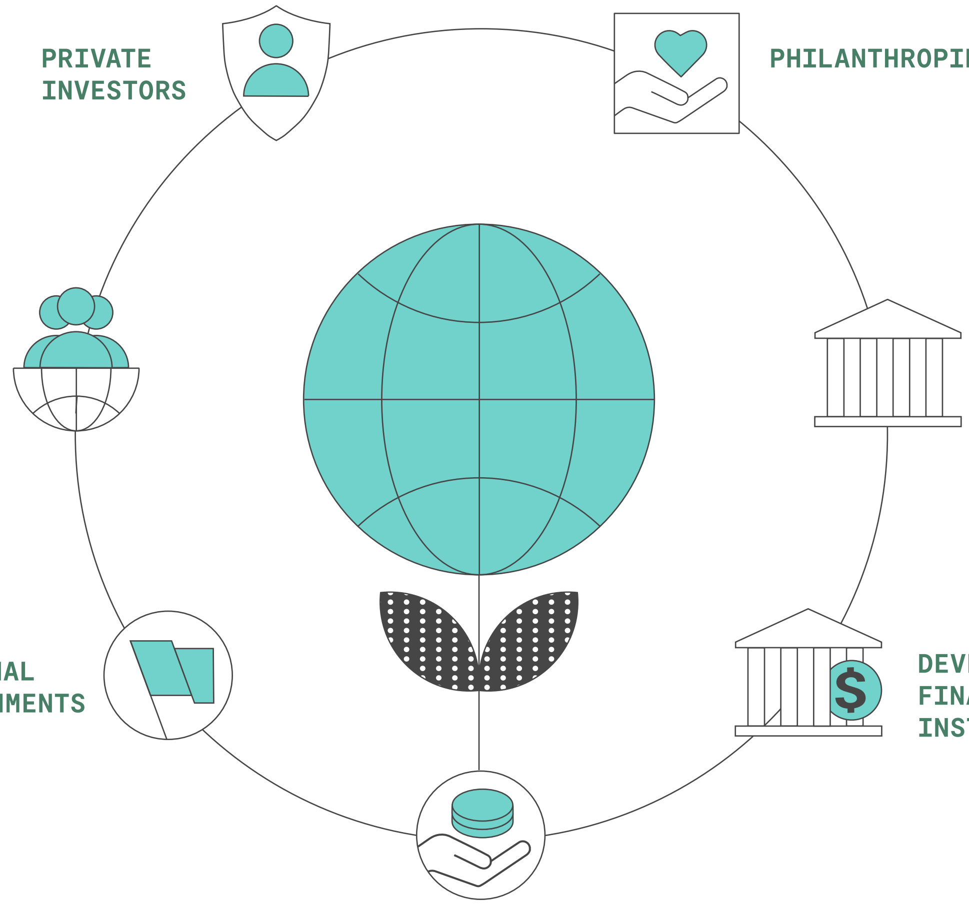
There are several barriers that stand in the way of distributed renewables achieving their enormous potential. First, the revolution in renewable pricing has yet to touch many Africa and Asian countries. This is particularly apparent for smaller-scale distributed energy resources. For example, minigrid developers in sub-Saharan Africa pay between 2.5 and 3.8 times as much as the global average for lithium-ion batteries and over 20 percent more for photovoltaics, even before taxes and import fees that can increase costs by an additional 25 percent in many countries.[27]

The second factor is the cost of capital. Attracting investment in many markets is challenging because returns have long been modest and risks relatively high.[28] Minigrid developers remain small and under-capitalized, lacking the balance sheets to start new grid projects. Minigrids need to be treated like other infrastructure assets, leveraging a project financing approach to access long-term debt. Without scale and cost reductions, however, long-term financing remains elusive.

Finally, subsidies are required for rural and last mile connections, regardless of whether electricity is provided via the main grid, minigrids, or with smaller solar off-grid projects. Governments, donors, and developers all recognize that distributed renewables are often the least-cost option to deliver universal energy access, but small-scale projects lack access to the same concessional financing that supports central grid extension in rural areas. A smarter use of subsidies is required to de-risk and catalyze large private investments. A results-based financing approach, for example, provides credit once a connection is made and verified to meet specific standards, or once the service has reliably been delivered for a period of time, thereby shifting the focus towards outcomes and allowing developers the flexibility to adapt and experiment to achieve delivery. In contrast to distributed renewables, the business models, financial products, and sources of capital for developments using fossil fuels are often well established and more accessible.[29]

The magnitude of fiscal stimulus packages currently being considered by governments in response to the Covid-19 crisis, combined with a low interest rate environment, offer a unique opportunity to break away from the business-as-usual investment trends and to overcome these barriers. Investment activity in the coal, oil and gas sectors has already declined dramatically, while renewable power sources have so far demonstrated far greater resilience in the face of market volatility.[30] These factors have opened the door for a structural shift in global energy sector investment trends.

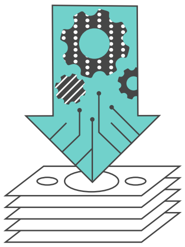
A platform to end energy poverty with clean energy



Closing the investment gap and overcoming barriers to scale will require a new global partnership focused on ending energy poverty with clean energy. This partnership, involving major international and regional organizations, multilateral development banks, development finance institutions, philanthropies, donors, private investors and national governments, could provide a forum where specific solutions can be scaled up in a coordinated manner, accompanied by a suite of enabling actions.

Through a dedicated platform, partners could commit to providing long-term, sizeable and predictable funding consisting of both grant and concessional investment capital. This would enable international organizations focused on clean energy to expand support for developing countries, which in turn would provide a greater incentive for low-income and emerging countries to establish policies and regulations supportive of distributed renewables. Supportive regulations and measures include: developing integrated strategies for full electrification, strengthening rules for the operation and management of grids, and strengthening market incentives for clean energy investment. Countries that demonstrate an investment-grade policy and regulatory framework would be in a position to rapidly access the financing and technical resources pooled under this partnership via an integrated set of financing mechanisms.

This integrated set of new mechanisms to address the barriers to scale could include:



01

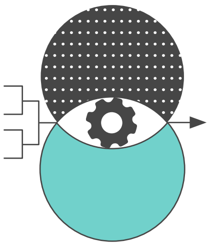
Establishing a technology facility to drive down investment costs

Reducing the cost of energy storage, solar PV panels and associated controls in sub-Saharan Africa to global averages would by itself decrease energy storage prices by 70 percent and those of distributed renewable generation by 30 percent. Such reductions would decrease the cost of providing electricity access for 200 million people by $7 billion.

Achieving cost reductions of this magnitude would require a host of actions, including:

- Standardizing component specifications to enable aggregated purchases
- Aggregating purchases across large and small companies and guaranteeing minimum volumes
- Mobilizing blended private financing (see below) to rapidly expand capital available to DRE developers to fund purchases
- Partnering with government-led rural electrification programs to increase access to low-cost technology for developers
- Developing innovative controls for modularity to seamlessly increase system size as demand grows
- Expanding the technological focus over time, including supporting demand side innovations

This facility creates multiple value propositions. Small developers can cut capital expenditures and taxes while growing profits and customers. Larger power companies can de-risk their entry into new distributed renewables by increasing customer familiarity with innovative solutions and demonstrating market potential. Manufacturers can uncover innovations that are needed to seed and ultimately serve new markets in countries that will dominate global long-term electricity growth.[31] Ultimately, end-users will have access to cheaper, cleaner, and more reliable and resilient power to drive economic development.

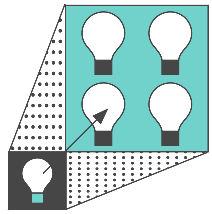


02

Establishing a blended finance vehicle to rapidly expand capital available for project developers

Donors could provide grant capital to crowd in concessional and private investment into a facility to finance mini-grid and off-grid development. An initial catalytic contribution has the potential to enable third-party investment that otherwise would not be possible, and could go a considerable way to bridging the distributed renewables investment gap in Africa. A blended private finance facility could fuel rapid growth in equity and debt investment to bolster company and market growth, and could favorably affect investor sentiment, which in turn has the potential to reduce the perception of risk associated with mini-grid projects and drive down the cost of capital over time.

These funds could be invested in discrete projects or existing facilities that have successful track records in underwriting clean energy projects. Funding could also be paired in overlapping African markets with the Universal Energy Fund.



03

Scaling the pan-African Universal Energy Fund to provide results-based finance for electrification

The Universal Energy Fund is a multi-donor results-based financing facility that takes a coordinated funding approach for grid extension, minigrids and home-based solar systems. The facility, currently in a pilot phase, can be rapidly scaled across Africa, with countries eligible to opt in by committing to adopt a core set of integrated electrification planning and investment reforms. Subsidy amounts will be set based on the viability gap and will be adjusted as the market scales.

An expanded UEF could issue regular calls for proposals for qualified companies. Upon earning a contract, developers would have funds earmarked for them for a limited period of time within which they must achieve the intended target connections. This approach maximizes results, ensures that funds are used efficiently, and leverages significant private capital. The facility will establish a consistent and standardized approach for evaluation conducted and managed by an independent non-profit.

The fund’s goal is to raise $500 million within a year and deliver electricity to 10 million people by 2023. If that succeeds, the fund could expand 10-fold in the following three years and then 10-fold again in the last three years of the decade, a level of expansion in keeping with achieving universal energy access by 2030.

Conclusion

The challenge of scaling up investment in clean energy access is not new but the urgency is. The tools are finally at hand. The time to act is now. A world with universal access to clean energy is a world in which every child can read and study at night and every student is connected to the modern information economy. It is a world in which each citizen has access to modern healthcare services and every door to increased wellbeing is opened for excluded communities. It is a climate-resilient world far more insulated to the systemic shocks that are likely to be a defining feature of the century ahead.

Footnotes

1 https://coronavirus.jhu.edu/
2 Wealthy countries have used fiscal stimulus measures to expand social safety nets, to protect those most vulnerable, including wage support to preserve jobs, increased access to unemployment benefits, and targeted cash transfers to low-income households, see: https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world#
3 https://www.wider.unu.edu/sites/default/files/Publications/Working-paper/PDF/wp2020-77.pdf
4 https://www.bloomberg.com/features/2020-green-stimulus-clean-energy-future/
5 Estimate provided by Catalyst Off Grid Advisors, November 2020
6 https://www.iea.org/reports/energy-access-outlook-2017
7 https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/May/IRENA_Renewable-Power-Generations-Costs-in-2018.pdf
8 https://about.bnef.com/new-energy-outlook/
9 IPCC (2018) estimate that renewables could account for to 85 percent of electricity by 2050 in climate-safe scenario. Some studies have concluded that an electrical system powered 100% by renewable energy is technically and economically feasible, https://web.stanford.edu/group/efmh/jacobson/Articles/I/USStatesWWS.pdf but this finding has been contested https://blogs.scientificamerican.com/plugged-in/landmark-100-percent-renewable-energy-study-flawed-say-21-leading-experts/
10 https://newclimateeconomy.report/2018
11 We consider DREs to be renewable technologies that are either connected to the low and/or medium voltage distribution network (rather than the high voltage transmission network), or are entirely off-grid, and are generally smaller scale (e.g. <10MW).
12 https://link.springer.com/article/10.1007/s10644-020-09270-z
13 https://www.iea.org/reports/world-energy-outlook-2020
14 https://openknowledge.worldbank.org/bitstream/handle/10986/31926/Mini-Grids-for-Half-a-Billion-People-Market-Outlook-and-Handbook-for-Decision-Makers-Executive-Summary.pdf?sequence=1&isAllowed=y
15 https://www.ceew.in/publications/building-workforce-indias-emerging-clean-energy
16 https://www.mckinsey.com/business-functions/sustainability/our-insights/how-a-post-pandemic-stimulus-can-both-create-jobs-and-help-the-climate
17 RF Analysis, Smart Power India.
18 https://www.iea.org/reports/energy-access-outlook-2017
19 https://www2.deloitte.com/us/en/insights/topics/social-impact/women-empowerment-energy-access.html#end-notes
20 https://www.prb.org/investing-women-girls-gender-dividend/
21 https://www.lightingglobal.org/wp-content/uploads/2019/09/PULSE-Report.pdf
22 https://rmi.org/insight/ethiopia-productive-use/
23 https://www.worldbank.org/en/topic/smefinance
24 According to IEA, renewable power investments were slightly under $300 billion an only slightly above this benchmark a decade later
25 Where all countries achieve a “modern energy minimum” of 1,000kWh per person by 2040
26 This estimate factors in considerations around the reliability and quantity of existing generation in each country, coupled with existing penetration of variable renewable generation sources, population density, and the key drivers of new electricity demand.
27 Industry interviews, BNEF.
28 SEI (2017) Catalyzing investment in sustainable energy infrastructure in Africa: Overcoming financial and non-financial constraints
29 Some 450GW of coal plants are planned, permitted or under construction around the world, for example, despite the fact that these investments are financially risky, pose chronic health risks for local populations and could drive rapid climate change for decades to come.
30 https://www.iea.org/reports/world-energy-investment-2020/key-findings?utm_content=buffer78a8b&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer
31 https://www.iea.org/reports/world-energy-outlook-2018

The ROCKEFELLER FOUNDATION

rockefellerfoundation.org