

# Development of Training Infrastructure for Decentralized Solar PV

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Project Report By

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**AnthroPower**  
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# Executive Summary

## Project Objectives

In response to the need for more and better quality training providers to cater to the human resource needs of the decentralized solar sector, CLEAN and AnthroPower initiated a project to 'Develop training infra-structure for decentralized solar PV', in January 2016. The primary objective of this project was to reduce entry barriers for technical training providers to start programs for decentralized solar PV installation and maintenance.

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## Activities

The project activities focused on attracting and enabling training providers to invest their capital and bandwidth in training for the needs of the decentralized solar industry. To achieve these objectives, the project focused on 3 levels of activities described below:

1. *Awareness:* Reached out to over 2000 technical training institutes by e-mail and phone, as part of its outreach to create awareness and interest among the vocational training providers in exploring business opportunities in the solar sector;
  2. *Training-of-trainer:* Conducted 4 training-of-trainer workshops in Ranchi, Gandhinagar, Tezpur and Bangalore. Over 100 trainers from 54 institutes, training managers and solar industry professionals attended the workshops, where the technical trainers equipped themselves with solar skills and knowledge and connected with solar industry professionals;
  3. *Support:* Provide continued support to training providers who pursued their goal of starting a training program in solar.
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## Outcomes and Recommendations

Of those who participated in the program, 13 new institutes have taken concrete steps to initiate new vocational training programs in solar PV installation. Out of these 5 institutes have already made the financial investment needed to start their programs. The project points to the need for continued efforts on 2 tracks:

### *Supply side intervention*

- Selling the job prospects and the growth of the solar sector to the vocational education industry to attract their investment in capital, infrastructure and bandwidth to the sector;
- Providing ongoing support to training providers. The specific form and shape of the support needed is described in this report.

### *Demand side intervention*

- Aggregating demand for human resources from solar enterprises for their requirements;
- Enhance capacity of companies to absorb entry level trained workforce, through apprentice programs.



## Project Objectives and Scope

The objective of this initiative is to support the creation of a sustained supply of trained entry-level workforce in sales and service for the rooftop PV, solar home system and off-grid power sector. The Suryamitra program by the Ministry of New and Renewable Energy (MNRE) and the NSDC sector skill councils provide a curriculum and framework for training providers to enter the business of solar training. There is however still a need to attract quality training providers, who can cater to the human resource demand from decentralized solar enterprises spread across a wide and diverse geography. Attracting training providers would mean getting the vocational education industry to bring its own investment in bandwidth and resources to pursue renewable energy skills as a business opportunity. This project was developed with such an end goal in mind.

The problem of insufficient available skilled human resources in a general environment of chronic underemployment is a multi-layered one and does not have a silver bullet solution. It requires coordinated interventions at multiple levels. The strategy paper published by CLEAN and developed by AnthroPower, called '**Skill Solutions for Off-grid Clean Energy**' (<http://thecleannetwork.org/downloads/skill-solution.pdf>) describes the range of interrelated solutions needed that includes creating career pathways through job linked certifications, structured apprenticeship programs and investment in good quality content and pedagogy.

The immediate target of the activities in this project was to create capacity in vocational training providers to produce employable installers and technicians for the decentralized solar PV sector. The project team defined a few specific targets at the outset:

- Create 10 to 15 new training providers for solar PV within a year especially in geographies, which are underserved;
- Create a database of potential training providers and insights on how best to onboard them to provide a sustained stream of qualified entry-level workforce;
- Suggest or recommend a future course of action for enhancing skill development for the sector.

Within this defined scope, the immediate objectives for capacity building were targeted at 3 primary audiences – training managers, electrical trainers and industry professionals. The specific objectives aimed for each of these targeted participants are described below in Table 1. Workshop Objectives.

**Table 1. Workshop Objectives**

Target Group	Objectives
Electrical Trainers	<ul style="list-style-type: none"> <li>• Learning objectives for entry level skills in solar PV</li> <li>• Conducting lab experiments and site procedures in installation</li> <li>• Ensuring quality learning experience and outcomes</li> </ul>
Solar PV Engineers	<ul style="list-style-type: none"> <li>• Understanding of published curriculum and standards</li> <li>• Adult learning and activity based learning session using multi-media</li> </ul>
Training Managers and Entrepreneurs	<ul style="list-style-type: none"> <li>• Understanding of job roles and job market in solar PV</li> <li>• Finding companies for apprentice or placement</li> <li>• Infrastructure needed for entry level solar training</li> </ul>

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## An Employability Model for the Decentralized Solar Industry

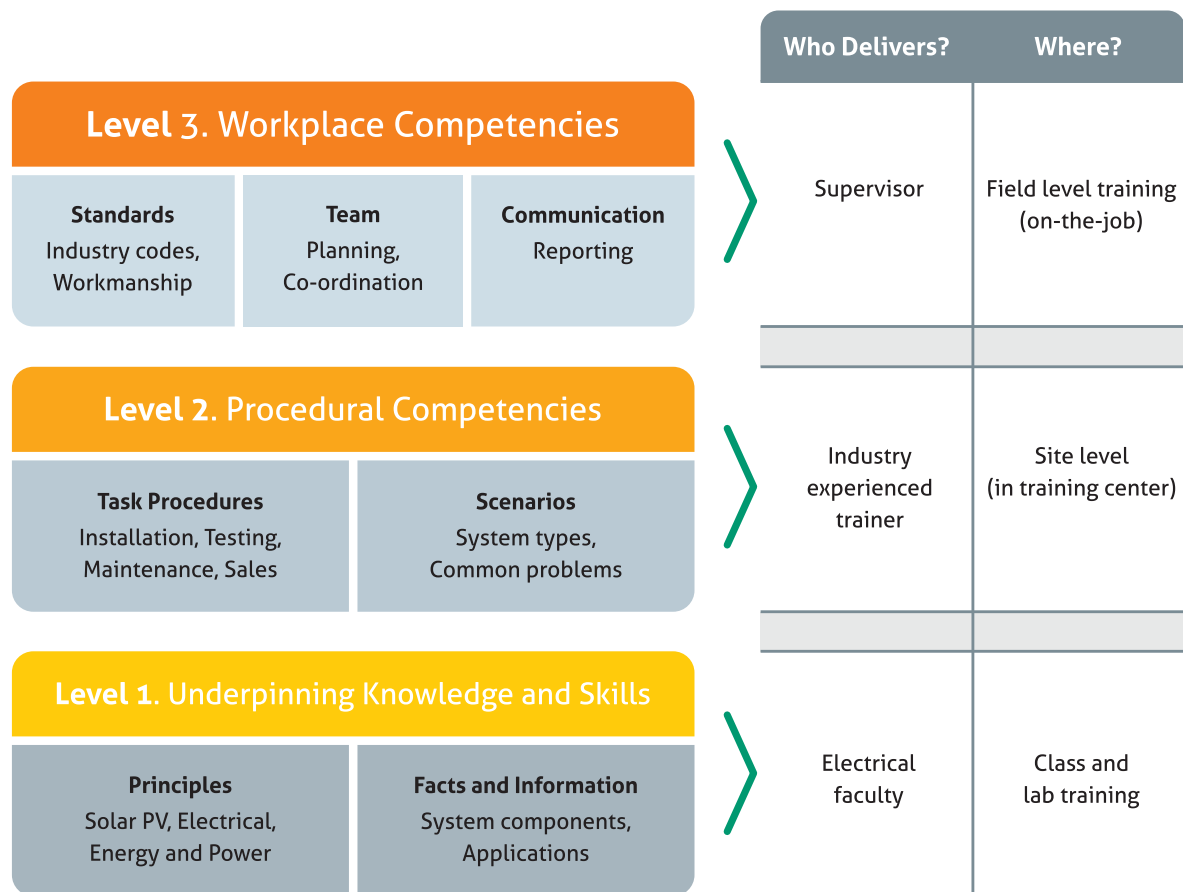
Building the capability of vocational training providers first requires a definition of the specific value they offer in the skill building process. There is therefore a need to clearly define a model of how knowledge and skills are transferred by these training providers to their beneficiaries. The model adopted for this project and described below answers the following questions:

1. What competencies should the learner acquire as he or she progresses on the path to employability?;
2. Who exactly in the skill development process will transfer the knowledge and skills to gain the competency?;
3. How well can a model fit the needs of an industry, where small and medium enterprises are scattered across geography.

## Learners' Path to Employability

In the model described in Fig 1, there is a clear distinction between the competencies acquired by the learner at each level, the competencies of the trainer required for each level and the physical location of the training delivered. All of these have significant implications for the quality of training outcomes.

**Figure 1. Model for Creating Employability**



## Key implications for training providers

To scale skill development with quality, efforts should be directed to bring the right type of resources to each level of training. The nature of activity and the type of trainer is vastly different for the 3 levels. This is further elaborated below.

### *'Level 1':*

This level is inherently educational in nature and a professional adult educator is more essential as opposed to an industry expert. What is more critical is the ability of the trainers to actively engage the learner on a structured learning path on a daily basis. This requires a set of tools for the trainers to scaffold and deliver training, for example, trainer session guides, learner handouts and possibly digital enablement. To scale up, there is a need to target a larger number of existing technical vocational training providers in allied trades such as electrical, telecom and construction. These providers should be able to bring in the class and lab infrastructure along with the trainers needed for day-to-day engagement needed for the learner. Moreover, these training providers should be physically present in clusters where deployment of small and medium solar systems has gained traction.

### *'Level 2':*

Industry experience at the supervisory level is the most important competency required for this level of training. Target partnerships with experienced industry professionals to demonstrate and supervise site level instruction within the premises of the 'level 1' training providers. These trainers should be able to deliver as per the national occupational standards of the sector skill councils.

### *'Level 3':*

A direct supervisor with coaching abilities is the most important attribute since learning has to be enabled in the context of a particular workplace. To scale up, target solar companies, who are effectively the training providers at this level. So it is important that they have the capacity to onboard and coach new hires in the field.

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## **Project Activities**

Bringing trained and talented human resource to the solar industry first requires awareness generation and advocacy on the prospects in the industry. Therefore, the project focused heavily on such activity as the first step. Secondly, the team had to translate any interest generated into real progress in setting up pro-grams. The means used to accomplish this was the conduct of training of trainer workshops.

## Awareness generation and advocacy



For initial interest generation, the team focused on mass mailers and cold calls to Vocational Training Providers (VTP) from lists available with Director General of Employment and Training and NSDC. The team reached out to over a 2000 technical training providers who already have programs for allied sectors such as electrical, electronics, telecom and construction. The mailers emphasized the job opportunities in the emerging solar PV sector. This attempt was carried out in multiple cycles within specific geographic areas in the northeast, east, and west and south of India.

Out of these 2000, over 180 training providers across registered interest in attending a workshop to learn further. After screening, 54 organizations attended the training-of-trainer workshops. The screening criteria focused on the intent and capacity of the applicant to start a new solar training program within 3 to 6 months.

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## Training of trainer (ToT) workshops

The second stream of activity was to impart skills, knowledge and information to the training administrators and technical trainers who expressed interest in starting their program. The content for the ToT workshop covered the following 3 areas:





- Sector knowledge including job roles and employers;
- Domain knowledge in solar PV including class, lab and site activities from the government defined Suryamitra curriculum;
- Trainer competencies relevant to entry-level ITI candidates such as how to structure a session at the right level, activity based training etc.

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## Findings

Among those who attended, **Table 2** below provides the number of organizations at each stage of development. The last rows estimates the number of training providers who are not likely to start a program.

**Table 2. Training providers enabled by the project**

Stage of development in starting a solar PV training program	Number of training providers
Program already underway; attended ToT workshop to strengthen skill of trainer	6
Started a solar training program after receiving assistance	6
Likely to start a program within 3 months	7
Likely to start a program within 6 months	5
Not likely start a program in the near future	33

**Table 3** below shows the level of access the training providers have to domain expertise in solar. The figures clearly points to a need for assistance to the providers to access industry experts.

**Table 3. Access to industry expertise for conduct of training programs**

Domain expertise to start solar training	Number of training providers that attended the program
Have in-house experience in solar PV domain	9
Already have access to solar PV domain experts from outside	3
Need access to solar PV experts	44

**Table 4** below shows the financial model under which training providers operate. The figures point to the fact that only a relatively small number of NSDC partners and foundation backed training providers have shown interest in starting solar training programs. This points to the need for greater advocacy with large foundations and NSDC backed organizations.

**Table 4. Mode of financing**

Investment and revenue model	Number of training providers that attended the program
Self-financed with operating revenue from government schemes	41
Financed by large private donors or corporate groups	8
Public University or NSDC funded	7

## Feedback from participants

Participants were asked the following questions in an online feedback form:

1. How do you rate the training approach in the workshop?

2. How do you rate the knowledge and skill of the trainers?
3. Were the scenarios and activities easy to understand?
4. Do you think the workshop was well organized?

On a scale of 1 to 5, the above questions elicited an average rating of 4.46. On comments and suggestions to improve the workshop participants in general requested provision of content for their use as instructors, longer workshops and more practical activity.

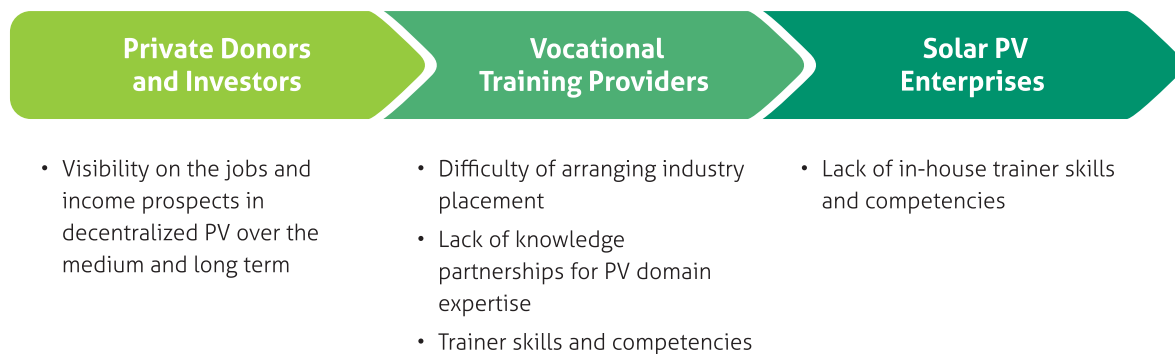
## Entry barriers faced by stakeholders

The data presented above coupled with qualitative insights gained during the conduct of the program, points to actions that can boost the quality and quantity of training for decentralized solar PV. The project team identified specific entry barriers for new training providers in entry-level skill development in the context of decentralized solar PV. For a significant increase in training capacity in the sector to occur, there are 3 primary stakeholders in the ecosystem who will need to make a significant management level initiative to invest in the solar sector with their financial or human capital:

1. Foundations and other large investors in skill development programs;
2. Vocational training providers who deliver the program on the ground, some of whom are self-financed;
3. Solar enterprises that have a need for trained human resource at the entry level.

The specific barriers they face in making a decision to enter the field is described in **Figure 2** below.

**Figure 2. Barriers to Start Solar PV Skill Development**



## 1. Visibility on jobs, income and placement

The reasons why enterprises face hurdles in finding quality human resource and why training providers may be reluctant to satisfy that demand has a lot to do with the size and geographic spread of the estimated demand. What appears like a significant demand and supply mismatch at the aggregate level may not be reflective of actual micro-level demand. The number of trained candidates that can be hired by enterprises at any single place and time may often be less than what the aggregate number suggests. Thus, as mentioned in the bullet points in **Figure 2** above, visibility and predictability of human resource demand can help push the decisions by private donors and vocational training providers.

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## 2. Knowledge partnerships

Despite the above constraint, the awareness campaigns conducted during the project on the solar opportunity generated significant interest from skill development players, who attended workshops with their own travel budgets. But even after a training provider makes a decision to begin the process of starting a skill program in solar, they face hurdles in bringing all the components together such as industry expert, equipment and learning content.

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# Conclusions and Next Steps

It is widely believed that infusion of trained human resources can have a catalytic effect on the growth of an industry. So this project addressed the supply side of the equation focusing on capacity expansion for training providers. This included industry knowledge, domain technical knowledge and appropriate pedagogy. These activities created awareness and built capacity in over a 100 technical trainers and training administrators across India to begin their solar journey. As a result, 13 training providers have so far reported concrete actions to set up their training programs representing an annual capacity of 3000 additional trained technicians for the industry.

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## Ongoing Activities in the Project

The table below lays out the original goals and what future actions will be sustained in the next 6 months to try and meet the goals. The next section will point to actions that are needed to further boost skill development in the sector, beyond the scope of this project.

**Table 5. Project Summary**

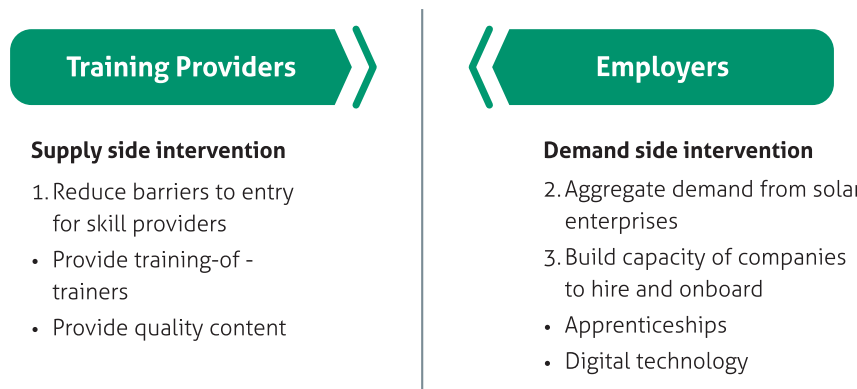
Project Goals by end of the year	Current Status	Planned actions as part of the project for rest of the year
4 orientation and training workshops in 4 states for 60 participants	Completed with attendance of over 100 trainers	—
5 training providers from each workshop have submitted proposals (total of 20)	11 training providers in total have submitted proposals to their state nodal agencies or the green jobs skill council after attending the workshops	Phone and e-mail support will be provided by AnthroPower for the following: <ul style="list-style-type: none"> <li>• Equipment procurement</li> <li>• Proposal writing for affiliation</li> <li>• General information</li> </ul>
3 new training centers from each state have commenced training program (total of 12)	8 new centers have started: IL&FS – 5 centers Donbosco Tech – 1 center SELCO, Manipal – 1 center Husk Power – 1 center	On-site training of trainers and content licensing will be provided by AnthroPower as a paid arrangement to the training providers
Capacity created for 1000 new learners per year in solar PV	8 centers represent capacity for 800 learners per year	Provision of services described in rows 2 and 3 should help meet this target

## How to Further Accelerate Skill Development in the Sector

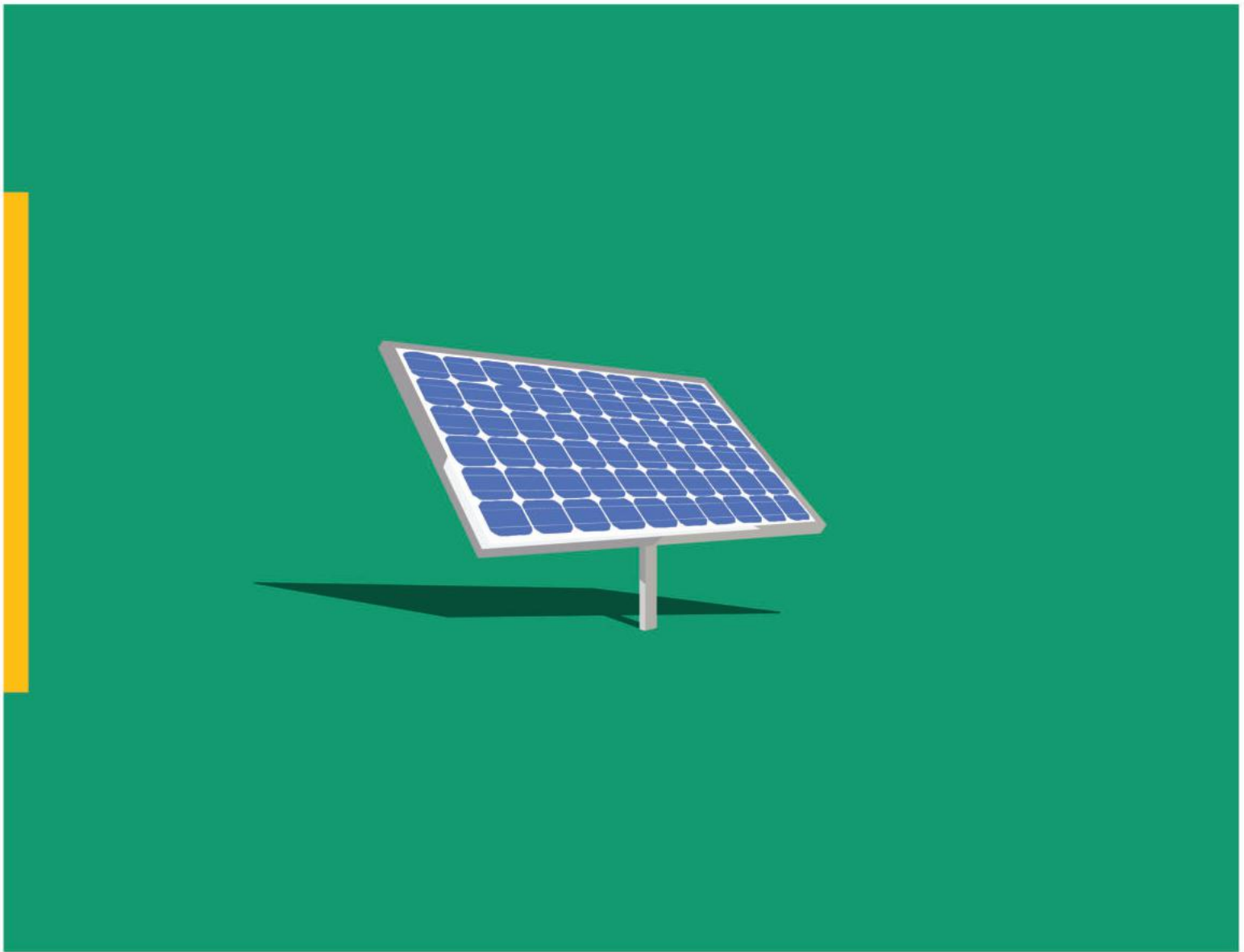
The efforts described in this report are a starting point to create a sustainable training infrastructure. A lot needs to be done to further improve the attractiveness of the sector as a whole by removing the barriers to entry described in **Figure 2**. This sub-section provides an outline of these steps in **Figure 3**.

CLEAN should take an integrated approach for new programs by also tackling the demand side of the problem by engaging companies that can provide jobs or apprenticeships. This will dovetail into 'level 3' of training as defined in the employability model in this report. A 3-step action plan is described in **Figure 3** below that integrates both demand and supply side interventions.

**Figure 3. Actions needed for a sustainable training infrastructure**



1. Aggregate demand from enterprises by coalescing their human resource requirements for the coming 6 to 12 months. Demand aggregation may include entry criteria and assessment standards that the employers have bought into. With this number worked out, sell a well-defined market proposition to both training providers and the larger investors in skill development programs such as corporate foundations
2. Create capacity within solar enterprises to on-board and absorb entry-level hires by deploying tools and systems such as apprenticeships, performance ratings and the use of technology



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