SMART POWER
CONNECT
Empowering Rural Communities & Transforming Lives

Rooftop Solar for MSMEs
Empowering Youth To Become Agents Of Change in Climate Crisis
Putting Equality and Development at the Heart of a Clean Energy Transition
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FROM THE CEO’S DESK

India’s energy sector is on the cusp of a transformation. As the country pursues its renewables agenda to meet the ambitious target of 175 GW of installed capacity by 2022, it is likely to account for 25% of the rise in global energy demand by 2040 (as per International Energy Agency). As the country’s energy and electricity demand is pegged to grow at a CAGR of 3.7%-4.5% and 5.4%-5.7% till 2047, the pressure on natural resources to fuel the demand would only rise in the future. Amidst this, coal will continue to remain the mainstay of India’s future energy mix where about 42%-50% reliance on coal will persist even in 2047.

India needs to adopt a multi-pronged strategy which would be a mix of conventional and renewable sources of energy. Within renewables, a mix of centralised and decentralised solutions needs to be deployed. Focus on energy efficiency will help reduce energy demand and enhance domestic supply in order to achieve its overall developmental ambitions in the energy space.

This magazine presents the key insights of our climate and economic development goals and challenges through write-ups, case studies, insights from experts across the energy value chain, and a roadmap that envisages India to play a key role in the global energy scenario.

India currently stands at the precipice of a unique moment in history with respect to its energy requirements. Discussions about electricity in India are frequently dominated by accessibility. This is quite understandable as access to affordable electricity can dramatically improve the quality of life of India’s historically under-served communities.

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But, at this point, access to electricity is viewed as a basic fundamental right and is a fairly low bar for the success of a country’s energy sector – there are many other important criteria like quality, efficiency, or reliability.

On the one hand, the worsening effects of climate change require an immediate global response to reduce carbon emissions and transition towards renewable energy and green technologies. But, on the other hand, India has ambitious plans for economic development. The window of opportunity for this progress is slowly closing as India’s relatively young population begins to age. Any discussion on energy must ultimately resolve how these two goals can simultaneously be achieved as that will be the key to securing India’s future in the 21st century.

The global energy transition offers a great opportunity to transform the energy sector in all aspects. The transition towards a renewable, distributed, decarbonized energy system is creating an array of social and economic benefits, including growing employment and livelihood opportunities. An industry report estimates that the number of jobs in the sector could go up from 10.3 million in 2017 to nearly 29 million in 2050. What will be paramount during this transition would be to ensure that the opportunities it creates are equally accessible and distributed among different sections of the society, factoring in their contributions, skills, and views.

Since 2015, Smart Power India has spearheaded an innovative and market-based initiative that enables rural electrification through renewable energy, mostly solar PV based mini-grids. We have developed a business model that makes mini-grids commercially viable, while enabling last-mile distribution of electricity through a portfolio of 606 Minigrid Installations with a total capacity of 18,310 kW. SPI acts as a catalyst in the evolution of the mini-grid ecosystem in India by providing support across the mini-grid value chain, supporting implementation, influencing stakeholders, sharing best practices and bringing in much-needed risk capital.

SPI launched the Rural Rooftop Solar (RTS) for MSME program in 2021 in Uttar Pradesh to reduce dependency on fossil fuels. The program has installed over 10 MW of solar rooftop installations as of November 2022 and aims to solarise over 10,000 MSMEs (100 MW) by 2024. In September, SPI launched a two-phase awareness campaign “Solar Se Samridhi” in Varanasi and Mirzapur districts of the state. The campaign engaged with rural communities through various awareness-driven activities and helped them understand the economic and environmental benefits of rooftop solar.

With solutions such as Rooftop Solar for MSME’s and Minigrids, and bringing together preeminent philanthropic, government, donor, MDB, DFI, and private sector partners, Smart Power India is supporting the Indian government’s targets to increase its capacity for renewable energy to 175 gigawatts (GW) by 2022 and 450 GW by 2030, and building a unique international platform to transform how energy is delivered to the last mile.
About 40% of rural MSMEs, especially in Northern and Eastern states of India, are either not connected to the grid or have an inadequate supply of electricity from distribution companies. This leads to a heavy reliance on other energy sources that are carbon intensive and expensive.

Leveraging the existing on-ground presence and experience with distributed renewable energy, Smart Power India (SPI) launched its Rooftop Solar Program in 2021, with the vision of solarising MSMEs in rural areas and improving lives through holistic socio-economic development. Apart from directly impacting profitability, the program aims to create 1.94,300 green jobs and accelerate reliable energy access to peri-urban and rural areas. From the program’s pilot in Uttar Pradesh, we have observed the program’s impact on lives in a holistic manner. In this issue, we highlight some of the economic & social impacts experienced by rural entrepreneurs from Varanasi, Uttar Pradesh.

The Government of India is targeting 40 GW of rooftop solar by 2030; however, only 15% (6 GW) of this has been installed till date. SPI aims to catalyse 9 GW of installations in the states of Uttar Pradesh, Bihar, Odisha and Jharkhand, within three years. The RTS program targets 100 MW of installed capacity which would avert 4,21,500 MT of CO2, creating 1.94,300 green jobs and accelerate reliable energy access to peri-urban and rural areas. From the program’s pilot in Uttar Pradesh, we have observed the program impacting lives in a holistic manner. In this issue, we highlight some of the economic & social impacts experienced by rural entrepreneurs from Varanasi, Uttar Pradesh.

Rooftop Solar Brings Viability and Well-Being to Improve Lives of Rural Entrepreneurs and Their Families

Shripakash Singh
Flour Mill Owner
Sajahuli, Uttar Pradesh, India

Frequent power cuts during the daytime forced Shripakash to work late into the night to make up for lost time during the day. The arrival of Rooftop Solar in the village of Sajahuli, Uttar Pradesh, in 2021, enabled Shripakash Singh to improve the well-being of his family.

**IMPACT**

Shripakash saves anywhere between INR 400 to INR 1000 every day, which is enabling him to pay his monthly instalments on time and also meet his family’s living expenses comfortably.

He can power both his machines during the day without any interruption. This has brought stability to his business.

He no longer works erratic hours since he has access to quality & reliable electricity in the day.

His children can focus better on academics without any noise from the running of diesel generators.

Renu Mehta
Flour Mill/Oil Expeller Owner
Budhipur, Uttar Pradesh, India

In rural Varanasi, energy access is also giving rise to women’s economic empowerment with entrepreneurs like Renu adopting rooftop solar to run her commercial enterprises, which includes a grocery shop, a flour mill and an oil expeller unit.

**IMPACT**

Renu and her husband, Ajay, produce around 12 quintals of wheat flour daily, whereas earlier they were only producing about 6 quintals a day. This has decreased cost of production thereby, increasing her profit.

Renu is investing the increased profits into supporting her livelihood, household, education of her children and the well-being of her family.

Renu and her husband, Ajay, work in a noiseless and clean environment that has improved the quality of their lives.

Renu’s story is inspiring other women in her community to adopt rooftop solar for improving their livelihoods.
POWERING MICROENTERPRISE LED ECONOMIC DEVELOPMENT IN RURAL INDIA

WATER TREATMENT UNIT

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Gulshan Thakur, the business head of Mahaurja Grameen Ltd, an energy service company operating mini-grids in the rural hinterlands of India, is looking over the latest customer data and is concerned to see that several of his plants are under-utilized by the very communities they are meant to be serving.

The question is - what's the best way to increase the adoption of electricity in a way that can also drive economic opportunities for the local community?

An idea comes to him when he sees one of the most ubiquitous sites in rural India - a woman walking with two jugs of water balanced gracefully on her head. He knows most of these women can spend two hours a day fetching drinking water for their families - which might not even be safe to drink and he ponders why clean water isn't more easily available.

Like most mini-grid energy service companies (ESCOs), Mahaurja Grameen Ltd was set up to provide sustainable electricity to rural India - where 237 million people live without electricity. Even in places with good central grid infrastructure, many households often have no connection or post-quality supply for only a few hours a day. This is the gap companies like Mahaurja Grameen Ltd have been trying to bridge; now more than ever with the Government of India's focus on driving up renewable energy. Since it began in 2005, Mahaurja Grameen Ltd has expanded to more than 35 plants across 3 states. The company knows sustainability and ease of access are key and so has embraced renewable energy. But Gulshan is also a mindful businessman keen on making his company strong and viable.

There are many factors at play, but one of them is electricity. Of the lack of it. He already has tight control over key operating expenses - like diesel fuel usage for backup power and staff costs - which has improved his unit-level profit margins. He also understands his existing market wants expanded hours of electricity and more attractive pricing packages, so he's adapted accordingly. But he knows what will really drive his business forward is increasing the uptake in electricity, especially in mini-grids that are being under-utilized.

That's the moment Gulshan thinks about setting up a water treatment unit (WTU) in one of the villages where he operates a solar mini-grid that has only 40% plant utilization. With the support of Smart Power India (SPI), an agency set up by the Rockefeller Foundation to spur economic development among underserved rural India by providing access to reliable electricity, he decides to identify the right location for the WTU and outline the right micro-enterprises (ME) business and operating model.

Gulshan is enthusiastic about the idea of a water treatment unit because the benefits are three-fold; the community has easy access to safe drinking water, one WTU can give employment to 2-5 people, and demand for Gulshan's mini-grid electricity increases. It's a win, win, win!

Electricity Demand of WTU

The electricity consumption by the WTU is driven by seasonal demand for water with an average consumption of 14-kilowatt hours (kWh) per day. The peak demand months for water are the hot summer months of April to June with the daily electricity demand of 17 kWh per day. Winter months, from November to February, have the lowest electricity consumption at 12 kWh per day. Energy consumption may drop further in the winter months due to reduced usage of the chilling unit.

The Power to Replicate

Seeing how successful one WTU can be, Gulshan wonders if this model can be replicated. In discussions with SPI he finds that there is indeed massive growth potential - with a need for almost 25,000 new WTUs in three energy-deprived Indian states alone. That's a new WTU in every four to five villages in Bihar and UP - two of India's most populous states - as well as Jharkhand.

Gulshan is excited by the massive expansion potential of WTU micro-enterprises and notes that there are certain key enablers that can play a critical role in replicating WTUs across geographies.
a) Creating ME Portfolio Management Unit (PMU) within ESCO’s organizational structure (operational factor) - The PMU would be responsible for the replication, scale-up, and performance of the various MEs connected to the ESCO mini-grids, thereby improving the success rate of replication and scale-up of OES. A PMU would consist of one or two senior personnel from the ESCO who would manage a team of regional ME representatives. These regional representatives would be responsible for the day-to-day operations of the WTUs. The senior ESCO members would be involved in strategic activities such as knowledge transfer between WTUs; training of the ME personnel (including entrepreneurs); and aligning with SPI (or other facilitators) with the support required. PMUs can find the most efficient ways of working, which can lead to increased profitability of MEs at a portfolio level. For example, PMUS could encourage the sharing of resources between similar MEs in the same region (e.g., transport vehicles and staff) and across different MEs (e.g., training modules), which would lower costs for MEs and drive profitability and efficiency.

b) Access to finance for both capital expenditure and working capital (financial factor) - This holds true for both the entrepreneur model and COCO model. In fact, ESCOs with a larger share of COCO model MEs may need access to more working capital than compared to those with more entrepreneur-led WTUs.

c) Marketing and branding (marketing and knowledge factors) - A portfolio of WTU MEs would benefit immensely from branding and marketing efforts, particularly if there is competition from other RO water service providers in nearby regions. Improving the brand and awareness of the water from WTUs at a portfolio level will also improve profitability by 1) increasing the demand amongst customers and 2) fetching a higher price from customers.

Impact on the local community

Gulshan knows that on average one WTU serves safe drinking water to 500 households. SPI informed him that the WTUs have the potential to provide 4.6 million households in Uttar Pradesh, Bihar, and Jharkhand access to safe water. This could lead to a significant drop in the number of water-borne disease cases in these states.
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SMART POWER
INDIA'S IMPACT ON GROUND

559 Installations in Uttarakhand
10.5 MW Installed capacity
USD 7M Finance unlocked

14,749 MT
of less CO2 emissions per annum leading to improved health benefits

8252 Jobs enhanced
559 Commercial enterprises
$2400 Increase in income (commercial)

606 plants across Uttarakhand, Bihar, Jharkhand and Nagaland

74,065 Overall customers
18.3 MW Overall installed capacity
97% plants use solar energy
3% use solar/biomass hybrid technology

161 Telecom & Micro-enterprises
70 Institutions
8,374 Commercial users & Micro-enterprises
18,917 Shops
26,346 Households

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Factors influencing India's Clean Energy Transition

Capital Investment Infrastructure and innovative business environment
- Access to capital
- Ease of investment
- Availability of technology
- Innovative business environment

Environmental Sustainability
- Air pollution
- Energy intensity
- Carbon intensity
- Energy demand growth
- Electricity energy mix

Security and Access
- Energy access
- Quality of supply
- Security of supply

Economic Development & Human Capital
- Affordability
- Fuel subsidies
- GDP contribution
- Jobs in the RE sector
- Gender-inclusivity
- Rural focus

Regulation and political commitment
- International agreements
- Renewable energy targets
- Support to energy efficiency
- Government incentives
- Access to financial instruments
- Commitment to renewable energy targets
India’s ongoing power crisis, the worst in six years, has highlighted the power sector’s dependence on fossil fuels. Compounded by extreme heatwave conditions and recovery of economic activity following the pandemic, increased demand for electricity has driven the government to double down on carbon-intensive sources for power generation. The current energy consumption pattern is unsustainable, as geopolitical events have driven up prices of fossil fuels, leading to a shortage of energy. This is evident from the power outages across India.

These power cuts are especially crippling for commercial & institutional (C&I) customers, for whom diesel (a common alternative source of power) is three times more expensive than electricity from the local grid[1]. Outages are even more prolonged in rural areas, where load shedding has decreased electricity supply hours by 1.6% [2]. This crisis highlights the urgency of shifting to alternative sources of power, such as solar energy, that can be used to bring down India’s dependence on fossil fuels. C&I customers, especially in rural and peri-urban India, can benefit significantly from reliable and clean energy from solar rooftop installations.

Why Rural C&I?

A vast majority of rural C&I customers are underserved by the main grid. Almost 40% of these customers in UP, Bihar, and Jharkhand are not connected to the grid and rely heavily on alternate sources of electricity, primarily diesel. This segment consumes over 1 billion litres of diesel each year. The other 60% of customers who are connected to the grid lack quality access and many of these customers continue to use diesel as a backup.

The Government of India has set an ambitious target of installing 40 GW of rooftop solar by 2030. However, only 20% of the rooftop target has been achieved, and only 3.1% of the target for rural India has been installed. There are millions of rural C&I customers suitable for solar rooftop installations with a potential demand of 16 GW, which could translate into a market opportunity of USD 11 billion. Currently, only 8% of these customers are being served, despite the cost-saving from solar rooftop installations.
Problems and Solutions

Despite the high potential of this market, the adoption of rooftop solar offering by the rural C&I market has been slow. Some of the key challenges include the lack of consumer awareness, low-ticket sizes, fragmented demand, and limited access to finance. Over 80% of surveyed enterprise customers were not aware of rooftop solutions and their benefits. The low-ticket size coupled with dispersed demand in rural areas leads to a high cost of customer acquisition. Moreover, due to the small size of rural C&I customers & their limited credit history, most developers refuse to enter long-term Power Purchase Agreements (PPAs). Limited credit histories also pose a challenge in accessing finance as banks are risk-averse and do not extend credit without collateral guarantees - which small C&I customers are unable to offer. The state-level policy and regulatory framework for rooftop solar is also ever-changing, and state utilities are reluctant to give net metering connections to customers.

Solutions for catalyzing the rural C&I market have to be looked at in terms of geographic clusters (as opposed to as individual enterprises, which work for large-scale industries) as this allows for the aggregation of demand that makes it easy to run awareness campaigns in a targeted manner. Market actors such as national and local developers and financing partners have to be drawn in to achieve operational viability and scale in fragmented rural areas. Facilitating access to wholesale capital for retail financiers supplements their liquidity to offer loans for willing rooftop customers, while de-risking their lending risk through guarantee mechanisms. Moreover, various Development Finance Institutions (DFIs) have a crucial role in extending debt and equity to solar rooftop developers to finance their expansion.

Collaborative and strategic partnerships combined with philanthropic capital can fast track the adoption of solar rooftop installations and put in place solutions to focus the attention of various sectoral stakeholders on rooftop solar, especially for rural C&I customers, to successfully enable the government to achieve its 16 GW target for non-urban C&I solar rooftop installations by 2023.

[1] ‘Coal shortage and heatwave spark India’s power woes’ - Mint (9-5-2022)
[2] ‘These Indian states are on brink of power outage amid heatwave, increased demand’ - BBC (22-4-2022)
MANTHAN:
INDIA’S PLATFORM FOR RESEARCH AND INNOVATION
UNLOCKING THE POTENTIAL IN ENERGY SECTOR

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India is working on a mission mode to build India into a US$ 5 trillion economy by 2025. While the country is pursuing its ambitious goals, one of the key areas to focus on will be sustainable and environment-friendly growth by adopting a greener approach. The energy sector is one of the important catalysts to reach this goal. The energy policy of India mainly focuses on four key objectives: Access at affordable prices, Improved energy security and independence, Greater sustainability, and Economic growth. However, research has indicated that the steady growth of any economy will be possible only through innovations and technological developments for a cleaner and greener environmental ecosystem. This is very much aligned with United Nation’s Sustainable Development Goal 7, “Clean and affordable energy”.

The first goal of SDG 7 is to ensure universal access to affordable, reliable, and modern energy services. India has made multiple efforts through the SAUBHAGYA scheme that aims at providing last-mile connectivity and electricity connection to all un-electrified households in rural areas. This also includes Solar Photovoltaic (SPV) based standalone system for un-electrified households located in remote and inaccessible villages/habitations, where grid extension is not feasible or cost-effective. Though the access to electricity is ramping up efficiently, the major challenge is getting reliable and affordable energy, ensuring commitment to the Net Zero Carbon Emission target. Presently coal contributes more than 70% of total energy consumption. Considering India’s Energy security dependence on coal, attempting to use coal without adding to atmospheric carbon dioxide levels is a major technological challenge. Here is the opportunity where industries may work together with the research and innovation ecosystem, tapping technology development on clean coal energy and technology for trapping greenhouse gases. Many research institutions and Startups in India are working in the area of Coal gasification, Technology development in Carbon capture, Carbon storage or Carbo sequestration. There is also a need for technology development to manage the Coal Based Methane and Coal mine methane effectively.

While India is currently the third-largest energy consumer in the world, its energy demand will grow significantly over the next two decades. India’s quest for energy security could be seen under the framework of four ‘A’s: availability, accessibility, affordability, and acceptability, which is to make energy accessible to all sections and sectors at an affordable price in a socially and politically acceptable carbon-controlled environment. This can only be possible if we focus on the second goal of SDG 7 to increase the share of renewable energy in the global energy mix substantially. India’s current installed power capacity is 404 GW, consisting of coal-based 204 GW (50%), renewable energy sources 114 GW (28%), and hydro 47 GW (12%). Nuclear power generation capacity is 7 GW, gas-based power 24 GW, and lignite and diesel-based 8 GW. The country’s installed capacity is expected to be 820 GW in 2030. In order to keep our contribution of renewable energy to more than 50% overall, it is imperative to focus on exploring various alternative sources of energy that are infinite, renewable and environment friendly. The government has given a massive push in this regard in energy production through solar energy, wind power, hydroelectricity power, biomass, and nuclear energy. However, we still have many challenges where researchers and innovators are playing important role. Many researchers are working on finding solutions for efficient management of variability and storage of Renewable energy to achieve a capacity of 500 GW target. Many innovations at different technology readiness level are available in areas of off-grid technologies; advanced solar PVs, thermal, wind, ocean and others.
Green hydrogen can be seen as a game-changer for India’s energy security and its ambitious decarbonization targets for a country that imports 85 percent of its oil and 55 percent of its gas. With Green Hydrogen Mission in place Indian researchers and Innovators are helping industries to unlock potential by working on challenges like Low-cost Indigenous development of electrolyser, Offshore hydrogen generation, storage, transport, utilization and enhancement of RE applications for Hydrogen production and cost optimisation. Efforts has been made to make more efficient generation from Wind energy and ethanol blending with continuous research. Also, it is crucial to focus on research for safe disposal, recycle/reuse, and reclamation of the useful material on account of batteries, Solar Photovoltaic panels, Wind turbine blades and other wastes - after their useful life.

Upgrading to higher efficiency technology is the need of the hour to support reduction up to 45% of the energy intensity goal of India by 2030. Innovators are working on many emerging technologies like Artificial Intelligence in Microgrids, Blockchain and IoT in Energy Systems, Digitalisation of power plant and cyber security. Technologies for low-cost energy storage and fast charging infrastructure for promoting developments in electric mobility. Technologies for reducing high-electricity transmission and distribution losses and Nan-materials for super conducting and magnetic material application in power sector. Energy efficiency audits and improvements in process and Market ready Innovation from institutions & start-ups will be very useful for MSMEs Sector in India.

India’s ambition of rapid sustainable economic growth will need strong base of research and Innovation ecosystem where each stakeholder should come and work together. Much of the futuristic research are being done by research institutions and start-ups in our country and different products are available at different technology readiness levels. In the rapid transition, the private players have the potential to play a significant role in the energy sector and delivery modes by building collaborative partnerships with researchers and Innovators and ensuring inclusive growth by achieving sustainable goals. According to research, the private investment opportunities in India account to a staggering $700 billion in clean energy.

To facilitate collaborative approach in many of the research areas as mentioned above. The Office of Principal Scientific Adviser to the Government of India has launched Manthan Platform to encourage collaborative projects between Industries and Researchers & Start-ups focusing on Sustainable Developments Goals. Emerging technology & Corporate Social Responsibility project. Industries, Foundation, International and Central and State government etc who can provide opportunity for researchers and start-ups can scout research project and Market ready innovation from 300+ premier research institutions and 65K+ start-ups to support in Clean and affordable energy. This platform also helps to facilitate research and development project by research institutions and to be funded under CSR Schedule VII which are aligned to SDG7 Clean and affordable energy. This platform also brings opportunities from various central line ministries and state governments for researchers, start-ups & industries to work together on a common goal. Covid has highlighted the importance of research and Innovation and working together in a collaborative manner.

It is imperative for the energy sector to develop a strong base of research and innovation ecosystem to achieve sustainable growth.
Equitable And Clean

Energy Access
Is The Key To A Sustainable Future

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At COP26 this past November, governments from more than 200 nations converged in Glasgow to chart a path to a more sustainable and equitable future. The world is watching to see how India, South Africa, and other nations that made major new commitments will deliver on those promises, and what specific steps they will take to reduce emissions and accelerate just energy transitions.

For its part, India announced some significant goals for 2030, including a pledge to reduce its total projected carbon emissions by one billion tons and meet half its energy requirements with renewable fuels. India also declared its ambitious net-zero goal for 2070, as part of its “five elixirs” to combat the global climate crisis. As India and other emerging economies grow, the demand for reliable power will rise significantly, and the next two decades will be key to meeting this demand with a viable, low-carbon pathway.

With the right policies and programs, this pathway can also help tackle another of the world’s most pressing issues: energy poverty. Advances in renewable energy technology have provided us a once-in-a-generation opportunity to bring clean electricity to hundreds of millions of people worldwide who still live without access, and to power the lives and economic aspirations of 2.8 billion people who lack reliable electricity. With a scaled-up and integrated approach to support distributed renewable energy, grid-based renewables, and fossil fuel transitions, we can respond to the climate emergency without leaving these billions of people behind.

A Green Pathway for Growth and Development

To date, global efforts to combat the climate crisis have largely focused on the reduction of emissions in wealthy, energy-rich economies. There has been minimal attention paid to low-income, energy-poor nations that comprise more than half the world’s population but are collectively responsible for just 8% of its carbon emissions and have received only a small fraction of investments in renewables.

While energy-poor countries bear little responsibility for global emissions to date, if they are left out of global energy transition efforts, their annual emissions could grow to more than 75% of global emissions by 2050. Investing in energy-poor economies today is thus vital from both the perspective of global development and climate action.

In Glasgow, the Indian government made an ask of USD 1 trillion in climate finance from developed countries in order to meet its climate commitments in the decade ahead. Developed countries’ decade-old commitment to mobilize $100 billion in climate finance annually to support emerging economies’ energy transitions is yet to be realized. COP26 demonstrated the need, and the opportunity, to build the kinds of partnerships that can provide the financial and technical assistance developing nations need to support transformational energy programs that provide universal access to clean power.

From Commitment to Action, The Road Ahead

Turning commitments to curb carbon and expand energy access into reality will require a significant scaling up of novel financing mechanisms and urgent, organized action from various stakeholders: policymakers, regulators, financial institutions, the private sector, and civil society. Policymakers and regulators must create a conducive environment - designing favourable regulatory schemes, streamlining licensing and administrative processes, and expanding access to open-source data.

For its part, philanthropy can provide grant capital to de-risk investments, especially at the early stages of project development. Together with investments from development finance institutions, this blended finance can also stimulate larger capital flows from commercial investors.

To offer an example of the power of philanthropic and private sector partnership, Smart Power India, The Rockefeller Foundation and Tata Power’s collaboration led to the establishment of the world’s largest rural solar mini-grid venture in 2019, which aims to deploy 10,000 mini-grids that will provide affordable,
reliable electricity to millions across rural India. As of January 2022, 175 mini-grids were empowering over 1.282.200 people as well as 10,000 shops and productive enterprises that have already begun to transform local economies, leading to new jobs and increased incomes. The success of this venture and similar projects in developing markets worldwide led the Rockefeller Foundation, IKEA Foundation, and Bezos Earth Fund to establish the Global Energy Alliance for People and Planet, which launched with $10 billion in philanthropic capital and aligned investments from development finance institutions at COP26. The Alliance will help catalyse the financing, technical support, and regulatory changes needed to accelerate green energy transitions and expand energy access in partnership with emerging economies around the world.

There is still a lot to be done if the world has a hope of meeting the commitments made six years ago in Paris, commitments that were reinforced last year in Glasgow. But with practical solutions for project delivery and finance, and the right approach to policy and partnership, we can build a world where the transition to renewable energy empowers everyone, everywhere.

EMPOWERING YOUTH TO BECOME AGENTS OF CHANGE IN CLIMATE CRISIS

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Across the world as the climate crisis goes from theory to a reality with floods, massive forest fires and many other climate emergencies, governments and individuals are embracing the wisdom that we do not inherit the earth from our ancestors, but rather borrow it from our children. When we see the challenge from that perspective, the role of the youth in furthering the conversation on sustainable development is more important than ever before. And the issue is critical—according to the Intergovernmental Panel on Climate Change, by 2040, the world will have warmed an additional 1.5 degrees Celsius. Every other problem we face as societies seem to pale in comparison to the climate crisis.

To foster a positive change, youth are crucial to facilitating large-scale change. Young people are likely to be most impacted by climate change and they also have the power to turn this around by contributing to achieving the climate goals necessary to meet the challenge.

The last episode of Flip The Switch podcast deep dives into mainstreaming the role of young people in energy and climate. And there are few people more qualified to do that than eminent young climate activist Eduarda Zogghi, a political scientist and alumna of Columbia University. Zogghi was also recently selected for the Atlantic Council’s Women Leaders in Energy Fellowship and led the expansion of Columbia University’s Women in Energy programme to Brazil. She discussed the challenges of the impact of climate on future generations. She also explained the importance of youth, especially young women, joining this process to shape better policies through technology deployment and reach rural communities and those most vulnerable.

Zogghi’s passionate plea throughout the conversation focused on the importance of education, innovation and technological development as central to fixing the climate crisis. “The conflicts we see today for natural resources are going to be exacerbated,” she emphasised.

She sees the energy sector as crucial for future decarbonization. “Two thirds of the global population do not have proper access to electricity. In Africa, the population under 35 represents almost a billion people, accounting to 23% of the world’s total youth population and Asia has 38% of the world’s youth. So, when thinking of solutions, we must ask ourselves how can we integrate young people in all continents to be part of the solution? How can they lead a decarbonized society through adequate support, finance, mentorship from leaders?” Zogghi thinks it is therefore vital to engage young people in various levels of education.
The role of youth is key

When asked about the role of youth in climate intervention, Zaghbi believes green jobs hold the answer. As part of networks such as Student Energy, the SDG7 Youth Constituency and BRICS Youth Energy Agency, we work together from the bottom up, talking to local governments, reviewing policy documents and consulting with young people on what they want to see in the transition."

She reminisces that as a climate activist in the early 2000s, when she was just 12, it was inconceivable to visit law enforcement agencies. But now she is witness to the massive change of how more and more young people are involved in every sphere and aspect of society working with climate issues. "We are in the process of building the capacity of future leaders and working with young people across countries to empower them to understand what climate change means."

And Zaghbi insists that young people make a huge difference — "We have enough data to say that young people are the most threatened generation as they are the most vulnerable to climate change. We need young people to learn at an early stage how to discuss challenges in a multicultural environment, negotiate and represent the interests of their countries at a global level."

Getting women involved

But she also warned about the urgency of the situation. "To change the world, we need to act immediately. Young people must adopt renewable energy solutions to tackle climate change and work with policymakers and businesses to make a difference." However, in her experience, she stated that not enough emphasis is being given to involving young women in conversations.

"There is an issue not just in terms of integrating women and having them participate in the process, but also in decision making. For example, public lighting is a critical factor in protecting women in their daily lives related to energy access. But women barely make the cut as urban planners, architects and engineers involved in placing public lighting in cities. All stakeholders should seek to create space for women and young people in all industries to participate in developing our world's energy future."

She explained that there is an absence of a gender lens in policymaking in most countries: women in global parliaments are barely visible. "In Brazil, I think we rank 153 out of 180 countries in terms of female participation in Congress. We have fewer than 12% of women involved in decision-making positions."

Zaghbi urged energy organisations and companies to offer opportunities to young women. Her conversations with undergrad women through "Women in Energy Brazil" have made her understand the lack of work opportunities for young women in the energy sector.

"Gender lens is crucial if we want women to occupy a larger space in the energy industry. Consider gender and energy as together: One is female participation in the workforce, especially in decision-making positions, but also acknowledging women's role as energy consumers, different than men's responsibilities."

The affordability question

While it is essential to democratize energy access for all stakeholders, Zaghbi also emphasized the affordability issue due to the surge in energy prices. "Introducing electric vehicles to countries is an excellent move towards reducing carbon footprint, but we forget that most communities are struggling to survive. We must look at affordability, how to shape demand, view energy tariffs, models that work and those that do not. In my experience, Latin American and African countries have led the solar energy movement to enable low cost for communities."

In this era of universal access, one must remember that no country is immune to climate change. "Energy is a catalyst to improve people's lives and should not be treated as an object." When asked about her vision of a constructive, climate-empathetic workforce in the future, Zaghbi highlighted the Global Youth Energy Outlook study, where youth from across the world are interviewed on how they can make a difference by transforming an idea into action.

"While there is hope and opportunity, much needs to be done by governments, businesses and civil society organisations in imparting energy education, training and mentorship to youth and women to become sustainable energy consumers and energy leaders in the future."
Putting Equality and Development at the Heart of a Clean Energy Transition

Damilola Ogunbiyi, Special Representative of the UN Secretary-General for Sustainable Energy for All and Co-Chair of UN-Energy

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

In his seminal essay, ‘Poverty and Famines,’ Amartya Sen makes a seemingly obvious yet deeply profound statement: “Starvation is the characteristic of some people not ‘having’ enough food to eat. It is not the characteristic of there being not enough food to eat.” He goes on to unpack concepts of democracy, entitlements, and rights as determinants of mass hunger, and addresses the place of the non-poor in a whole-of-society approach to poverty. What Sen was raising in his examination of famines 40 years ago applies to the discourse on climate change today. The question that we must contend with now is the inverse: how do we ‘include’ the poor in our approach to a crisis that was a direct outcome of wealth and consumption?

Until recently, much of the discussion around green energy transitions rightly centered on the role and responsibility of rich nations. The principle of ‘common and differentiated responsibility’ enshrined in the Rio declaration 30 years ago remains essential. At the same time, the dialogue has been somewhat paternalistic, wherein we talk about climate mitigation by the rich countries, and climate adaptation for the poor. We rarely talk about the poor in rich countries, and even less so the rich in poor countries. We need a far more convergent mindset.

The inability to access and consume reliable power is a massive constraint to opportunity and upward mobility for the world’s poor, 70% of whom are women. A 2021 study conducted by the Oxford Poverty and Human Development Initiative concludes that “electricity is the most interlinked indicator in the global Multi-Dimensional Poverty Index (MPI), and three quarters of the global energy poor are multidimensionally poor...this turns energy poverty in one of the strongest predictors of multidimensional poverty.”

The Energy for Growth Hub has defined the idea of the Modern Energy Minimum, a threshold of 1,000 kilowatt hours of electricity per capita consumption as the minimum viable level needed to drive opportunity and economic mobility. Yet in sub-Saharan Africa today, only five of 46 countries consume above 1,000 kWh per capita, and only South Africa is above 3,000 kWh. Put in starker terms, an average American today consumes 27 times more electricity than the average African. As the table below clearly illustrates, there are no high-income, low-energy economies on the planet.

As we look at the intersection of extreme poverty and energy poverty today, the data shows that the two are largely concentrated in the same districts, provinces, and countries around the world. We need to fight poverty in precisely the places where people are living without modern energy. In other words, if we want to end poverty, we must end energy poverty, and the tool to fight both is the same: electrification.

A fascinating new Stanford University-led paper in Ecosphere analyses energy use in 140 nations from 1971-2018 against nine metrics, including life expectancy, infant mortality, happiness, and economic performance. Their finding that increased energy use and well-being are highly correlated is unsurprising. However, the study reveals that this correlation ends at consumption levels far below the current average in the United States and other wealthy nations.

What this implies is that investing in a clean energy future that increases per capita consumption of electricity for lower- and lower-middle-income nations is going to be necessary if we want to expand human well-being, build societal equality and resilience, and move irreversibly towards a more secure climate future. It is egregious that in the 21st century, hundreds of millions of people – so many of them women and girls – remain locked out of opportunity, and their inability to access and consume sufficient energy is at the heart of the problem. Equally concerning is that at the current rate of progress, 650 million people will still lack access to electricity in 2030, the vast majority of them in Africa.

Unfortunately, recent global crises have put vulnerable populations at even greater risk of being left behind. The Covid-19 pandemic has highlighted and deepened the vast inequalities and impacts that come with a lack of access to energy, especially for women. As economies slowly recovered from the impacts of the pandemic, oil and gas prices increased as supply remained constrained – even before the markets were thrown into greater turmoil in the wake of the conflict in Europe. Price spikes have hit consumers at the fuel pump and in the supermarket, with a global food crisis exacerbated by the centrality of natural gas for fertilizer production. Public budgets have not been spared, with rising fuel subsidy costs putting a strain on government accounts in cash-strapped developing economies. Global aid is also being redirected away from energy-poor economies towards the
crisis in Ukraine.
For many leaders and citizens in the developing world narratives of a dystopian climate future ring hollow when the present holds so many challenges — from addressing extreme poverty and hunger, to creating jobs for a burgeoning young population, to expanding opportunities for women to participate equally in the economy, or to delivering critical social services in a highly constrained fiscal environment.

But this isn’t a zero-sum game. We must view the ongoing global crisis as an opportunity to take bolder action on clean energy investments that will boost energy security for all. This requires a serious global effort to drive investment and technical support for the design and implementation of comprehensive integrated energy plans in energy-poor countries. Yet last year, Sustainable Energy for All’s Energizing Finance report found that investment for residential electricity in 20 countries home to 76% of the global population without electricity was less than one-third of the $41bn that is estimated to be needed globally per year. Finance also fell disappointingly short of the $4.5bn required for clean cooking. This must change.

We also have an unprecedented opportunity to turn a green energy movement into a gender equality revolution. It is well documented that women are more vulnerable to the impacts of climate change, both directly and indirectly. In many regions where women are traditionally responsible for domestic and unpaid work, including the production and consumption of household energy, their lives and livelihoods are at far greater risk from the impacts of extreme weather events. With so much growth and investment projected, it is therefore essential that the renewable energy industry serve as a rising economic tide for women who are so often shut out of traditional sectors of the economy. This can happen in two ways.

First, women-owned local enterprises can be given expanded support to take advantage of the arrival of new clean electricity solutions. In Sierra Leone, GEAPP has partnered with CARE to launch the Solar Harnessed Entrepreneurs (SHE) initiative, which will work in 20 locations that have been recently electrified via solar mini grids to start and grow businesses. They will provide financing and technical assistance for productive-use appliances, business training, mentoring, and enhanced market linkages to help grow 400 businesses that benefit 7,000 women. CARE will test and refine the more effective models and develop a blueprint to scale profitable, sustainable renewable energy-enabled businesses for women that can be replicated in mini grid sites across other priority GEAPP markets.

Second, we must ensure that women benefit disproportionately from the jobs that are being created along the renewable energy supply chain. In East Africa, GEAPP is working with Shortlist on their Women for Green Jobs (WGJ) initiative, which will train and place women directly into jobs within 40 green energy companies across six countries in sub-Saharan Africa. The goal of this effort is to develop large, sustainable talent pools of women, to incentivize and support energy companies in the hiring and retention of female talent, and to develop an open-source database that will continue to be used by green energy companies after the duration of this grant. Shortlist will initially place 750 women in jobs through a wage subsidy scheme and anticipates an additional 15,000 women will be placed in green energy positions over the next few years.
Achieving Sustainable Development Goal (SDG) 7—universal energy access—will require a drastic reimagining of how we deliver energy services for households, businesses, buildings, transport, and public services. This has the potential to transform.

the status of several other SDGs, from improved nutrition and food security, good health and well-being, quality education, reduced inequalities, and climate action. The SEforALL Forum in Kigali this May will gather a wide range of global leaders to measure progress and identify solutions to achieve faster, broader gains towards SDG7. Officials from the public and private sectors of Africa and Asia, as well as youth leaders driving our clean energy future, will together shape what a just and equitable energy transition looks like across economies at different stages of development and raise ambition for scaled-up finance and investments for clean energy programs ahead of COP27.

Amartya Sen is often quoted for his assessment that, ultimately, “poverty is the derivatio
SPI Publications 2022

The ‘Solar PV Mini-grid Systems Design, Installation, Operation and Maintenance Guidelines - A Handbook for Engineers and Developers’ is a ready-to-practice handbook for mini-grid engineers and developers to address gaps in developing and replicating mini-grid projects at scale and sustainably. It provides engineers and developers with specialised knowledge of how to enhance their existing skills and implement safe and reliable solar PV mini-grid systems by following the best practices in design, installation, operation, and maintenance. The handbook has been compiled by Smart Power India with the help of different training materials and resources available at the GSES library, references of relevant IEC, NEC, and AS/NZS standards, and GSES India’s in-house expertise and experience.

‘Green Pathway Through Distributed Renewable Energy’, a white paper by Smart Power India team, explores the potential of ‘Distributed Renewable Energy (DRE) Systems’ to meet the energy needs of rural India. It explores positioning of distributed renewable energy systems while addressing the challenges to inherent to decentralised generation and distribution. The paper culminates with 10 key recommendations for the DRE sector by experts from Smart Power India and GIZ.

‘COP27: Envisioning an Equitable Green Transition’, in collaboration with Research Triangle Institute (RTI International) assimilates outcomes from the recently concluded COP 27. It is a must read for those invested in making the fight against climate change more equitable and sustainable.

All SPI publications can be accessed at smartpowerindia.org/knowledge
10 point Agenda for increasing the Adoption of distributed Renewable Energy in India

Following are the 10 key recommendations for the distributed renewable energy (DRE) sector by experts from Smart Power India and GIZ, featured in SPI’s white paper - Green Pathway Through Distributed Renewable Energy

1. Scaling up of mini-grids while maintaining their distributed nature can bring in cost efficiencies and reduce risk by distributing revenue over a larger customer base. This will, however, require an investment of $25-50 million in capital.

2. Partnership from various stakeholders, like original equipment manufacturers or OEMs who provide electrical motors, value engineering or value chain partners, could enhance value of DREs.

3. Power generated through DREs can be put to productive uses in mobility, healthcare (telemedicine), income generation from farm activities by adding cold storages or cold rooms for vegetables and fruits, and even for non-farm activities thereby decreasing dependence on fossils.

4. More research is needed to bring more efficient cooking solutions that can also be linked to mini-grids.

5. The role of mini-grids becomes important for a green recovery from COVID-19 hit economy. A concerted policy approach just as in the case of solar water pumps needs to be devised.

6. Finance being a major catalyzing factor for DRE developers and their customers, micro-finance institutions should be encouraged to invest in setting up distribution infrastructure and help customers buy both appliances and connections.

7. Evolving a sustainable and robust business model around mini-grids, where all the stakeholders can benefit.

8. Availability of quality power can be an incentive for setting up training and skilling institutes especially among labour who have returned after COVID-19 induced lockdown and do not want to return to city centers.

9. Changing behaviour of local community towards use of electricity especially through energy efficient appliances. Work with them to align their productive activities along with the sunshine hours to transition loads from the night-time to day-time.

10. Creating or introducing sustainable technology partners and helping Energy Supply Companies (ESCOs) overcome problems to create a sustainable distributed renewable energy systems model.
Smart Power India facilitates world’s largest portfolio of mini grids

Electricity-starved Nagaland installs solar mini grids to solve the problem

Husk Power Systems bags $4 mn finance for rural microgrids in India

Smart Power India, Adani Solar to promote solar energy usage in rural areas of 4 states

Cholera tragedy in Indian village sheds light on power debts
#GreenTheGap
A campaign that signifies catalysing sustainable economic growth with greater adoption of green energy and providing reliable energy access at the last mile without compromising on our climate goals.

#SolarSeSamridhi
An awareness programme amplifying on ground activities including a road show, nukkad natak and workshops promoting the benefits of adopting rooftop solar for small businesses in Varanasi & Mirzapur districts of Uttar Pradesh.

#RooftopSolarSimplyPut
Discussions on key factors contributing to the growth of Rooftop Solar for rural MSMEs in India.

#FlipTheSwitch
Discussions hosted on a podcast on Glasgow Pact, role of women in energy access and the challenges and opportunities in clean and reliable energy access.

#SEforAllTakesOverSPI
A social media takeover by SEforALL on our Twitter channel under the theme of ‘DRE and Transformational Country Partnerships’.

#PowerPeoplePlanet -
Conversations dedicated to three important pillars of the energy ecosystem power, people and the planet.
01

Energy Transition Asia Pacific 2021:
Mr. Jaldeep Mukhej shares his thoughts on equitable energy access, opportunities surrounding the energy transition, also providing potential to generate broader socio-economic benefits.

02

S P I
PARTNERS
MEET

Simon Harford, CEO, GEAPP, visited India and shared GEAPP’s vision with the partners and stakeholders in India.

03

Inauguration of mini grid plant at Mon, Nagaland

Inauguration of the first mini grid plant in Mon, Nagaland with installed capacity of 25.15 KWP that powers households and enterprises, in collaboration with MORS.

04

Sustainable Energy for All FORUM Kigali 2022

Mr. Jaldeep Mukheji highlighting the reliability of power is crucial for SMEs. With high diesel usage due to low customer awareness, fragmented market & apprehension from financiers.

05

S O L A R  S E
SAMRIDDHI

A campaign to promote the adoption of Rooftop Solar in micro-enterprises and catalyse the energy transition for millions of micro-enterprises by putting in place structural elements to support the market players.
06

Partnership with Renewable Energy India

07

The Economist Impact: Future of Energy Week 2022

Mr. Jaideep Mukherji highlighted that Distributed renewable energy systems can chart a green pathway for the EnergyTransition and accelerate energy consumption in underserved & vulnerable rural communities.

09

Roundtable discussions on the benefits of DRE in Nagaland- 2022

A roundtable discussion to create awareness on the benefits of DRE in Nagaland, sharing the key findings of the pilot project with the key stakeholders.

10

SPI Retreat- 2022

SPI team’s rejuvenating retreat in the beautiful city of Udaipur, Rajasthan, where the team got an opportunity to unwind and celebrate together.
Smart Power India (SPI), a subsidiary of The Rockefeller Foundation was founded in 2015 to implement the Smart Power Initiative of the Foundation. SPI enables access to power to the under-served with the larger aim of ending energy poverty and transforming livelihoods. To this end, we are working towards building and nurturing ecosystems to promote sustainable and scalable models to deliver electricity access.

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