CEEW
THE COUNCIL

SHAKTI
SUSTAINABLE ENERGY
FOUNDATION

Upgrading Suryamitra Skill Development Programme

Improving Uptake and Employability of Suryamitras in the Solar Sector

Akanksha Tyagi, Sharayu Shejale, and Neeraj Kuldeep

Report | September 2022

Image: Alamy

Executive summary

The *Suryamitra Skill Development Programme* was initiated in 2015 by the Ministry of New and Renewable Energy (MNRE) and implemented by the National Institute of Solar Energy (NISE) to meet skilling demand and employment in the solar sector. As of financial year (FY) 2020, the programme had trained about 48,157 Suryamitras nation-wide with the state of Maharashtra achieving maximum Suryamitras trained (4,383). Furthermore, as of FY21, there are about 776 certified training partners (TPs) under this programme with Uttar Pradesh hosting maximum (82) training centres. This study assesses the *Suryamitra Programme*'s performance over the years to produce a skilled workforce for the solar industry to accelerate the clean energy transition. For this, it focuses on quality of curriculum and trainings provided, career prospects of Suryamitras in the solar sector, and implementation challenges through in-depth interviews with key stakeholders (industry players, training partners, and Suryamitras) involved in implementing the programme.

A. Key findings

- While Suryamitra respondents are satisfied with the quality of the training and curriculum, industry and training partners highlighted the **need for expanding the curriculum to include more modules like solar manufacturing, as well as focus on more practical, on-the-job training**.
- Several Suryamitras have cited **the long duration and residential format of the programme as a barrier** to participate and continue in the sector. Often being a sole breadwinner, it's difficult for them to leave their current occupation and families behind for such trainings.
- Suryamitras are primarily hired as contractual workforce under the roles of technicians (field/site technician, manufacturing technician) for construction and maintenance activities. This **limits their career progression** in the solar sector. Furthermore, low wages and outstation employment contributes to **low retention in the sector**. Industry respondents and analysis of the NISE database show a **declining trend of hiring Suryamitras over the years**.
- The **local employment generation remains low**. One possible reason identified is the mismatch between the Suryamitras trained and solar capacity installed within a state.
- There's **low awareness among trainees about the solar industry and career prospects** that pushes them to drop out midway through the course or not take up jobs in the industry upon completion. Training partners often struggle to mobilise good candidates.

B. Key recommendations

- MNRE should **expand the *Suryamitra Programme* curriculum to include new modules like solar manufacturing and more practical training by collaborating with the industry**. This will improve their employability in the envisioned domestic solar manufacturing industry and other emerging industries.
- MNRE should **reconsider the mode and duration of the training** as several Suryamitras have cited **the long duration and residential format of the programme as a barrier** to participate and continue in the sector.
- **Blended learning modules, where online theory courses and refresher courses** can be offered, along with a practical, on-ground component should be considered. This will also **encourage women candidates to participate in the programme** and reduce the dropout rates.
- NISE, in conjunction with state nodal agencies (SNAs), should **organise national and regional conferences and job fairs** to bring together local solar companies, training partners and Suryamitras for networking and placement opportunities.

1. Introduction

Renewable energy (RE) holds the potential to meet the holy trinity of jobs, growth and sustainability. Over the past few years, India's RE capacity has seen a rapid growth, with 50 GW in 2016 (PIB 2016) to 105 GW as of January 2022 (MNRE 2022), a 101 per cent increase. Of this, 47 per cent (50 GW) accounts for solar energy deployed across ground mounted, rooftop and off-grid systems. The significant increase in the installed capacity and infrastructural deployment has unleashed a huge employment opportunity. The total workforce employed in the solar and wind sectors (excluding manufacturing) saw a fivefold increase from 19,790 to 99,900 between the financial year (FY) 2014 and 2019 (Tyagi et al. 2022). As of FY21, India's solar and wind sectors cumulatively employ about 1 lakh people and can potentially increase 10 times by 2030 (Tyagi et al. 2022).

It's critical to train the eligible in necessary skills to tap this huge employment opportunity. A skilled workforce would not only support the capacity expansion but also empower them to create sustainable livelihood solutions. Rightly so, in 2015, MNRE started the *Suryamitra Skill Development Programme* (SSDP), or the *Suryamitra Programme*. It's now implemented by NISE, an autonomous institution under MNRE. The *Suryamitra Programme* targets the skilling gap to provide youth with the technical expertise to work in the solar industry, especially in construction and maintenance activities. Additionally, the programme also aims to prepare candidates to become entrepreneurs in the solar sector over the course of the training module (NISE 2022).

At its inception, MNRE aimed to graduate 50,000 trainees (also known as Suryamitras) by 2020, distributed across the country.

BOX 1 Brief overview of the *Suryamitra Skill Development Programme*

The *Suryamitra Programme* is sponsored by MNRE through NISE or the concerned SNAs. The training is implemented by NISE, and the Skill Council for Green Jobs (SCGJ) functions as the certification and assessment agency. The training focuses on solar projects' installation and operation and maintenance, taught over the course of 600 hours, or approximately three months (NISE 2022). It has modules on site survey for installation, assessing customer's requirement, procurement of components, installation of Civil, Mechanical and Electrical components, testing and commissioning, personal health & safety at project etc. Furthermore, it is a residential programme that is offered free of cost, including boarding and lodging. It is also integrated within the National Skills Qualification Framework (NSFQ) offering a certification at the end (NSQF Level 4). The minimum educational eligibility is 10th + I.T.I (Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation, Welder) or Diploma (Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation, Welder). Training partners follow the applicable eligibility requirements for each qualification pack, while higher degree graduates are disqualified (NISE 2022).

Each batch consists of 30 candidates, who are screened and selected by certified local Training Partners (TPs). Also, during the selection of the candidates, special emphasis is given to trainees from a rural background, and from disadvantaged groups such as women and Scheduled Caste (SC) and Scheduled Tribe (ST) candidates. At the end of the course, a proper assessment is made and certificates are issued. The respective TPs also carry out placement drives for the graduating Suryamitras to enable their employment in the solar sector, by inviting Engineering, Procurement, and Construction (EPC) companies, solar manufacturing companies, contractors, marketing companies, etc. (NISE, *Suryamitra Skill Development Programme* Guidelines 2015).

Source: Authors' analysis of NISE annual reports

2. Objective

Currently, with 50 GW capacity, solar energy dominates India's renewable mix (MNRE 2022) and would continue to do so with the renewed 500 GW non-fossil electricity generation capacity target. Such huge capacity expansion makes the solar energy sector the highest employment provider in the available renewable technologies. In order to ensure that the *Suryamitra Programme* meets its intended goals of creating a skilled workforce for India's solar sector, it's important to periodically evaluate the programme's progress and address the limitations. Past analysis of the *Suryamitra Programme* have qualitatively examined the uptake of the programme (Kuldeep and Ghosh 2020) with some focus on perception of trainers and trainees (SCGJ 2020). However, the insights on industry perception and expectations are lacking. This study aims to fill this gap.

We examine the performance of the *Suryamitra Programme* from two lenses: progress at the programmatic level and perception of the key stakeholders.

At the programmatic level, the study evaluates its

- spatial development: looking at uptake across states and social groups,
- coverage and beneficiaries across years/categories/gender, and
- performance of different states and budgetary allocations

The stakeholder perception focuses on

- quality of curriculum and trainings provided,
- career prospects of Suryamitras in the solar sector,
- implementation challenges, and
- impact of the COVID-19 pandemic and coping strategies adopted by the training partners

3. Methodology

This study employs a mixed-methods approach, using grounded theory to conduct in-depth interviews with identified stakeholders. The insights were supplemented with the analysis of secondary data and reports from NISE and MNRE. The stakeholder interviews were telephonic and survey responses were collected via online forms.

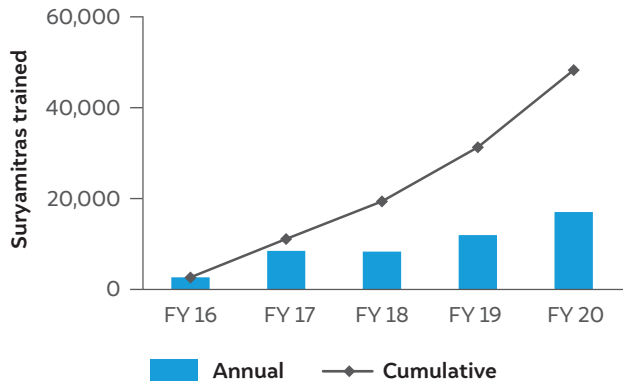
We adopted non-probability sampling technique for stakeholder selection. A mix of convenience and purposive sampling methods were used, based on the following metrices:

- **Industry**: Top 10 per cent performers across various profiles (developers, EPC providers and module manufacturers) were contacted as these companies were more likely to have a significant human resource requirement.
- **Training partners**: States with maximum number of training centres were targeted. Within these, centres with regular training batches and periodic data publishing were shortlisted.
- **Suryamitras**: The sample was a mix of trainees currently working in the sector, early graduates but no longer part of the RE industry and dropouts.

Over this, the language familiarity was also a key metric for selection of training centres and Suryamitras. These stakeholders were more comfortable in responding to calls and participating in the interview if the researcher was speaking their language. Hence, most of the Hindi- and Marathi-speaking stakeholders were targeted.

Table 1 shows the type and number of stakeholders consulted in the survey and themes of discussion. Refer to Annexure 2 for a detailed profile of stakeholders and Annexure 3 for the questionnaires. The response rate for the industry was lower compared to other stakeholder categories. The desired information was more likely to be available from project managers, who were often in the field during the study period. Employees at the head offices did not have the required information or insight as the recruitments are mostly project-specific.

Figure 1 Number of Suryamitras trained has steadily increased over the years



Source: Authors' analysis of NISE database

4. *Suryamitra Skill Development Programme* over the years

This section presents the programmatic-level performance of the *Suryamitra Programme*. Beginning with the programme's uptake across states, it presents the training trends with analysis on social inclusivity and gender parity.

4.1 Suryamitra trainings

The number of Suryamitras trained has increased steadily every year since the programme's inception in FY16 (Figure 1). There was a big leap in the number of Suryamitras trained from FY16 to FY17 with 5,801 more Suryamitras trained in FY17 over FY16 (NISE Annual Report 2016; NISE Annual Report 2017). The next leap was observed between FY19 and FY20 with 11,912 and 16,074 Suryamitras trained, respectively (NISE Annual Report 2017-18 2019; NISE, Annual Report 2018-19 2019). As can be seen in the same figure, with 48,157 Suryamitras trained by FY20, the MNRE target for training 50,000 Suryamitras by March 2020 has been met.

4.2 State-wise uptake

The uptake of the *Suryamitra Programme* has been different across states (Figure 2). Maharashtra, Uttar Pradesh, and Madhya Pradesh are the top three states for total Suryamitras trained in the last five years. However, they don't have the highest installed solar capacity, which is dominated by Karnataka, Rajasthan and Tamil Nadu (MNRE 2022). So, there's a mismatch in the supply and demand of trained workforces in the top states. Meanwhile Andaman & Nicobar, Lakshadweep, and Meghalaya are at the bottom in terms of Suryamitras trained. Unlike the top states in capacity and trainings list, these states also have a low solar penetration (MNRE 2022), indicating a similar trend in capacity and training expansion.

The distribution of TPs across states also varies. Uttar Pradesh has the maximum number of certified TPs, followed by Madhya Pradesh and Tamil Nadu (Figure 3). Interestingly, the states with more TPs don't necessarily produce more Suryamitras (Figure 4). For instance, Uttar Pradesh, with 16 certified TPs in FY18, produced 577 Suryamitras, much less than Suryamitras produced from states like West Bengal, Madhya Pradesh, Tamil Nadu

and Maharashtra with lesser number of certified TPs (Figure 4a). A similar trend was observed in FY19 (Figure 4b) before Uttar Pradesh caught up in generating greater number of TPs and Suryamitras in FY20 (Figure 4c).

These trends indicate that not all TPs are running at the same efficiency (number of batches/year or students/batch) and hence some states have produced more Suryamitras with lesser TPs.

Table 1 Overview of stakeholder consultations

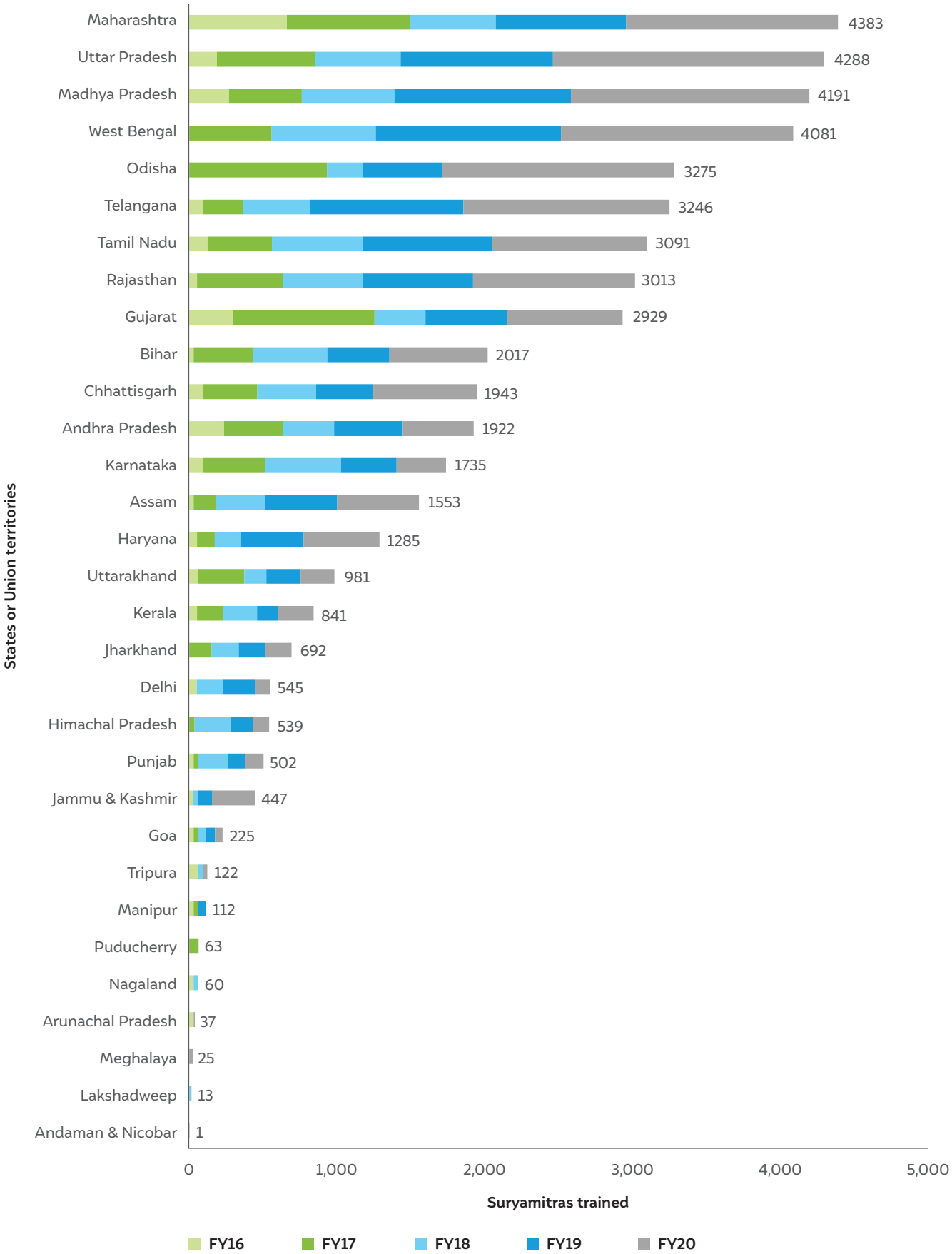
Profile	Industry	Certified training partners	Suryamitras
Number of respondents	7	6	15
Main discussion theme	Skill level of Suryamitras and improvement scope	Recruitment trends, programme implementation challenges	Training and job prospects after graduation

Source: CEEW

Note: Total number of unique stakeholders contacted were 35, 15, and 25 for Industry, Certified training partners, and Suryamitras respectively.

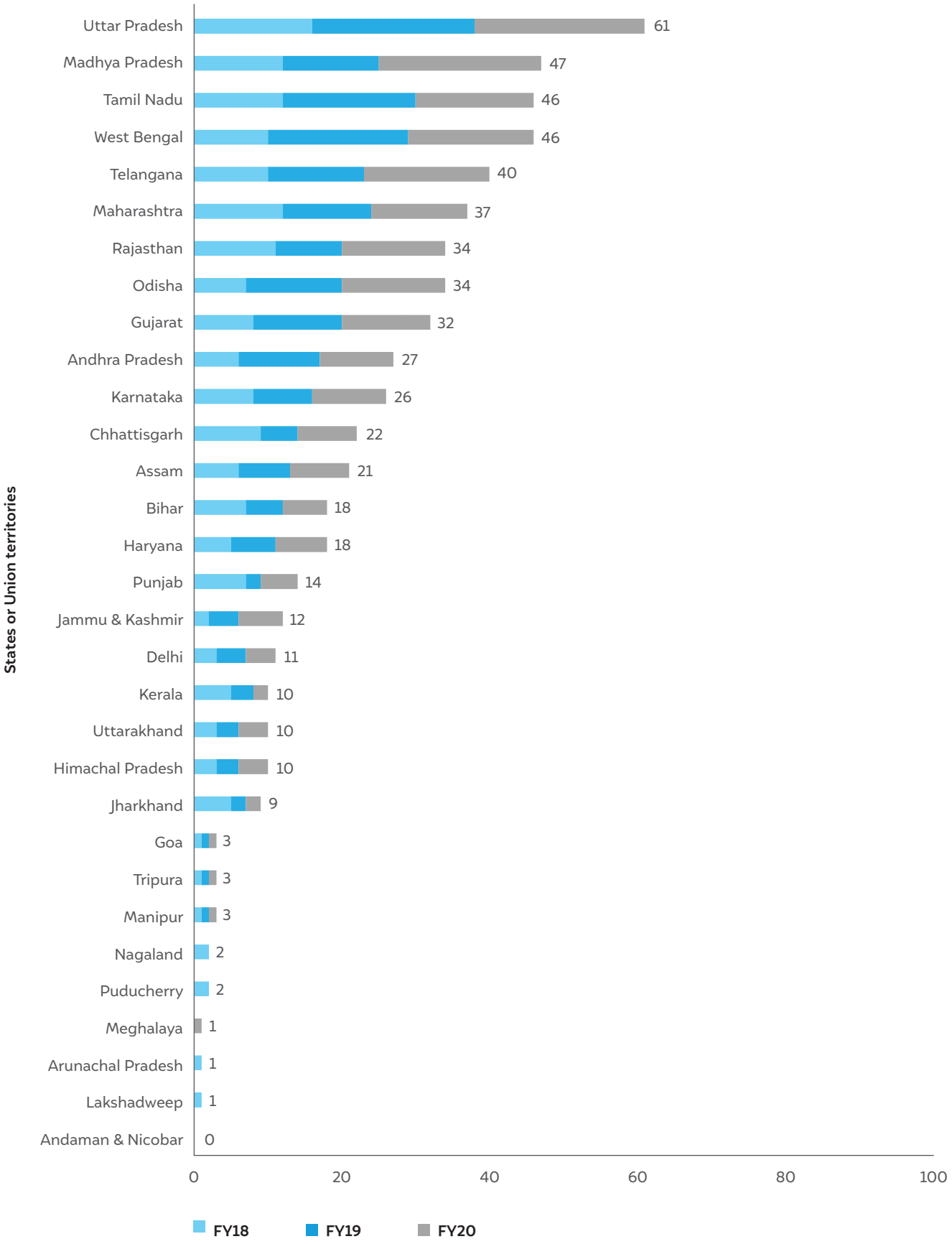
Image: Asian Development Bank

Figure 2 Maharashtra has produced maximum number of Suryamitras



Source: Authors' analysis of NISE database

Figure 3 Uttar Pradesh has maximum number of training partners



Source: Authors' analysis of NISE database

Figure 4 Temporal changes in training partners and Suryamitras for selected states

Figure 4a FY18

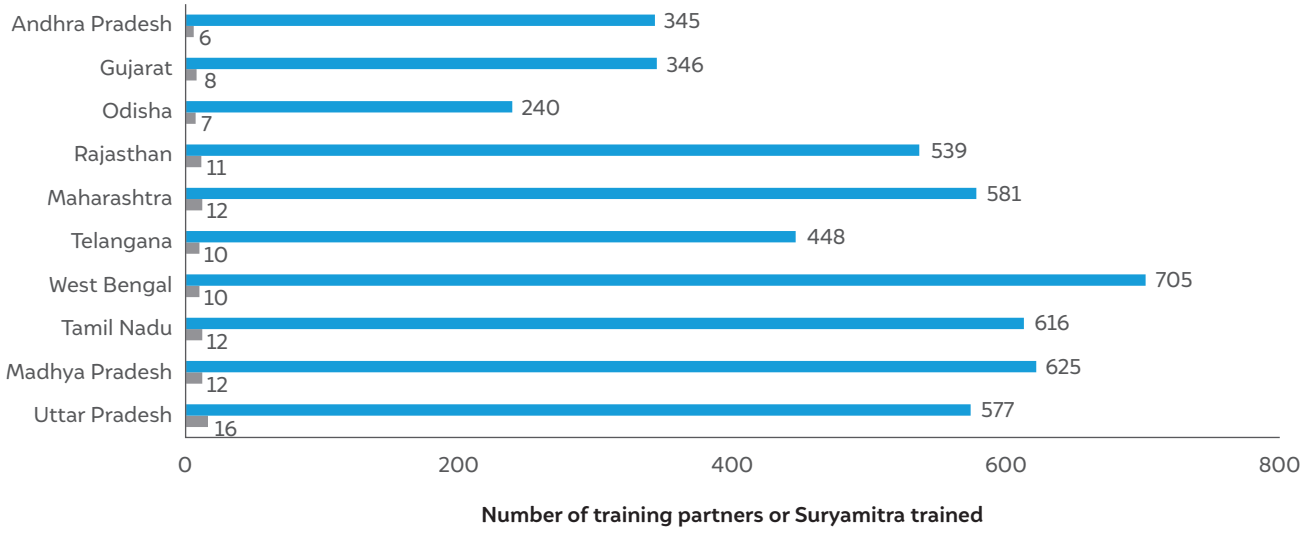


Figure 4b FY19

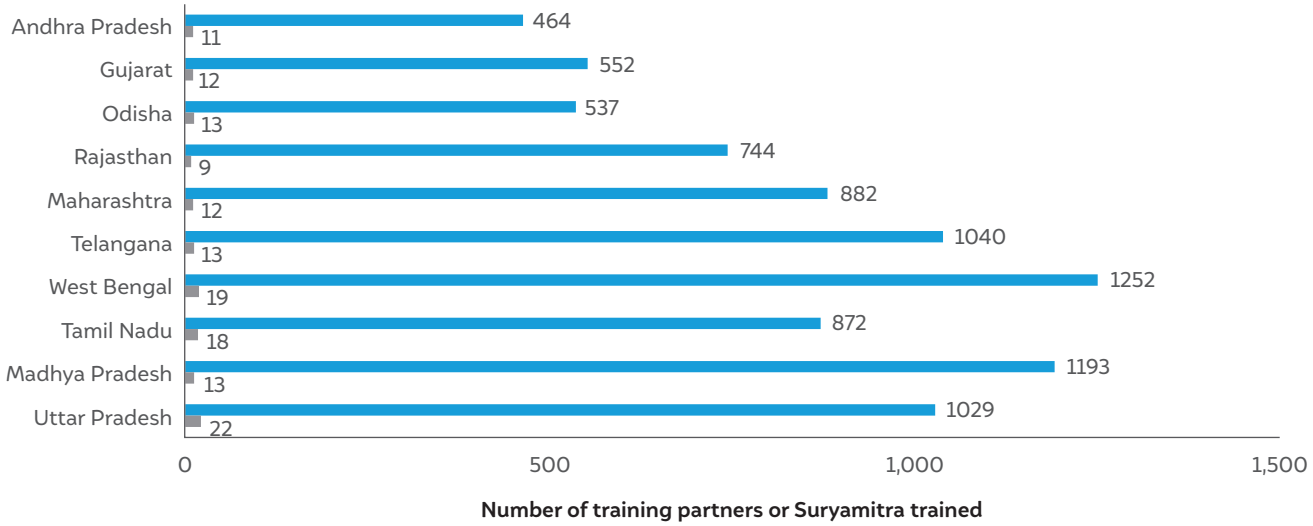
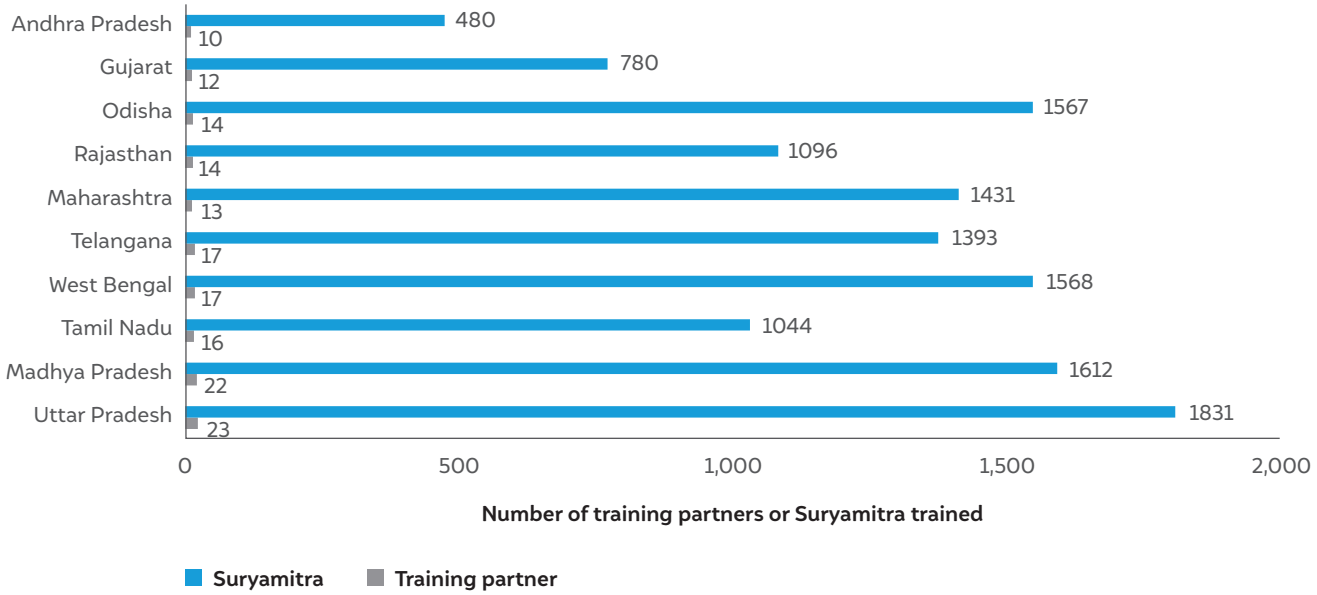


Figure 4c FY20



Source: Authors' analysis of NISE database

4.3 Significant gap between supply and demand

Karnataka, Rajasthan, and Tamil Nadu are the states with highest installed solar capacity (MNRE 2022). On the other hand, Maharashtra, Uttar Pradesh, and Madhya Pradesh are the top three states for Suryamitras trained (Figure 5). In FY20, Karnataka added about 1,182 MW of solar capacity that employed a workforce of 1,340 (Figure 5c). Seventy-six per cent (1,019) of this workforce was required for construction and commissioning, and operation and maintenance (O&M) activities, roles relevant for Suryamitras. However, only 711 Suryamitras were trained that year (Figure 5c). Similarly, Uttar Pradesh added 135 MW of capacity to employ a workforce of 67 for Suryamitra related roles in FY20 (Figure 5c). However, 1,831 Suryamitras were trained in the state that year (Figure 5c).

Figure 5 States differ considerably in Suryamitras trained and annual workforce requirement for project construction and maintenance

Figure 5a FY18

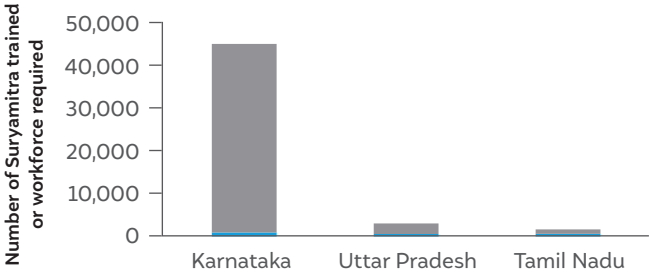


Figure 5b FY19

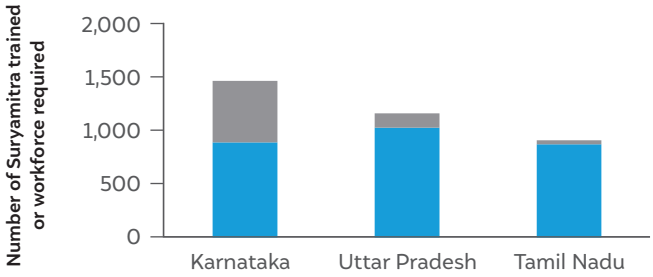
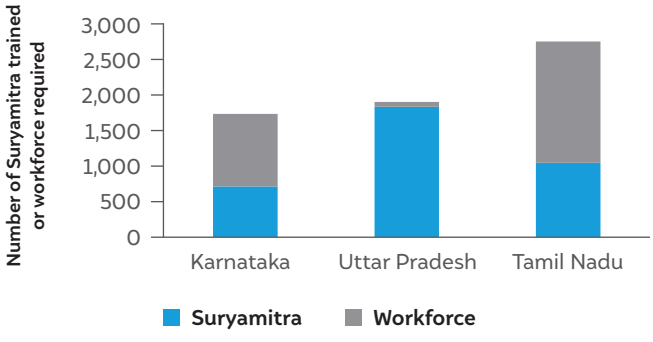


Figure 5c FY20



Source: Authors' analysis of NISE database, MNRE 2022

Comparing these two figures, a mismatch can be observed—the top states with installed solar capacity are not the top states with the number of Suryamitras trained, and vice versa (Figure 5). **States with the most solar installed capacity have to hire out-of-state technicians to meet their demand, while candidates from most Suryamitra producing states, have to travel out of state as there is not enough local demand.**

Taking the example of Karnataka, the state with highest solar capacity installed, Figure 6 shows the gap between the workforce requirement commensurate to the solar capacity installed and Suryamitras trained. The significant jump in the solar capacity installed from FY17 onwards was not accompanied by a proportional jump in the number of Suryamitras trained.

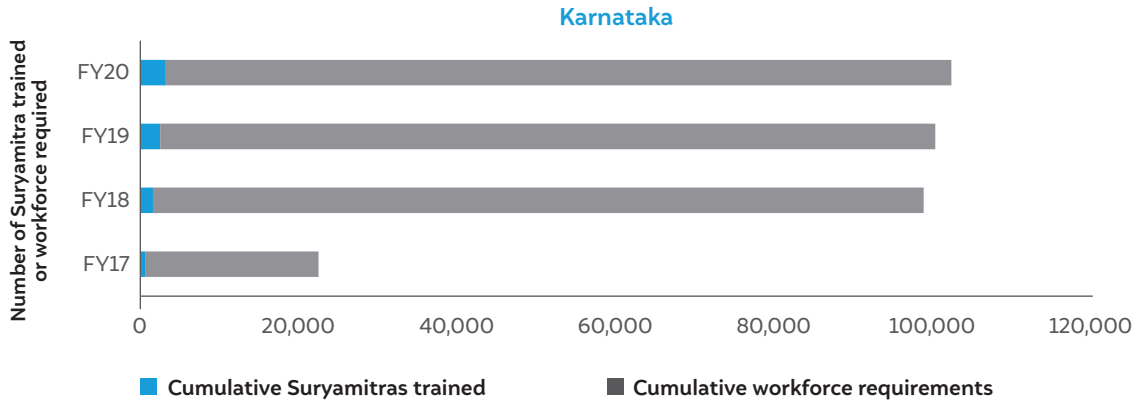
On the other hand, taking the case of Uttar Pradesh, the state with the second largest number of Suryamitras trained, we see a different gap (Figure 7). The significant jump in the number of Suryamitra trained FY19 onwards is not accompanied by a proportional jump in the solar capacity and subsequent workforce requirements.

Finally, taking the example of Tamil Nadu, which is the third highest in terms of solar capacity installed and the seventh highest in terms of Suryamitras trained, Figure 8 shows a steady proportional increase in Suryamitras trained and workforce requirements arising from the solar capacity addition. This is corroborated by Suryamitra respondents from Tamil Nadu, who mention getting jobs in the solar sector within the state.

Thus, while some states have achieved parallel growth of solar infrastructure and the respective trained workforce required, this is not always the case.

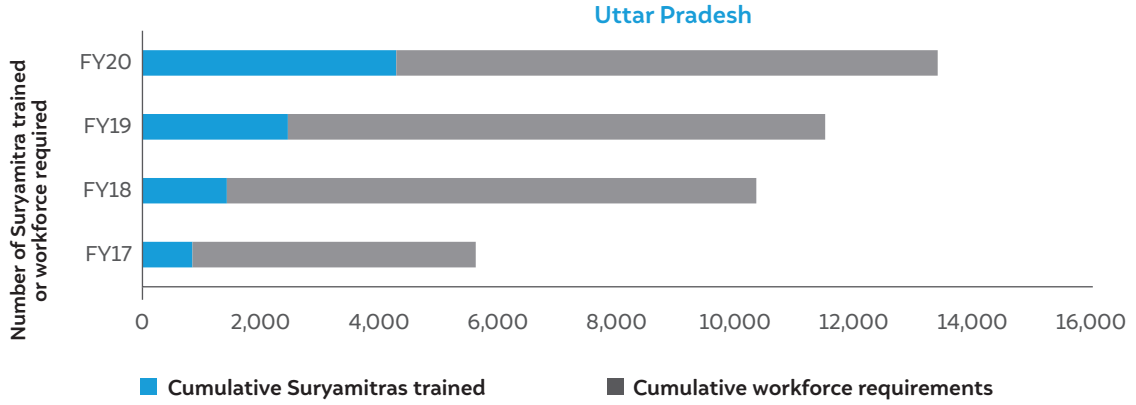
Image: Dominic Sanson/World Bank

Figure 6 Growth of workforce requirement in the solar industry in Karnataka is significantly more than local Suryamitras trained



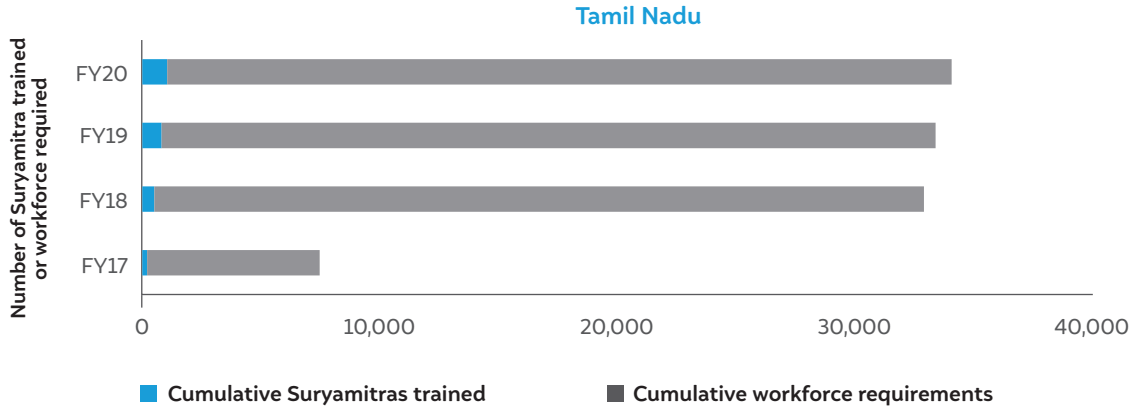
Source: Authors' analysis of NISE database, MNRE 2022

Figure 7 Growth of workforce requirement in the solar industry in Uttar Pradesh is far slower than local Suryamitras trained



Source: Authors' analysis of NISE database, MNRE 2022

Figure 8 Trend of solar industry's workforce requirement in Tamil Nadu matches with local Suryamitras trained



Source: Authors' analysis of NISE database, MNRE 2022

4.4 Social inclusivity

The improvement in the disclosure of the social background of the participants in the NISE database has provided insights to the training trends across different social groups[1]. The OBC category is most represented across the years, followed by the general category (Figure 9). The distribution across the different social groups, however, has remained more or less constant over the years. The percentage of Suryamitras from the SC category has increased from 14 per cent in FY16 to 17 per cent in FY20. The percentage of Suryamitras from the OBC category has also increased from 40 per cent in FY16 to 44 per cent in FY20. However, the percentage of Suryamitras from the ST category has decreased slightly from 6 per cent to 5 per cent.

4.5 Gender inclusivity

Gender disaggregated data has only been collected for FY16 and FY17. **The lack of gender-disaggregated data since FY18 limits the evaluation of the programme's gender inclusivity**. In FY16, only 2 per cent were women candidates (NISE Annual Report 2016). There was a slight increase in FY17, with nearly 3 per cent of women Suryamitras trained (NISE Annual Report 2017). Thus, while the distribution of the *Suryamitra Programme's* training across social groups is positive, gender inclusivity is sub-par.

Our analysis suggests that some basic issues in the programme's design could be limiting women's participation. The long residential nature of the trainings at distant locations from their home, ambiguity around employment prospects post course completion and majority of postings in remote field profiles are some major reasons for poor representation of women in these trainings. The residential nature of the programme is also a concern for men. Often being the sole breadwinner, it's difficult for them to leave their current occupation and families behind for such trainings.

The low participation of women in the Suryamitra trainings is reflected in their eventual representation in the workforce engaged in the solar sector. A joint study by CEEW and IEA on India's rooftop solar sector identified that women represent only 11 per cent of the workforce, lower than the global average of 32 per cent but greater than other energy sectors in India like coal, oil and gas companies, and electricity utilities (Nobuoka et al. 2019). Furthermore, majority of the women are employed in the non-field segments like corporate, project design and pre-construction activities. Workforce involved in segments like construction and operation and maintenance, which are a focus of the *Suryamitra Programme*, constitute a mere 3 per cent and 1 per cent women, respectively.

> **The long residential nature of trainings and placement in remote areas limit women's participation in the *Suryamitra Programme*.**

4.6 Budget outlay

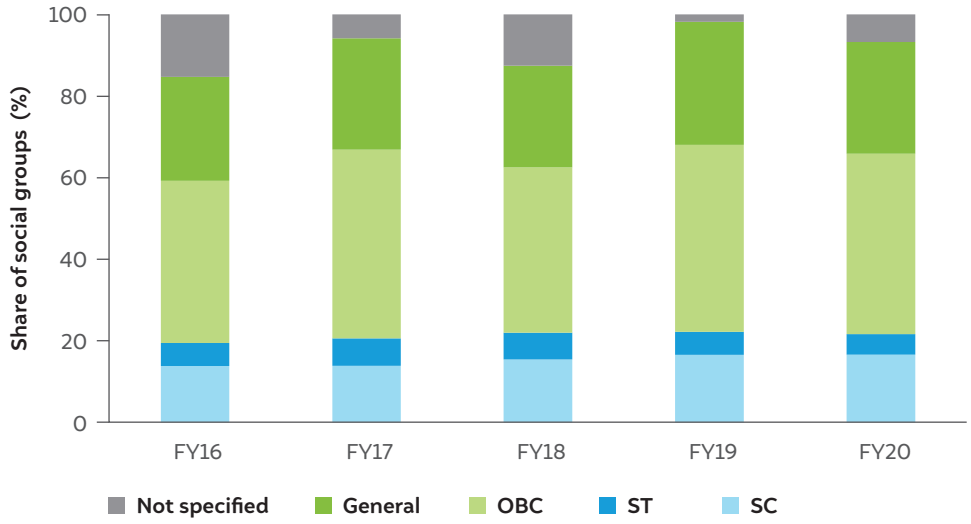
There has been a steady increase in the budget expenditure on the *Suryamitra Programme* by MNRE since its inception, as it has increased training capacity (Figure 10). The number of Suryamitras trained has also seen a proportional increase every year. In FY18, there was a dramatic increase in expenditure, which may be a predictive budget to increase capacity for subsequent years. As can be seen, the next year, FY19, the number of Suryamitras trained saw a jump, back on track to meet 2020 targets. MNRE, through the SNAs, provides about INR 58,400 per participant for a 30-participant batch (NISE 2022). The funding is distributed across boarding and lodging[2], course fees and assessment charges. Overall, MNRE, through SNAs, spends about INR 17 lakh per batch.

5. Perception of stakeholders on the *Suryamitra Programme*

This section presents the findings from the discussion and survey with various stakeholders. The findings are segregated across different themes critical for programme evaluation.

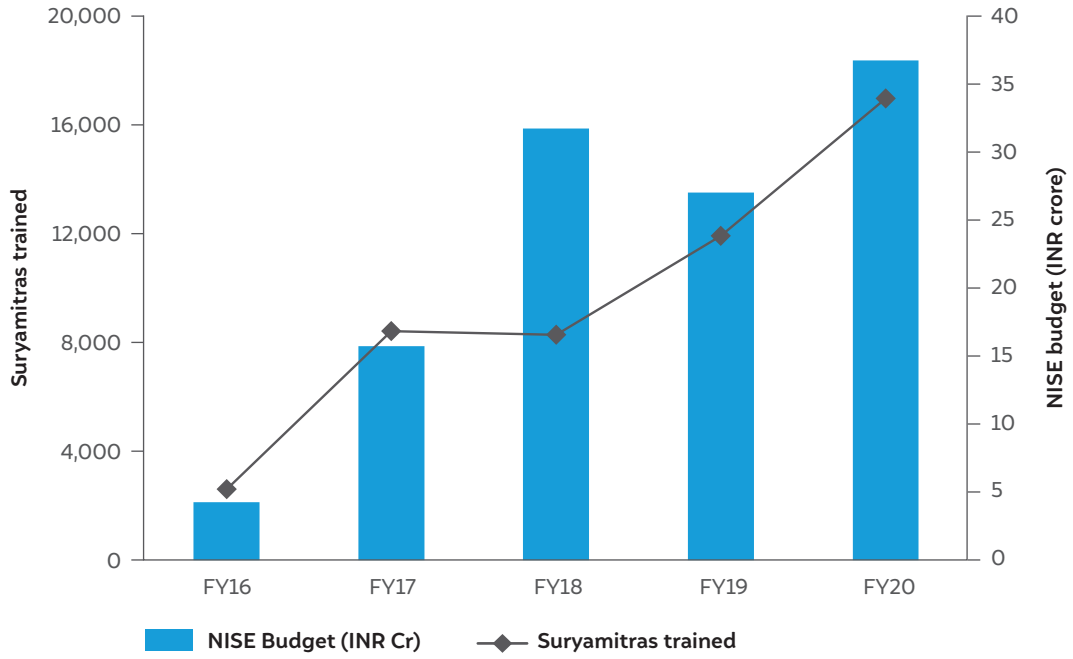
1. OBC: Other backward classes; SC: Scheduled castes; ST: Scheduled tribes. 'Not specified' represent share of Suryamitras with social group field blank in the NISE database.
2. Boarding and lodging costs are in the range of INR 220 to 375/day depending on the location.

Figure 9 Majority of Suryamitras are from the OBC category



Source: Authors' analysis of NISE database

Figure 10 NISE's budget has significantly increased since the *Suryamitra Programme's* inception



Source: Authors' analysis of NISE database, NISE annual reports

5.1 Curriculum and skill level

Suryamitra respondents to the questionnaire gave a positive review of the training provided, in terms of the quality of the training as well as the curriculum. One Suryamitra respondent claims:

> "I learnt more during the three month [Suryamitra] training than during two years of ITI course."

Past studies also show a similar trend, with around 67 per cent of Suryamitras completely satisfied with the curriculum (SCGJ 2020). However, industry respondents mentioned some mismatch between their requirements and the training provided to the Suryamitras.

They highlighted the necessity of:

1. **On the job training**: Although on-the-job training is mandatory in the MNRE-funded *Suryamitra Programme*, participants highlighted scope for improvement. Industry respondents said they also

provided special in-house training sometimes, depending on the skill level of the Suryamitra. Brief on-the-job training is common, but this is not unique to Suryamitras and is provided to all technicians employed.

Respondents from TPs were also aware of the necessity of incorporating more practical training in the programme. However, they face infrastructural limitations such as lack of technical equipment, space or industry connections to facilitate practical demonstrations. For instance, one TP respondent described the challenges faced to train Suryamitras in solar installations:

> "Installation training infrastructure [that we have] can support up to 2 kW, but the placement company requirements are mostly for MW plants."

2. **Diverse training modules**: At present, the solar PV module is adequate for EPC companies but falls short of the requirements for other segments, such as solar manufacturing. One reason could be the different job role for the EPC and manufacturing segments in the companies.

   One recruiter for a large solar manufacturing plant described the extensive three-week training given to Suryamitras after hiring them:

> "They [Suryamitras] are familiar with skills for EPC, but Suryamitras don't have any knowledge about cell and module manufacturing. We have to teach them everything from scratch, from cell and module manufacturing process to the module capacity, efficiency, using the manufacturing equipment..."

5.2 Employment and career growth prospects

Based on industry respondents, the primary roles that Suryamitras are hired for are site/field technicians, installers, and solar manufacturing technicians. There was also some anecdotal evidence of hires who have remained in the organisation for years and have taken on more roles and responsibilities such as site manager, module designer, and so on. Placements are facilitated by the TPs, who have their in-house processes and outreach team for the same. The major mass recruiters are contractors for utility-scale solar. Outreach to local companies is also done, though they have limited requirements. Hiring cycles by companies and training cycles by TPs are conducted throughout the year.

Suryamitras have high attrition rate: Findings from TP respondents mention having an average placement rate of 70-75 per cent in their Suryamitra placement drive. It is important to note that this percentage only records the extension of the offer, and does not account for whether the Suryamitra in question actually joins the company. However, analysis of NISE data shows an average placement rate of 51 per cent from FY16 to FY20.

Furthermore, a declining placement rate is observed over the years (Figure 11), from 61 per cent in FY16 to 31 per cent in FY21[3].

This trend is corroborated by some industry respondents who have mentioned growing averse to hiring Suryamitras over the years due to high attrition rates. Some reasons shared by Suryamitras are lack of career growth opportunities due to contract-based work, out-of-state employment, and low salaries.

Contractual nature of work and out-station postings affect the retention of Suryamitras: Primary findings across stakeholders indicate that most Suryamitras are hired as contractual workers for utility-scale solar. Only 18 per cent of Suryamitras are on the organisation's payroll (SCGJ 2020). Being hired as contractual workers, Suryamitras are often poorly paid and seen as expendable. Analysis of the NISE database shows that in FY16, the average income was about INR 9,700 per month, with almost 70 per cent of Suryamitras earning less than INR 10,000 per month (Figure 12).[4] Industry respondents mention that they offer other incentives such as free food and transportation on utility solar plant sites. On the other hand, local players mention that they offer bonuses and salary hikes for employees who stay on.

3. However, it is important to note that the above data is extracted from NISE databases, where data on placements is poorly maintained, and thus incomplete and inconsistent over the years. Blank fields, as well as 'not placed', 'unemployed', 'seeking employment', 'unplaced' and so on, were filtered out. Furthermore, Suryamitras pursuing entrepreneurship and/or own business of any kind have not been included.

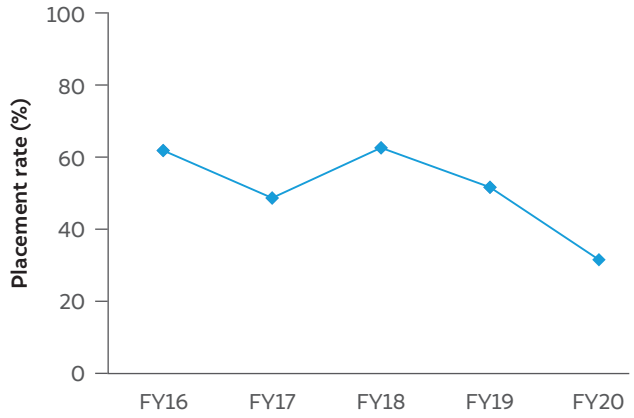
4. Salary estimates for subsequent FYs could not be found due to unavailability of data. Furthermore, there was discrepancy in packages mentioned in the FY16 databases so we set INR 50,000 as monthly income upper limit.

The other major reason for the low retention in the solar industry cited by all the stakeholders—industry, TPs, and Suryamitras—is the need for Suryamitras to travel out of state for employment for extended durations. Furthermore, Suryamitra respondents argue that the remuneration offered for such out-of-state employment is not lucrative enough. TP respondents mention the challenge of convincing Suryamitras to join an out-of-state role after getting the offer. One such TP respondent mentioned:

> “We also have to do counselling with the Suryamitra’s parents, to convince them to take it [job] up.”

Low remuneration is a demotivating factor: Suryamitra respondents mention the absence of opportunity for growth, in ranks or remuneration, and contractual nature of work, as reasons for quitting the sector. Thus, the remunerative value addition post-*Suryamitra Programme* is not substantial enough, even if there is significant technical skill improvement. Only 4 per cent of Suryamitras are retained in the solar sector after three years (SCGJ 2020). Suryamitra respondents mention the difficulty in finding another opportunity in the solar sector after the completion of their original contract, which was facilitated by the TP’s placement drive.

Figure 11 Placement rate of Suryamitras has declined by 30% in the last 5 years



Source: Authors' analysis of NISE database

> **Low remuneration, outstation postings and contractual nature of work lead to high attrition rate of Suryamitras.**

Sustaining interest of candidates is challenging: On the other hand, TP respondents mention that mobilising candidates with sustained interest is a challenge, as many enter the course without understanding the exit options and employment potential in the industry. Some drop out mid-course, while others leave a few months into their jobs.

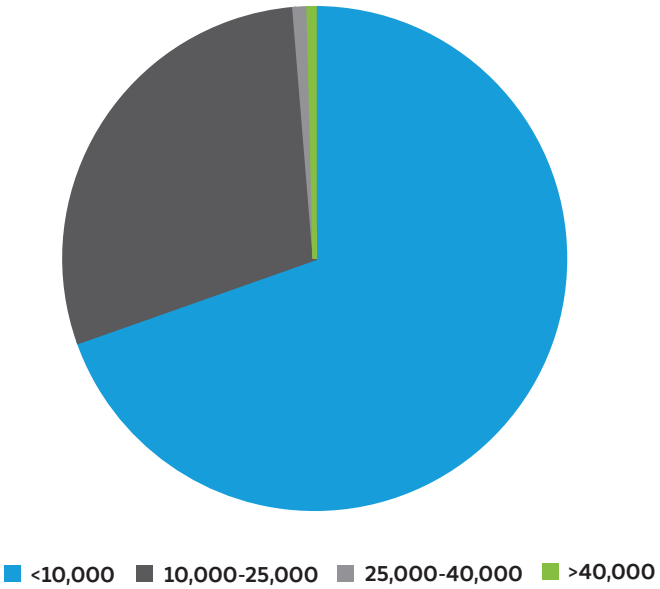
5.3 Other barriers to the programme's uptake

1. **Mobilisation challenges**: Some TP respondents mention challenges in mobilising good candidates. ITI/diploma graduates do not have enough knowledge about the potential opportunities and type of work in the solar sector, so they enrol in the programme without knowing their employment prospects or career trajectory. As a result, some leave midway or a few months into their job.

2. **Low awareness of the Suryamitra app**: In FY17, a Suryamitra mobile application was also launched by the government (PIB 2016). This app was developed by NISE to “enhance the employment of trained youth in solar PV technology and also improve the businesses of solar entrepreneurs because of quality servicing, maintenance and repairing professionals” (PIB 2016). These services are also provided to solar pumps installed under various government schemes. Entrepreneur Suryamitras can also register themselves on this site to provide these services. However, awareness and usage for this application remained low. Some TP respondents mentioned that they had developed in-house applications instead, offering similar functionality; for example, the International Solar Training Institute (ISTI) marketplace app (Gupta 2022)[5].

5. The ISTI application connects contractors to the available trained workforce and machinery, using a pay-per-use model. The Suryamitra application is a GPS-based mobile app that enables registration of requests for visit of a Suryamitra for undertaking maintenance/repair of solar PV systems.

Figure 12 70% of Suryamitras in FY16 earned less than INR 10,000 per month



Source: Authors' analysis of NISE database

3. **Support for unplaced Suryamitras:** There are no common processes or systems in place to support unemployed Suryamitras. TPs most commonly have a social media group like WhatsApp for communication of opportunities for unplaced Suryamitras. Sometimes, additional soft skills training and refresher courses for unplaced Suryamitras are offered. Some TP respondents also claimed to offer sessions on entrepreneurship and government schemes and funding opportunities for Suryamitras wishing to start their own business.

6. Recommendations

Based on the gathered insights, we propose the following next steps towards upgrading the *Suryamitra Skill Development Programme* in India:

1. **Expand *Suryamitra Programme* curriculum:**
   - **Focus on practical, on-ground training:** NISE and SCGJ should collaborate with industry players to offer practical demonstrations and on-ground training at the project sites during the programme. As the programme is already integrated with the National Apprenticeship Promotion Scheme (NAPS), focus should be to increase the uptake of Suryamitras' by the industry.
   - **Introduce solar manufacturing module:** A detailed solar manufacturing module can be added, especially since the budget 2022 allocates INR 19,500 crore on solar module manufacturing to meet the 280 GW installed capacity target (GoI 2022). This additional module can be made a part of the NISE curriculum, and can be taught in tandem with the existing solar PV installer module.
   - **Develop refresher courses and online modules:** NISE, in collaboration with SCGJ, should develop common course modules that can be made available online for Suryamitras. Weekly assessment can be carried out through the online mode as well. These options would open the possibility of distance-learning courses with an on-site demonstration component for a week.

BOX 2 COVID-19's ripple effect on the sector

The RE sector was mostly resilient throughout the COVID-19 pandemic but capacity deployment slowed down due to supply chain disruptions and workforce shortages induced by the lockdown (Tyagi et al. 2022). As the RE projects were exempted from the pandemic restrictions, the capacity deployment continued, albeit at a slower rate than previous years (Tyagi et al. 2022). Respondents from large EPC companies mention that their demand for technicians has been continuous. But local companies have been impacted more, with players either stalling hiring or unable to get "good candidates". The pandemic impacted the employment prospects for trainees, with every four out of five Suryamitras surveyed either unable to get a job or laid off from FY20.

Source: Authors' analysis

This may incentivise women candidates as well, as they don't have to be in residence for three months.

- **Promote entrepreneurial shift**: The curriculum should also include stream/specialisation for entrepreneurship in the solar sector, which will enable local employment as well as incentivise distributed solar deployment. Local employment generation through distributed renewable energy (DRE) seems to be key in increasing the employment prospects of Suryamitras (Banerjee and Chiplunkar 2019). This entrepreneurship specialisation can be developed by NISE and added to the existing curriculum.

2. **Encourage local employment generation**:
   - **Outreach to local companies and geographical mapping**: NISE can organise national and regional conferences which bring together TPs, industry, and Suryamitras to facilitate networking and placement opportunities.
   - **Conduct regional job fairs**: These can be organised by SNAs for local solar companies and TPs to get placements for Suryamitras. Some international examples are that of France's City Jobs Alliance and Belgium's Professional Reference Centre for Construction that "brings together educational institutions and the construction sector, targeting low-skilled workers for integration in the labour market" (IRENA 2020).[6]
   - **Integrate Suryamitra app with DESH e-portal**: The app can be refurbished and made a part of the placement process, or integrated with the newly announced Digital Ecosystem for Skilling and Livelihood (DESH-Stack) e-portal (MoF 2022). Furthermore, the Suryamitra app can include the functionality of trained Suryamitras uploading their profiles for local solar installation and associated work, and thus get hired by local companies, residents, and contractors directly.
   - **Preferential employment for local labour**: In utility-scale solar especially, industry mandates can be put in place by the SNAs to have a certain percentage of Suryamitra workers from the state they are operating in to be eligible for government subsidies and incentives. The collaboration of state and central governments, in tandem with MNRE, would be required for this. This can bring down the supply and demand mismatch of trainees.

3. **Improving retention of Suryamitras in the solar sector:**
   - TPs can offer informational sessions and counselling for interested candidates before enrolment. This would increase the Suryamitras' awareness of the job potential and prospects in the solar sector.
   - The salaries of the Suryamitras could be increased and be at par with a similar skill level in other sectors as per the Labour Laws.
   - Industries can consider giving flexible transfers and growth opportunities to retain the trained Suryamitras.

7. Conclusion

The study maps the impact and development of the *Suryamitra Programme* over the years. The programme has seen a steady increase in capacity, with about 50,000 Suryamitras already trained. Furthermore, the state-wise distribution of the programme has also increased pan-India. The programme has been mostly inclusive across social groups, with the OBC category being most represented among all the Suryamitras trained. However, the programme has failed to be gender inclusive, with estimates showing that women candidates account for only 2 per cent in the year of inception. The lack of gender-disaggregated data after that limits the evaluation of the *Suryamitra Programme's* gender inclusivity.

Our study asserts that there's an immediate need to expand the programme's curriculum to have more modules that provide transferable skills to the trainees, increase on-the-job trainings for better employability of the trainees at industry's expectation levels, and change the programme's execution to a hybrid mode to encourage women's participation.

6. These projects were started as a part of post-COVID recovery efforts to generate local employment. Local authorities such as industry players, trade unions and public authorities came together to address skill shortages and coordinate employment opportunities for low-skilled labour.

References

Banerjee, Abhijit, and Gaurav Chiplunkar. 2019. "Understanding the Employment Preferences of Low-Income Skilled Labour in India." Research Note. Private Enterprise Development in Low-Income Countries, July 3, 2017. https://pedl.cepr.org/publications/understanding-employment-preferences-low-income-skilled-labour-india

GoI. 2022. *Budget 2022-2023: Speech of Nirmala Sitharaman*. February 1, 2022. Accessed March 1, 2022. https://www.indiabudget.gov.in/doc/budget_speech.pdf.

Gupta, Anand. 2022. "ISTI – on a Skilling Mission to Empower & Positively Impact the Lives of Underprivileged & Unemployed Youth!! – EQ Mag Pro." *EQ International*. Accessed February 17, 2022. https://www.eqmagpro.com/isti-on-a-skilling-mission-to-empower-positively-impact-the-lives-of-underprivileged-unemployed-youth-eq-mag-pro/.

IRENA. 2020. *The Post-COVID Recovery: An Agenda for Resilience, Development and Equality*. Abu Dhabi: International Renewable Energy Agency. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Post-COVID_Recovery_2020.pdf.

Kuldeep, Neeraj, and Arunabha Ghosh. 2020. "Building the Workforce for India's Emerging Clean Energy Sector." In *Reviving Jobs: An Agenda for Growth*, edited by Santosh Mehrotra. New Delhi: Penguin Books.

Kuldeep, Neeraj, Kanika Chawla, Arunabha Ghosh, Anjali Jaiswal, Nehmat Kaur, Sameer Kwatra, and Karan Chouksey. 2017. *Greening India's Workforce: Gearing up for Expansion of Solar and Wind Power in India*. New Delhi: Council on Energy, Environment and Water and Natural Resources Defense Council. https://www.ceew.in/publications/greening-indias-workforce.

MNRE. 2022. *Physical Progress*. 31 January, 2022. Accessed February 28, 2022. https://mnre.gov.in/the-ministry/physical-progress.

MoF. 2022. Press Release. 01 February, 2022. Accessed March 08, 2022. https://pib.gov.in/PressReleasePage.aspx?PRID=1794132.

NISE. 2022. "Expression of Interest (EOI) of *Suryamitra Skill Development Program* for FY 2021-22." 23 March, 2022. Accessed May 13, 2022. https://nise.res.in/wp-content/uploads/2022/03/EOI-Suryamitra-Skill-Development-Programme-March_15_2022-Final.pdf.

NISE. 2022. *About Suryamitra*. Accessed February 13, 2022. https://suryamitra.nise.res.in/info/About-Suryamitra.html.

NISE. 2016. *Annual Report*. https://nise.res.in/wp-content/uploads/2018/02/NISE-Annual-Report-English-2015-16.pdf.

NISE. 2017. *Annual Report*. https://nise.res.in/wp-content/uploads/2018/07/NISE-AR-2016-17-11.pdf.

NISE. 2019. *Annual Report* 2017-18. https://nise.res.in/wp-content/uploads/2019/01/NISE-AR-2017-18-English.pdf.

NISE. 2019. *Annual Report* 2018-19. https://nise.res.in/wp-content/uploads/2019/12/NISE-AR-2018-19-English-min.pdf.

NISE. 2015. *Suryamitra Skill Development Programme Guidelines*. http://manireda.com/wp-content/uploads/2016/07/1456477536Guidelines-For-Suryamitra-Skill-Development-Program.pdf.

Nobuoka, Yoko, Sasmita Patnaik, Shaily Jha, and Neeraj Kuldeep. 2019. *Women Working in the Rooftop Solar Sector*. Paris: IEA and CEEW. https://www.ceew.in/sites/default/files/Women-Working-Rooftop-India-web-v3.pdf.

PIB. 2016. *Shri Piyush Goyal Launches "SURYAMITRA" Mobile App*. June 7, 2016. Accessed March 14, 2022. https://pib.gov.in/newsite/PrintRelease.aspx?relid=146033.

Rheinland, TUV, interview by Sharayu Shejale. 2022. *Interview with TUV Rheinland Suryamitra Training Centre* (January).

SCGJ. 2020. *Impact Assessment Report for Suryamitra Training Program*. New Delhi: Skill Council for Green Jobs. https://sscgj.in/wp-content/uploads/2022/03/Suryamitra_Impact-Assessment-Report-SCGJ.pdf.

Suryamitra, interview by Sharayu Shejale. 2022. *Interview with Suryamitra from Gujarat* (January).

Tyagi, Akanksha, Charu Lata, Jessica Korsh, Ankit Nagarwal, Deepak Rai, Sameer Kwatra, Neeraj Kuldeep, and Praveen Saxena. 2022. *India's Expanding Clean Energy Workforce: Opportunities in the Solar and Wind Energy Sectors*. New Delhi: Council on Energy, Environment and Water, Natural Resources Defence Council, and Skill Council for Green Jobs.

The authors

Akanksha Tyagi
akanksha.tyagi@ceew.in

An experimental chemist by training, Akanksha's research at The Council focuses on solar energy and energy storage. Some of her current projects include modelling viable use cases of behind-the-meter storage for discoms, developing roadmaps to manage resources in clean energy technologies, and assessing the jobs and skilling requirement to support India's clean energy transition.

Sharayu Shejale
sharayu598@gmail.com

Sharayu Shejale is an early-career researcher with a Master's in Development Studies from the Indian Institute of Technology Madras. She interned with the Renewables Team at CEEW and contributed to the Inclusive Transition programme. She has been studying the socioeconomic impact of green energy transitions under the DIALOGUES project at the University of Geneva, and is currently an EDF Climate Corps Fellow with the Government of Maharashtra.

Neeraj Kuldeep
neeraj.kuldeep@ceew.in | @neerajkuldeepp

Neeraj's research at The Council revolves around solar and wind markets and the socioeconomic benefits of renewables, including jobs and skilling in the sector. He is particularly interested in the policy, regulatory, and economic aspects of rooftop solar, and is currently leading a project to design new business models to accelerate the deployment of rooftop solar in the Delhi region.

Suggested citation: Tyagi, Akanksha, Sharayu Shejale, and Neeraj Kuldeep. 2022. *Upgrading Suryamitra Skill Development Programme: Improving Uptake and Employability of Suryamitras in the Solar Sector*. New Delhi: Council on Energy, Environment and Water.

Disclaimer: The views expressed in this study are those of the authors and do not necessarily reflect the views and policies of the Council on Energy, Environment and Water. The views/analysis expressed in this study do not necessarily reflect the views of Shakti Sustainable Energy Foundation. The Foundation also does not guarantee the accuracy of any data included in this publication nor does it accept any responsibility for the consequences of its use. For private circulation only.

Peer reviewers: Deepak Rai, Head - Standards and Research, Skill Council for Green Jobs; Ankur Malyan, Independent Researcher; and Shanal Pradhan, Programme Associate, CEEW.

Acknowledgment: The Authors would like to thank Parvej and Tanisha Kamat, former interns with CEEW, for their contributions to the initial phase of this project.

Publication team: Kartikeya Jain (CEEW); Alina Sen (CEEW); Amit Dixit; Twig Designs; and FRIENDS Digital Colour Solutions.

Organisations: The **Council on Energy, Environment and Water** (CEEW) is one of Asia's leading not-for-profit policy research institutions. The Council uses data, integrated analysis, and strategic outreach to explain – and change – the use, reuse, and misuse of resources. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with wider public. In 2021, CEEW once again featured extensively across ten categories in the *2020 Global Go To Think Tank Index Report*. The Council has also been consistently ranked among the world's top climate change think tanks. CEEW is certified as a Great Place To Work®. Follow us on Twitter @CEEWIndia for the latest updates.

Shakti Sustainable Energy Foundation seeks to facilitate India's transition to a sustainable energy future by aiding the design and implementation of policies in the following areas: clean power, energy efficiency, sustainable urban transport, climate change mitigation and clean energy finance.

COUNCIL ON ENERGY, ENVIRONMENT AND WATER (CEEW)

ISID Campus, 4, Vasant Kunj Institutional Area
New Delhi - 110070, India
T: +91 (0) 11 4073 3300

info@ceew.in | ceew.in | @CEEWIndia | ceewindia