



## Powering Jobs Census 2022: Focus on India

**POWER** FOR ALL



*Good Energies*  
BY PORTICUS



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## The Powering Jobs Census 2022 Series

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- » Focus on Ethiopia
- » Focus on India
- » Focus on Kenya
- » Focus on Nigeria
- » Focus on Uganda

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# About

## About This Report

Coordinated and led by Power for All, the #PoweringJobs campaign and the Powering Jobs Census 2022 are made possible through the generous support and encouragement of The Rockefeller Foundation, Good Energies Foundation, GET.invest, and a coalition of research and implementation partners.

## About Power for All

Power for All is a stakeholder coalition campaigning to rapidly scale the deployment of decentralized renewable energy to achieve universal electricity access before 2030. Decentralized renewables, specifically solar appliances and systems designed for households, businesses, and productive use, offer the fastest, most affordable, and cleanest path to electricity access for all. Power for All brings together more than 300 business, finance, research, and civil society organizations to achieve that goal.

## Acknowledgments

#PoweringJobs partners contributed to data collection and analysis, interpretation of results, and feedback on the report. Global and national steering committees and peer reviewers provided expert guidance.

### Research Partners

- » CLEAN Network
- » Council on Energy, Environment and Water (CEEW)

### India Steering Committee

- » CLEAN Network
- » Climate Trends
- » Council on Energy, Environment and Water (CEEW)
- » Husk Power
- » Hydrogreens Agri Solutions
- » S4S Technologies
- » SELCO Foundation
- » World Resources Institute India (WRI India)

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# 1. Introduction

## 1.1 Report Objectives

Economies and labor markets are currently facing many challenges globally. Existing vulnerabilities, such as high youth unemployment and widespread energy poverty, combined with severe pandemic lockdowns have worsened livelihoods and deepened socio-economic crises in sub-Saharan Africa (SSA) and South Asia (SA). In comparison to the standard grid extension strategy, DRE can now provide underserved populations with faster, cleaner, and more affordable energy while also generating sustainable jobs that boost local economies. *Powering Jobs Census 2019: The Energy Access Workforce* was the first study of the prevailing employment landscape of the decentralized renewable energy (DRE) sector and demonstrated the sector's great capacity to contribute to the creation of quality jobs [1].

This study is part of Power for All's Powering Jobs Census 2022 series, which examines the labor market for the DRE industry in Ethiopia, India, Kenya, Nigeria, and Uganda. The DRE industry, which includes pico-solar appliances, solar home systems (SHS), commercial and industrial (C&I) standalone systems, and mini-grids, has an important role to play in the current global context. The technologies that comprise the DRE sector are essential to achieving universal energy access (Sustainable Development Goal 7), but the sector also contributes to achieving Sustainable Development Goal 8 through job creation.

*Powering Jobs Census 2022: The Energy Access Workforce* [2] is a bottom-up count of employment in the DRE sector. Through direct surveys of over 350 DRE companies, the study consolidates employment data for the period spanning 2019 to 2021, and also includes employment and sales projections for 2022 and 2023. Primary data from the surveys, along with existing literature on the DRE sector, was used to estimate total DRE employment at a national level. The data collection and analysis were complemented by five focus group discussions (FGDs), one in each focus country, that helped validate the main results of the census and obtain additional qualitative information and context. For details regarding methods, sample characteristics, definitions, and scope of analysis refer to the global report [2].

This report breaks down the research results for India, focusing on the country's DRE employment landscape, labor market features, and workforce profile. The latter includes the participation of women, skill levels and training in the sector, and compensation. The

findings of this study can be used to raise awareness of the DRE sector's potential for job creation and to spark conversation about how to train the workforce for energy access. As India's unemployment problems worsen, the deployment of DRE systems exhibits significant possibilities for employment generation.

## 1.2 DRE Sector Landscape in India

### Current Status of Electrification

In recent years, India has undergone a massive rural electrification project. The World Bank estimates that access to electricity in the country went from 55% of the population in 2001 to 99% in 2020 [3]. While India is considered a fully electrified country, most of the households in rural villages are living "under the grid". This means that, while they fall within the power distribution area, they have an unreliable power supply, unscheduled power cuts, low or inconsistent voltages, or no electricity at all. The latter could be due to an inability to afford a connection or unwillingness to pay for a low quality service [4]. Thus, improving the quality of connections is a necessary condition for improving energy access.

Access to continuous and reliable electricity remains a challenge not just for households, but also for commercial and industrial customers in India [5]. Rural and agricultural customers suffer the most from the intermittent and low-quality supply of power, which results in a low quality of life for households and reduced output for farmers. These customers would benefit the most from DRE (particularly off-grid solar) technologies, which have already been shown to improve grid reliability and extend energy access [6].

The government of India has set an ambitious renewable energy target of 450 GW of installed capacity by the end of 2030. Solar energy represents almost 60% of the target, and the government aims to deploy 40 GW of rooftop solar (including small-scale, grid-connected solar projects) [6]. To date, the Indian government has prioritized large-scale solar projects, connected to the grid, as the primary focus of renewable energy expansion. However, achieving India's ambitious renewable energy targets will also require a significant increase in DRE projects.

### Current State of the DRE Sector

The high market potential for DRE technologies in India is due to its massive unelectrified population, which is estimated at 6.6 million households [7]. The Indian government has set a target of installing up to 2000 MWp for off-grid solar PV applications that include solar lamps/lanterns, solar pumps, and SHS [8]. However, the full potential of DRE technologies remains untapped due to a plethora

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of factors such as lack of access to finance, limited policy support, and a limited pool of qualified workers. For example, the rooftop solar sector is underdeveloped due to a lack of access to institutional finance, both in the form of debt and equity. The current rooftop solar installed capacity is 5.25 GW, far away from the government's target of 40 GW for the end of 2022 [6],[9].

Solar mini-grids can provide last-mile electricity access in villages where the grid is unreliable or does not serve the entire population. While grid electricity remains the most common source of electricity among rural households, rural enterprises are increasingly taking up mini-grids as an alternative when grid reliability is problematic [10]. Although mini-grid customers often pay more for electricity (since grid electricity is heavily subsidized), they are willing to pay a premium for the superior quality of service offered by a mini-grid compared to the main grid [11].

### Policy Landscape

India's clean energy targets are driven by a need to cut carbon emissions, improve living standards, prevent climate-related risks, and generate socio-economic benefits [6]. For instance, achieving the 40 GW distributed solar target can create more than 500,000 short-term jobs and over 100,000 full-time jobs [12]. Acknowledging these benefits, several Indian states—with support from the central government—have created favorable policies for DRE technologies [6]. The mini-grid industry has also seen fast changes in the policy and regulatory environment to support the deployment of projects. For instance, some Indian states have deregulated the mini-grid market such that companies are exempt from licensing and tariffs are set via mutual negotiation between the customer and the developer [13], [14]. Mini-grid developers are taking measures to increase the rigor of governance and equity in community-owned mini-grids [13]. For instance, some developers provide loans to women entrepreneurs to finance the upfront investment of productive-use equipment. Such initiatives can result in better-managed mini-grids with higher load factors, which leads to increased profitability [13].

### Future Prospects for the Sector

Several DRE technologies are already contributing to bettering people's lives in India, and their growth potential is promising. With the government's ambitious renewable energy targets, off-grid solutions will play a key role in decarbonizing the economy, increasing energy reliability in underserved regions, and improving the living conditions of marginalized people. The Indian market also holds great potential for other DRE technologies such as solar water pumps and solar cold storage technologies. In India, only around 50% of agricultural land is under irrigation [6]. This gap presents a

market opportunity to provide solar-based irrigation solutions to around 80 million households [6]. Since access to reliable grid electricity is a challenge for rural populations, there is an opportunity for solar-based cold storage solutions to penetrate the market.

Access to finance remains a challenge, especially among end-users (primarily due to financiers' reluctance to invest in the sector). In addition, high-interest rates and collateral for bank loans continue to hinder growth. To realize the full potential of DRE technologies, companies require an enabling business environment that allows them to thrive and contribute to providing clean and affordable energy while creating green jobs. Increased collaboration between government, private sector, and academia will also prove crucial to strengthening the DRE sector. In addition, it will be necessary to close the skills gap through training and standards and further promote the participation of women [15].

## 2. Labor Market Features

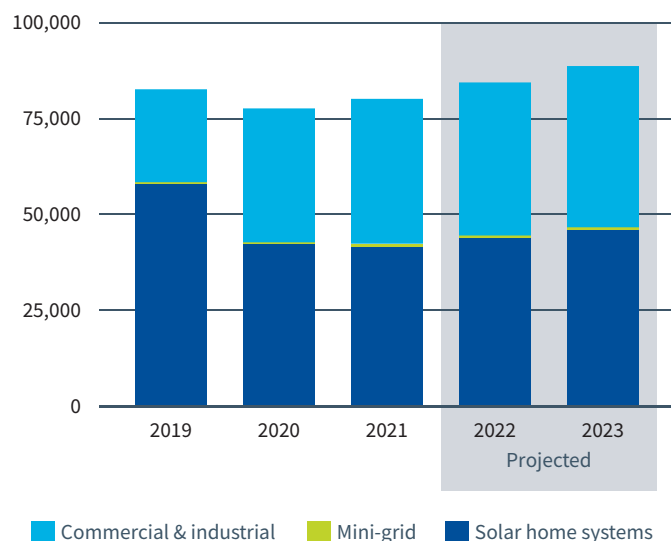
### 2.1 Employment Estimates

The Powering Jobs Census 2022 data indicated that the Indian DRE sector employed more than 80,000 workers in 2021. The highest employment numbers were recorded pre-pandemic, in 2019, with over 82,000 jobs in the sector. Despite some loss in employment (of less than 2.5%) between these years, the DRE sector showed impressive resilience compared to other sectors of the economy. For example, COVID-19 had a significant impact on the Indian broader renewable energy sector, which resulted in a 48% decline in employment in 2021 compared to 2019 [16]. The wind and utility-scale solar sectors saw a 45% and 42% decline, respectively, in the number of workers in 2021 as compared to 2020 [16].

To combat the spread of COVID-19, India introduced one of the most severe lockdowns in the world, which slowed down economic activity in all sectors [17]. The DRE sector saw decreased demand for products and services as well as supply chain disruptions [15]. Hence, the sector's sales performance was lower than the previous year, which forced some companies to lay off staff [15]. However, the Indian DRE market was able to bounce back quickly and is expected to regain its pre-pandemic level of employment by the end of 2022 (see Figure 1).

There are several reasons behind the quick bounce back of the DRE sector in India. The main reason is the impressive rebound of the overall Indian economy after the downturn caused by the

**FIGURE 1. TOTAL DRE SECTOR DIRECT EMPLOYMENT IN INDIA**

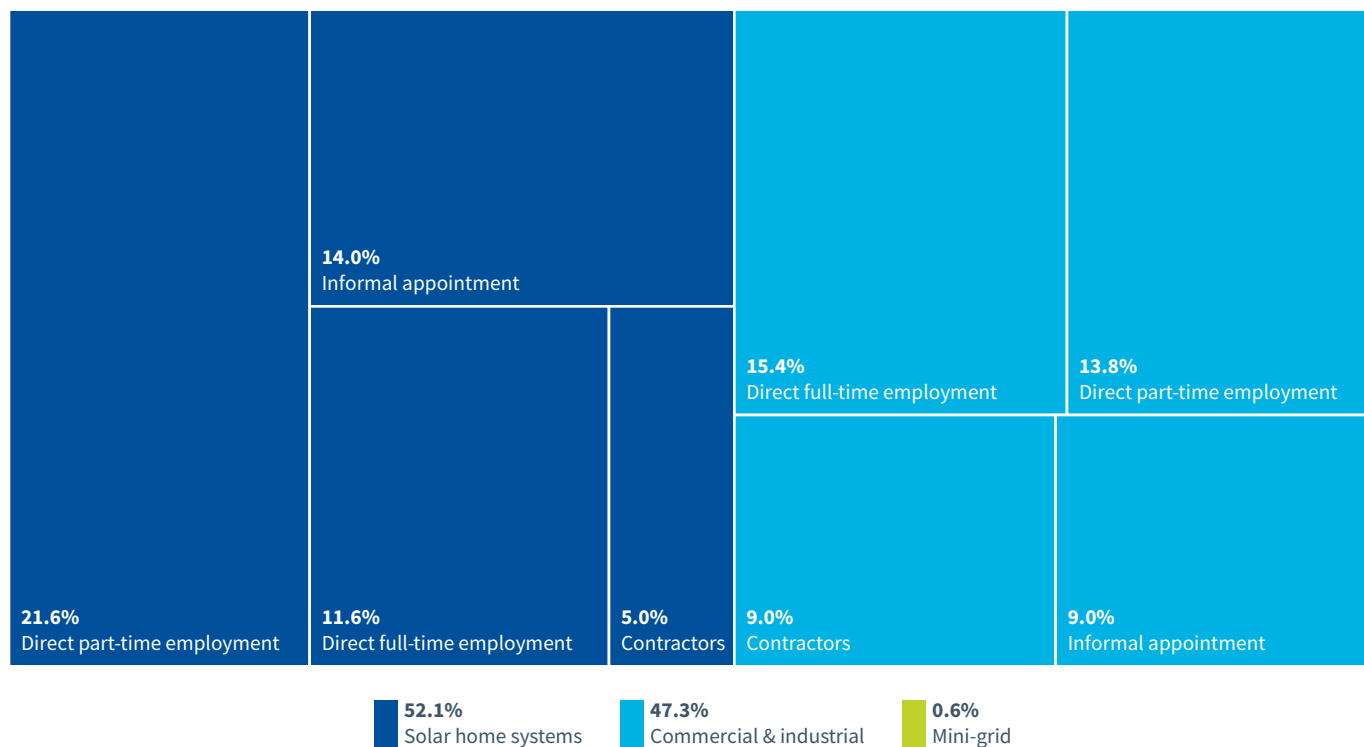


Source: Data from Power for All (2022); market size estimates from GOGLA (2022) and IRENA (2021)

pandemic [18]. The rapid increase in economic activity has encouraged Indian rural households to spend their disposable income on DRE products. Second is the strong capacity of DRE companies to raise funds. In 2021, DRE companies raised close to US\$20 million [15]. While this is about 10% less than the total funds raised in 2018, the allocation of funds seems to have been directed towards more resilient and successful DRE companies [15].

According to the results of the Powering Jobs Census 2022, the DRE sector in India is expected to employ close to 89,000 workers in 2023, based on market size estimates and survey projections. The latter are used to compute the employment factor, a measure of how many workers are employed per unit of DRE products sold (or per MW of installed capacity for mini-grids and C&I systems), for 2023. By the end of 2022, the DRE sector is expected to achieve a higher level of employment than in 2019 and continue growing into 2023. The demand for C&I technologies such as rooftop solar has been increasing while total annual sales of SHS have been declining in India since 2019 [16], [19], [20]. Hence, the growth in the C&I segment is expected to be the major driver of DRE job growth in the next few years.

**FIGURE 2. SHARE OF DRE WORKERS BY TYPE OF TECHNOLOGY AND LEVEL OF FORMALITY IN 2021**



Source: Data from Power for All (2022); market size estimates from GOGLA (2022) and IRENA (2021)

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## 2.2 Employment Types

The pico-solar/SHS and C&I sectors account for almost an equivalent proportion of DRE sector employment. This makes the Indian DRE sector unique compared to other major DRE markets where the SHS sub-sector fully dominates sales and employment. The high penetration of C&I systems and the diversity of product offerings are a testament to the maturity of the Indian DRE sector. Figure 2 demonstrates the share of employment creation by various technologies and types of employment.

In the coming years, the Indian DRE sector is expected to shift away from SHS and towards C&I and mini-grid technologies [21]. This will result in a decline in total units sold for SHS products despite the increase in the average capacity of DRE products [21]. This is a sign of maturity of the Indian DRE market. Maturity is defined by various indicators including, but not limited to, diversity of DRE product offering, level of consolidation, sustained growth, and access to finance including debt investment [22].

The maturity of the Indian DRE sector will have an impact on employment creation in India since pico-solar and SHS technologies are the most labor-intensive. As they lose additional market share to C&I standalone systems and mini-grids, direct employment

creation is likely to drop—especially in sales and distribution jobs. On the other hand, indirect and induced jobs are expected to rise as the employment contribution of larger DRE systems comes largely through supporting commercial activities in local villages, such as small retail shops and restaurants. For instance, in some countries, the mini-grid sector has demonstrated its ability to create indirect and induced jobs. AMDA's *Benchmarking Africa's Minigrids* report shows that mini-grid developers created 621 local village jobs and 402 central staff jobs from 2010 to 2019 in 288 sites across western, central, eastern, and southern Africa [23].

As can be seen in Figure 2, informal workers in DRE account for only 23% of the sector's total employment in India, far lower than the overall level of informality in the country. India has relatively high rates of informal employment, close to 88% [24]. The Powering Jobs Census 2022 estimate for the share of informal DRE jobs in India is far lower than the 2018 estimate from the Powering Jobs Census 2019, signaling a trend of declining informality in the sector.

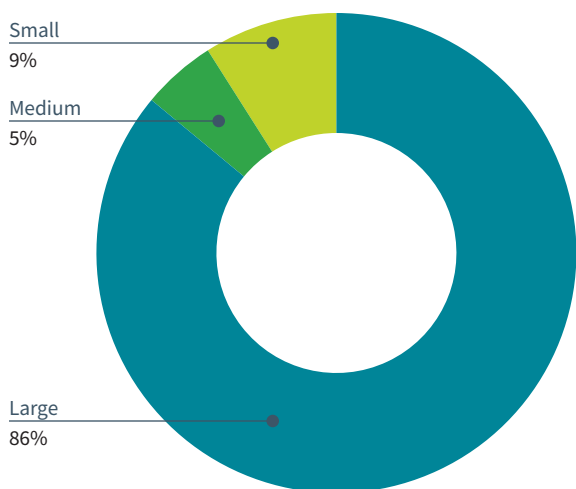
Lower levels of informal employment are evident, not just in the DRE sector, but across the entire economy of India. The contribution of the informal sector to India's GDP declined from 53% in 2018 to 20% in 2021 [25]. There are two main factors that have contributed to the relatively lower levels of informal employment

### Box 1: Solar Manufacturing

Countries can now enter a relatively high-technology, “green” industrial sector by engaging in solar manufacturing. Due to the decrease in the price of photovoltaic (PV) modules, shipping and transportation expenses now make up a larger portion of the overall cost of PV installations. Thus, local manufacturing (or even assembly) can significantly lower the costs of off-grid solar installations. Another good reason for governments to support local solar production is to reduce their vulnerability to geopolitical upheaval and developments, i.e. solar production provides a form of energy security. Supply disruptions and delays can be avoided if the complete value chain could be developed within a single nation [26].

During the last decade, India has been a major deployer of solar PV, having installed approximately 50 GW. Since 2021, there has also been a lot of interest in establishing the country's solar manufacturing chain, from polysilicon and wafers to cells and modules [26]. Several companies have announced and begun solar manufacturing as a result of a slew of government policies and incentives such as the Production Linked Incentives (PLI) scheme, which provides government assistance to companies who set up solar manufacturing plants and a 25% customs duty on PV cell imports to make locally produced products competitive against imported ones [27]. It is expected that by 2025, India will have developed approximately 40 GW of modules, some of which will have full or partial upstream integration. This would place India among the top two or three solar manufacturers in the world and would allow the country to meet its energy needs as well as its carbon emission commitments by 2030, while also ensuring energy security. Finally, this manufacturing push gives India the opportunity to become a major exporter and supplier of solar components to the rest of the world [26].

**FIGURE 3. SHARE OF EMPLOYMENT BY SIZE OF FIRMS**



Source: Power for All (2022)

in all sectors. First, job loss during the pandemic (mostly as a result of lockdown measures) disproportionately impacted informal workers, who, among other things, lack job security. As a result, the share of informal employment decreased. While the formal sector has been able to recover quite quickly, the informal sector is still struggling to achieve a pre-pandemic level of economic output. In addition, there has been a growing push by the government of India to improve the formalization of the economy through initiatives such as the eSHRAM portal, a centralized database designed to provide welfare and social security schemes for informal workers [25].

### 2.3 Size of Firms

The Indian DRE sector is composed of a diverse set of companies. In the Powering Jobs Census 2022, Indian DRE companies are classified into three groups based on their number of employees. The first category is large DRE companies, defined as those companies employing more than 100 full-time employees. The second category is medium-sized companies, which employ more than 25 but less than 100 workers. The last category is small companies, which employ less than 25 workers. Figure 3 illustrates the distribution of DRE employment by the size of companies.

Employment in the DRE sector is dominated by large companies that on average employ more than 100 workers. The dominance of large companies can be considered a sign of the level of maturity of the Indian DRE sector. As the DRE sector grows, there is a tendency for consolidation in the short run. In the early phases of the

sector, DRE services are dominated by the larger companies that integrate the various stages of the DRE service provision (e.g. sales, installation, after-sales) [28]. Over time, however, the smaller local enterprises are expected to populate the market. The dominance of large companies may also have been exacerbated by COVID-19. When demand for DRE products declined as a result of the pandemic, smaller companies that relied on day-to-day sales were affected the most [29]. On the contrary, larger companies with better human and financial resources were able to survive the economic shock caused by the pandemic [29].

Finally, there is likely an under-representation of smaller companies in the survey—which is not uncommon in informal economies. Participating DRE firms validated, in a focus group discussion conducted as part of the Powering Jobs Census 2022, that the sector is dominated by large companies but the number of employees working for smaller companies may have been underestimated. Some smaller companies may not have a formal address, making it harder to reach out to them. In addition, the survey was originally prepared in English, which may have posed a language barrier for some DRE companies. The survey was later translated into Hindi, improving smaller company participation; however, this still misses out on representatives of companies who speak other languages. Furthermore, FGD participants indicated that larger companies outsource their projects to smaller ones but lack visibility into the number of employees those smaller companies have.

## 3. Workforce Profile

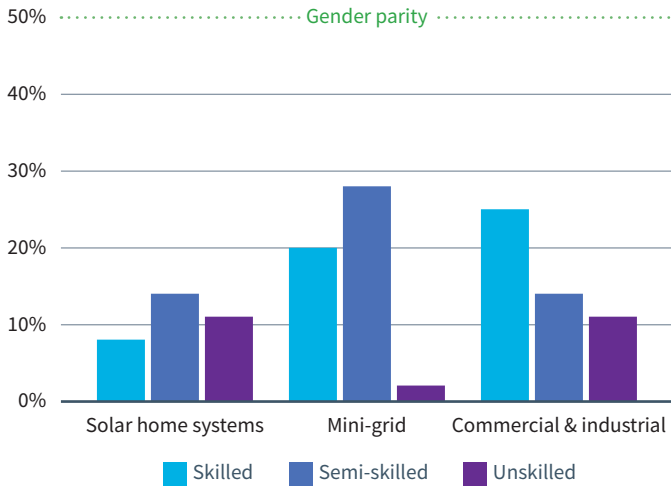
### 3.1 Women’s Participation

The participation rate of women in the DRE sector in India currently stands at 21%. The DRE sector has a similar level of women’s participation to the overall Indian economy, which stands at 20% [3]. However, female-male participant ratios vary widely by type of technology and skill level (see Figure 4).

On average, the employment share of women is the lowest for SHS. This finding is compatible with a 2019 estimate by the International Energy Agency (IEA) and Council on Energy, Environment, and Water (CEEW), which suggests that women account for 11% of the workforce in the rooftop solar sector in India [30]. Excluding the mini-grid segment, the highest women’s employment shares correspond to skilled work in C&I systems, while the lowest are those of skilled workers in SHS. On the other hand, across the different levels of skill, the census reveals that women’s participation is the



**FIGURE 4. SHARE OF WOMEN WORKERS ACROSS DIFFERENT SKILL LEVELS AND DRE TECHNOLOGY**



Source: Power for All (2022)

lowest for unskilled workers. This is corroborated by DRE companies in FGDs as some companies claimed they prefer to hire men workers for roles that require manual labor such as the construction of mini-grid sites.

The participation rate of women in the Indian DRE sector has declined slightly compared to the Powering Jobs Census 2019 estimate in which the share of women in the workforce stood at 23% [1]. DRE companies indicated that the decline in women’s participation may have been caused by COVID-19 [31]. Many women were forced to leave the labor force during the pandemic due to additional childcare responsibilities following school closures [31].

Women’s participation also varies across the value chains of the DRE sector. Women tend to be better represented in office and corporate function jobs such as office assistants. On the other hand, DRE companies indicate the number of women in technical positions is very low compared to administrative positions. There are even fewer women in jobs which require frequent travel and onsite project work, especially in remote areas [30].

Several factors contribute to the low participation of women in technical positions. One of the major factors is the low pool of women applicants for technical positions in the DRE sector. Even though India has one of the highest shares of female students in STEM fields (at 30%), there are very few women applicants for technical positions in DRE companies as most of the roles tend to

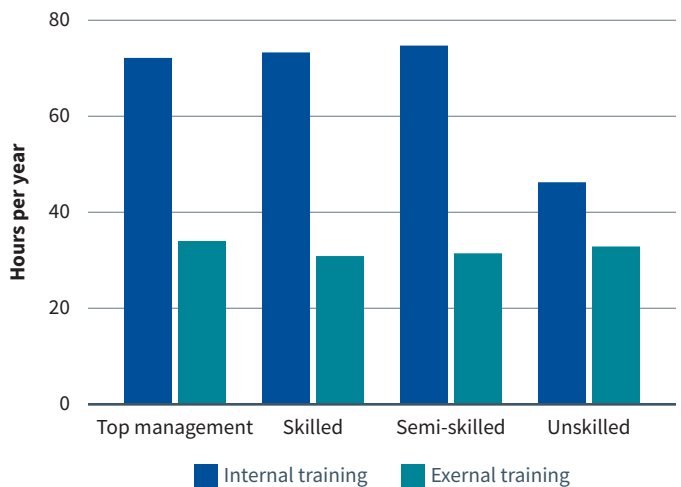
be in remote rural locations which are less desired by women candidates [30]. Even if women apply, there is an implicit bias in the sector which is built on the stereotype that women will not be able to perform in these roles compared to their male counterparts [30]. As shown in Figure 4, close to 25% of the employees in skilled C&I segment are women. While this is encouraging, skilling programs targeted at women need to be implemented to ensure that women are not left behind as the sector transitions to more technically demanding jobs such as technicians, electricians, and engineers [30].

### 3.2 Workers’ Skill Levels and Training

An Indian worker from the DRE sector receives, on average, 67 hours of internal training and 32 hours of external training. Internal training is defined as training provided by the DRE company itself while external training is any type of skill development program offered by the government, a non-profit, or other private sector actors. As shown in Figure 5 the average hours of external training are lower than that of internal training for all skill levels. Interestingly, external training is similar across all skill levels (averaging 32 hours per year), while internal training seems to be more relative to skill. Skilled and semi-skilled jobs (including top management) received, on average, 74 hours of internal training. In contrast, unskilled jobs received only 46 hours per year.

Over half (55%) of the DRE companies that participated in the Powering Jobs Census 2022 reported that they provide some training

**FIGURE 5. AVERAGE HOURS OF TRAINING FOR COMPANIES SURVEYED**



Source: Power for All (2022)

(either internal or external) to their employees. Most of those companies offer internal training programs, regardless of the skill level of the workers. The situation for external training is entirely different. For top management and skilled workers, 33% and 35% of the companies provide external training. But for semi-skilled and unskilled workers, on the other hand, only 25% and 20% respectively provide external training.

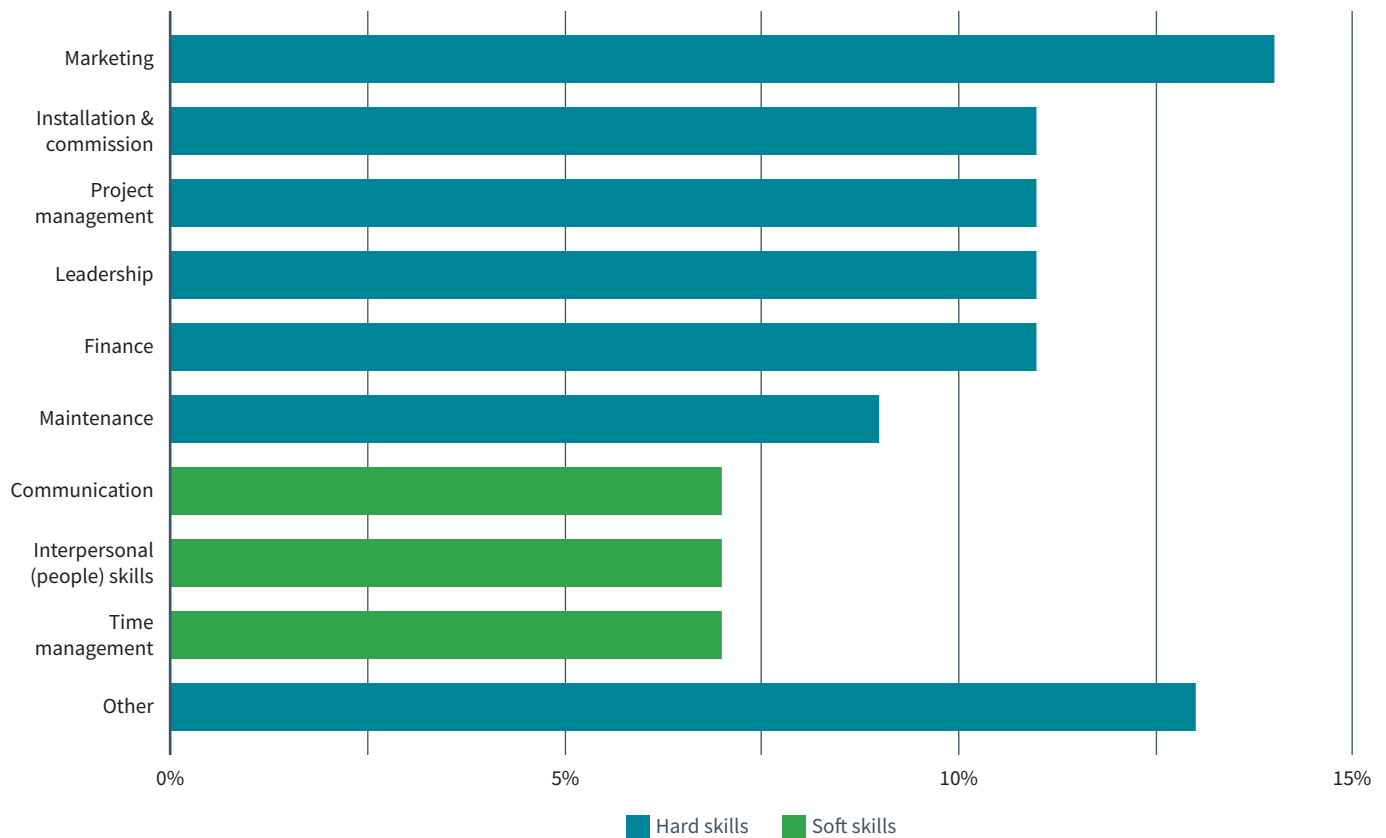
The survey identifies nine main categories in which more training is needed. Most involve hard skills, such as marketing, installation and commission, and project management, but there are also some soft skills such as communication, interpersonal skills, and time management. Although companies in the DRE sector identified marketing as the most valued skill in their employees, the results indicate parity between the types of skills presented in Figure 6.

There are multiple initiatives by various stakeholders to support the skill development of the Indian DRE workforce. Most of the

programs focus on upskilling, building a higher level of competency among employees in their current roles. Other programs focus on reskilling, enabling workers to learn a whole new set of skills. In addition, some skill development programs target marginalized groups such as women and youth. For instance, Solutions Using Renewable Energy (SURE) has trained women in Maharashtra in entrepreneurship, sales, and marketing [32]. As of 2019, the company has been able to reach over 250,000 households through more than 1,250 women entrepreneurs [32].

Apart from firms providing training, the Indian government also has some initiatives. The National Power Training Institute (NPTI), under India's Ministry of Power, is a national entity dedicated to providing training and development for the power sector. It runs Suryamitra, a skill development program that aims to develop the skills of young people in the solar energy sector, and has already trained almost 28,000 people [33].

**FIGURE 6. TYPE OF SKILLS DRE COMPANIES IDENTIFIED AS VERY IMPORTANT FOR THEIR STAFF**



Source: Power for All (2022)

Finally, there are some additional opportunities that could be further utilized, such as online training which can potentially reach a much wider audience, and school programs/training that are included within the curriculum and in line with industrial demands. However, these initiatives are also facing some challenges such as finding last-mile talent with the required mobility, a lack of trainers, and a lack of standardized processes. Also, the average level of retention for the Indian DRE sector is 21 months. Stability in jobs is a fundamental incentive to promote and encourage training. The growth of the DRE sector can be enhanced by better coordination between the needs of companies and the training capacities of the public sector.

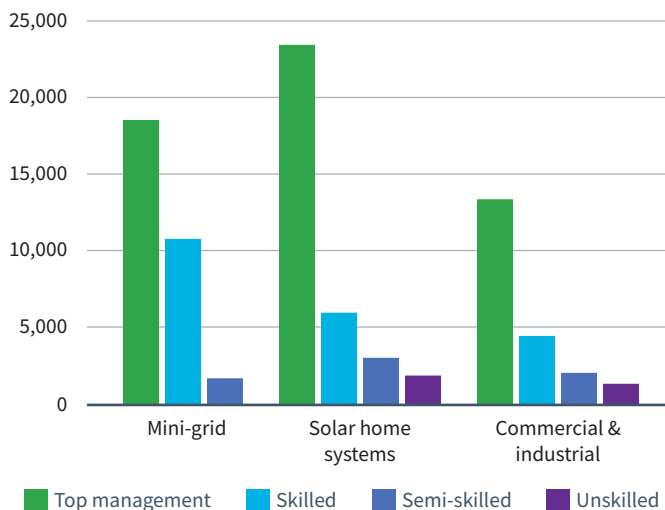
### 3.3 Levels of Compensation

Based on the Powering Jobs Census 2022, the average annual wage for the Indian sector ranges from US\$23,000 for a top management position in a SHS company to close to US\$1,300 for an unskilled worker in a C&I company. Average DRE wages in India are slightly higher than average wages in India. According to an estimate by the Reserve Bank of India, average rural wages in India were close to US\$1,115 in 2020, which is slightly lower than unskilled workers' annual wages for a C&I company [34]. On the other hand, the average urban wage for all types of jobs in India is close to US\$3,300 which is slightly higher than the average earnings of a semi-skilled worker in the DRE sector but lower than that of skilled workers in the DRE sector [35]. See Figure 7 for more detail on the average DRE wage in India.

Significant differences in compensation, however, exist across skill levels. As expected, the level of compensation increases hand-in-hand with an increase in skill level. Disparities in compensation are also evident between companies' technology types (SHS, mini-grids, and standalone C&I systems). Mini-grid companies are structured differently from other types of DRE firms. They tend to have more skilled workers, which explains why their average annual employee wage (US\$10,339) is the highest in the sector. The difference between SHS and standalone C&I systems is mostly explained by the difference in top management wages. Although the former pays better than the latter across all skill levels, the notable difference is seen in top management positions.

A significant pay discrepancy between men and women employees in the sector is also evident. According to the results of the Powering Jobs Census 2022, women in the DRE sector earn only 80% of what their male counterparts earn. The highest pay gap exists for top management staff at 60%, while unskilled women DRE workers

**FIGURE 7. AVERAGE ANNUAL WAGE FOR DIFFERENT ROLES IN THE DRE SECTOR IN 2021 (IN US\$)**



Source: Power for All (2022)

in India have the lowest pay gap at 96% of the male wage. India has one of the widest gender pay gaps in the world [36]. For every US\$100 that a male Indian worker earns, a woman in a similar job earns only US\$63 [36]. The DRE sector has a better gender pay gap compared to the national average, but the sector is still influenced by the same socio-economic and structural problems that result in women earning less than their male counterparts. During FGDs, Indian DRE companies indicated that there is an implicit bias against hiring women for technical roles because women are deemed less technically proficient than their male counterparts.

## 4. Conclusions

**In 2021, the Indian DRE industry employed around 80,000 people.** Between 2019 and 2021, employment in the DRE sector in India decreased by about 2.5%. The decline in employment was most severe in 2020 and is believed to be largely due to the stringent lockdowns India enacted in response to COVID-19 [10], [12]. By the end of 2022, the Indian DRE market is anticipated to have recovered to its pre-pandemic level of employment.

**C&I companies account for an increasing share of DRE workers in India.** Currently, the SHS and C&I sectors account for almost an equivalent proportion of DRE sector employment. However, in 2019, 70% of the DRE sector employment came from SHS companies.

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This illustrates the transition of the sector from smaller SHS products into more advanced and larger C&I technologies. While the size of the DRE market is expected to grow in coming years, the SHS segment is likely to have a less prominent role. An indication of this change is the decline in sales volume of SHS products since 2019 [19], [21]. This shift into C&I technologies will have an impact on the types of jobs required in the future.

**Large enterprises, which typically employ more than 100 people, account for the majority of employment in India's DRE industry.** Large Indian DRE companies account for more than 85% of the sector's employment, demonstrating consolidation in the Indian DRE sector. This trend may have been driven in part by COVID-19, as larger companies with better financial and human resources were able to survive the economic shock brought by the pandemic.

**Women's participation rate in the Indian DRE workforce declined from 23% in 2018 to 21% in 2021.** DRE companies indicated that the decline in the women's participation rate might have been caused by COVID-19 and the transition of the Indian DRE sector to more advanced DRE technologies such as mini-grids. Women's participation also varies across the value chains of the DRE sector with

women represented in office and corporate function jobs at a higher rate than in technical positions.

**An Indian employee working in the DRE sector receives 32 hours of external training and 67 hours of internal training annually.**

Additionally, 55% of DRE organizations offered some sort of training in 2021. Regardless of skill level, about one in two DRE firms offer internal training. Nine key categories were identified in the Powering Jobs Census 2022 as areas of focus for additional training. The majority of them are hard skills, such as marketing, installation and commission, and project management, but some are soft skills, such as time management and communication. Along with businesses that offer training, the Indian government also offers courses through the National Power Training Institute.

**The average annual wage for the Indian sector ranges from US\$23,000 for a top management position in a SHS company to close to US\$1,300 for an unskilled worker in a C&I company.**

Average DRE wages in India are slightly higher than the general average wages in India. According to the results of the Powering Jobs Census 2022, women in the DRE sector earn only 80% of what their male counterparts earn.

## Box 2: DRE sector employees feel they are positively impacting their communities through their jobs

The Indian DRE sector is composed of workers with different motives and interests, but a common theme amongst DRE employees has been the desire to create a meaningful and positive impact in their communities. The Powering Jobs Census 2022 asked some workers what they like about their work and below are some of their responses.



“The best part about the work is the satisfaction of creating an impact on the lives and livelihood of small and marginal farmers, including women farmers, by scaling sustainable energy solutions in the agriculture and allied sectors. Secondly, the sector played a pivotal role during the unprecedented COVID times by boosting agricultural productivity, effectively bridging energy gaps, facilitating local value addition, and creating employment opportunities for skilled and semi-skilled workers.”

**Preeti Kumari**  
Project Associate



“The opportunity of working as an operator within the village has helped me earn money without having to migrate out and stay away from family. With the solar pump, I had to involve my entire family. With the solar pump, it has effectively saved time, money, and effort, yet I can provide water to my neighbors.”

**Shyam Lal**  
Solar Pump & Mill Operator



“I feel good about making a positive impact in the agrarian community. During COVID-19, when everything was closed, I took charge of the entire cold storage unit and tried to keep it functional. Even after being a homemaker, cold storage has given me an opportunity to earn a monthly income.”

**Rita Devi**  
Solar Cold Storage Operator

**Photos generously provided by:** Oorja Development Solutions (p. 13), and SELCO Foundation (cover).

*The opinions expressed in this report are those of the authors, and do not necessarily reflect the views of funders or partners.*

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