

# **BUILDING ODISHA'S GREEN WORKFORCE**

**Strengthening the Skilling  
Ecosystem and Enabling Integration  
in the Emerging Economy**





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**iFOREST** | INTERNATIONAL  
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## List of Abbreviations

DDUGKY	Deen Dayal Upadhyaya Grameen Kaushalya Yojana
EPC	Engineering Procurement and Construction
GSVA	Gross State Value Added
IPICOL	Industrial Promotion & Investment Corporation of Odisha Limited
ITIs	Industrial Training Institutes
JSS	Jan Shikshan Sansthan
NAPS	National Apprenticeship Promotion Scheme
NCVET	National Council for Vocational Education and Training
NSQF	National Skills Qualifications Framework
NSTI	National Skill Training Institute
OSDA	Odisha Skill Development Authority
PLFS	Periodic Labour Force Survey
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
SCTE&VT	State Council for Technical Education & Vocational Training
SDTE	Skill Development & Technical Education
VDA	Variable Dearness Allowances
WSC	World Skill Center

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# Summary for Stakeholders

**Odisha is** entering a new phase of industrial transformation. For decades, coal and non-coal mining and various fossil fuel-based industries have formed the backbone of the state's industrial growth. As India advances toward a low-carbon development pathway, Odisha's industrial structure is also beginning to diversify. New opportunities are emerging in sectors, such as, renewable energy (RE), electric mobility, sustainable manufacturing, green construction, green hydrogen and ammonia, among others.

The opportunities in the emerging sectors are shaping the labour market, creating demand for a future-ready workforce equipped with skills and competencies required by these sectors. To harness these opportunities and enhance the prospects of local workforce integration, Odisha must strengthen its skilling ecosystem and institutional capacities. This will not only enhance new employment opportunities, but will also help to minimise potential disruptions in jobs from the energy transition.

This study provides a comprehensive assessment of Odisha's labour-market trends, skilling architecture, and sectoral demands, supported by primary surveys of students (571), faculty members and institutional representatives (30), employers (33) and workers (110) in the solar and electric vehicle (EV) sectors. The findings highlight the progress made, the systemic gaps that persist, and the practical actions that are needed to build a robust green-skilling ecosystem and enable workforce integration in the emerging economy.

## Key Findings

### 1. Green skilling is not suitably integrated in Odisha's training ecosystem.

Despite Odisha's extensive network of Industrial Training Institutes (ITIs), including 72 government and 418 private, 35 polytechnics, and more than 350 short-term skilling centres, green skilling has not been meaningfully integrated into mainstream technical education.

With respect to curricula, while approximately 67% of ITI principals reported that their curricula has now been updated to include specific green content, particularly in solar and EV modules, however skilling is largely limited to NSQF alignment without explicit integration of green skill training.

The primary survey results of students showed their limited exposure to defined green skilling in these institutes. Only 7% of the students in the training institutes were enrolled in any specific green skill course (such as related to RE, electric vehicles, etc.). Besides, there is also a significant lack of awareness of green skill courses, with over 45% surveyed students being unaware of the existence of such courses. Collectively, these have limited the scope of students and trainees being equipped with green skills at these institutes.

### 2. A significant demand-supply gap exists for the skilled workforce in emerging green sectors.

Over the past few years, Odisha has witnessed substantial investment commitments in new-age and low-carbon industries. Solar, wind, and green-hydrogen projects, along with equipment manufacturing units and EV supply-chain industries, are beginning to take shape. For example, between March 2023 and December 2024, the state attracted over rupees two lakh crore in green industries with an employment potential of 1.3 lakh jobs. Further, long-term projections suggest that upto 10 lakh full-time equivalent green jobs can be potentially generated in the state by 2030 across 28 value chains. These value chains span four major clusters, including RE and storage, green hydrogen and ammonia, EV and battery manufacturing, and bioenergy and circular economy activities.

Currently, expansion in renewables (particularly solar) and EV sectors backed by strong policy support is creating a significant demand for a skilled workforce. Over 73% of the employers surveyed in the solar sector expect a 50% increase in workforce in the next five years, from the current average of 20 to 25 people at these facilities.

However, at present there is a huge demand-supply gap. About 93% of employers surveyed in the solar sector reported that the entrants are not adequately equipped with the necessary skills for the sector. In the EV sector too, a similar gap exists. The workers' survey in both these sectors also suggested similar trends. Nearly 70% of

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workers surveyed in the EV sector lacked any formal EV-specific training; while for the solar sector, about 46% lacked specific training. This mismatch between rising industrial demand and limited workforce readiness is slowing sectoral growth and constraining Odisha's ability to maximise local employment in high-potential green industries.

### **3. Faculty readiness and training delivery remain suboptimal as compared to industry needs.**

Training delivery across ITIs, polytechnics, and short-term skilling centres has not kept pace with industry expectations or technological change. About 95% of instructors reported no formal exposure to solar, EV, hydrogen, or digital diagnostics, and fewer than 15% had participated in any Training-of-Trainers (ToT) programme for green technologies.

With respect to infrastructure, while around 70% of institutions possess adequate infrastructure for conventional trades, they lack the modern equipment, diagnostic tools, and specialised labs required for emerging sectors. This results in classroom instruction that often does not reflect the practical competencies demanded by employers.

### **4. Weak industry engagement limits course design, curriculum relevance, and practical learning.**

Industry participation in course design and training delivery is highly limited, leaving curricula misaligned with emerging green-sector needs. Hands-on exposure is also inadequate; only about 51% of surveyed students reported any form of industry interaction. Formal partnerships with industries are rare, with most ITIs depending on informal or ad-hoc arrangements rather than structured MoUs, co-designed courses, or apprenticeship pipelines. This weak interface directly affects training quality and job readiness.

Employers and workers in both solar and EV sectors informed that outdated and insufficient training as a major constraint, highlighting that current course design, content, and practical modules are not keeping pace with evolving technologies, job roles, and industry standards

### **5. Low wages and contractual agreements are predominant across majority job roles in solar and EV sectors.**

Green sectors, such as solar and EV, currently offer modest wages and contractual agreements, reducing their attractiveness for youth and contributing to weak retention. In the solar sector, 46% of workers surveyed earn between ₹15,000 and ₹25,000 per month, while about 29% earn below ₹15,000. In the EV sector, the worker share in low wages are further higher, with 58% of workers reported an earning below ₹15,000 per month. This wage compares to minimum wage in the state related to semi-skilled and skilled workers.

At the same time, women's participation in green and technical trades remains negligible, with limited representation in solar, EV, or other emerging sectors.

## **Recommendations**

### **1. Odisha needs to develop and implement a Green Jobs and Skills Mission, including time-bound strategies, to ensure holistic workforce development.**

Odisha should anchor its workforce transition through an integrated Green Jobs and Skills Mission with the objective of preparing a skilled, future-ready workforce for sectors central to these goals, enhancing local workforce participation in emerging green industries, improving employment outcomes, and supporting inclusive development.

Under the mission, the state government should develop a five-year strategy (with revisions thereafter) to guide green workforce development, with clear targets and outcomes. It should also enable the convergence of existing schemes and programmes administered by the central and state governments to optimise resources and ensure coordinated delivery.

To strengthen local capacity and support workforce integration, District Skill Councils may be established for local planning and matching training supply with industry demand. A Green Labour Market Information System is needed to track demand, supply, wages, and placements in real time.

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## **2. Establish Regional Green Skill Hubs, with a focus on regions to be potentially impacted by the energy transition.**

The state government, through the support of the central government, and the private sector, should establish Regional Green Skill Hubs, with a focus on regions that will be potentially most impacted by the energy transition. This will be important to build a future ready workforce, while also ensuring pre-emptive measures for minimising income losses and integration of impacted workers in the new economic sectors.

These regional hubs will function as anchor institutions for district-level training, innovation, incubation, and green entrepreneurship. These hubs should include industry-grade laboratories, digital diagnostics, EV and solar testing facilities, augmented reality (AR) and virtual reality (VR)- enabled classrooms to provide interactive, and experiential learning environment among others.

## **3. Integrate green skilling in the curriculum of various institutes, including short-term skilling centres.**

The revision of curriculum is needed across skilling institutes in the state to align training programmes with emerging industrial demands and the state's changing economic priorities. The focus should be on updating core content, strengthening practical and industry-linked learning, and ensuring that students gain the competencies required in modern workplaces. Training delivery should become more applied, technology-oriented, and better connected to job roles. To strengthen curricula and learning outcomes, partnership between skilling institutes and agencies, and the industries will be important.

## **4. Build faculty capacity in training institutes through dedicated programmes.**

Besides curriculum, faculty readiness is a key challenge. The state government should initiate a Faculty Development Programme to build a technically updated and industry-aligned training cadre. This should include ToT programmes, exposure visit to industries, simulation-based teaching, and certification in green technologies. Partnerships with the National Skill Training Institute, Sector Skill Councils, and leading industries in green sectors and relevant industry associations will be essential for continuous upgradation of faculty and trainer capacity.

## **5. Deepen government–industry partnerships to strengthen workforce integration.**

Stronger, long-term partnerships with industry are essential for ensuring that training remains relevant and demand-driven. The state government should expand public-private partnership models, adopt dual-training systems, and formalise collaboration for curriculum co-development, apprenticeships, and placements.

At the same time, the state government can mandate local workforce integration in the green sectors through relevant state policies. Some of the key policies in this regard include the Industry Policy Resolution (IPR 2022), the Odisha Renewable Energy Policy (OREP 2022), the state EV Policy (currently in the process of finalization), among others.

## **6. Improve wages, employment security and inclusion practices in green sectors.**

Improving wage levels, providing long-term contracts, and ensuring career progression through upskilling of the workers, is essential for attracting and retaining workers in green sectors.

The state government, along with industry partners, should promote advanced skill certifications, improve wage floors for key technical roles, and develop state-level occupational standards for solar, EV, energy-efficiency, and other emerging sectors.

The state government should also enable integration of women in the green skilling ecosystem. This will require investments in building foundational skills among girls and women, and improving access to skilling programmes. The government can scale up the Sudakshya model for women in technical green trades, and promote green entrepreneurship through programmes, such as Nano Unicorn.

## CHAPTER 1

# Introduction



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## 1.1 Context

Odisha is one of the most important states in India's energy transition, owing to its strong industrial base, large coal and mineral reserves, and concentration of energy-intensive sectors. For decades, industries such as, coal mining, steel, aluminium, and thermal power have driven the state's economic growth and supported employment generation. These sectors continue to provide direct and indirect livelihoods to lakhs of workers, particularly in mining districts and industrial belts.<sup>1</sup>

However, these sectors also account for nearly 84% of Odisha's greenhouse gas (GHG) emissions. As India moves toward its national net-zero commitment, these sectors will undergo a structural transformation, marked by the gradual decline of fossil fuel production and consumption, and the simultaneous growth in renewable energy (RE), energy efficiency, electric mobility, and sustainable manufacturing, among others. This transformation will reshape local labour markets, creating both risks and opportunities. On one hand, workers in coal mining and coal and fossil fuel-dependent industries will face job contraction or the need for reskilling; on the other, new economic opportunities in emerging green and low-carbon sectors will generate significant local employment if the workforce is adequately prepared.

To navigate this transition, Odisha needs to adopt a forward-looking strategy for skilling, reskilling, and upskilling its workforce. Alongside, expanding training capacity, modernising curriculum, and ensuring district-level readiness will be essential.

Against this backdrop, this study examines the state's preparedness to build a future-ready workforce and identifies institutional, policy, and market interventions needed to support a just transition.

### GREEN JOBS AND SKILLING

A clear and commonly accepted definition of green jobs is essential for preparing the workforce for such jobs through targeted skilling and reskilling measures, and integrating them in the green economy. Without such a shared understanding, it becomes difficult to design effective interventions, direct investments to priority areas, develop targeted skilling frameworks, or monitor progress in a consistent manner.

Globally, two broad conceptual approaches are used to define green jobs.<sup>2</sup> The first is the firm or sector-based approach, which defines green jobs based on the nature of goods and services produced or the technologies used by a firm. Under this approach, employment in renewable energy companies, electric-vehicle manufacturing units, or energy-efficient appliance industries is considered green, regardless of the specific tasks performed. This method is simple to apply and captures a wide range of employment linked to the green economy.

The second is the worker or task-based approach, which defines green jobs by the actual tasks carried out or the skills applied to reduce environmental impact, irrespective of the sector of employment. For example, a construction technician using sustainable building practices or a logistics specialist improving fuel efficiency would be counted as part of the green workforce even if employed in a conventional firm. This approach offers a more accurate reflection of green-skill requirements and labour-market needs, though it is more data-intensive and challenging to operationalise at scale.

The International Labour Organization (ILO) supplements these approaches by emphasising that green jobs must also meet the principles of decent work. According to the ILO, green jobs are "decent jobs that contribute to preserving or restoring the environment, whether in traditional sectors like manufacturing and construction, or in emerging green sectors such as renewable energy and energy efficiency." This perspective integrates environmental goals with fair wages, safe working conditions, social protection, and respect for workers' rights.<sup>3</sup>

In India, a single standardised definition or taxonomy of green jobs is yet to be established. However, there is growing interest across government departments, skill development agencies, industry bodies, and research institutions to arrive at a coherent and standard definition. Such efforts are steadily progressing and hold significant promise for guiding national planning, strengthening green-skilling initiatives, and enabling India to take advantage of workforce integration in the expanding green economy.

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## 1.2 Objectives

This report aims to assess Odisha's preparedness to skill and reskill its workforce for green jobs in the context of a just energy transition and to outline actionable steps for aligning human-capital development with emerging industrial and economic opportunities.

The specific objectives are to:

- To map Odisha's priority green and low-carbon sectors and estimate the nature and scale of green-job opportunities likely to emerge in the coming decade.
- To evaluate the capacity, relevance, and readiness of the state's skilling ecosystem, including institutions, curricula, infrastructure, and resources, to meet the evolving demands of green and transition-oriented sectors.
- To assess workforce readiness and perception across priority sectors such as RE and electric mobility (EV) through surveys of training institutions, students, trainers, and industry representatives.
- To develop an integrated understanding of sectoral opportunities, skill gaps, institutional constraints, and labour-market expectations, thereby providing a strategic foundation for strengthening green-skills development and ensuring that the benefits of the green transition translate into improved employability, better wages and security, and inclusive growth across the state.

## 1.3 Methodology

The study adopts a mixed-methods approach, integrating quantitative and qualitative techniques to assess Odisha's preparedness for a green and inclusive workforce transition. The methodology combines secondary research with primary field surveys to ensure analytical depth and contextual understanding.

### 1.3.1 Secondary research

The secondary component involved systematic data procurement, validation, and analysis from credible state, national, and international sources.

An extensive review of published reports, policy documents, and institutional studies was undertaken to understand Odisha's energy transition, industrial decarbonisation pathways, and workforce-development priorities. Sectoral data were compiled from government publications, industry departments, official dashboards, and national datasets such as the Periodic Labour Force Survey (PLFS), and CMIE database. The analysis used descriptive statistics and comparative indicators to examine employment trends, labour-market dynamics, training enrolments, and completion rates across traditional and emerging green sectors.

Projections of potential green-job demand over the next decade were derived from existing studies, and employment estimates obtained from Odisha Industrial Promotion and Investment Corporation of Odisha Limited (IPICOL) and related state databases.

A skill-supply assessment was also undertaken through data analysis and validation to evaluate the capacity of Odisha's skilling ecosystem. This included an assessment of Industrial Training Institutes (ITIs), polytechnics, and state-run training centres, focusing on the range of trades offered, infrastructure and laboratory readiness, trainer availability, and institutional preparedness to meet the requirements of rapidly evolving sectors such as renewable energy, electric mobility, sustainable manufacturing, and circular-economy enterprises.

## 1.3.2 Primary survey

The primary research component aimed to capture on-ground perspectives on the green skill ecosystem in the state to complement the secondary data. Besides this, another key purpose of the survey was to understand whether there exists a supply-demand gap between workforce demand in emerging green sectors, and the availability of suitably trained workforce. The on-ground survey in Odisha was conducted by adopting a purposive sampling method to ensure the inclusion of relevant institutions and stakeholders.

The primary survey was structured around three complementary instruments to capture perspectives from both the supply side (training institutions, students, and trainers) and the demand side (industries and workers).

- a. Student surveys:** Conducted with students in selected ITIs to understand perceptions of existing training quality, course relevance, awareness of green skills, and barriers (if any) in access to skilling and upskilling.
- b. Surveys with trainers and instructors:** Conducted with trainers and instructors, in selected ITIs and training institutes to understand existing training quality, curriculum, and course relevance, and institutional issues.
- c. Employer and employee survey:** Semi-structured interviews were conducted with companies in the solar and EV sectors to assess current hiring trends, occupational profiles, skill needs, and anticipated demand for green-skilled labour. These firms were selected to represent both established and emerging enterprises within Odisha's green industrial base. Besides employers, a survey was undertaken with workers currently employed in these sectors to understand job roles, recruitment pathways, training exposure, and career progression opportunities. Together, the employer-employee data provide a comprehensive view of workforce characteristics and market demand and supply of workers in green industries, which are currently the most prominent ones in the state.
- d. Key informant interviews with government departments/agencies:** In-depth interviews were held with senior officials and institutional representatives to gather policy, administrative, and strategic insights. Respondents included officials from the Odisha Skill Development Authority (OSDA), Central Tool Room & Training Centre (CTTC), Skill Development Institutes (SDIs), and the World Skill Centre (WSC), focused on institutional readiness, curriculum reform, and inter-agency coordination for green skilling.

**Table 1.1: Sample distribution**

Stakeholder category	Sample size
ITI students	571
Principals	5
Trainers	19
Odisha Skill Development Authority (OSDA), Central Tool Room & Training Centre (CTTC), World Skill Centre (WSC), Skill Development Institute (SDI) Officials, National Skill Development Corporation (NSDC), Skill Council for Green Jobs (SCGJ)	6
Solar industry employers	17
EV industry employers	16
Solar workers	52
EV workers	58

Source: iFOREST analysis

Overall, the survey covered respondents in seven districts in Odisha, including Angul, Cuttack, Balangir, Ganjam, Jharsuguda, Sundargarh, and Khorda. These districts cover Odisha's key transition regions, where green industries are emerging and skilling and employment opportunities are present. All data—from FGDs, surveys, KIs, and secondary sources were triangulated at to ensure robustness.

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## 1.4 Expected Outcomes

This assessment is expected to provide clear and actionable insights to strengthen Odisha's skilling ecosystem in alignment with emerging green and low-carbon sectors. By examining sectoral opportunities, institutional readiness, and labour market expectations, the analysis will help inform practical strategies that improve the quality and relevance of training and enable better employment outcomes and workforce integration in renewable energy, electric mobility, and related transition sectors.

The findings will highlight opportunities to expand and modernise training capacity through curriculum updates, upgraded infrastructure, improved laboratory and workshop facilities, and enhanced trainer capabilities. Strengthening coordination among departments responsible for industry, energy, MSME development, labour, and education will be crucial to ensure that green-sector priorities are effectively embedded within state skilling policies, programmes, and implementation frameworks.

A key outcome will be the identification of feasible mechanisms and opportunities for public-private partnerships, including industry-linked training programmes, apprenticeship pathways, and structured collaborations where industries play a direct role in curriculum design, training delivery, technology exposure, and local talent development. Such partnerships are essential for making training demand-driven and ensuring smooth workforce integration into emerging green sectors.

Overall, the assessment will support government agencies, training institutions, and industry partners in developing focused, realistic, and implementable skilling strategies that enhance employability, create stronger pathways into emerging green industries, and enable an inclusive and equitable transition for Odisha's workforce.

## CHAPTER 2

# Labour Market and Green Job Prospects



---

## 2.1 Introduction

Odisha stands at a pivotal moment in its economic transformation. The state's strong mineral and industrial base has driven rapid growth, but much of this progress has been anchored in carbon-intensive sectors such as coal mining, coal-based power, and metals. As India advances toward a low-carbon development pathway, these sectors will need to evolve, adopt new technologies, and shift toward cleaner production models. At the same time, new sectors—such as RE, electric mobility, green manufacturing, green metals and mining, green construction, etc., will continue to expand.<sup>1</sup> This transition will require an entirely new set of skills and competencies across the workforce. Odisha's ability to build and prepare a future-ready workforce will be central to ensuring that its economic transformation is just, inclusive, and resilient.

This chapter provides an overview of the state's labour-market landscape in the context of emerging green economies. It examines the structure of Odisha's economy and labour-market patterns, employment dependence on fossil-fuel industries, and the prospects of green jobs in the next five to 10 years. Together, these insights establish the baseline for understanding Odisha's workforce readiness for a green and just transition.

## 2.2 Economic Structure and Growth Pattern

Odisha's economic structure continues to be shaped by its rich mineral endowment and metals-led industrialisation. This industrial orientation is reflected in the composition of its Gross State Value Added (GSVA). In 2024–25, industry accounted for about 43.9% of GSVA, ahead of services (37.2%) and agriculture and allied sectors (18.9%).<sup>2</sup> Manufacturing accounts for more than half of industrial GSVA, rising from 42.6% in 2012–13 to 52.6% in 2024–25, signalling a steady shift toward value-added production. Construction and utilities have also grown fast, reinforcing an industrialisation trajectory rooted in resource-based production but gradually diversifying.<sup>3,4</sup>

**Table 2.1: Sectoral composition of Odisha's GSVA**

Sector	Share of GSVA (AE in%)
Industry	43.9
Services	37.2
Agriculture and allied	18.9

Source: Odisha Economic Survey, 2024–2025

As Odisha's industrial base evolves, the need for a workforce with stronger technical, digital, and sector-specific skills is increasing. Modernisation within manufacturing, construction, and resource-based activities, combined with the expansion of new green-economy segments (as noted above), underscores the importance of developing a skilled and adaptable labour force. Strengthening workforce capabilities will be essential not only for ensuring Odisha's industrial competitiveness but also for supporting the state's transition toward cleaner, more efficient, and future-oriented industries.

## 2.3 Labour Market Characteristics and Trends

Odisha's Labour Force Participation Rate (LFPR) and Workforce Participation Rate (WPR) are 49.4% and 47.9% respectively (Usual Principal Status), which are above national averages, indicating an active workforce engagement. The latest (2023-24) Periodic Labour Force Survey (PLFS) data also shows that the state's workforce has expanded significantly—from 38.8 lakh in 2017-18 to 58.9 lakh in 2023-24. While this reflects high participation, the distribution of workers across sectors, the nature of employment, and the low coverage of formal skilling shape Odisha's present labour-market outcomes and its preparedness for an emerging green economy.

Employment in Odisha remains strongly concentrated in a few sectors, particularly agriculture and construction. Overall, about 49% of workers are associated with the agriculture sector. Industry accounts for around 26% of the workforce, and the service sector for about 25%.<sup>5</sup>

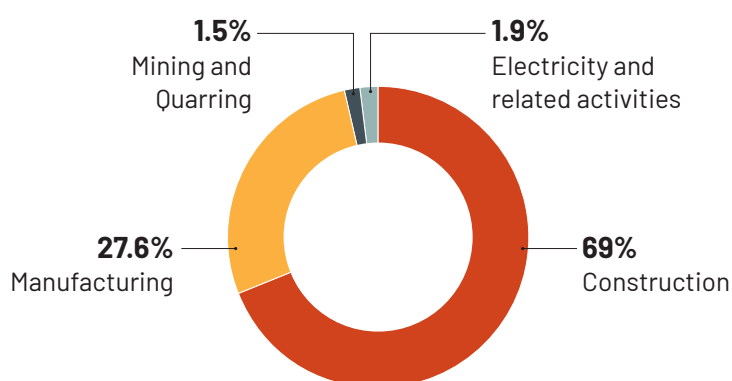
**Table 2.2: LFPR and WPR status**

Indicator	Region	Percentage (%)
LFPR	Odisha	49.4
	All India	45.1
WPR	Odisha	47.9
	All India	43.7

Source: Periodic Labour Force Survey (PLFS), Annual Report 2023-24

Within the industry sector, about 69% of the workers are associated with construction, a sector characterised by a high proportion of informality and low-skilled workers. Around 28% of industrial workers are associated with manufacturing activities, while mining accounts for less than 2%.

**Figure 2.1: Employment distribution in the industrial sector**



Source: iFOREST analysis based on PLFS, Annual Report 2023-24

The structure of employment has shifted slowly over the past decade. Agriculture's share in the workforce has declined from 56% to 49%, while industry has increased from 23% to 26% and services from 21% to 25%.<sup>6</sup>

Although this indicates diversification, the movement of workers into higher-productivity or skill-intensive activities remains limited. Most new entrants continue to be absorbed into informal and low-skilled work rather than into formal jobs in manufacturing or modern services.

## 2.4 Employment Dependence on Fossil Fuel Industries

Odisha's labour market is significantly exposed to carbon-intensive value chains such as coal mining, coal-based power, steel, aluminium, and the associated transport and construction activities. More than nine lakh workers are directly or indirectly dependent on these sectors, and many of them are likely to be affected as the energy transition accelerates over the next 30 years. This high concentration of livelihoods in fossil-fuel industries highlights the need for planned and well-sequenced transition strategies to safeguard workers and to create alternative employment pathways in emerging green sectors.<sup>7</sup>

**Table 2.3: Sector-wise formal workers in fossil fuel industries in key industries**

Sector	No. of formal workers	No. of informal workers	Total number of workers
Coal mining	40,515	65,000	1,05,515
Coal-based power	32,293	60,000	92,293
Factories (high and moderately impacted)	2,45,167	4,90,000	7,35,000
<b>Total</b>	<b>3,17,975</b>	<b>6,15,000</b>	<b>9,32,658</b>

Source: iFOREST analysis

Odisha's twin challenge is therefore to protect existing livelihoods while enabling a gradual shift of workers toward emerging green sectors such as renewable energy, electric mobility, and sustainable manufacturing. As the state's industrial structure evolves, it will need to invest in diversification, reskilling, and supportive green infrastructure so that communities dependent on coal and other carbon-intensive activities are not left behind. Well-planned and phased transition measures will be essential to ensure that Odisha's shift toward a low-carbon economy is both economically resilient and socially equitable.

## 2.5 Green Jobs and Employment Prospects

Odisha's economy is entering a decisive phase of industrial transformation, pivoting from resource extraction to sustainable manufacturing and clean energy systems. As highlighted in the Odisha Economic Survey 2024-25, the state's industrial strategy now prioritises investments in RE, green hydrogen and ammonia, compressed biogas, electric mobility, battery manufacturing, circular economy, technical textiles, and sustainable food and packaging industries, all foundational to a green growth pathway.<sup>8</sup>

At the same time, Odisha is entering a new phase of industrial transformation marked by increasing interest in clean energy systems, sustainable manufacturing, and circular-economy solutions. The state's industrial policies and investment environment have begun to attract a growing number of firms in renewable-energy equipment, green hydrogen and ammonia, electric mobility, and battery technologies. These shifts signal the beginning of an economic realignment: while traditional heavy industries will continue to play a major role, the share of employment emerging from new green sectors is likely to rise steadily.

Over the past few years, Odisha has witnessed substantial investment commitments in new-age and low-carbon industries. Solar, wind, and green-hydrogen projects, along with equipment manufacturing units and EV supply-chain industries, are beginning to take shape. For example, between March 2023 and December 2024, Odisha attracted ₹2.1 lakh crore in new-age and green industries with an employment potential of 1.3 lakh jobs, signalling strong investor confidence in its clean-growth vision.<sup>9</sup> Flagship projects in green equipment, electronics system design and manufacturing (ESDM), and green hydrogen and ammonia plants, notably the ₹14,000 crore projects at Gopalpur (Ganjam) and Paradip (Jagatsinghpur), mark the state's entry into India's emerging green-fuel ecosystem.<sup>10</sup>

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Traditional industries are also beginning to integrate low-carbon technologies. In steel, aluminium, and cement facilities in Odisha, companies are adopting energy-efficiency measures, waste-heat recovery, and green-power sourcing. As industries modernise, new technical roles will emerge even within existing sectors, offering pathways for workers to upgrade skills and move into safer, cleaner, and higher-value roles.

Beyond energy and heavy industry, new opportunities are emerging in sectors such as bioenergy, waste management, agro-processing, bamboo processing, sustainable packaging, and forest-based enterprises. These sectors offer livelihood potential for rural and semi-urban communities and can support community-led economic development. As cities expand and sustainability standards strengthen, there will be rising demand for workers skilled in waste segregation, recycling, construction-and-demolition waste processing, water management, and green building practices.<sup>11</sup>

A key driver of this transition is the emergence of a supportive policy environment in Odisha. The Odisha Renewable Energy Policy 2022 aims to scale solar and wind capacity, promote local manufacturing, and create a more stable market for green power.<sup>12</sup> The Odisha Electric Vehicle Policy 2021 supports EV adoption and encourages investments across the EV supply chain, including assembly, component manufacturing, and charging infrastructure.<sup>13</sup> The Industrial Policy Resolution 2022 further strengthens this shift by incentivising low-carbon technologies, clean manufacturing practices, green power procurement, and circular-economy initiatives.<sup>14</sup> Together, these policies direct investments toward future-ready industries, strengthen local value chains, and support job creation across both rural and urban areas.

These state-level measures are complemented by national incentives for green hydrogen, solar manufacturing, and battery storage, all of which have enhanced investor interest in Odisha. The state's industrial land bank, port connectivity, reliable power supply, and mineral base add to its competitiveness as a destination for green industry development. Going forward, close alignment between state policies, workforce development programmes, and local infrastructure planning will be essential to maximise the employment benefits of Odisha's green transition.

Taken together, these trends indicate that Odisha's employment landscape is likely to undergo gradual but significant change over the next decade. Jobs will increasingly emerge from renewable-energy deployment, the manufacturing of green equipment, battery and EV systems, energy-efficient construction, waste and material recovery, and nature-based solutions. Many of these roles will require moderate to high levels of technical skill, creating opportunities for young entrants into the workforce while also demanding improvements in the state's training ecosystem.

## Potential Sunrise Sectors for Green Jobs

Odisha's industrial diversification is anchored in sectors with high employment elasticity potential, while contributing to low-carbon industrial growth. Some of the key investments announced by the state in the past two years are outlined below.

**Renewable energy:** The state targets 7.5 GW of solar capacity by 2030, expected to generate over 25,000 full-time jobs, with complementary gains from wind and small hydro.<sup>15</sup>

**Green hydrogen and ammonia:** Projects by ACME (Gopalpur) and Sembcorp (Paradip) will together produce 1.2 million tonnes annually, creating 10,000+ jobs. Additional ventures by Avaada Green H<sub>2</sub> and Ocior Energy could add another 10,000 jobs across EPC and operations.<sup>16,17</sup>

**EVs and battery manufacturing:** Investments worth ₹4,515 crore across 18 projects are projected to generate ~8,200 jobs, supported by ₹154.3 crore in EV subsidies for 39,000 vehicles.<sup>18</sup>

**Sustainable agriculture and agro-processing:** 23 new investments of ₹4,982 crore are expected to create ~11,900 jobs, focusing on food processing, bio-inputs, and value-added farm enterprises.<sup>19</sup>

**Eco-tourism and eco-enterprises:** Under Vision Odisha, 10 lakh green livelihoods are planned through community-led forest initiatives and eco-enterprises, embedding inclusivity in the green transition.<sup>20</sup>

## Projected Employment

Odisha's employment trajectory is set to evolve rapidly as the state transitions from fossil-fuel-dependent industries toward green manufacturing, renewable energy, electric mobility, and circular-economy systems. To understand the scale of this shift, it is useful to consider both long-term estimates of green job creation and the near-term employment pipeline emerging from projects approved or currently under implementation in the state.

Long-term projections suggest that Odisha could generate up to 10 lakh full-time equivalent (FTE) green jobs by 2030 across 28 value chains. These value chains span four major clusters: RE and storage; green hydrogen and ammonia; electric-vehicle and battery manufacturing; and bioenergy and circular-economy activities. Collectively, these sectors offer opportunities for a wide range of workers—from technicians, assemblers, and operators to engineers, supervisors, and logistics personnel—reflecting the broad and inclusive nature of green-sector job creation.<sup>21</sup>

Complementing these long-term projections, Odisha's current industrial pipeline (as obtained from IPICOL from 2023-25) provides a clear picture of the green jobs likely to materialise in the short to medium term. Investment proposals and ongoing projects across RE equipment, EV and battery manufacturing, green hydrogen and ammonia, and circular-economy enterprises are expected to create nearly 98,000 jobs in the near term. These jobs include roles in manufacturing, construction, installation, operations and maintenance, quality testing, waste processing, and a variety of service-sector and supply-chain functions linked to green industries.

Together, these projections highlight both the long-range potential and the immediate job opportunities emerging from Odisha's transition. The long-term figures outline the scale of employment that could be created as green sectors expand, while the near-term pipeline demonstrates growing investor confidence, policy traction, and early employment gains already taking shape on the ground. Converting this combined potential into stable and high-quality jobs will require continued investment, local value-chain development, and targeted skilling efforts to prepare workers for new and evolving occupations.

These employment trends also underscore Odisha's dual challenge: managing the risks associated with declining or transitioning fossil-fuel-based industries, while capturing the employment gains associated with renewable energy, low-carbon manufacturing, green mobility, and circular-economy systems. For districts dependent on coal, steel, aluminium, and related industries, this will demand proactive and well-planned just-transition strategies that support workers, diversify local economies, and expand access to new skill pathways and livelihood opportunities.

**Table 2.4: Projected green employment estimates**

Sector	Estimated jobs by 2030	Projected jobs based on IPICOL green investment pipeline (2023-25)
RE and storage	4.0 lakh*	50,946
Green hydrogen and ammonia	40,000**	23,918
EV and battery manufacturing	30,000***	15,408
Bioenergy and circular economy	5.3 lakh****	7,564
<b>Total</b>	<b>10,00,000</b>	<b>97,836</b>

Source: iFOREST analysis of IPICOL data and CEEW estimates

\*Utility-scale solar, rooftop solar, floating solar, onshore wind deployment, renewable-equipment manufacturing (modules, turbines), pumped-storage hydropower (PSH), battery energy storage systems (BESS), distributed renewable energy (DRE) for livelihoods.

\*\*Green hydrogen production, green ammonia manufacturing, electrolyser equipment production.

\*\*\*EV assembly and component manufacturing, battery-pack manufacturing, battery recycling (li-ion waste), EV charging infrastructure deployment.

\*\*\*\*Includes biogas/CBG production, bio-fertilisers, organic farming, eco-tourism and mangrove restoration, construction & demolition waste recycling, battery & e-waste recycling, bamboo and bio-packaging industries, agro-processing and forest-based livelihood value chains.

Overall, the projected employment scenario points to significant shifts in Odisha's labour market over the coming decade. The largest gains are expected from renewable-energy deployment and manufacturing,

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followed by bio- and circular-economy value chains, green hydrogen and ammonia production, and the EV-battery ecosystem. Together, these sectors offer broad and diverse opportunities that can position Odisha as a major hub for green industry, provided that workforce development, local enterprise support, and institutional capacity strengthen in parallel with industry growth.

Among the emerging industries, EV and solar energy have advanced the fastest from planning to on-ground execution, already generating visible demand for technicians, installers, operators, and maintenance personnel. In contrast, sectors such as green steel, hydrogen, and low-carbon cement remain at early pilot or feasibility stages, with larger employment gains expected over a longer horizon as technologies mature and investments scale.

The next chapter examines insights from field surveys and key informant interviews with skilling institutions, policymakers, and early industry entrants in Odisha's EV and solar sectors. It assesses how the state's training and institutional ecosystem is responding to these emerging demands and the extent to which it is preparing the workforce for the green transition ahead.

CHAPTER 3

# Skilling Ecosystem



## 3.1 Introduction

Odisha has built a strong foundation in skill development through a wide network of technical and vocational institutions, with steady progress in expanding access, modernising infrastructure, and strengthening training systems, positioning the state as a leader in skilling in eastern India. The flagship Skilled in Odisha initiative has further strengthened this foundation by enhancing the quality and relevance of vocational education, improving the performance of Industrial Training Institutes, increasing enrolment, and earning national recognition. Focused investments in infrastructure, training capacity, and advanced institutions, such as the World Skill Center, have created a robust base for employability. Partnerships with organisations like Tata STRIVE, Autodesk, and Microsoft have introduced modern tools, digital skilling, and industry-relevant training that prepare youth for the emerging economy.<sup>1,2</sup> As new industries grow in areas like RE, electric mobility, sustainable manufacturing, etc. Odisha's skilling system needs to adapt to this rising demand for green and technology-based skills.

This chapter reviews the current skilling ecosystem in Odisha. It looks at the main institutions, training infrastructure and resources, and key central and state programmes to understand how well they can support the state's future workforce needs.

## 3.2 Institutional Landscape

Odisha's skilling ecosystem is led by the Skill Development and Technical Education Department (SDTE), which provides overall policy direction and ensures coordination across technical education, vocational training, and employment services. The department acts as the central authority for planning, funding, and aligning skilling initiatives with the state's economic priorities.

Under SDTE, a group of specialised directorates and agencies manages different parts of the skilling value chain. These include the regulation and affiliation of institutions, long-term technical training through ITIs and polytechnics, short-term and demand-driven skilling, and employment facilitation. Together, they help deliver training that is both inclusive and responsive to industry needs.

Over time, this institutional setup has evolved to combine government leadership with industry participation, ensuring that skilling remains relevant to changing technologies and emerging sectors. The following sections outline the key institutions that form the backbone of this system.<sup>3</sup>

### Directorate of Technical Education and Training

The Directorate of Technical Education and Training (DTET) oversees Odisha's network of Industrial Training Institutes (ITIs), polytechnics, and skill development centres. Its responsibilities include infrastructure management, curriculum delivery, and institutional governance across the state's technical education system.<sup>4</sup>

As of 2024–25, Odisha has 72 government ITIs, 35 polytechnics, and 82 Skill Development or Extension Centres, along with the World Skill Center in Bhubaneswar, which functions as a finishing school for ITI graduates.

Government ITIs have an approved intake of 23,560 seats, with 23,426 admissions, showing a utilisation rate of over 99%, a strong indicator of sustained demand for vocational training. In contrast, private ITIs, though far more in number, show lower utilisation. The state has 418 private ITIs (including two government-aided units) offering about 57,490 seats, of which 37,152 were filled in 2024–25, leaving a 35% vacancy.<sup>5</sup>

The status suggests that although private institutions offer a larger share of training seats, they continue to face high vacancy rates due to affordability concerns and perceived quality issues. There is also a gender imbalance, with female enrolment significantly lower than in government ITIs, despite the Sudakshya scheme.

**Table 3.1: Number of ITIs**

Type of ITI	Total no.	Total seats	Seat occupancy
Government	72	23,560	99%
Private	418	57,490	65%

Source: SDTE, Odisha - Activity Report 2024–25

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## State Council for Technical Education and Vocational Training

The State Council for Technical Education and Vocational Training (SCTE&VT) serves as the statutory body responsible for the regulation, affiliation, and academic governance of diploma and vocational institutions in Odisha. It ensures uniform quality standards across the state's technical education system by overseeing curriculum design, examination conduct, evaluation, and certification.

SCTE&VT regularly updates syllabi in consultation with industry partners and national skill bodies to keep training relevant to technological advancements and labour market needs. It also aligns courses with the National Skills Qualification Framework (NSQF) and the guidelines of the Directorate General of Training (DGT), ensuring that graduates from Odisha's polytechnics and ITIs meet national competency benchmarks.<sup>6</sup>

By maintaining consistent academic and assessment standards, SCTE&VT plays a central role in improving the credibility and portability of technical qualifications within and outside the state.

## Odisha Skill Development Authority (OSDA)

The Odisha Skill Development Authority (OSDA) is the state's apex agency for short-term, demand-driven skilling and industry engagement. It was established to bring together various skill initiatives under a common framework and ensure alignment with market needs. OSDA leads the "Skilled in Odisha" mission, works closely with Sector Skill Councils (SSCs) and employers, and promotes industry-led training, apprenticeships, and placement facilitation.<sup>7</sup>

## Directorate of Employment / State Employment Mission

The Directorate of Employment, functioning under the SDTE Department, supports job placement and career services across the state. Through employment exchanges, placement drives, and collaboration with training institutions, it connects skilled youth to job opportunities in both public and private sectors. The State Employment Mission (SEM) coordinates employment-linked initiatives and career counselling, particularly for rural and semi-urban job seekers.<sup>8</sup>

## World Skill Center

The World Skill Center (WSC) in Bhubaneswar is Odisha's flagship advanced training institute. It serves as a finishing school for ITI and diploma graduates, offering hands-on training in advanced trades such as manufacturing, mechatronics, and construction technology. The WSC has recorded placement rates of around 90% in recent batches, highlighting its role in preparing youth for high-skill and emerging green-sector jobs.<sup>9</sup>

# 3.3 Key Skilling and Entrepreneurship Schemes

Odisha's skilling ecosystem is supported by a combination of state-led flagship programs and centrally sponsored schemes. Together, they provide structured training opportunities for youth, promote inclusion, and address the growing demand for employable and future-ready skills across sectors. Below are the key central and state-sponsored skilling programmes and schemes.

## 3.3.1 State schemes

The following are some of the key state schemes that support skilling and workforce development in Odisha.

### Nutana Unnata Abhilasha (NUA) Odisha

Launched in 2023, the Nutana Unnata Abhilasha (NUA) Odisha program is the state's flagship initiative for continuous skilling, reskilling, and upskilling of youth across all 30 districts. It aims to bridge skill gaps in both traditional and emerging sectors while ensuring equitable access for aspirational, tribal, and remote districts. The programme emphasises the integration of new-age technologies such as artificial intelligence, machine

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learning, blockchain, cloud computing, and 5G with Odisha's established strengths in handicrafts, handloom, and agriculture.<sup>10</sup>

Since its launch, the scheme has trained over 1.97 lakh youth (2023–25), reflecting strong implementation momentum. It has partnered with leading institutions such as IIT Delhi, Intense Technologies, AI SATS, and GMR Aero Academy to deliver specialised courses in aviation, IT/ITeS, RE, and mining. Notably, NUA Odisha has also facilitated the establishment of Centres of Excellence (CoE), including a renewable energy CoE at Dhenkanal, and introduced foreign language training (Japanese) to support overseas employment opportunities.

NUA Odisha demonstrates a clear shift in the state's skilling strategy, from conventional vocational training to a more future-oriented model that blends technology, innovation, and inclusion. Its district-wide coverage and partnerships with national and industry leaders reflect a scalable and adaptive framework. The challenge ahead lies in deepening sectoral specialisations, aligning curricula with local employment clusters, and embedding green and digital skills as core components of the program's next phase.

## **Sudakshya**

Launched in 2017–18, the Sudakshya scheme aims to increase girls' participation in technical and vocational education by easing financial and social barriers to enrolment. It provides female students in ITIs and polytechnics with fee waivers, hostel facilities, travel support, maintenance allowances, and uniforms. These measures have led to a sharp rise in female enrolment—government ITIs have moved from 6% in 2016–17 to 28.4% in 2024–25, while polytechnics have increased from 16% in 2021–22 to 31.2% in 2024–25. Students also receive monthly assistance of ₹1,500 for hostel accommodation or ₹500 as day-scholars, along with admission fee reimbursement and post-placement support during apprenticeships and jobs.<sup>11</sup>

Sudakshya has significantly strengthened gender inclusion in Odisha's skilling ecosystem by making technical training more accessible to women, especially those from disadvantaged backgrounds. The steady rise in enrolment shows that targeted financial support and safe residential options can drive sustained participation. Moving forward, a key priority will be to expand the presence of women in high-growth and emerging sectors—such as renewable energy, digital technologies, and advanced manufacturing—so that gender inclusion keeps pace with the state's green and future-ready skilling agenda.

## **Placement Linked Training Programme**

The Placement Linked Training Programme (PLTP), implemented by the Odisha Skill Development Authority (OSDA), focuses on enhancing employability among school and college dropouts through short-term, demand-driven courses lasting between two and six months. The program targets job-oriented trades and links training directly to placement opportunities across priority sectors.

Between 2021 and 2025, PLTP has trained 35,583 youth, with an allocation of ₹58.86 crore for FY 2025–26 to expand its reach. The scheme has made strong progress in gender inclusion, with female participation rising from 39% in 2021–22 to 64% in 2024–25. Training has been concentrated in sectors such as apparel, construction, healthcare, logistics, and manufacturing, which offer accessible entry points for youth employment.<sup>12</sup>

PLTP has proven effective in connecting training to employment, particularly for marginalised and dropout youth. The notable rise in female participation reflects growing inclusivity within short-term skilling programs. Going forward, the focus should be on improving post-placement tracking, expanding partnerships with employers in high-growth sectors, and integrating emerging green and service-oriented job roles to enhance long-term career outcomes.

## **Other state skilling initiatives**

In addition to major flagship programs, several complementary initiatives have been introduced to strengthen Odisha's skilling and employment ecosystem. These initiatives focus on improving last-mile outreach, promoting entrepreneurship, and integrating digital learning into mainstream education.

**Chief Minister's Skill Development Fellowship (CMSDF):** Deploys fellows across districts to support the implementation of skilling programs, improve coordination among stakeholders, and strengthen operations of Model Career Centres.

**Kaushal Rath:** Operates as a mobile counselling and awareness initiative, reaching schools, colleges, and remote tribal areas to disseminate information on available skilling schemes and employment opportunities.

**Digital Skilling Hubs:** Established in collaboration with Coursera and IIT Delhi, these 30 hubs embedded in higher education institutions provide access to global online courses and have trained around 30,000 students in digital and future-oriented skills.<sup>13</sup>

**Chief Minister’s Employment Generation Programme (CMEGP):** Implemented across more than 10 departments, this program integrates skill training with entrepreneurship promotion. As of 2025, it has trained 1.9 million candidates, supporting both wage and self-employment across sectors.<sup>14</sup>

These initiatives collectively enhance the inclusiveness and reach of Odisha’s skilling architecture. While large schemes like NUA Odisha and PLTP address employability and training outcomes at scale, these smaller programs strengthen institutional capacity, digital access, and local entrepreneurship. Sustaining and scaling these complementary efforts will be key to building a more flexible and future-ready skilling ecosystem.

Besides skilling, the state government has also been supporting entrepreneurship. A key one in this regard is the Nano Unicorn. Launched in 2023–24, the Nano Unicorn scheme is designed to promote youth entrepreneurship and self-employment across Odisha. The program supports early-stage entrepreneurs through a combination of refundable seed capital of up to ₹1 lakh, repayable over three years, and structured mentoring and business training based on a mini-MBA model.

The scheme targets the creation of 1,200 entrepreneurs during 2023–26. As of February 2025, 82 entrepreneurs have been trained, and 10 have received funding, including four women-led enterprises from Ganjam district. Enterprises have been established across diverse sectors such as aviation, hospitality, green jobs, electronics, mining, IT/ITeS, and capital goods manufacturing.<sup>15</sup>

Nano Unicorn represents a strategic step toward embedding entrepreneurship within Odisha’s broader skilling ecosystem. By linking training with start-up funding and mentorship, the program helps convert skilled youth into job creators rather than job seekers. While the early uptake remains modest, its targeted approach and emphasis on inclusion, particularly support for women-led ventures, position it as a promising model for fostering local enterprise development and strengthening the state’s innovation and self-employment base.

### 3.3.2 Central schemes

Odisha also implements major national programs. The key Central Government schemes include Pradhan Mantri Kaushal Vikas Yojana (PMKVY)<sup>16</sup>, Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDUGKY)<sup>17</sup>, and the National Apprenticeship Promotion Scheme (NAPS),<sup>18</sup> among others.

#### Pradhan Mantri Kaushal Vikas Yojana

The Pradhan Mantri Kaushal Vikas Yojana (PMKVY 4.0), implemented by the Ministry of Skill Development and Entrepreneurship (MSDE), is India’s flagship programme for short-term, industry-linked training and certification across a wide range of job roles, including emerging green sectors. Odisha remains one of the better-performing states under the scheme, with strong outreach and participation across districts and sectors.<sup>19,20</sup>

**Table 3.2: Overall performance under PMKVY**

Particulars	Number
Total Enrolled	66,294 candidates registered
Total Trained	48,917
Total Training Institutions	182
Total Training Centres	353
Districts Covered	30

Source: iFOREST analysis of data from Skill India Digital Hub (SIDH) portal, 2024–25

While the scheme has strong coverage and a broad institutional network, the gap between the number of candidates trained and those certified indicates the need for better coordination between training delivery, assessment, and certification agencies to ensure employability outcomes.

Odisha has also begun to make steady progress in green skilling under PMKVY 4.0, showing early alignment with India's green growth and energy-transition goals. Although still modest compared to total enrolments, participation in green job roles is expanding across districts. Solar-related training—covering installation, maintenance, and electrical systems—has emerged as one of the dominant green skilling areas, accounting for more than half of all green enrolments. The introduction of the Green Hydrogen Technician course highlights Odisha's early move into high-technology clean-energy sectors. Certification rates in green job roles exceed 90 per cent, indicating good training quality and strong employability potential.

The majority of trainees are enrolled in NSQF Levels 3 and 4, which focus on entry- and mid-level technicians, while higher-level green job roles (NSQF Levels 5-7) are still emerging. This distribution indicates a growing but still foundational green-skills base in the state.

**Table 3.3: PMKVY 4.0 – Performance in green job roles**

Particulars	Number
Total Enrolled	2,027 candidates registered
Total Trained	1,778
Total Training Institutions	10
Total Training Centres	19
Districts Covered	7

Source: iFOREST analysis of data from Skill India Digital Hub (SIDH) portal, 2024-25

**Table 3.4: Top five green job roles**

Job roles	No. of candidates
Safai Karamchari (Sanitation Worker)	692
Solar PV Installer - Electrical	461
Solar PV Maintenance Technician	402
Solar PV Installer - Civil	118
Green Hydrogen Technician	105
<b>Total</b>	<b>1,778</b>

Source: iFOREST analysis based on Skill India Digital Hub Portal (SIDH portal) data, 2024-25

Odisha's experience under PMKVY 4.0 demonstrates both scale and strategic direction. The scheme has achieved widespread district coverage and high enrolment, reflecting strong demand for short-term, job-oriented skilling, while the growing inclusion of green job roles signals a clear shift toward future-ready competencies. Overall, the state's performance highlights both reach and relevance: the state has expanded access to training while beginning to build a structured green skilling portfolio aligned with its renewable energy ambitions. The next step is to deepen green training coverage, introduce more higher NSQF-level programmes, and strengthen industry partnerships to ensure long-term workforce readiness for a sustainable and future-oriented economy.

### Deen Dayal Upadhyaya Grameen Kaushalya Yojana

The Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDUGKY) focuses on rural youth skilling, especially from low-income families, and provides placement-linked training through registered partners. Under this scheme, Odisha has trained 2,15,024 candidates and placed 1,76,962 across all trades.<sup>21</sup>

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## National Apprenticeship Promotion Scheme

The National Apprenticeship Promotion Scheme (NAPS) is designed to support entrepreneurship and make youth employable. The scheme encourages employers to hire apprentices by providing financial incentives and supports on-the-job training across industries. In 2024-24, Odisha has engaged 10,757 apprentices and of whom 4610 have completed training. Enrolment data shows that apprenticeships in Odisha are still dominated by traditional industrial trades. The top two courses—Fitter (1,631 males, 109 females) and Electrician (1,587 males, 202 females)—together account for the bulk of participation, highlighting strong demand for core manufacturing and maintenance skills.<sup>22</sup>

Emerging service-sector courses such as General Duty Assistant (835 trainees) and Retail Trainee Associate (656 trainees, 281 female) indicate a gradual diversification toward healthcare and retail roles. However, women's participation remains limited to a few segments such as retail and microfinance, where they make up a visible share of enrolments.

Courses in automotive driving, microfinance, and welding show smaller but growing uptake, pointing to incremental engagement across logistics, finance, and technical support functions.

Overall, Odisha's NAPS enrolment pattern reflects its strong industrial base—anchored in conventional trades—while also showing early signs of diversification into service-sector and emerging green-linked occupations. To better align with the state's future workforce needs, apprenticeship offerings will need to expand into renewable energy, electric mobility, and circular-economy roles, while also encouraging higher female participation across a broader set of technical and high-growth trades.

## Jan Shikshan Sansthan

Odisha operates a wide-reaching, community-based skilling network under the Jan Shikshan Sansthan (JSS) programme, which is specifically designed to expand training access for women, rural youth, and other marginalised groups who often remain excluded from formal skilling pathways. JSS centres play a critical role in livelihood-oriented skilling for low-literacy and informal-sector workers, offering short-duration courses in trades such as tailoring, food processing, beauty and wellness, and handicrafts—sectors where women's participation is particularly strong.

As of FY 2024-25, Odisha's JSS ecosystem spans 29 districts through 29 JSS institutions, with 2,614 active batches, demonstrating wide institutional outreach across rural and semi-urban areas. This network underscores the state's commitment to last-mile, inclusive skilling by bringing training directly to communities that face mobility, affordability, and socio-cultural barriers to accessing mainstream technical education.<sup>23</sup>

The JSS model complements formal skilling through ITIs and polytechnics, but there remains significant potential to strengthen its alignment with emerging green livelihood opportunities. Integrating themes such as sustainable agriculture, waste management, repair and recycling, and renewable-energy micro-enterprises can help make non-formal skilling more future-ready, expand income opportunities for women and marginalised groups, and enhance their participation in Odisha's broader green growth and just transition agenda.

Together, these central schemes complement Odisha's state initiatives, ensuring that the skilling ecosystem reaches diverse groups from students and informal workers to entrepreneurs and rural youth.

Besides these, Odisha has also been identified for an expanded mandate under India's Green Skills Initiative. According to officials from the National Skill Development Corporation (NSDC), the state has been assigned a target of 19,000 trainees in green hydrogen job roles. The programme implemented by the Skill Council for Green Jobs (SCGJ) through the Central Tool Room and Training Centre (CTTC), Bhubaneswar, represents a strategic push to prepare a skilled workforce for the emerging hydrogen economy. This positions Odisha among the first states to begin large-scale training for India's National Green Hydrogen Mission, focusing on production, storage, and safety operations.

Overall, the national programmes and emerging green-skills initiatives point to two clear trends in Odisha's skilling landscape. First, the state has achieved impressive scale with extensive enrolments, but the depth and diversification of green skilling remain limited and will need significant expansion. Second, stronger coordination between training, assessment, and certification systems is essential to ensure that skilling efforts translate into meaningful employability outcomes, especially in fast-growing green and clean-energy sectors.

## 3.4 Infrastructure and Resources

Odisha has built a wide and diversified network of institutions that collectively form the backbone of its skilling and technical education ecosystem. As discussed earlier, this network spans ITIs, polytechnics, engineering colleges, model career and skill centres, and advanced training institutions such as the WSC, all operating primarily under the SDTE Department.<sup>24</sup> Complementing this formal system is an extensive network of short-term and community-based training centres. These include training centres implementing key centrally sponsored schemes, including the PMKVY, JSS, and the NAPS. Collectively, these form the backbone of Odisha’s long-term and short-term skilling infrastructure. Together, these institutions deliver both foundational and advanced skills across diverse sectors

As of October 2025, Odisha’s skilling ecosystem comprises more than 1,700 training institutions and training centres (TC) across government and private domains. This reflects both the scale and the reach of the state’s investments in technical education and vocational development.<sup>25</sup>

**Table 3.5: Number of training institutions and training centres**

Institution type	Government	Private	Total
ITIs	71	418	489
Polytechnics	35	126	161
WSC	1	-	1
PMKVY (TC)	353		353
JSS (TC)	29		29
NAPS	707		707
DDUGKY	-	-	Data not reported

Source: iFOREST compilation of data from various state and central government dashboards and parliament question response (on 31-10-2024) on JSS and NAPS scheme.

This institutional distribution shows substantial rural and urban penetration, combining formal technical education with flexible, short-duration skilling pathways. The presence of a premier institution like the WSC adds high-end finishing capacity, while a large NAPS network helps connect youth to workplace-based learning. Going forward, strengthening quality assurance systems, digital infrastructure, and the integration of green and technology-driven modules will be critical to ensure the ecosystem remains aligned with the state’s evolving industrial and economic priorities.

A closer look at programme offerings shows that Odisha’s ITI ecosystem continues to be dominated by traditional industrial trades. According to the NCVET dashboard data of 2025, Odisha’s ITI ecosystem remains dominated by traditional industrial trades. Electrician and fitter together account for the highest share of enrolments, followed by welder, mechanic, motor vehicle, and electrical mechanic, which align with the state’s manufacturing and infrastructure base. Among service and digital-oriented trades, Computer Operator and Programming Assistant (COPA) is gaining traction, reflecting gradual diversification toward IT-enabled skills.<sup>26</sup>

While these patterns indicate strong continuity in industrial skill development, they also highlight a critical gap: the limited availability of green and emerging-technology-oriented trades. To prepare a future-ready workforce, Odisha will need to introduce and scale courses in solar PV installation and O&M, electric vehicle maintenance, battery assembly and testing, energy-efficient systems, hydrogen-ready industrial technologies, and resource-efficient manufacturing practices. Aligning course offerings with Odisha’s emerging green industries—renewables, EVs, low-carbon manufacturing, and green construction—will be essential as the state accelerates its transition to cleaner and more sustainable growth pathways.

Enrolment trends across the ecosystem further underscore the growing appeal of vocational and technical education. The Sudakshya scheme has played a pivotal role in promoting girls’ participation in ITIs and polytechnics, while the rollout of Digital Skilling Hubs in higher education institutions has widened access to advanced and multi-disciplinary skilling opportunities.<sup>27,28</sup>

**Table 3.6: Number of enrolments and placement percentage**

Institution type	Total enrolment (2024-25)	Placement %
ITIs	60,578	62
Polytechnics	49,686	55
WSC (Advanced Modules)	4,282	90

Source: iFOREST compilation from Activity Report SD&TE 2024-25

Sustaining this momentum will require continued investment in industry-linked training, expansion of digital and technology-enabled modules, systematic integration of green skills across trades, and focused measures to strengthen gender inclusion. Equally important will be deeper engagement with the private sector, both large industries and small and medium enterprises (SMEs), particularly green SMEs, to co-develop curricula, offer apprenticeships, and strengthen employment pathways. Upgrading infrastructure, laboratory facilities, and trainer capabilities will also be critical to improving placement outcomes and ensuring that Odisha's skilling ecosystem remains responsive, industry-oriented, and aligned with the state's long-term economic transformation.

## 3.5 Private Sector Engagement

Private sector participation forms a vital component of Odisha's skilling ecosystem, strengthening the linkage between training and employment and ensuring that skill development remains responsive to market realities. The state has actively promoted public-private partnerships (PPP) and industry-led models to keep training aligned with evolving workforce needs, especially in high-growth sectors such as manufacturing, healthcare, renewable energy, logistics, and financial services.

A notable example is the Odisha Skill Development Project (OSDP), supported by the Asian Development Bank (ADB), which encourages private sector engagement in sustainable training models. The project integrates industry partnerships into the design of curricula and facilitates placement-oriented training linked directly to employer demand.<sup>29</sup>



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Another important initiative is Project ODISERV, a collaboration between the National Skill Development Corporation (NSDC) and Bajaj Finserv, aimed at developing a skilled workforce for the financial services sector. The program has trained over 1,100 candidates, resulting in significant direct employment outcomes and establishing a model for industry-academia collaboration.<sup>30</sup>

Private companies have also contributed through Corporate Social Responsibility (CSR) initiatives. For instance, Converttech Equipment Pvt. Ltd. implemented a project between 2020 and 2021 across four districts of Odisha, training and certifying 1,100 women as “Covid Warriors” in areas such as digital literacy, hospitality, and health services.<sup>31</sup>

Jindal Foundation aims to support women and girls from Odisha. Through this initiative, selected candidates will receive financial assistance to pursue vocational skill training, academic programs in general, or professional streams at their preferred educational institutions.<sup>32</sup>

Overall, the private sector engagement is instrumental in enhancing the quality, relevance, and employment potential of Odisha’s skilling landscape. Partnerships with industry, multilateral institutions, and CSR actors have helped align training with sectoral demand and introduced innovative delivery mechanisms. To build on this momentum, the state can prioritise scaling successful PPP frameworks, expanding CSR-linked training in emerging sectors such as renewable energy, EV and battery technologies, logistics, and digital services, and establishing sector-specific CoEs in collaboration with leading employers. Such efforts will be essential to ensure deeper industry ownership of training processes and stronger alignment between skills supply and economic transformation.

## 3.6 Placement and Employer Linkages

Placement systems are a critical bridge between Odisha’s training institutions and the labour market. As of 2024–25, placement outcomes for ITI graduates have shown steady improvement. In 2022–23, the overall placement rate for ITI graduates was reported at 57%, which increased to 62% in 2024–25.<sup>33</sup> At the state level, the Odisha Skill Development Authority (OSDA) has supported initiatives such as the Nua Odisha Global Summit and district-level job fairs to connect trained youth with employers. National portals such as National Career Service (NCS) and Apprenticeship India also serve as platforms for Odisha’s trainees, although uptake has been uneven.

Despite these efforts, structural gaps persist. Placement cells within ITIs and polytechnics are often under-resourced, with limited dedicated staff, insufficient industry linkages, and inadequate tools for tracking graduates. Employer engagement tends to be episodic rather than continuous, resulting in weak feedback loops between training institutions and industry. For many graduates—particularly from rural, tribal, and aspirational districts—limited mobility, inadequate digital access, and lack of career counselling constrain their ability to connect with employers beyond their immediate region. These barriers reduce both the scale and the quality of placements.

In the context of green and emerging sectors, placement pathways are still at a nascent stage. While there are isolated examples of youth placed in solar installation companies, waste management enterprises, and EV servicing centres, such opportunities remain scattered and are not yet institutionalised across the state. Green industries operating in Odisha have not systematically integrated with placement cells or job fairs, reducing the visibility of emerging job roles for trainees and slowing the development of a structured pipeline for green employment.

This highlights a broader challenge: while Odisha’s institutional base is expanding and maturing, the systemic orientation towards green job roles, transition-linked skills, and future technologies is still evolving. Addressing this requires leveraging OSDA’s convening role, the WSC’s advanced training and modular learning model, and SCTE&VT’s capacity for setting standards and certification protocols.

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## 3.7 Overall Observations

Odisha's skilling ecosystem has expanded rapidly over the past decade, supported by strong institutional capacity, flagship state programmes, and a growing role of the private sector. However, despite this progress, the system has yet to fully align with the workforce requirements of a green, technology-driven, and rapidly transforming economy. Formal skilling coverage remains uneven across districts, and a large share of training continues to be concentrated in conventional industrial trades, with limited integration of emerging skills in renewable energy, electric mobility, resource efficiency, and circular economy value chains.

Flagship initiatives such as the WSC and NUA Odisha are positioned to drive the next stage of skilling transformation. Yet, both require further strengthening of curricula, infrastructure, and training modules based on detailed skill-gap assessments and granular market analyses. Similarly, the PLTP, which has delivered strong employment outcomes, should integrate emerging green sectors to expand placement opportunities in areas such as green construction, sustainable manufacturing, clean energy, and logistics.

Parallel to these programme-level shifts, enhancing the capacity of technical education institutions remains critical. Expanding ITIs and advanced skill centres in industrial districts dependent on fossil fuels can play a crucial role in supporting a just transition by preparing local workers for new opportunities. The WSC, with its emphasis on advanced technologies, digital skill sets, and global training standards, can catalyse innovation and sustainability across local industries, setting a new benchmark for training quality and future-readiness.

To strengthen Odisha's readiness for a green and inclusive economic transition, policy priorities should centre on modernising curricula and training equipment, upgrading trainer capacity, expanding access in underserved regions, and aligning public-private partnerships with emerging opportunities in green and high-technology sectors. Collectively, these steps will help position Odisha's workforce to meet the demands of a rapidly evolving labour market while supporting the state's broader industrial and climate transition goals.

The next chapter builds on this analysis through findings from primary surveys of ITIs and private training centres, as well as interviews with employers, employees, and trainers in the electric vehicle and solar sectors, providing a ground-level perspective on institutional readiness and pathways for enhancing the state's skilling effectiveness.

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Chapter 4

# Green Skill Readiness Survey



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## 4.1 Introduction

To understand how effectively Odisha's skilling ecosystem is preparing youth for emerging green economic opportunities—and how workers and employers are experiencing the early transition, a primary survey was conducted across training institutions and two fast-growing green industry sectors, solar and EV. The survey aimed to capture the full spectrum of dynamics shaping workforce readiness, including student awareness, institutional capacity, job outcomes, and industry expectations.

As noted earlier (Chapter 1), the survey covered:

- 571 students enrolled in ITIs and skill centres
- 30 faculty members and institutional representatives
- 33 employers from the solar and EV sectors
- 110 workers are currently employed in these industries

The survey results provide a comprehensive view of how Odisha's training ecosystem is responding to new green-sector skill requirements.

## 4.2 Survey Results

The results of the primary survey are structured around four core questions that assess the preparedness of Odisha's skilling ecosystem for the green transition. These include:

- What are the levels of awareness and enrolment in green skill courses?
- How prepared are training institutions—through infrastructure, curriculum, faculty, and industry linkages—to deliver green skills?
- Do current training pathways translate into better employment, earnings, and livelihood outcomes for the green sector workers, such as solar and EV workers?
- Is there adequate supply of locally trained workforce for the emerging sectors?

The assessments corresponding to these questions are outlined below.

### 4.2.1 Enrolment trends and awareness of green skill courses

In recent years, Odisha has witnessed a steady rise in enrolment across vocational and technical training programmes, reflecting growing interest among youth in skill acquisition. However, awareness and participation in dedicated green skill courses remain limited.

The survey of 571 students revealed that:

- Only 7% were enrolled in green skill courses.
- Out of those enrolled in green courses, 90% were in electrical courses related to solar applications.
- There is also a sharp gender imbalance in enrollment. The gender ratio stood at 3:4, male to female.

The results also show that awareness of green skill courses remains limited across ITIs and skill centres. For instance, among the surveyed students:

- 45% reported being unaware that green skill courses existed.
- Additionally, about 20% of the students said that such courses were not available in their institute.

These gaps were particularly visible in smaller or rural ITIs where solar or EV trades are not offered. Faculty members also noted that the concept of green skills is still unfamiliar to many students, resulting in low demand for such courses even where they exist.

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Faculty members also highlighted limited awareness, and family hesitation, particularly for female trainees, as key deterrents to enrolment. Principals acknowledged that the concept of a “green economy” remains new and requires systematic integration of green skills into mainstream trades rather than isolated programmes.

Overall, the findings suggest that the primary barriers are linked to limited awareness, uneven course availability, and narrow trade structures rather than lack of student interest. This underscores the need for targeted awareness efforts, clear career pathways, and localised delivery of green-skilling programmes.

## 4.2.2 Institutional capacity and readiness

The institutional capacity and readiness to deliver green skills have been evaluated through the survey of faculty members and representatives of skilling institutions to complement the observations of the secondary assessment.

Institutional readiness was assessed considering two key indicators, course curricula and infrastructure to support green skill training.

### Curricula and infrastructure

With respect to curricula, approximately 67% of ITI principals reported that their curricula had been updated to include specific green content, particularly in solar and EV modules. About 33% indicated that while curriculum revisions had taken place, these were largely limited to NSQF alignment without explicit integration of green skills, reflecting structural compliance rather than thematic adaptation.

By contrast, institutions such as the WSC and Skill Development Institute (SDI), Bhubaneswar, follow industry-driven models designed to directly address market demand.

On infrastructure, around 70% of the surveyed principals reported having adequate laboratory and workshop infrastructure for conventional trades, but only a few have dedicated facilities for solar or EV-related training. Most institutions continue to operate under the National Council for Vocational Education and Training (NCVET) framework, with limited localisation to Odisha’s green-sector priorities.

Feedback from trainers further highlights systemic gaps—such as obsolete lab equipment, outdated syllabi, and limited access to digital learning tools—which restrict the delivery of high-quality, industry-relevant training. Trainers consistently emphasised the need for modern equipment, updated instructional materials, and stronger industry partnerships to ensure practical, hands-on learning that aligns with evolving green-sector practices.

### Faculty capacity

Faculty capacity emerged as a critical constraint in scaling Odisha’s green skilling efforts. While most instructors were familiar with the concept of green skilling, they lacked clarity on how to translate it into teaching practice or integrate it within existing course frameworks.

95% of trainers reported that their training delivery remains anchored in traditional mechanical and electrical curricula, with no structured orientation to solar or EV technologies. Obsolete tools, limited simulation-based learning equipment, and outdated laboratory infrastructure were cited as major barriers to quality instruction. Trainers expressed the need for clear guidance from OSDA on embedding green modules into existing trades and aligning them with industry standards.

Currently, fewer than 15% of trainers have undergone formal Training of Trainers (ToT) or exposure to renewable or EV technologies. Most have not participated in live demonstrations, industry visits, or updated training programs, resulting in a disconnect between classroom learning and practical applications.

Discussions with the National Skill Training Institute (NSTI), Bhubaneswar, highlighted the need to embed sustainability and green technology modules within the Crafts Instructor Training Scheme (CITS), which is the key channel for instructor preparation in the state. Trainers also emphasised the value of regular industry immersion and exposure visits, suggesting structured collaboration between NSTI, OSDA, and private enterprises.

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Overall, trainers consistently expressed the need for:

- Dedicated ToT programs in solar, EV, and related green technologies.
- Industry-linked practical exposure through internships or apprenticeships.
- Updated teaching aids and pedagogical materials reflect new technological standards.

Building faculty capacity and trainer readiness is thus one of the key interventions that will be necessary to scale up green skilling in Odisha.

### 4.2.3 Industrial linkages

A strong interface between training institutions and industry is essential to ensure that the skills imparted align with labour-market needs, particularly in the fast-evolving green sectors. The industry linkages with the ITIs and skill centres were evaluated considering curriculum co-design, on-the-job training (OJT), apprenticeships, and placement partnerships with solar, EV, and other green enterprises.

Industry linkage emerged as a critical determinant of training quality. Among surveyed students, 51% reported some form of industrial interaction, and 66% had hands-on exposure to green tools such as solar panels, EV systems, or composting units. However, one in five students had no such practical exposure. Most ITIs lack structured partnerships with industries. Engagements such as industrial visits, guest lectures, and internships occur through informal networks or the efforts of individual faculty members rather than through formal institutional arrangements.

Feedback from principals reinforced this finding. Only a few institutions have formal partnerships or MoUs with industries; most operate through informal networks or ad-hoc arrangements driven by individual faculty efforts.

Overall, the findings indicate that systematic partnerships between training and skilling centres and industries are extremely limited. Therefore, strengthening institutional MoUs, expanding apprenticeships under schemes like NAPS, and embedding structured OJT modules within curricula will be crucial to bridge the gap between training and employment in Odisha's emerging green economy.

### 4.2.4 Employment outcomes in solar and EV sectors

The workforce survey in solar and EV sectors provides insights into employment patterns, wages, skills, and career prospects in Odisha's early-stage green industries. These two sectors were selected because they represent the earliest visible segments of the green economy in the state.

### 4.2.5 Solar sector

The survey of 52 workers in the solar sector suggested the following trend with respect to education, formal training, wages, and job security.

On education and training, the results show that:

- The workforce is generally well-qualified: 58% hold ITI or diploma-level qualifications, and 37% are graduates.
- Regarding formal training, 56% reported some form of formal training, out of which 9% received training from ITIs or polytechnics.
- Over 44% reported learning skills primarily through on-the-job training.

With respect to earnings, it remains modest across roles for instance:

- 46% earn between ₹15,000–25,000 per month,
- 28% earn below ₹15,000, and
- Only 6% earn above ₹25,000.

Roles such as Solar PV installer (Electrical) and site survey assistant typically fall within the ₹15,000–25,000 range, while helpers and maintenance technicians often earn below the semi-skilled minimum wage of ₹13,052 per month. All technicians (personnel involved in maintenance, manufacturing, and installation) earn below ₹15,000/month, which is below or near the minimum wage for semi-skilled workers.

Besides, a large proportion (about 90–95%) are engaged to short-term contractual agreements, with shifting site duties. During the survey, workers shared that this also creates uncertainty in long-term prospects and is a reason for people leaving the job mid-way.

**Table 4.1: Monthly earnings of solar workers**

Approximate monthly earnings	Number of workers	Percent share (%)
₹15,000–25,000	24	46
₹25,001–35,000	3	6
₹35,001–45,000	8	15
₹45,001–55,000	1	2
Above ₹55,000	1	2
Less than ₹15,000	15	29
Grand Total	52	100

Source: iFOREST analysis

**Table 4.2: Monthly earnings of workers in solar according to job roles (in % share)**

Job roles	₹15,000–25,000	₹25,001–35,000	₹35,001–45,000	₹45,001–55,000	Above ₹55,000	Less than ₹15,000
Solar Maintenance Technician						100
Solar PV Cell Manufacturing Technician						100
Solar PV Installation Helper						100
Solar PV Installer (Electrical)	75	10				15
Solar PV Site Survey Assistant	100					
Other	29.4	5.9	47.1	5.9	5.9	5.9

Source: iFOREST analysis

Access to employer-provided social security is also uneven. While 65% of workers reported receiving some benefits, coverage varies by role. Workers in Solar PV installation and survey roles had the highest coverage (75% and 100%, respectively), whereas maintenance technicians, manufacturing technicians, and helpers had little to no coverage. Many workers also receive in-kind support, such as accommodation and food, due to the site-based nature of solar deployment.

**Table 4.3: Social security benefits received by solar sector workers**

Occupation	Yes (%)	No (%)
Solar PV Site Survey Assistant	100	0
Solar PV Installer (Electrical)	75	25
Solar PV Installation Helper	20	80
Solar PV Cell Manufacturing Technician	0	100
Solar Maintenance Technician	0	100
Other	82	18

Source: iFOREST analysis

Overall, workers in the sector highlighted certain common challenges related to their current employment status. The key concerns expressed were low salaries, lack of advanced training, and limited opportunities for career progression.

A significant 50% of respondents identified the lack of advanced training opportunities as their biggest challenge, underscoring the limited availability of structured and up-to-date skill development programs. Another 33% cited low salary levels, aligning with earlier findings of widespread low income and limited wage progression.

Considering these challenges, workers expressed a need for advanced skill training and entrepreneurship support. About 50% workers expressed interest in advanced technical training, including digital skills. Entrepreneurship support was indicated by about 21% of the workers, indicating a desire for better roles or self-employment options.

## EV sector

Similar to the solar sector, the survey of 58 EV workers provides a detailed understanding of their education, formal training, wage structures, and key employment challenges in this emerging industry.

The survey results show that the workforce in the EV sector is predominantly technically qualified, but sector-specific training remains limited. For instance:

- 65% of surveyed workers hold ITI or diploma qualifications, and 35% are graduates.
- 69% reported not receiving any formal EV-related training, indicating a significant gap in structured, specialised programmes.
- Only 31% had undergone employer-led or on-the-job training specific to the EV sector.

Like the solar sector, wage levels in the EV sector are also modest and there are a significant number of workers who reported earning below ₹15,000 per month. Overall, the survey results show that:

- Over 58% of the workers earn below ₹15,000, placing most below the semi-skilled minimum wage in Odisha. The workers in this group are primarily EV mechanics and technicians
- About 34% earn between ₹15,000–25,000 per month.
- Only 3% earn above ₹25,000, mainly among supervisors or senior mechanics.

Besides, like the solar sector, most of the workers (except for senior supervisors) are engaged to short-term contractual agreements., undermining long-term employment security.

**Table 4.4: Monthly earnings of EV workers**

Approximate monthly earnings	Percent share (%)
₹15,000-25,000	34
₹25,001-35,000	6
Less than ₹15,000	58
Grand Total	100

Source: iFOREST analysis

Overall, workers in the EV sector reported a range of challenges that directly affect their job quality, stability, and long-term career prospects. Low pay emerged as the most widespread concern, highlighted by 83% of respondents. About 40% of workers expressed concerns about minimal access to advanced or sector-specific training.

Despite these constraints, workers expressed strong motivation to upskill and adapt to the demands of a rapidly evolving industry. More than 60% indicated the need for advanced technical and digital training, particularly in areas such as EV batteries and battery management systems, charging systems, and multi-vehicle diagnostic technologies—skills that are central to the future of EV servicing. Another 14% expressed interest in entrepreneurship and business skills, indicating aspirations for self-employment and micro-enterprise opportunities as the EV market expands.

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## 4.3 Supply of Skilled Workforce

A central question for Odisha's green transition is whether the current skilling ecosystem can meet the fast-growing demand for technically trained workers in solar and EV sectors. The survey findings from employers reveal a clear and widening demand-supply gap, driven by rapid industry expansion, limited job-ready talent, and inadequate alignment between training institutions and industry needs.

### 4.3.1 Solar sector

The solar industry remains dominated by small and medium enterprises—80% of employers are EPC contractors, with the remaining being dealers or service providers. Notably, there was no representation from manufacturing, indicating that Odisha's solar value chain is confined to downstream services such as installation, maintenance, and distribution.

Employers interviewed in the solar sector consistently described 2023–24 as a turning point, with rapid growth in solar EPC activities and rising requirements for field-level technical roles.

Most surveyed firms employ 11–50 workers (67%), but labour demand is concentrated overwhelmingly in field-level technical roles. Solar PV installer (electrical) is the most in-demand job role (73%), followed by site survey assistants (13%), reflecting a sector focused on ground-level deployment rather than design, integration, or advanced technical functions.

Recruitment channels show both dependence on formal institutions and significant informality. Government ITIs (80%), private ITIs (87%), polytechnics (67%), and engineering colleges (67%) were cited as key hiring sources. However, 73% of employers still rely heavily on informal local hiring, indicating the absence of structured placement pipelines or apprenticeship pathways.

Despite depending on ITIs as the primary talent pipeline, employers overwhelmingly reported that current training does not meet industry needs. For instance, only 7% felt that institutions could meet their skill requirements, while 93% highlighted clear mismatches between training curricula and job expectations, and 60% indicated that recruits require substantial on-the-job training.

Going ahead, the demand for labour is expected to grow sharply. About 73% of employers anticipate their workforce expanding by more than 50% in the next five years—primarily for installer and survey assistant roles. Another 20% expect moderate growth of 25–50%. This signals not only strong industry momentum but also an urgent need for skilling systems to scale up capacity, improve quality, and deliver job-ready workers. At the same time, the survey exposed severe gender imbalance, with only 2 of 15 employers reporting women in technical roles, and even then below 25%, indicating the need for gender-responsive skilling initiatives.

### 4.3.2 EV sector

Odisha's EV industry is smaller than the solar sector but is expanding rapidly around sales, servicing, diagnostics, and basic repair work—and is already outpacing the supply of skilled workers.

The results of the employer survey reveal a highly fragmented early-stage market: 15 out of 16 respondents were EV dealers or distributors, and only one identified as an OEM. Workforce sizes are small—70% employ fewer than 10 workers, with another 25% employing 11–50 workers.

EV mechanics and technicians are the most in-demand roles, reflecting the sector's current dependence on routine servicing and after-sales maintenance. Advanced roles such as battery diagnostics, EV design, or high-voltage systems are not yet visible in the local labour market.

Even for basic roles, employers face a pronounced demand-supply mismatch. Although 94% recruit from Government ITIs, most emphasise that the available training does not align with EV industry requirements. Employers pointed to gaps in hands-on training, diagnostic skills, and familiarity with EV-specific components—indicating an urgent need for curriculum modernisation and stronger practical modules.

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Job-readiness assessments were split: half the employers considered recruits fully ready, while the other half found them only partially job-ready and requiring substantial on-the-job training. This indicates that training institutions provide basic foundations but fall short of preparing workers for real-world EV servicing environments.

Future labour demand is expected to rise sharply like the solar sector. About 50% of the employers foresee their workforce growing by more than 50% in the next five years, while 44% expect a 25–50% increase. A key concern for employers is the low supply of skilled workforce in the state.

Overall, across both solar and EV sectors, the findings highlight the following:

- There is a high and rising demand for technicians and field-level operatives. However, there is an inadequate supply of job-ready workers from ITIs, polytechnics, and private institutes.
- Currently, employers are providing on-the-job training to the workers due to poor job readiness.
- There are also weak industry–institution linkages, with limited apprenticeships or co-designed curricula.
- Rapid future expansion, which will further widen the demand–supply gap unless skilling systems adapt quickly.

## 4.4 Overall Observations

Odisha's vocational and technical education ecosystem has grown in scale, but its alignment with emerging green-sector requirements remains limited. Awareness of green skilling is low—only 7% of students are enrolled in green courses, and 45% are unaware that such courses exist. Most green enrolments are concentrated in solar-related electrical trades, with very low female participation, reflecting geographic, informational, and gender-based barriers.

Institutional readiness to deliver green skills also remains uneven. While many ITIs have updated their curricula, most revisions are procedural rather than substantive, with limited integration of solar, EV, or broader green-economy content. General laboratories are functional, but dedicated solar and EV training facilities are scarce, restricting practical learning. Faculty capability is the most significant constraint: 95% of instructors have no formal exposure to solar or EV systems, rely on outdated tools, and lack structured ToT or industry immersion. Without modernised curricula, updated equipment, and strengthened faculty development, institutions cannot keep pace with evolving industry needs.

These constraints are reflected in workforce outcomes. Workers in both solar and EV sectors are technically qualified but largely trained informally on the job, with minimal formal certification. Wages are modest—28–62% of workers earn below the semi-skilled minimum wage—indicating a skill–wage disconnect and limited career progression. Access to social security is inconsistent, and most workers express strong demand for advanced technical, digital, diagnostic, and safety training, showing readiness to upskill but lacking pathways to do so.

Employer feedback reinforces the structural demand–supply imbalance. In the solar sector, 93% of employers report significant skill mismatches despite routinely recruiting from ITIs. EV employers face similar shortages, even for basic technician roles, given limited hands-on training and curriculum gaps. Yet demand for skilled workers is rising rapidly: 50–70% of employers across both sectors expect their workforce to expand sharply in the next five years, driven by increased deployment, servicing, and diagnostics. However, industry–institution linkages remain weak, apprenticeships are limited, and gender representation is almost nonexistent in technical positions.

Overall, the findings point to a training ecosystem that is expanding but not keeping pace with the growing labour demand in the solar and EV sectors. Addressing this gap will require targeted interventions in curriculum modernisation, ToT and faculty development, structured apprenticeships, deeper industry partnerships, and gender-responsive skilling models. Strengthening these foundations will be essential for Odisha to build a job-ready workforce and ensure that its green transition delivers inclusive and high-quality employment opportunities.

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Chapter 5

# Agenda for Action



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## 5.1 Introduction

Odisha is entering a decisive decade of energy transition, which is also shaping the state's economic transformation. As highlighted in the previous chapters, the state's industrial base is diversifying, green investments are accelerating, and multiple districts with fossil-fuel dependence are beginning to experience early transition pressures. At the same time, new opportunities are emerging in RE, e-mobility, green manufacturing, sustainable construction, circular-economy industries, and service-based green enterprises.

This shift presents an unprecedented opportunity to create high-quality, future-ready jobs and expand employment avenues for the state's young workforce. Realising this potential, however, requires a strong and responsive technical education and skilling ecosystem—one that equips people for emerging green sectors while ensuring better wages, greater security, and clearer opportunities for advancement.

Yet, the assessment across the labour-market analysis, institutional review, and primary surveys reveals several critical limitations that, if not addressed proactively, could constrain Odisha's ability to fully leverage the employment potential of the green transition. Some of the key limitations that need attention are as follows.

- a. Despite Odisha's extensive network of ITIs, polytechnics, and short-term skilling centres, green skilling have not been suitably integrated in training programmes and courses offered by institutes and centres. As a result, a large proportion of students complete their training without exposure to the technologies, competencies, and work practices that are required by the emerging sectors.
- b. There exists a significant demand-supply gap for skilled workers in rapidly growing sectors such as solar and EV. Even as these industries expand and generate substantial employment opportunities, the local workforce is not adequately prepared to meet the rising demand. This mismatch will undermine the scope of maximising local employment generation in high-potential green sectors.
- c. Institutional delivery across training centres remains misaligned with industry expectations. Curriculum content, teaching and training approaches, and assessment systems do not consistently reflect the practical requirements or competency standards needed in the workplace.
- d. Resource constraints and limited practical exposure further weaken training quality and outcomes. Many institutions lack modern laboratories, updated equipment, and structured opportunities for industry-linked learning. Consequently, students receive limited hands-on experience and are not exposed to real-world work environments during training.
- e. Industry engagement is weak across the skilling value chain—from curriculum development to placements. Limited formal collaboration between institutions and industry restricts opportunities for students to participate in internships, on-the-job training, or apprenticeships, further widening the skill-readiness gap.
- f. Wage levels in many green sectors continue to be low, particularly for entry-level technical roles. Further, contractual agreements and limited career progression pathways reduce the attractiveness of these occupations for young workers and constrain workforce retention.
- g. Inclusion barriers persist across the skilling ecosystem. Women's participation in technical and green-sector courses continue to be negligible,

Considering these limitations, this chapter presents a set of practical and time-bound recommendations to strengthen the state's skilling ecosystem—one that not only builds a future-ready workforce but is fully aligned with emerging sectoral opportunities arising from the energy transition, and creates better employment and income prospects.

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## 5.2 Recommendations

Odisha stands at a crucial juncture where its economic prospects, industrial competitiveness, and social objectives increasingly converge around the emerging green economy. The transition now underway offers not only a pathway for decarbonisation but also a transformative opportunity to create dignified, secure, and future-ready livelihoods for the state's citizens. Realising this potential will require a comprehensive and forward-looking approach—one that reshapes and strengthens the state's skilling architecture, aligns closely with evolving industry needs, and ensures a just and inclusive workforce transition.

The following recommendations outline the core areas of action needed to drive this transformation and maximise the opportunity.

### a. Establish a state Green Jobs and Skills Mission

Odisha should develop a 'Odisha Green Jobs and Skills Mission', aligned with the state's energy-transition agenda and climate-resilient developmental goals. The objective of the Mission is to prepare a skilled, future-ready workforce for sectors central to these goals, enhance local workforce participation in emerging green industries, improve employment outcomes, and support inclusive development.

#### **This Mission should:**

- Formulate a five-year skilling strategy (to be updated every five years, based on gaps and need assessments), with clear targets and outcomes.
- Establish District-level Skill Councils for green sector transition to assess district-specific opportunities, evaluate skill gaps, design localised skilling and workforce development measures, coordinate supply-demand alignment.
- Enable convergence of schemes and programmes to mobilise resources for skilling, ensuring shared mandates, budgets, and outcome indicators.
- Build a Green Labour Market Information System (Green-LMIS) for real-time mapping of demand, supply, placement outcomes, wages, and transition risks.
- Publish an Annual Green Skills Review to guide policy adjustments.
- Support evidence-based planning at district and state levels.

### b. Establish Regional Green Skill Hubs

The state government, along with support from the central government and industry partners, should establish Regional Green Skill Hubs, with a focus on districts and regions most likely to be affected by the energy transition—such as Jharsuguda, Sundargarh, Angul, Dhenkanal, Jajpur, Keonjhar, and Kalinganagar. These hubs should function as anchor institutions for district-level training, innovation, incubation, and green entrepreneurship, providing flexible, future-ready spaces equipped for hands-on learning, technology exposure, and industry-relevant training across emerging green sectors.

#### **Each Green Skill Hub should include:**

- Modern laboratories and demonstration facilities for practical training in RE, electrical systems, and other green technologies.
- Workshops and diagnostic centres to support hands-on learning in next-generation mobility solutions, mechanical systems, and technical services.
- Facilities for materials testing, repair, and resource-management training, enabling skills in recycling, reuse, efficiency, and circular-economy practices.
- Multi-purpose digital and technology-enabled training spaces, such as simulation rooms, augmented reality (AR) and virtual reality (VR)-enabled classrooms to provide interactive, and experiential learning environment, etc.

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### **c. Revamp curriculum and training delivery across all ITIs, polytechnics, and skill centres**

The state government need to undertake a comprehensive curriculum revision for all levels of technical education.

#### **This should include:**

- Embedding green components into at least 50% of ITI and polytechnic courses. Currently, fewer than 10-12% of institutions offer any green modules, and coverage is very low.
- Introducing specialised courses on solar installation and operation and maintenance (O&M), EV diagnostics, battery technologies, energy-efficient construction, waste management, hydrogen safety, digital diagnostics, etc.
- Integrating digital competences (AI-enabled diagnostics, remote monitoring, robotics basics) across mainstream trades.
- Updating assessment frameworks to emphasise competency-based learning, practical demonstration, and industry co-evaluation.

### **d. Build a strong, future-ready faculty cadre through a Green Faculty Development Programme**

Faculty capability is the backbone of the skilling ecosystem. Odisha should launch a Green Faculty Development Programme (GFDP), with a clear target of training master trainers and instructors over the next five years.

#### **The programme should:**

- Partner with central institutions, industry-specific Sector Skill Councils, leading industry bodies, and expert technical agencies to deliver industry-aligned faculty training, curriculum development, and certification programmes.
- Include mandatory industry immersion, exposure visits, simulation-based learning, and certification systems.
- Facilitate sustained engagement between government, industry, and technical institutions to strengthen instructional capacity and ensure continuous upgradation of faculty skills.

### **e. Foster government and industry partnerships to strengthen sector-specific skilling and prospects of workforce integration**

Strengthening structured partnerships between government and industry is essential to ensure that training and workforce development remain relevant, demand-driven, and aligned with real labour-market needs. Continuous engagement with industry will help close the skill-readiness gap, improve curriculum relevance, and create clearer pathways for workforce integration.

#### **Such partnerships should include:**

- Creation of public-private partnership (PPP) models, where industries co-create curricula, co-deliver training, offer on job training and capsule trainings, and commit to recruitment pipelines.
- Adoption of dual-training models where training is split between classroom instruction and industry-led practical training.
- Convening of Annual Odisha Green Workforce Summit to update competency standards, forecast workforce needs, and review progress.

### **f. Support a green apprenticeship ecosystem**

A robust apprenticeship ecosystem is essential for producing job-ready workers in emerging green sectors. Odisha should create clear mechanisms to develop and expand such ecosystem to build practical exposure and strengthen industry integration.

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**Some of the key intervention areas include:**

- Reserving 10% of state-sponsored apprenticeship seats for green-sector roles.
- Providing financial incentives to MSMEs to host apprentices in solar, EV, repair services, and waste-management operations.
- Introducing apprenticeship-linked certification pathways to strengthen career progression.

**g. Improve wage outcomes and employment security**

Low pay, contractual engagement, and weak career progression remain key deterrents for young workers entering green sectors. Improving job quality is therefore essential for building and retaining a skilled workforce.

**Some of the key intervention areas include:**

- Introducing advanced certifications tied to higher wages and long term employment security.
- Encouraging industries to adopt minimum wage floors for green technical roles and linking incentives to compliance.
- Developing state-level occupational standards for solar, EV, energy-efficiency, and circular-economy job roles.

**h. Strengthen inclusion and ensure a just transition of the workforce**

To ensure that the benefits of the green economy are shared equitably, Odisha must embed inclusion and transition support into all skilling efforts.

**The following are some interventions to ensure this:**

- Reserving at least 25% of seats in green skilling programmes for women.
- Providing mobility support, safe hostels, childcare, and mentorship for women and low-income group trainees.
- Prioritising aspirational and transition-prone districts for new training centres, JSS programmes, and community-linked skilling models.
- Offering short-cycle, capsule reskilling for or contractual and informal workers to support their integration into low-carbon sectors, designed to fit their current work demands and financial constraints.

Taken together, these recommendations offer a comprehensive roadmap for building a skilled, competitive, and inclusive green workforce in Odisha. Implementing them will require coordinated leadership, sustained investment, and strong partnerships with industry, training institutions, expert agencies, and local organisations. With a mission-oriented approach, Odisha can prepare its workforce for emerging opportunities, improve job quality, and support a just transition for districts undergoing economic and industrial change. By strengthening institutions, upgrading training capacity, improving job outcomes, and ensuring inclusion, the state can position itself as a national leader in green workforce development and ensure that its energy transition becomes a pathway for wider economic opportunity and shared prosperity.

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