Ashden India
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Human Capacities and Capabilities for Decentralized Renewable Energy

Decentralized renewable energy (DRE) is seen to have enormous potential to address energy access gaps in India, but the sector's growth has been constrained by numerous factors, including the lack of skilled manpower for critical functions. To date, the approach to address this shortfall has been to devise training programme in DRE. While there is no doubt that skills development through training is important, a systematic approach to address the labour void in DRE faces two challenges. The first is a lack of understanding of the employment needs and prospects of the DRE sector, and the second is gaps in the way DRE training is currently being provided.

Challenge 1: Poor understanding of DRE manpower needs and gaps

There is a lack of in-depth understanding of the employment prospects and workforce requirements in the sector. In renewable energy (RE) generally, and specifically in DRE, there is very little global or Indian research on these topics, a fact highlighted in recent International Renewable Energy Agency (IRENA) reports.[1] The number of jobs created by DRE in India is a poorly researched estimate, and varies considerably because of differences in DRE achievement projections and normative manpower requirements. Off-grid solar photovoltaic (SPV) is a rapidly growing segment of the industry, and IRENA (2012) reports that this segment employs 72,000. The biogas sector employs 85,000, and back-of-the-envelope estimates indicate that about 20,000 persons are required to maintain solar home lighting systems (SHS).[2]

The only widely available formal estimate of current and projected employment in key DRE areas (off-grid solar, biomass/biogas, and small hydro) indicates that there are 233,000 persons currently employed, a number that is projected to more than triple to 862,000 by 2020 (MNRE/CII, 2010). However, not all experts agree with the numbers presented in the Ministry of New and Renewable Energy/ Confederation of Indian Industry (MNRE/ CII) study and point to the need for a better understanding of employment needs of the sector, which are very different from those of conventional centralized energy systems. Studies, however, can be expensive and time consuming and their reliability uncertain.[3] The absence of robust studies should not be an excuse for procrastination.

A rapid assessment by DRE experts of the manpower needs and gaps is summarized in the table below. The following are key points:

- DRE is not a single sector. Job creation opportunities and manpower needs vary significantly across technologies and scales, making normative estimation difficult. There is added complexity with job creation opportunities across the life cycle and value chain of DRE. Opportunities in solar are concentrated at the installation stage but tend to be more scattered geographically. Biomass-based

>> Highlights

- Employment potential and job skills in this new sector need a detailed study.
- Issues about availability and relevance of training workers for this sector are being addressed but need a review for quality and relevance.
- Jobs will be full and part time, technical and non-technical.
- We need to explore the possibility of employing local skilled youth by providing additional training or retraining.
- Successful entrepreneurs/ enterprises must be roped in for on-the-job training and entrepreneurship development.

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[1] For instance, 'Caution is needed in relying on existing data. …many studies rely on the same sources. The sample of countries is also low and may not necessarily be comparable for all economies. Moreover, many estimates are derived from countries with large-scale deployment and successful manufacturing industries.' (IRENA, 2011)

[2] Assuming about 1 million SHS with about two persons required per hundred systems.

[3] Previous reviews (IRENA, 2011) have also found gaps in existing data on renewable energy jobs. While the study states, 'More information is needed on the net job impact of increased renewable energy deployment,' it also cautions that '… this can be expensive and highly sensitive to modeling assumptions,' and further that, ' In making such an assessment, it is important to be clear as to which effects are attributable solely to an increase in renewable energy and which are caused by other factors. In particular, job losses in conventional energy to date have been the result of changes in the industry itself, not renewable energy deployment, although there is the potential for this to change in the future.'

technologies are more centralized in location but more evenly spread out over the life cycle. These patterns are consistent with the categorization of job opportunities in RE outlined in IRENA (2011).[4]

- There are few full-time employment opportunities. A typical DRE project is characterized by seasonal variations in manpower demand.

Challenge 2: Limitations in training programmes for DRE

While there has been activity and interest in the development of training programmes to provide technical skills applicable to RE, a case can be made for reviewing the relevance of these programmes to both the trainees and their potential employers.

A number of limitations have been noted in the RE courses typically offered at engineering and technical institutes. The following are some of the issues.

- ***Limited options***: According to All India Council for Technical Education (AICTE) data, only 3.8% of engineering colleges (52/1346) offer energy management courses with RE as a major elective at the post-graduate level. Only 2% of post-graduate students (910/40000) pursue energy management with RE as an elective (AICTE Annual Report 2007/08 as cited in MNRE/CII, 2010).
- ***Little emphasis on DRE***: Courses are geared towards RE generally but do not address the specific needs of DRE.
- ***Theoretical content***: Courses tend to be theoretical, largely because the faculty typically consists of scientists with sound academic knowledge but little hands-on project experience. In addition, there is a dearth of infrastructure such as equipment for testing and experimentation, and laboratories.
- ***Lack of quality standards***: Course quality is an issue, and as there is no system of certification or evaluation, potential candidates have no way to identify the better courses.

Manpower requirement and gaps

Areas / activities	Availability of skilled manpower
Manufacturing of DRE hardware	Moderately available
Marketing of DRE systems and products	Available but with poor knowledge of the sector; most workers are from general marketing background
Installation and commissioning	Available but with poor knowledge
Servicing, repair and maintenance	Highly inadequate
Design of DRE programmes and projects	Available but with poor sector knowledge
Product design	Moderately available

Source: Discussions with AIREC members

Looking ahead, given the twin challenges outlined above, and recognizing the need for detailed studies to support a better understanding of issues specific to DRE, the following steps are recommended based on perspectives provided by the sector.

Make DRE priority sector

An important step would be the recognition of DRE as a priority sector by existing government institutions like the National Skill Development Corporation (NSDC), the Ministry of Labour (vocational courses), the Ministry of Finance (banking and insurance sectors), and the Ministry of Human Resources (MHRD) (higher education). This will require MNRE partnerships with NSDC and other ministries developing human resources (AIREC, 2012).[5]

Decentralize DRE training

Currently, DRE education opportunities are confined to a few colleges and universities typically in or around urban centres. It is suggested that training for DRE be made available at the district level. District headquarters or District Rural Development Agencies (DRDAs) could be entrusted with this role. DRE training could also be integrated with Rural Livelihood Missions. The involvement of block development officers and village panchayats would also be useful. This would not only expand the opportunities for DRE training, but also help reach local youth to equip them to take on roles in DRE projects and programmes. Local youth are good candidates for managing or implementing DRE projects because of their local knowledge and community acceptability.

Integrate DRE with existing training mechanisms

Practitioners recommend introducing DRE electives and projects in electrical, civil, electronics, chemical, and other streams of engineering as well as including them as part of the curriculum in degree, diploma, and certificate courses.

[4] For fuel-free renewable energy technologies, the greatest number of jobs is generally concentrated in the installation, manufacturing, and administration phases, while for fuel-based technologies, feedstock production and distribution of biofuels account for the largest share.

[5] Elaborating on the employment potential of DRE compared to centralized energy based on renewables and/or fossil fuels, the GSES/IT Power report (2008) states: 'the jobs are largely created in the rural areas and require a skillset that is much more attainable for a wider range of rural people.'

To advance this notion, MNRE should discuss the integration of DRE into engineering curricula through AICTE and/or MHRD in the industrial training institutes (ITIs). Subject areas include electrical, civil, and chemical engineering, agriculture, and architecture. It is also recommended to introduce DRE enterprise development courses and electives through existing programmes in entrepreneur development institutes (EDIs) across districts. EDIs may also be encouraged to design DRE-specific courses based on demand from existing and budding entrepreneurs in the area.

Factor in part-time employment needs in DRE, retrain existing workers

It is critical to bear in mind that although manpower requirements for DRE are large, they do not always present full-time employment opportunities. For example, the labour demand for installation and maintenance of solar pumps is high, but the need is typically seasonal. Similarly, the maintenance requirements of solar lanterns or SPV off-grid projects are low and do not require large numbers of full-time staff. This raises the issue of employability of a trained workforce.

Several experts recognize the value of retraining existing workers rather than providing DRE training to untrained youth. The following are practical recommendations:

- For solar water heating (and to a lesser extent solar pumping), retrain or provide specialized training to plumbers. The maintenance needs in these applications are typically plumbing related.
- For installation and maintenance of SPV off-grid projects and lighting systems, electricians could be relatively easily trained, as they already have an understanding of the fundamentals.
- For improved cookstoves, masons, welders, and fabricators are good candidates for training. There is also an opportunity for masons to be trained in daylighting and convection heating, which are elements in energy-efficient rural homes.
- Integrating RE into the existing training of energy auditors and electrical inspectors could create a cadre of specialists in RE and DRE.
- Refrigeration and air-conditioning installers could similarly be retrained for RE installations.

The Indian Copper Promotion Council of India has trained many plumbers in solar water heating as part of a programme at ITI Maharashtra, and the plan is to extend the training to 500 plumbers each year.[6] Similarly focused programs are proposed for biogas plants, improved cookstoves, solar lights, and various types of mini grids.

Involve practitioners in hands-on training

There is tremendous scope for on-site training. This represents an opportunity for private-sector entrepreneurs, but it will have to be incentivized, possibly through government schemes. Engaging entrepreneurs in programmes for such training combines practical knowledge of the technology with business acumen. Entrepreneurial training will help the trained youth to establish themselves independently without having to seek employment with a project developer. Nevertheless, trainees need to be fully briefed about their entrepreneurial and employment prospects in the course of their programme. It is also important to plan for future trends, such as the likely demand for rooftop solar in urban areas, requiring skills very different from those for rural DRE applications.

Assure and certify quality

Though decentralization of DRE is proposed, we must be mindful of the quality of training provided. To ensure the quality of training is not compromised, it would be useful for MNRE to stay engaged with and lead the development of training material pedagogy, and maintain a record of training resources. Monitoring the quality and effectiveness of training programmes and developing a mandatory certification process is equally important. The involvement of professional organizations and trained personnel is also critical. Given the large numbers of people who would need to be trained, it is important to first create a cadre of qualified instructors.

Build on and go beyond technical skills

It is important to note that training for DRE requires not just technical skills but also a range of softer skills, including community engagement, financing, and project management. Some DRE systems require specific technical knowledge, for example, knowledge of forestry and agriculture is vital while implementing biomass-based projects. Case studies developed by IRENA highlight the importance of broader training encompassing the development of business skills, knowledge of product standards, and quality control, as well as marketing skills.

Training modules for DRE should cover a host of topics, including comparative relevance of DRE options in various situations; technology constituents and devices; installation; procurement; problem detection and servicing; regular

[6] http://solarthermalworld.org/content/india-first-training-programme-plumbers-icpci

maintenance and replacement of parts; economics of the technology process; relevance of policy and regulatory frameworks; and pre-project feasibility assessment and planning through technical surveys, resource assessment studies, and socio-economic surveys.

Training must also distinguish between skills for design and those for installation, operations and maintenance. While design training is better suited to engineers (who can also become instructors for other training programmes), other trainers could be non-engineers or ITI pass-outs.

There would be a need for auditors, inspectors, financers, installers, service technicians, and a host of other skilled personnel (AIREC, 2012). Capacity building must therefore focus not only on preparing skilled technicians for maintenance and support, but also on working with stakeholders, particularly bankers and financers.

It is important that all activities related to DRE manpower management—be it in training or in understanding training needs—the views of marginalized groups and women must be taken into account. Women have not only been seen to be one of the largest beneficiaries of the adoption of improved DRE options, but are also active users and informal marketing agents. Involving women in design, installation, maintenance, and servicing will offer significant benefits.

Depending on the needs of the sector, courses of various durations and intensity must be offered, ranging from short (1-week), medium (1-month), to long duration (6-12 months).

Addressing the manpower gap in DRE and achieving the sector's employment potential must be viewed as two sides of the same coin. The focus on training for DRE is important and it must reflect the specific characteristics of labour needed in various DRE projects and programmes. The DRE project too must fit into the employment and development matrix of the region.

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