PAGE PARTNERSHIP FOR ACTION ON GREEN ECONOMY

Assessment of India's Green Jobs and Just Transition Policy Readiness

UN environment programme

ILO International Labour Organization

UNDP

UNIDO

unitar United Nations Institute for Training and Research

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EXECUTIVE SUMMARY

Green jobs are a priority for India, since the country is working towards its ambitious climate commitments to decarbonize the economy. Being one of the fastest growing major economies in the world, the third highest greenhouse gas emitter, and the fifth most vulnerable country to climate change impacts, the country is moving towards green growth to decouple emissions from economic prosperity while also creating millions of decent jobs. Many sectors are in different stages of creating/implementing policies and strategies to drive sustainability – which in turn result in job creation. In this shifting scenario, this research note aims to assess India's policy readiness to create and promote green jobs, and ensure a Just Transition for the workforce that may be negatively affected by greening.

Methodology used to assess policy readiness

The policy mix for promoting green jobs and skills, as well as a Just Transition, includes measures to produce green jobs in traditional and emerging sectors, but also measures to reduce the impacts of job losses and industry phase- outs on workers and communities. This encompasses many policy fields including development and employment policy, energy policy, industry policy, training and skills development, as well as sectoral level policies and policies at different jurisdictional levels. The broad array means that in addition to a policy mix; policy coherence and coordination are also critical issues in the successful implementation of policies for promoting green jobs.

In a similar study conducted for ASEAN countries in 2020–21, a framework was developed to assess policy readiness which has been adopted in this research note. The framework combines nine key policy areas – identified by ILO's *Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All* – into three broad areas of policies that promote green jobs:

1. Policies creating demand for green jobs (for ex. macroeconomic, industrial, sectoral, enterprise policies),
2. Policies enhancing supply for green jobs (including skilling, labour market policies),
3. institutional arrangements (including social protection and occupational safety policies, policy coordination and coherence mechanisms)

Against this framework, extensive secondary research was undertaken to analyse policy context and map out stakeholders. A guiding questionnaire was developed based on gaps in the research and circulated among relevant stakeholders. Interview consultations were carried out with stakeholders from government ministries, industry, trade unions, research organizations, UN agencies, and independent experts. Combined results from the desk study and interviews have been summarized in this research note.

Findings

- In terms of the understanding of green jobs in India, definitions are mostly conceptual and the general understanding is that green jobs are "jobs that positively impact the environment". The only officially available definition among policy documents is by the Skills Council for Green Jobs developed from the ILO definition. There is lack of clarity around whether all jobs in a green sector can be considered "green". The Ministry of Labour and Employment looks forward to creating a methodology to map green jobs among the existing classification of occupations.
- Different estimates of future green jobs have been made by different sources – ILO estimates 54 million green jobs will be created between 2021 and 2030, Skills Council for Green Jobs estimates 30–35 million by 2047, and World Economic Forum estimates 50 million+ by 2070. Sectoral green jobs estimates from ILO say that ~16 million jobs will be created by 2030 in the waste and water management sectors each, followed by 8.8 million in green construction and 4.3 million in renewable energy. Sectoral estimates are made periodically through collaborations between government agencies and civil society, focusing on the renewable energy and electric vehicle (EV) sectors.
- Clear definitions of a Just Transition are not available in policy documents, and discourse is mostly led by civil society in the energy and transport sectors. Within the Government, ensuring a Just Transition is a focus area for the Ministry of Coal which is working on an eight-year Just Transition project with World Bank and has instituted a "Just Transition

Cell" to overlook activities, although trade unions are yet to be consulted for Just Transition plans. Government stakeholders from the energy sector identified that in-depth understanding of direct and indirect industries/livelihoods associated with the coal ecosystem is essential to Just Transition planning, in addition to creating re-skilling policies and economic diversification plans in the region. The large proportion of informal/contractual labour in the coal and related sectors need to be accounted for during Just Transition planning.

- India's updated Nationally Determined Contributions (NDCs) declared by the Prime Minister at international climate conference CoP26 are ambitious and have reinvigorated the formulation and implementation of green policies/initiatives within ministries. Priority sectors for greening have been identified by different agencies and largely include energy, green transportation, built environment, sanitation and waste management, water resources, agriculture and pollution control. Strongest policy push and budgetary allocations for green jobs are in the renewable energy, electric vehicles, energy efficiency, waste management/circular economy sectors. Other sectors with green focus are agriculture, tourism, textiles, finance, and rural development. Stronger greening policies are required in industry and construction sectors. Some effective green jobs policy measures have been –
  - In the renewable energy sector, the Government's tax incentives, renewables purchase and generation obligations, transmission waivers, opening up of green energy access to smaller consumers, and promotion of domestic manufacturing through PLI schemes are encouraging infrastructure installation and jobs. The schemes for employment intensive sectors, such as the rooftop solar programme and decentralized renewable energy policy, coupled with a Human Resource Development policy are creating a strong foundation for green jobs creation.
  - In the electric vehicle (EV) sector, the Government's FAME-II scheme for subsidizing EVs and Production- Linked Incentive (PLI) scheme to promote indigenous battery and auto component manufacturing have laid a solid platform to develop a progressive value chain for job creation.
  - In industry policy, the Perform-Achieve-Trade (PAT) scheme yielded positive results, and the Draft National Resource Efficiency Policy lays a framework for decarbonization of industries.
- Investment in green sectors of clean energy, clean transportation, and energy efficiency have been rising year on year, and public investment was 43 per cent of total investment in these sectors in 2019/20. However, the total annual green finance in India is 25 per cent of the finance required to achieve NDCs by 2030 – focus needs to be on using public funding to mobilize resources from the private sector.
- Support for green entrepreneurs in India is present but is not strong. On the other hand, civil society and UN agencies have implemented multiple green entrepreneurship training and incubation programmes. A few financial assistance government schemes exist for green enterprises, mostly by Small Industries Development Bank of India. Ministry of Micro, Small and Medium Enterprises has also implemented the Zero Effect Zero Defect (ZED) scheme among a few others to promote greening, and would benefit from a roadmap to propel strategic green transition and job creation.
- Skilling in green sectors is led by the Skills Council for Green Jobs (SCGJ), although other ministries such as environment and renewable energy are also implementing green skilling programmes in solar, wind, biogas, forestry and more. High recruitment rate of the skilled workforce needs to be ensured. Education systems will include green skills as per the National Education Policy 2020. Integrating industry green skill requirements into higher education and vocational training is critical to realizing future workforce requirements.
- In terms of labour market policy, awareness on upcoming green jobs is limited among trade unions. The Government has taken steps towards enhancing employability and training in green sectors by – (1) working towards creating national level portals for wider green jobs information dissemination such as SCGJ's Rozgar portal and labour ministry's National Career Service portal, (2) designing policies and incentives for on-the-job trainings for green skilling, particularly in the renewable energy and EV sector, and (3) linking environmental conservation efforts with employment guarantee programmes. Occupational safety and health (OSH) and social protection policies are in place to some extent but are missing specific strategies for regions affected by climate change and green transition.
- Institutional mechanisms for green jobs policy coordination include high level inter-ministerial committees such as the Apex Committee for Implementation of Paris Agreement consisting of 14 ministries, and sector specific committees led by the planning commission NITI Aayog. There is no active coordination body for green jobs. The involvement of trade unions and other workers' organizations in green jobs planning is very low and needs to be increased.

Green jobs and Just Transition policy readiness summary table

Policy area	Status	Comment
Macroeconomic and growth policies (Green agenda part of national development, CC assessments, links to NDCs, Paris Agreement)		Green policies integrated into national development framework; National Electricity Plan, Green Hydrogen Mission, Draft National Resource Efficiency Policy, Env Ministry regulations – all in line with achieving NDCs
Public investment leveraged for green jobs (Infrastructure investments, green public procurement, research and development, and eco-innovation funding)		Significant govt budgetary allocations in green sectors; Indian and UK govts investing in Green Growth Equity Fund; Green public procurement policy being led by Min of Finance; Eco-innovation funding available but not sufficient according to experts
Industrial and sector policies (Target sectors for green jobs scoped out, sector specific policies for energy, waste, agriculture, built env)		Target sectors for green jobs scoped out by various agencies; Sectoral green policies present for energy, transport, energy efficiency, waste management; Green policies are in progress/not fully developed for other sectors
Enterprise policies (Availability of information and financial assistance, entrepreneurship support, business resilience for micro, small and medium enterprises)		No specific policies/incentives/assistance for green enterprises in the Government's Startup India programme; Few green funding avenues exist; MSME greening and business resilience programmes exist and can be strengthened
Skill development (Green skills consensus, skill adequacy/gap assessment, integration of on-the-job training)		Skills Council for Green Jobs defines green skills, conducts skills gap assessments, on-the-job trainings, green jobs certifications; Strong HR policy in place for skilling workforce in renewable energy sector; Govt focus is on women and unemployed youth
Active labour market policies (Green jobs and skills labour market information by geography, demographic, Just Transition plans, retraining of workers)		Green jobs labour market information by geography/demographic not collected by the Government; Info for selected states available in 2022 report by EY; Just Transition plans initiated for energy sector by Min of Coal and World Bank; Platform created for posting renewable energy jobs; Policies/initiatives framed for decentralized renewable energy livelihoods
Occupational safety and health (OSH) (OSH for climate change affected areas; ILO Convention No. 155 in force)		The ILO Occupational Safety and Health Convention, 1981 (No. 155), and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187) have not been ratified, but OSH is fundamental principle and right at work; OSH policies in place in private and public sector renewable energy companies; OSH to be focus for value chains of upcoming green sectors
Social protection (SP) (Unemployment and social protection policies for regions affected by climate change and job losses due to green transition)		New Labour Code for New India expands scope for SP; Min of Labour and Employment's E-Shram portal captures data of workers in unorganized sector; Specific SP strategies for individuals and communities affected by climate change and green transition need to be strengthened, including provision of support for re-skilling and re-employment
Cross-cutting elements (Inclusion of labour rights into green jobs, Just Transition policies, social dialogue for implementation of green policies, ILO Convention No. 144 in force, policy coordination, coherence)		Labour rights not clearly included in green jobs policies; India has ratified the ILO Tripartite Consultation (International Labour Standards Convention, 1976 (No. 144); Social dialogue involving workers' organizations is low for implementation of green policies; Policy coordination bodies exist but are not active; Policy coherence is strong in priority sectors

Significant policy elements in place Some policy elements in place Limited/No policy elements in place

Note: The assessment above is based on snapshot data available until June 2023. India's policies and schemes with respect to greening the economy are continuously evolving and subject to ongoing updates.

Gaps and recommendations

- **Defining green jobs and a Just Transition:** There is a need to create a detailed definition of green jobs, green sectors and green skills through consensus across ministries, employers' organizations and workers' organizations. The definition would need to focus on decent work aspects (including decent work considerations at the global level where raw materials/services for green sectors are imported), defining the spectrum of green jobs (core green jobs, indirect green jobs) and delineate green jobs in "green" and "non-green" sectors through detailed value chain analysis, such that it can provide a framework to map green jobs in current and upcoming occupations. For a Just Transition, sectors undergoing green transition need to be identified and Just Transition definitions need to be framed for each of them aiming at minimizing the negative impact of the transition on employment. Awareness needs to be created on these concepts and associated best practices among government, workers' organizations and employers' organizations.
- **Calculating green jobs targets and estimates:** Priority sectors, sectoral targets, and implementation roadmaps for greening and green jobs creation are required based on India's updated climate commitments. This will help estimate future green jobs and formulate relevant skilling and employment policies – which need to be achieved through a standardized methodology across India. There is a gap in information on the geographic distribution, skill requirements and demographic requirements of these new green jobs – this information is pertinent to planning the transition of workers to new green sectors. For Just Transition planning, an in-depth study of the coal ecosystem and dependent livelihoods is suggested by government stakeholders. This will involve data collection on formal/informal/contractual workers, socio-economic backgrounds, skill levels, aspirations of the transitioning workforce, and the impact of the transition on vulnerable groups through tripartite consultations. Employment impacts of greening (positive and negative impacts) have been assessed for the renewable energy and EV sectors, and need to be calculated for other sectors/industries undergoing green transition including skills gaps. When estimating future green jobs, categorization must be provided on whether they will be short/medium/long term jobs.
- **Increasing green enterprise support:** There is a need for separate and focused support for budding green enterprises in India through financial and mentorship assistance. Providing micro, small and medium enterprises (MSMEs) with trainings and financial incentives to green their businesses, creating green public procurement targets, and implementing policies to improve climate resilience of MSMEs in vulnerable geographies will increase scope for green jobs. Designing and supporting green entrepreneurship and apprenticeship programmes, by employers' organizations, will help in creating a pool of skilled green professionals. For industries, incentives should be designed to adopt greener practices.
- **Aligning skilling policies with climate commitments:** A strategic roadmap is required to create a large enough skilled workforce that meets India's NDCs and green targets. To scale up training programmes, the Skills Council for Green Jobs is looking at (1) stronger industry collaborations in training and recruitment, (2) strengthening infrastructure and capacities of training partner network, and (3) obtaining green skilling requirements at a geography level to conduct localized trainings.
- **Strengthening coherence between greening and labour market policies:** Employment policies need to be more prominent and central to greening through the involvement and consultation of trade unions and other workers' organizations while drafting policies and roadmaps for green sectors. Substantial incentives in the form of stipends and other benefits should be given to workers interested in transitioning into green jobs, especially from sectors such as coal mining, automotives, and other industries to encourage on-the-job training in green skills. Incentives should also be extended to enterprises that provide on-job training in green skills to workers. The Government's portal on green jobs opportunities (SCGJ Rozgar) and on career guidance (National Career Service) being integrated, translated into regional languages, and socialized among vocational training institutes, colleges, and the district level could help take green jobs information to a wider audience.
- **Creating decent work conditions through OSH and social protection policies for the green transition:** OSH trainings and awareness for upcoming green sectors such as floating solar photo voltaic (PV) cells and e-waste handling are under-addressed, and need to be conducted for relevant government agencies, employers' organizations and workers' organizations. Special attention needs to be given to OSH in the emerging supply chains for green industries, which may be exploitative. In the shift towards a greener economy, strategic social protection measures need to be designed for those whose jobs are lost or being transformed, with special attention focused on informal workers. For instance, coal mining workers whose mines are shutting down can be provided with compensation packages, temporary and time-bound social protection packages can be designed to provide a

financial cushion for those who are upskilling/reskilling themselves with new green skills, and alternate employment options and reskilling avenues can be provided for those wanting to work within the region where job losses have occurred. On-ground monitoring of implementation of OSH and social protection policies should be conducted rigorously by the Government and verified through tripartite consultation.

- **Activating coordination body for green jobs:** Institutional mechanisms for green jobs needs to be made stronger. The inter-ministerial Apex Committee for Implementation of Paris Agreement (AIPA) created in end 2020 has diverse constituent ministries, but does not include the Ministry of Skill Development and the Ministry of Labour and Employment – inclusion of these ministries will help create employment centric green policies that will help realize green targets more smoothly. Activities of the committee are not known. A national coordination body for green jobs is critical to define green jobs, identify priority sectors, compile green jobs estimations, and document and promote successful green jobs strategies and programmes across national and state levels.
- **Strengthening tripartism and social dialogue:** It is suggested that tripartite dialogue be institutionalized and made regular in context of green transition planning, while also inviting key stakeholders from civil society organizations. Workers' organizations must be provided with information about geographies and industries where jobs will be created and lost due to greening of the industry/sector, and new skills to be gained by the workforce to transition into green jobs.
- **Creating knowledge sharing platform for strategies to promote green jobs and skills:** This can be done through support for an annual Green Jobs Conference (as successfully occurred in ASEAN region) in which different ministries and states can come together to share what worked and what did not work in their strategies to promote green jobs and skills – including financial incentives, industry/enterprise policies, skilling policies, employment provisions, and private sector initiatives. This will help replication of relevant initiatives that have been proven successful.

ABBREVIATIONS AND ACRONYMS

CEEW	Centre for Energy, Environment and Water
EV	electric vehicle
FAME	Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India
FTE	full-time equivalent
GDP	gross domestic product
GHG	greenhouse gas
MNRE	Ministry of New and Renewable Energy
MOEFCC	Ministry of Environment, Forest and Climate Change
MSMEs	medium, small and micro enterprises
NDC	Nationally Determined Contributions
OSH	occupational safety and health
PAGE	Partnership for Action on Green Economy
PSU	public sector undertaking
PV	photo voltaic
SCGJ	Skills Council for Green Jobs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
ZED	Zero Effect Zero Defect
ZLD	Zero Liquid Discharge

1. INTRODUCTION

1 INTRODUCTION

1.1. About PAGE

The Partnership for Action on Green Economy (PAGE) was launched in 2013 as a response to the call at Rio+20 to support those countries wishing to embark on greener and more inclusive growth trajectories. PAGE brings together five UN agencies – UN Environment Programme (UNEP), International Labour Organization (ILO), UN Development Programme (UNDP), UN Industrial Development Organization (UNIDO), and UN Institute for Training and Research (UNITAR) – whose mandates, expertise and networks combined can offer integrated and holistic support to countries on inclusive green economy, ensuring coherence and avoiding duplication.

ILO's activities within PAGE focus on green jobs and ensuring a Just Transition, one that manages workplace changes as a result of the impacts of climate change and climate action. In both cases, coherent and consistent policy frameworks are needed, as well as an understanding of how policies will be implemented and change workplaces, behaviours and activities at both the organizational and individual level.

Green jobs are jobs that are good for people, good for the economy, and good for the environment. They are both a mechanism to achieve sustainable development, as well as an outcome, in that they can provide the double dividend of just and decent employment creation with reduced environmental impacts. Developing and implementing policy to promote green employment is the ambition of governments around the world, including in India. Developing a supportive policy ecosystem to enable future green job growth, and ensure a Just Transition is critical; yet in many policy areas and jurisdictions green jobs and Just transitions are new concepts and require activities to build awareness and capacity before they can be fully developed.

After recording GDP growth of around 7–8 per cent for several years, India's economy has started to slowdown. The country is also facing acute environmental challenges, including climate variability, poor air quality, over-exploitation of groundwater, water scarcity, increasing inland and coast salinity, land degradation, and increased intensity of climate extreme events. These have adversely affected economic performance and resulted in increased poverty, unemployment and poor health. India has made significant efforts to tackle this through several policies and programmes, including, the National Policy on Biofuels, the National Clean Environment Fund, the Smart Cities Mission, the Green Hydrogen Policy, and concerted efforts to achieve its Nationally Determined Contributions (NDCs) as well as Sustainable Development Goals.

India joined PAGE in 2018 to catalyse action and enhance cooperation on existing initiatives on national and sub-national levels. The Government's focus on increasing resource efficiency through the National Resource Efficiency Programme (under finalization) provides a specific entry point for PAGE support. Support areas being explored:

- Enhancing national initiatives on **resource efficiency**;
- Providing support for the implementation of India's **resource efficiency roadmap**;
- Supporting national priorities pertaining to **sustainable public procurement** and **eco-labelling**;
- Supporting the **modernization of micro-small- and medium-sized enterprises**, particularly in the manufacturing sectors; and
- **Building synergies** with other green economy-aligned initiatives.

Given India's traction in green policies and initiatives, and bold international commitments towards climate action, the ILO deems it necessary to look into employment aspects of greening. Through this research note, the ILO assesses India's policy readiness to create and promote green jobs, and ensure a Just Transition for the workforce that may be negatively affected by greening.

1.2. Definitions

1.2.1. Green jobs definition

According to the ILO (2016), green jobs are decent jobs that contribute to preserve or restore the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency. Green jobs help improve energy and raw materials efficiency, limit greenhouse gas emissions, minimize waste and pollution, protect and restore ecosystems, and support adaptation to the effects of climate change.

At the enterprise level, green jobs can produce goods or provide services that benefit the environment, for example green buildings or clean transportation. However, these green outputs (products and services) are not always based on green production processes and technologies. Therefore, green jobs can also be distinguished by their contribution to more environmentally friendly processes. For example, green jobs can reduce water consumption or improve recycling systems. Yet, green jobs defined through production processes do not necessarily produce environmental goods or services.

The ILO's focus is on ensuring that these green jobs are quality jobs in line with the four strategic objectives at the heart of the ILO decent work agenda, which seek to:

- set and promote standards and fundamental principles and rights at work;
- create greater opportunities for women and men to obtain decent employment and income;
- enhance the coverage and effectiveness of social protection for all; and
- strengthen tripartism (government, workers' organizations and employers' organizations) and social dialogue.

There is no universal definition or accepted way of categorizing and counting green jobs. Most definitions of green jobs consider greening on a spectrum with some jobs being classified as directly green, and other indirectly.

1.2.2. Just Transition definition

For most of the workforce, greening will change their work by only a small amount. For other occupations, greening will change them significantly, new occupations will be created, and other occupations will diminish/ be phased out. According to the ILO, a Just Transition means greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind. It ensures that in the process of transitioning to a green economy, people in jobs and occupations that are reduced and phased out have pathways to transition to other viable employment, and have social protection on this pathway.

A Just Transition is possible only with tripartite dialogue and engagement between the government, employers, and workers, along with other relevant stakeholders to a particular industry in question. According to the ILO, 40 per cent of the world's employment – 1.2 billion people – relies directly on a healthy and stable environment, and COVID-19 has created a labour market crisis that the world has not recovered from. Tackling the environmental and employment challenges simultaneously now is a necessity.

At the outset, climate action and a Just Transition do not come cheap. But the cost of inaction is far greater than the cost of action, given that 23 million working-life years have been lost to disasters every year since 2000. In India, natural disasters cost a whopping US$80 billion in the 20-year period between 1998 and 2017. In the year 2020 alone, super cyclone Amphan and floods across the country resulted in damages worth US$23 billion. Exploring how a Just Transition can be financed, and by whom, must now be a key focus area for countries. A Just Transition may look different for different countries, and these plans need to be developed with country-specific context.

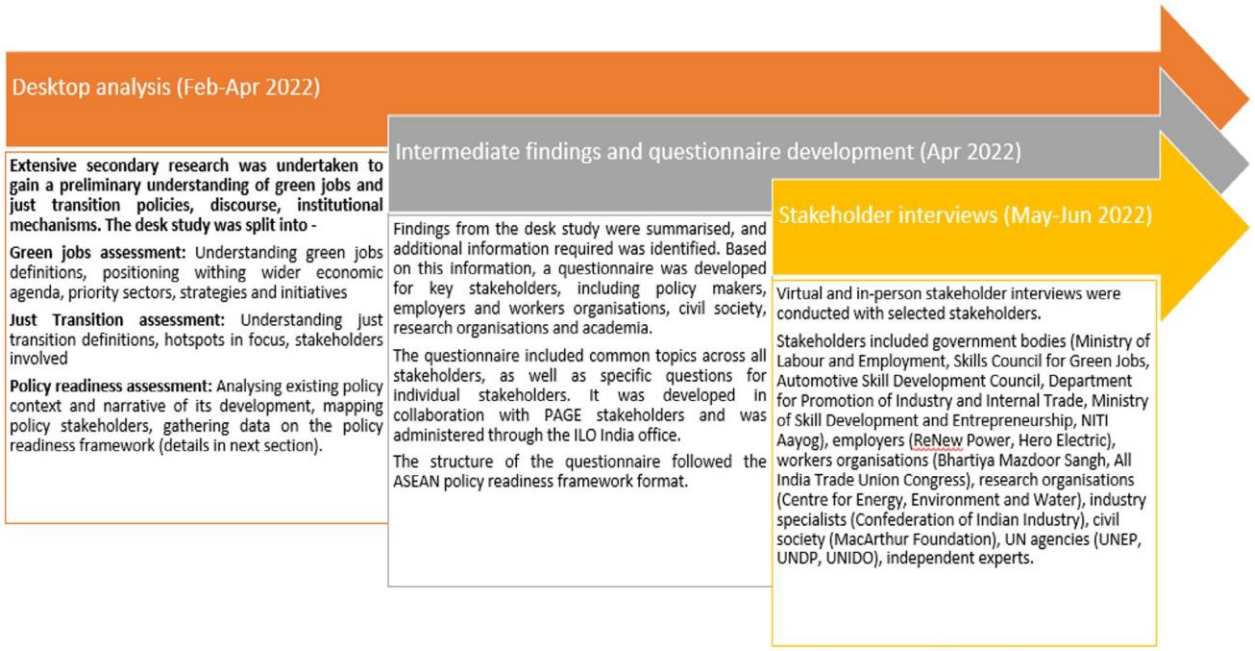
1.3. Report outline

We start by assessing the need and scope for green jobs in India, understanding of green jobs and a Just Transition among key stakeholders (policymakers, employers and workers, and civil society organizations), understanding green jobs positioning within wider economic agenda, and identifying priority sectors for policy frameworks to support green jobs promotion. The assessment of a Just Transition understanding focuses on the energy sector.

The research note then assesses green jobs and Just Transition policy readiness of India using the framework prescribed by ILO's 2015 publication *Guidelines for a Just Transition Towards Environmentally Sustainable Economies and Societies for All*. While the assessment aims to make a statement about the general policy readiness in India towards the different green sectors and tries to understand priority sectors for greening and green jobs promotion overall, the major focus is on the energy sector (the shift from coal to renewables).

1.4. Assessment method

The step-by-step research methodology is given below –



The ILO (2021) ASEAN policy readiness study, which was a guiding document for this research note, robustly compiles the factors to be considered when assessing green jobs and Just Transition policy readiness as adapted from ILO's *Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All*. In short, policy readiness can be assessed by looking at the adequacy of – policies influencing demand for green jobs (macro-economic and growth policies, industrial and sectoral policies, enterprise policies), policies influencing supply of green jobs (skills development, active labour market policies), and institutional arrangements (occupational safety and health, social protection, cross cutting elements including social dialogue, policy coherence and policy coordination).

2. |GREEN JOBS IN INDIA

2 GREEN JOBS IN INDIA

2.1. Need for green jobs in India

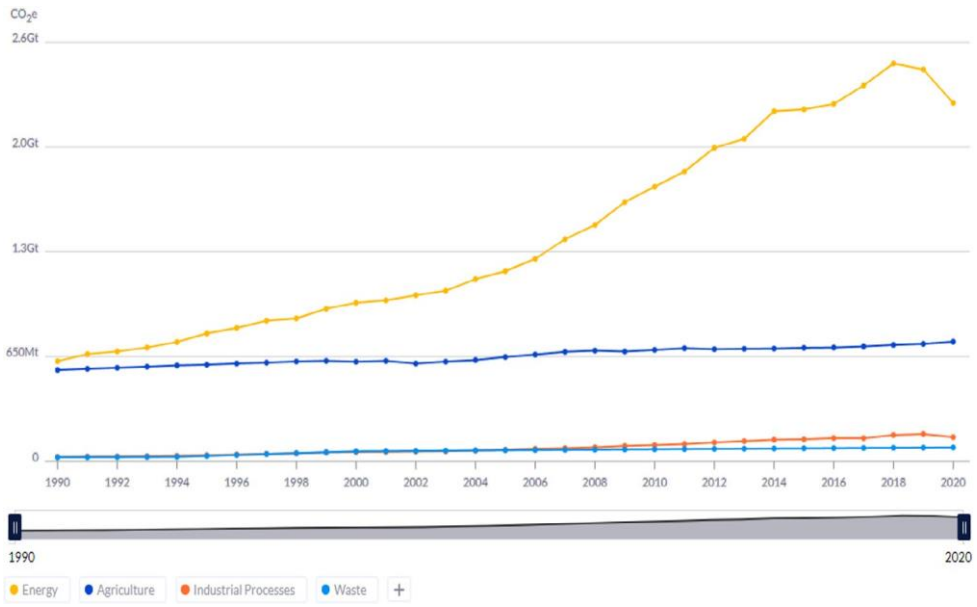
India is the fastest-growing major economy in the world with a projected GDP growth of 8.2 per cent in 2022 – more than double the average growth rate of 'advanced economies' – 3.3 per cent, and of 'emerging market and developing economies' – 3.8 per cent (IMF 2022). Along with impressive economic progress, India is soon to boast of the world's largest population, overtaking China by 2025 and peaking at 1.7 billion in 2060 (Timperley 2019). But with an economy heavily dependent on coal and oil, increase in resource demand from the rising population, and the burden to lift a large proportion of Indians out of poverty and unemployment, India's emissions will see a steep upward trajectory (caused by growth in electricity demand, industry, transport, construction, farming, and other sectors) unless conscious action is taken to curb them. The impact of the COVID-19 pandemic on India's industry and labour markets has been significant – employment rates are still lingering well below pre-pandemic levels. The IMF has estimated that of 100 million people across the world pushed into poverty because of the pandemic, 50 per cent or 50 million are estimated to be from India (Sangeetha 2021).

India's environmental performance has been
poor. High levels of Green House Gas (GHG) emissions along with increased climate vulnerability have not only put public health and safety under risk, but undermine developmental gains and affect marginalized communities disproportionately. India ranked 180th in Yale's 2022 Environmental Performance Index ranking out of 180 countries analysed (EPI 2022). India is also home to the top two of the ten most polluted cities in the world; the national capital New Delhi tops the list of the world's most polluted cities (HEI 2022, 5).

2.1.1. Greenhouse gas emissions

Over the years, India has risen to be the world's third largest emitter of greenhouse gases, contributing to 7.1 per cent of total global carbon emissions as of 2021, although India ranks much lower in per-capita emissions and has a large proportion of the population living with inequitable access to energy. There has been a steep rise in emissions from the power sector over the last 20 years (as seen in figure 1).

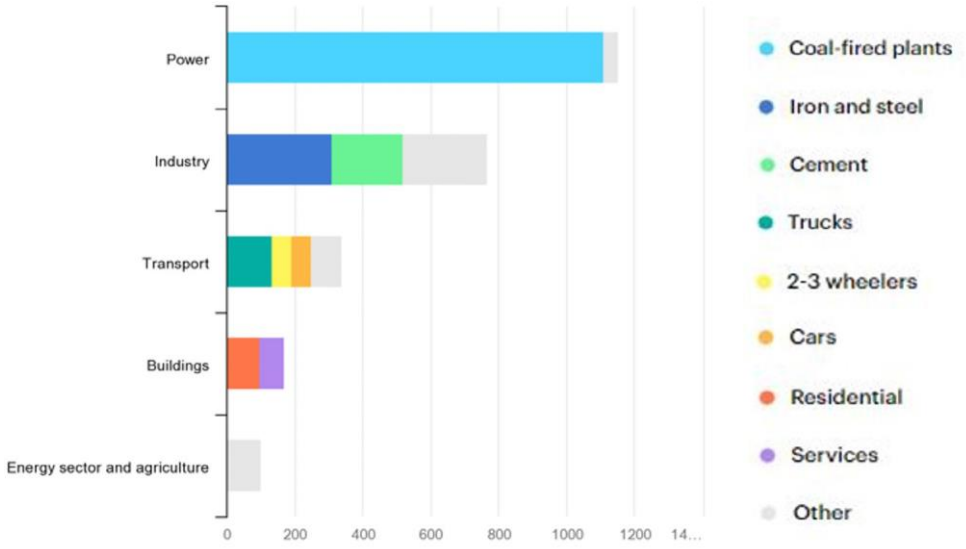
Figure 1. Steady rise in India's greenhouse gas emissions across sectors (until 2019)



Source: Climate Watch, n.d.

Within the sectors consuming energy, coal-fired plants constitute the largest share of greenhouse gas (GHG) emissions, followed by the iron/steel industry and the cement industry, the transportation sector, and buildings (as seen in figure 2).

Figure 2. Emissions from the Indian energy sector in 2019 (in Mt CO2)



Source: IEA 2021a.

2.1.2. Climate change impacts

According to the GermanWatch, India is the 5th most vulnerable country in the world to climate change – a phenomenon caused by the steep rise in GHG emissions resulting from human developmental activity over the last 150 years. In terms of climate vulnerability, for India this translates to extreme heat, rise in sea levels, erratic change in precipitation patterns, melting glaciers, and more severe and more frequent disasters. All these further lead to unprecedented losses of lives, livelihoods, social security, GDP, among other impacts. US$37 billion dollars were lost due to climate change in India in 2018 alone, nearly twice of what India lost between 1998 and 2017 (Eckstein et al. 2019, 6). A 2020 climate report by the Indian Ministry of Earth Sciences (Krishnan et al. 2020) predicts the impacts of continued climate change in India as follows:

- Extreme temperatures: Average temperature over India to reach 4.4 degrees by 2100, three to four times higher frequency of heatwaves, loss of 5.8 per cent working hours by 2030 due to amplified heat stress – agriculture and construction sector affected the most
- Changes in rainfall: Precipitation declined by 6 per cent from 1950 to 2015, 27 per cent higher frequency of dry spells, more intense wet spells in the period of 1980–2011, compared to the 30 years before that
- Rising sea level: By the end of twenty-first century, Indian Ocean level will rise by 300mm relative to 1986–2005 levels, compared to 180mm rise in the rest of the world
- Increased disaster risk: 2018 Kerala floods, 2019 cyclone Fani, 2020 cyclone Amphan – in 2018 India lost 37 billion dollars due to climate change – nearly twice of what it lost in the 30 years prior
- Reduction in agricultural productivity, loss of livelihoods, health impacts, acute water shortage, risk of destruction to coastal communities and north-western communities by flooding

The impacts of climate change will disproportionally affect marginalized and low-income communities because flood and drought zones often overlap with areas of high poverty and low access to essential services.

2.2. India's shift to a green economy and the scope for green jobs

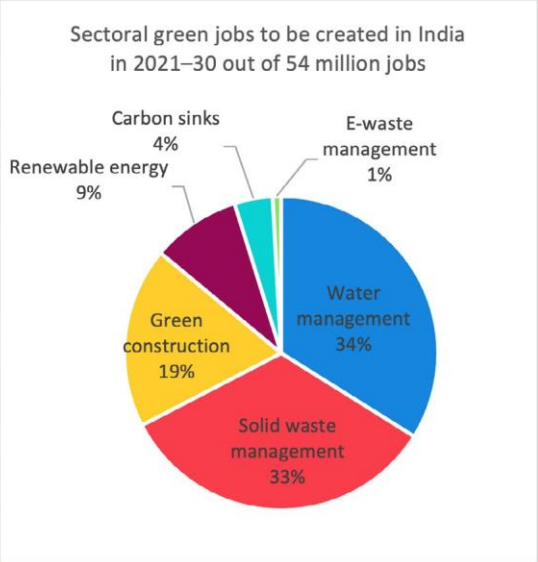
Given India's unique position dealing with economic transformation, increasing climate impacts, and setbacks caused by the COVID-19 pandemic, the country has an opportunity for green-led economic recovery. A "Green New Deal" proposed by the World Economic Forum states that "India's transition to a net zero economy can save lives, catalyse new industries, create over 50 million jobs and contribute more than $15 trillion in economic impact" (WEF 2021, 4).

India has already started on the path to a green transition. At the 26th Conference of Parties in November 2021, Indian PM Narendra Modi reiterated India's resolve towards meeting and surpassing previous climate commitments as he declared a five-fold strategy – achieving 500GW non-fossil fuel energy capacity by 2030, 50 per cent energy requirement met by renewables by 2030, reducing projected carbon emissions by 1 billion tonnes by 2030, 45 per cent reduction in the carbon intensity of the economy by 2030, and achieving net-zero emissions by 2070.

To achieve the targets above, India is working strategically towards increasing its renewable energy capacity, increasing the uptake of electric vehicles (EVs), investing in green fuels, introducing resource and material efficiency policy into industry, scaling up effective sanitation and waste management systems, and more. The ILO estimates that 54 million green jobs will be created in India between 2021 and 2030 across sectors (see in figure 3). The Skills Council for Green Jobs has also made a projection that 30-35 million jobs will be created across green sectors in India by 2047.

Figure 3. ILO sectoral estimates of green jobs creation in India between 2021 and 2030

SI. NO.	SECTOR	SUB SECTOR	TILL 2020	TILL 2030	2021-2030
1		Solar Photovoltaics	180,00	900,00	720,000
2		Solar Thermal	14,500	35,000	20,500
3		Wind Power	60,000	180,000	120,000
4		Small Hydro Power	10,000	30,000	20,000
5	Renewable Energy	Biomass/ Cogen / CHP	25,000	100,000	75,000
6		Energy Storage	50,000	300,000	250,000
7		Biofuels, Biogas, Pellets and Briquettes	55,000	275,000	220,000
8		Clean Cook Stoves	75,000	2,968,600	2,893,600
	Sub Total RE		**469,500**	**4,788,600**	**4,319,100**
9	Green Construction	Green Buildings / Campuses	2,200,000	11,000,000	8,800,000
10	Green Transportation				
11	Carbon Sinks		240,000	2,100,000	1,860,000
12	Water Management		3,000,000	19,000,000	16,000,000
13	Solid Waste Management		4,000,000	19,800,000	15,800,000
14	E-Waste Management		170,000	582,000	412,000
	Total		**10,829,500**	**64,770,600**	**53,941,100**



Source: ILO 2018, 16.

Of the green sectors, the renewable energy sector has strong targets, policies, and budgetary allocations in place for infrastructure setup and skilling. The national renewable energy shift is already showing its impact through (1) reduced jobs in coal sector, (2) solar and wind power tariffs falling below that of coal, and (3) rechanneling of future investments of coal companies into renewable energy. From an employment perspective, achieving the 500 GW renewables capacity goal by 2030 could employ 1 million people in just the solar and wind sectors by 2030 (CEEW, NRDC, and SCGJ 2022, 8). On the other hand, local economies of coal producing states are being heavily impacted by reduced coal consumption, creating a ripple effect throughout the entire industry engaged in coal and its related industries. An estimated 110,000 direct jobs in coal mining regions are under threat of being lost by 2030 (EY India 2022). The changing landscape of green jobs calls for a more detailed assessment of jobs created and lost due to India's energy and green transition, understanding of skilling requirements and gaps, identification of hotspots for job losses and need for a Just Transition, and policy coherence and coordination to ensure that this energy transition in duly supported.

2.2.1. Understanding of green jobs and a Just Transition in India

2.2.1.1. Green jobs understanding

Green jobs discussions in India began in 2009, when the Ministry of Labour and Employment established the "Multi-stakeholder Task Force on Green Jobs and Climate Change" with ILO's support, to address employment and labour market dimensions of environment related policies and strategies. However, activities of this task force are unclear, and there is not yet a detailed definition of green jobs in policy documents of ministries. The only available definition is by the Skills Council for Green Jobs (SCGJ) established in 2015, which states, "Green jobs are decent jobs that contribute to preserve or restore the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency" (SCGJ, n.d.). This is a direct and brief adaptation of the ILO green jobs definition. SCGJ lists out green sectors in India as given below (SCGJ 2022, 7), but does not define green jobs clearly enough to understand whether all jobs in the green sectors are considered to be green jobs or not, and whether some jobs in non-green sectors can be green jobs or not.

- Renewable energy: Includes solar, wind, hydro, energy storage, biomass/waste-to-energy, clean cookstoves, biofuels/biogas
- Environment, Forest and Climate Change: Includes solid and e-waste management, water management, carbon sinks (agro-forestry, plantation)
- Sustainable development: Includes green construction, green transportation, pollution prevention and control, green hydrogen, energy storage

The general understanding of green jobs is largely limited to jobs that are related to the environment, but the decent work aspect is not well known. For green sectors such as renewable energy and electric vehicles (EVs), raw materials are often imported from other countries. Decent work creation thus needs to be assessed at a global level at every level of the value chain of green products/ services. Also, direct jobs in fields like renewables and EVs are likely considered green jobs (although the decent work aspects of these jobs need to be more closely examined), but indirect jobs in the supply chains of these industries need not be green or decent. As per trade unions, green jobs planning currently involves government, industry, and customers, with low involvement of workers' organizations. Trade unions are supportive of green jobs, given that the work is decent and provisions are made to transition affected workers.

In July 2022, India was part of the Labour and Employment Ministers Meeting (LEMM) declaration made by BRICS countries, of which one of the goals was to understand more deeply and promote green jobs and a Just Transition (ILO 2022a). Indian Ministry of Labour has committed to better defining and measuring green jobs, strengthening green jobs and Just Transition research, adopting measures for human resource development, and classifying and creating standards for green jobs.

2.2.1.2. Just Transition understanding

There are no set definitions of a Just Transition or what it constitutes in policy documents. However there seems to be significant traction in the energy sector in India, and initial Just Transition discussions in the EV sector. Within the Government, the Ministry of Coal in May 2022 created a Just Transition Division and is collaborating with the World Bank on an eight-year project to create a robust mine closure framework incorporating principles of a Just Transition (2021–29). The Ministry's Sustainable Development Cell has set in motion the process of repurposing mines, while the Central Pollution Control Board in 2021, for the first time, issued guidelines for decommissioning coal-based plants.[1]

Civil society organizations have taken the lead in initiating discourse on the subject. The Energy Resources Institute in 2021 launched working papers on a Just Transition in India and hosted a multi-stakeholder dialogue on the implications and challenges of a transition away from coal. The India Just Transition Centre by iForest, an independent environmental organization, aims to enhance Just Transition understanding from a global south perspective, and has attempted to define and frame a Just Transition for India. Recently, a

1 The text of the guidelines is available at: https://imgs.mongabay.com/wp-content/uploads/sites/30/2021/11/10130032/draft- guidelines-for-decommissioning-of-coal-based-power-plants.pdf.

first-of-its-kind detailed study was undertaken on developing a skill action plan for a Just Transition from coal to renewable energy in India. The report presents a framework of actions to empower the states with all the resources to help design/converge industry relevant skilling and livelihood promotion interventions for the transitioning miners.

As trade unions push for Just Transition planning in light of the shift from coal to renewables, the government stakeholders acknowledge the urgent need for a Just Transition, while also maintaining that coal will continue being a significant source of power for the next 20–30 years to ensure energy security to millions of poor families. Planning commission NITI Aayog mentions that Just Transition planning would require an in-depth analysis of the coal ecosystem, the direct and indirect jobs/ businesses depending on it, and economic diversification opportunities in coal regions. This is because

- India is the second largest producer, consumer and importer of coal, which accounts for 44 per cent primary energy demand, forms the basis of the steel industry, and heavily cross-subsidizes passenger fare for the railways
- Coal-rich states of Jharkhand, Odisha, Chhattisgarh, West Bengal and Madhya Pradesh have high dependence on coal as a singular mode of trade revenues – they also rank lowest in socio- economic indices
- The coal sector employs close 2.5 million people of which 70 per cent are informal workers; Including indirect sectors such as transport, power, sponge iron, steel and brick sectors, the coal sector employs 13 million people of which 11 million belong to the brick sector alone (TERI 2022).
- The National Electricity Plan foresees an expansion of coal capacity of 46 GW between 2022-27, and estimates say that demand for coal will peak sometime after 2030 and start reducing only post that

Some challenges in Just Transition planning include the lack of adequate data, official labour estimates not including informal and contractual labour, no official dataset capturing socio-economic profiles of labour no clear roadmap for the energy sector to achieve the Net Zero target, no accountability for fiscal responsibility for JT and lack of involvement of trade unions is initial Just Transition dialogue. Other key aspects to consider for a Just Energy transition include assessing and mitigating the impacts on vulnerable groups such as tribals, displaced, indigenous, differently-abled groups, and making gender equality a pillar for Just Transition planning.

2.2.1.3. Need to shift to renewable energy

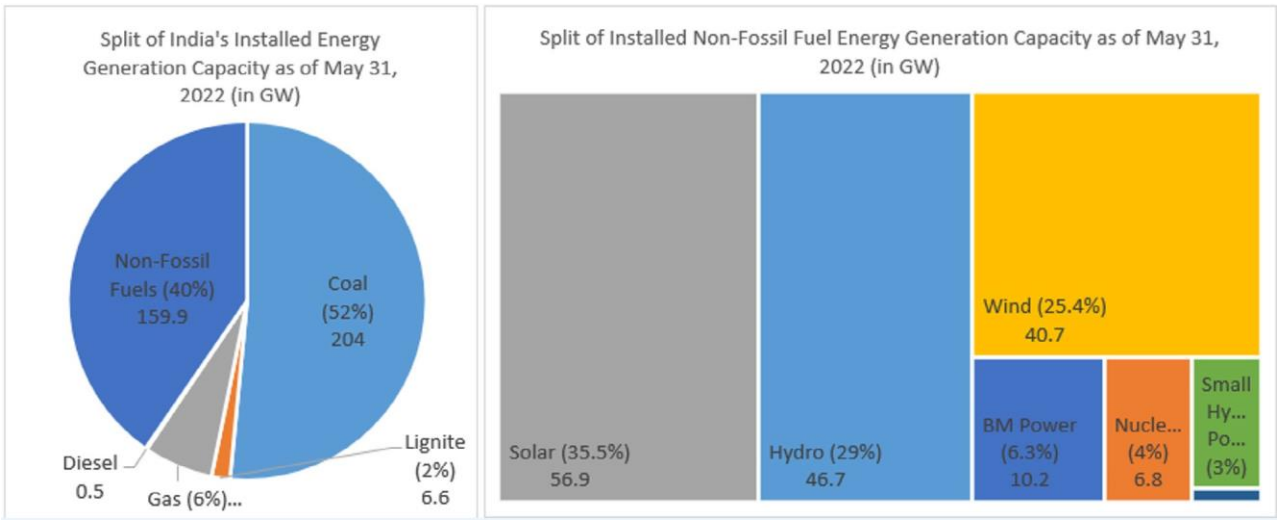
The coal sector has been seeing a steady decline over the past few years owing to unproductive mines, and technologies that are replacing manpower. Coal is also getting less competitive compared to renewables, with solar PV and wind tariffs (2–4 rupees/kWH) already below coal tariff (3–6 rupees/ kWH). Coal India Limited, which accounts for 80 per cent of India's coal output, has closed 80 loss making mines out of its 350 mines. By 2030, more mine closures are estimated to risk losses of 110,000 jobs in five states. However, by 2030 it is also estimated that 118,000 workers are required to meet renewable energy expansion plans of those five states (Ernst & Young, SED Fund, and FICCI 2022). Large public sector undertakings (PSUs) like Coal India Limited and National Thermal Power Corporation investing heavily in renewable energy gives more scope to skilling existing coal mining workers into renewable energy jobs. Whether those who lose their jobs in the coal sector will have matching skill sets and aspirations for renewable energy jobs, and whether there is availability of necessary trainings to transition into the renewable energy sector is questionable and needs to be studied further. A recent Just Transition report for the coal industry charts out existing and upcoming sectors in the coal belt which may be considered for economic diversification in light of coal-phase down. Taking the example of Jharkhand state,

- Major industries have been identified as agro-based industries, food processing, mining and mineral, heavy and light engineering, chemicals, healthcare and wellbeing, sericulture (tasar silk), handicraft, handloom, steel, tourism, auto components, power/energy
- Upcoming industries have been identified as textile and apparels, automobile, and electric vehicle Electronics System Design and Manufacturing (ESDM).

2.2.2. Renewable energy potential in India

Globally, India ranks fourth in renewable energy capacity and wind power, and fifth in solar power capacity. As of May 2022, 40 per cent of India's total installed energy capacity of ~400 GW is from non-fossil fuel based sources, and the Government aims to increase this share to 57.2 per cent by 2026–27 (India, Ministry of Power, n.d.-a). As per international commitments, the Government aims to increase its current renewable energy generation capacity from 113 GW to 175 GW by the end of 2022, and to 500 GW by 2030. It is important to note here that according to the National Electricity Policy, the energy demand is estimated to more than double from 400 GW current installed capacity in 2022 to 817 GW by 2030. Of the 817 GW, 50 per cent could come from just solar and wind energy sources – 280 GW from solar and 140 GW from wind. This will create many new jobs in the sector. The planning commission NITI Aayog is creating a roadmap for India's clean energy transition and requires firm targets from the Ministry of Power on the exact energy mix to achieve 500 GW by 2030, as well as for the 2070 net-zero target. Without the energy mix, it is difficult to predict employment impacts of shifting to renewable energy.

Figure 4. India's total and non-fossil fuel-based energy capacity as of May 2022



Source: India, Ministry of Power, n.d.-a.

2.3. Labour force characteristics[2]

In 2020, India's labour force participation rate was 51.1 per cent, albeit the male participation rate (75.8 per cent) is almost 50 percentage points higher than the female participation rate (26.2 per cent) (ILO). Overall, inactivity rate (100 minus the labour force participation rate) is 48.9 per cent, offering scope for absorption of a large proportion of inactive population into upcoming high-employment sectors and green sectors.

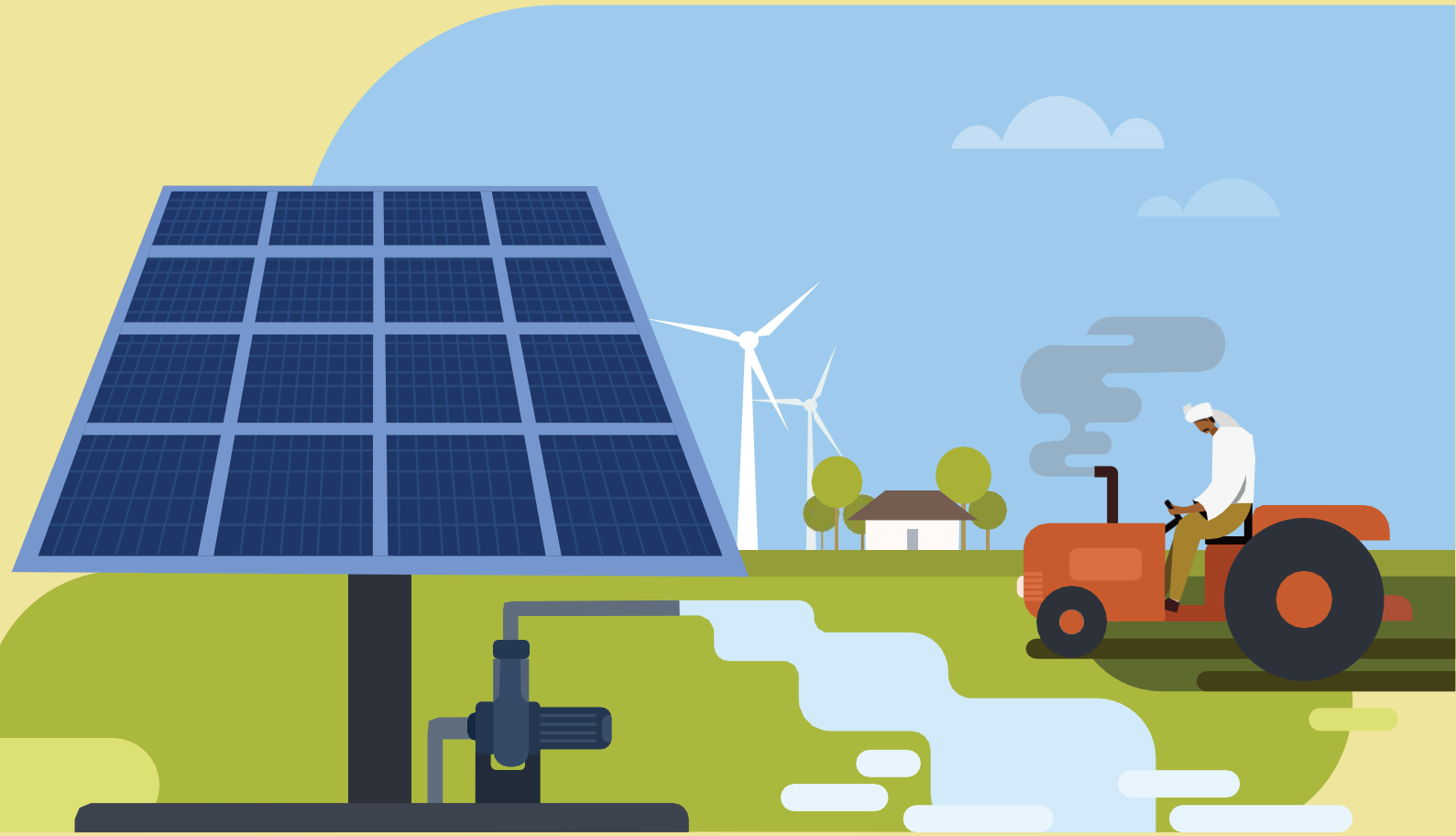
Further, looking at sectoral split of the workforce, 44.3 per cent is engaged in agriculture (including forest and fishing activities) forming the largest segment, 23.9 per cent in industry (including manufacturing, construction, energy and public utilities), and 31.8 per cent in services (including wholesale and retail trade, restaurants and hotels, transport, storage, business services, community health services and personal services). Gender disparity is observed in sectoral participation – significantly higher proportion of women are in agriculture (~58 per cent) when compared to men (~40 per cent), and much smaller proportions of women are engaged in the industry and services sector when compared to men.

The overall unemployment rate in India in 2020 was 4.8 per cent but youth unemployment was much higher, at 19.8 per cent. However, the informal employment was at 88.1 per cent in the same time period owing to issues specific to developing countries, such as lack of adequate jobs, lack of social safety nets such as unemployment benefits. As of

2 Unless otherwise indicated, the data in this section is derived from the ILO's ILOSTAT database.

2019, 74 per cent of India's population had vulnerable employment (World Bank, n.d.), which is defined by inadequate earnings, low productivity, and difficult conditions of work that undermine workers' fundamental rights. The high level of vulnerable employment could be because of high reliance on agriculture, coupled with high climate change vulnerability and disaster risk faced by communities living on India's vast coastline.

3. METHOD TO ASSESS POLICY READINESS TO SUPPORT GREEN JOBS PROMOTION AND A JUST TRANSITION IN INDIA



3. METHOD TO ASSESS POLICY READINESS TO SUPPORT GREEN JOBS PROMOTION AND A JUST TRANSITION IN INDIA

ILO has calculated that the measures taken to reach a green economy by decarbonizing the production and use of energy will lead to job losses of 6 million as well as the creation of some 24 million new jobs – a net increase of 18 million jobs resulting from changing the energy mix to renewable energy and taking up energy efficiency opportunities (ILO 2018a). Also, the move to more sustainable agricultural practices can both reduce emissions as well as enhance the decency of work in agriculture by introducing additional opportunities for wage employment, for example medium and large organic farms, as well as allowing small holders to diversify income sources through conservation agriculture.

Policy is necessary to:

- ensure the maximum amount of potential green jobs are created,
- the labour force is skilled and ready to take up this employment,
- and workers who are in industries negatively affected by greening are provided with support and opportunities for skills development and training so they can effectively transition to new employment.

A Just Transition includes a set of principles, processes and practices that produce plans, policies, investments and concrete measures designed to move the world towards a future where jobs are green and decent, carbon emissions are net zero, poverty has been eradicated, workers and their families enjoy their human right to social protection and communities are thriving and resilient (ILO 2019). There is significant scope for policies in the world of work to advance environmental sustainability, and for environmental sustainability to enhance decent work conditions (ILO 2018b).

3.1. Policy elements for green jobs and Just Transition assessment

The policy mix for promoting green jobs and skills, as well as a Just Transition, includes measures to produce green jobs in traditional and emerging sectors, but also measures to reduce the impacts of job losses and industry phase- outs on workers and communities. This encompasses many policy fields including development and employment policy, energy policy, industry policy, training and skills development, as well as sectoral level policies and policies at different jurisdictional levels. The broad array means that in addition to a policy mix; policy coherence and coordination are also critical issues in the successful implementation of policies for promoting green jobs. For analysis purposes three broad areas are helpful in distinguishing green jobs policies:

- Policy influencing the demand for green jobs;
- Policy influencing the supply of workers to undertake green jobs; and,
- Institutional arrangements.

Given below are the components within each of these categories and criteria against which we assess policy readiness against each category.

3.1.1. Policies influencing the demand for green jobs

Macroeconomic and growth policies: We assess the integration of green agenda into national development frameworks, links to international agreements such as the Paris Agreement and Nationally Defined Contributions (NDCs), and climate change assessments plans.

Public investment leveraged for green jobs: We assess public investment in green infrastructure development and green jobs institutions, latest union budget allocations for greening, policies for green public procurement and policies for green eco-innovation/research and development support.

Industrial and sectoral policies: We assess priority sectors for greening and green jobs creation, and sector-

specific policies for renewable energy, EVs and textile/garment sectors.

Enterprise policies: We assess available information, assistance, financial incentives for greening in enterprises, green entrepreneurship support for women and youth, business resilience programmes to support enterprises in implementing adaptation especially in MSMEs and SMEs.

3.1.2. Policies influencing the supply of workers to undertake green jobs

Skilling policy: We assess the green skills consensus, adequacy and availability of green skills training programmes, integration of green skills into formal and vocational education systems, conducting of skills gap analysis, and policy focus on skilling of women and youth

Active labour market policy: We assess availability of information on green jobs/skills labour market information by geography and demography, programmes for strengthening employability and training of transitioning workers, use of public employment programmes for poverty eradication and ecosystem protection, and the availability of avenues for on-the-job training

3.1.3. Institutional mechanisms

Occupational safety and health (OSH): We assess whether OSH risks associated with climate change, resource scarcity and green jobs are documented, a headline indicator here is whether the ILO Occupational Safety and Health Convention, 1981 (No. 155), has been ratified as this Convention sets out minimum threshold provisions for OSH in the country.

Social protection: We assess social protection provisions in India (including unemployment protection), and social protection mechanisms that contribute to offsetting impacts of climate change and challenges of the transition on livelihoods, incomes and jobs (with a focus on the energy sector)

Cross-cutting elements: We assess labour rights and standards in green jobs and Just Transition policy, social dialogue processes informing the development and implementation of green policies, ILO Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144), on social dialogue in force, measures to achieve policy coordination and coherence

Finally, a summary table is created in which the country performance against each of the above nine policy elements is summarized, and a colour code is assigned to each element based on the sufficiency of policies. Green represents that significant elements of the framework are in place, orange represents the need for additional policies needed and are identified in development, and grey represents no policy elements identifiable to date.

4. GREEN JOBS AND JUST TRANSITION POLICY READINESS ASSESSMENT FOR INDIA

4. GREEN JOBS AND JUST TRANSITION POLICY READINESS ASSESSMENT FOR INDIA

4.1. Macroeconomic and growth policies

4.1.1. Green agenda in international and national plans

Sustainability has been a part of India's national and international development plans for more than a decade. In 2008, India launched the National Action Plan for Climate Change, which consists of eight sub-missions including the National Solar Mission, National Mission for Enhanced Energy Efficiency, National Mission on Sustainable Habitat, National Water Mission, among others. The document laid a foundation with focus areas for climate action. Currently, India's actions for combating climate change are guided by its intended Nationally Determined Contributions (NDCs) submitted to the United Nations Framework Convention on Climate Change in 2015, with Ministry of Environment, Forest and Climate Change being the nodal Ministry.

The quantified commitments include –

- By 2030, increase the share of non-fossil fuel-based electricity to 40 per cent (target 175 GW capacity by 2022)
- By 2030, reduce emissions intensity of the GDP by 33–35 per cent from 2005 levels
- By 2030, enhance forest cover to absorb 2.5–3 billion tonnes of CO2

The intended NDCs above have been further strengthened by Indian Prime Minister Shri Narendra Modi's verbal commitment at the 26th Conference of Parties in November 2021, where he declared a five-fold low- carbon growth strategy termed as *Panchamrita*, including the following time-bound targets –

- India will get its non-fossil energy capacity to 500 GW by 2030
- India will meet 50 per cent of its energy requirements from renewable energy by 2030
- India will reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030
- By 2030, India will reduce the carbon intensity of its economy by less than 45 per cent
- By the year 2070, India will achieve the target of Net Zero

India's latest national development strategy released by the Planning Commission in 2018 integrates sustainability into infrastructural development plans for the next three decades. Five out of 11 focus areas for development directly contribute to sustainability, these are – (1) increasing renewable energy capacity and reducing oil imports, (2) developing smart cities by adopting technologies such as electric vehicles, (3) ensuring last mile access to water and sanitation facilities, (4) adopting sustainable agricultural practices like agro-forestry and natural farming, and (5) creating a sustainable environment through pollution reduction and increasing forest cover (India, NITI Aayog 2019).

4.1.2. Policy support towards greening

Multiple government policies and initiatives across various sectors/ministries are pushing forth India's green agenda. In 2020, the Ministry of Environment, Forest and Climate Change (MOEFCC) constituted a high-level inter-ministerial Apex Committee for Implementation of Paris Agreement (AIPA) to generate a coordinated response on climate change matters that ensures India is on track towards meeting its obligations under the Paris Agreement including its NDCs, and to operate as a National authority to regulate carbon markets in India, issue guidelines on carbon pricing, market mechanism, and other similar instruments (India, MOEFCC 2020a).

The Prime Minister announced in 2021 that India is on the path to becoming energy self-reliant by 2047 through a mix of a gas-based economy, ethanol blending in petrol, and adoption of electric mobility. Supporting policy measures include the Green Hydrogen Policy, the Roadmap for Ethanol Blending in India 2020–25, and the FAME-II scheme to promote e-mobility.

The Energy Conservation Act 2001, which promotes energy efficiency and conservation, has been amended in August 2022. The bill now also focuses on deploying renewable energy sources, introducing the national carbon market, realizing carbon trading and authorizing the utilization of non-fossil energy resources to achieve decarbonization and the Sustainable Development Goals as outlined in the Paris Agreement.

With high levels of green ambition in the energy sector, the National Electricity Plan prepared by the Central Electricity Authority under the Ministry of Power targets 275 GW of renewable capacity by FY2026–27 and a total share of non-fossil fuel capacity of 57.2 per cent. At the same time the Ministry of Coal has set the target to achieve 1,000 Mt of domestic coal production by 2024 to meet demand and reduce imports (India, Ministry of Coal 2019). The Government has mandated renewable energy generation and purchase, and provided tax incentives and waivers to renewable energy companies. Ministry of New and Renewable Energy has recently drafted a policy framework for promoting decentralized renewable energy (DRE) as livelihood applications, under which various DRE-powered solutions have been identified as employment generators in rural areas, as well as agents for achieving energy self-reliance. Greening efforts are underway in the coal sector – the Ministry of Coal has asked all coal/lignite PSUs to submit their "Net Zero Carbon Agenda" to become carbon neutral through the adoption of low emission technologies and carbon offsetting (India, Ministry of Coal 2022). The Government also has plans to implement a US$238 million National Mission on advanced ultra-supercritical technologies for cleaner coal utilization.

In order to curb emissions, the Ministry of Environment, Forest and Climate Change has released new stringent norms for emissions of local air pollutants from coal fired power plants, the implementation of which will increase the cost of coal-fired electricity (Ernst & Young, SED Fund, and FICCI 2022). The Ministry in 2019 developed a Cooling Action Plan to address cooling requirements across sectors and reduce demand by 20–25 per cent by 2037–38 while training and certifying 100,000 servicing technicians by 2022–23. To tackle indiscriminate use and pollution of water by industries, the Government's Central Pollution Control Board in 2015 came up with guidelines feasibility of implementation of Zero Liquid Discharge (ZLD) for 17 water polluting industries which will facilitate recycling of industrial effluents (Bahadur 2021).

Many policies work towards greening the automotive industry as well. The Ministry of Heavy Industries' Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME-India) Scheme provides demand incentives on purchasing hybrid and electric vehicles, the Ministry of Housing and Urban Affairs has a comprehensive policy on adoption of EVs through incentives and setting up adequate charging stations, and many state governments are formulating EV policies with a focus on employment creation.

In the construction sector, the National Building Code 2016 launched a new chapter on "Approach to Sustainability" which provides guidance on making buildings energy efficient and environmentally compatible. The Ministry of Rural Development (2019, iii) in its vision document for 2019–24 lays focus on "creating effective wage employment programmes for natural resource conservation and climate resilience with greater use of clean technologies". Both the Ministry of Rural Development and the Ministry of Textiles are working towards incorporating sustainability into their plans and programmes.

4.1.3. Climate change assessments

Climate change impact assessments have been made by the Indian Network for Climate Change assessment in 2010, and a detailed report was released by Ministry of Earth Sciences in 2020. According to trade unions, there has not yet been a concerted effort to assess livelihood impacts of climate change in India. This would be an essential step towards making communities and enterprises more climate resilient.

4.2. Public investment leveraged for green jobs

4.2.1. Public investments in greening

An analysis by the Climate Policy Initiative found that green finance in India's clean energy, clean transport, and energy efficiency sectors reached a biennial average of 3.09 trillion rupees in 2019/20, 150 per cent higher than the previous two years (Khanna, Pukayastha, and Jain 2022). The analysis estimates that green finance must be increased by 3.5 times to 11 trillion rupees to meet the NDCs by 2030. In 2019/20, green finance was highest in clean energy at 41 per cent, followed by energy efficiency at 38 per cent, followed by clean transportation at 21 per cent. The public sector accounted for 43 per cent of the total green investment (1.33 trillion rupees). At a sectoral level, clean energy investment was split 50:50 between public and private funding with majority investment in solar energy, clean transportation received almost all public funding, and energy efficiency received almost all private funding.

The Indian and UK governments are working together to finance renewable energy in India to support India's 2030 target. They have agreed on a US$1.2 billion (95.9 billion rupees) investment for green projects for the 2022–26 period. The Green Growth Equity Fund (GGEF) for renewables sector investments, set up by both the countries with £120 million of seed capital each, is scaling up with a commitment of US$200 million from international investors. Under this partnership, an initiative has been launched to mobilize private capital into sustainable infrastructure in India.

In terms of subsidies, coal subsidies have been steadily declining since FY 2014 (as seen in figure 5), but still remain 1.74 times higher than the renewable energy subsidies. Overall fossil fuel subsidies were 7.3 times larger than subsidies for clean energy in FY 2020. Renewables subsidies spiked in 2017 but have been reducing since – this could reflect increased competitiveness of solar and wind energy, and also a slowdown in deployment levels. Since FY 2019, EV subsidies have risen more than 2.3 times, primarily driven by growing sales in the two-wheeler segment.

Figure 5. Indian Government's energy subsidies for financial years 2015–21, by sector

Source: Viswanathan et al. 2021.

In terms of public sector undertaking (PSU) investments, 2020 saw 11 times more investment in fossil fuels projects than in clean energy ones. In general, the seven energy-related PSUs have relatively low ambition on clean energy and no planning on how to manage stranded asset risk of fossil-intensive asset portfolios (Viswanathan et al. 2021). However, the PSUs are venturing into renewable energy investments – for instance, Coal India Limited is setting up a Special Purpose Vehicle to generate 3 GW of solar power by 2024 at an investment

of 135 billion rupees, and the National Thermal Power Corporation by 2032 aims to have a minimum 60 GW renewable energy capacity constituting 45 per cent of its overall power generation capacity (NTPC, n.d.-a).

Investments in the Skills Council for Green Jobs, the Suryamitra Skill Development Programme, Decentralised Renewable Energy Livelihood Applications and the Ministry of New and Renewable Energy's Human Resource Development Schemes are efforts towards green jobs creation.

4.2.2. Union budget supports greening

The Union Budget 2022–23 has a "green focus", with climate action being highlighted as one of the underpinning pillars of the budget, along with the Prime Minister's Gati Shakti infrastructure masterplan, inclusive development, and energy transition. The following are areas of budgetary support for greening –

- Support for clean energy technologies: 195 billion rupees (US$2.5 billion) Production Linked Incentive (PLI) Scheme was announced for promoting domestic manufacturing of solar PV modules. The Solar Energy Corporation of India responsible for the development of the renewable energy sector was allocated 10 billion rupees. The EV policy FAME II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles), which provides subsidies to incentivize purchase of EVs was allocated 29.08 billion rupees (US$370 million), 260 per cent higher than last year. Battery swapping policy was announced for easy EV charging at scale.
- Transition to circular economy: Action plans for ten circular economy schemes are ready, including for electronic waste, used oil waste, toxic and industrial waste. Budget allocations for the Swachh Bharat Mission Rural and Urban (sanitation scheme for sustaining toilet facilities and waste management systems) are 71.92 billion rupees for the rural aspect of the scheme and 23 billion rupees for the urban aspect – 20 per cent and 15 per cent higher than last year's revised estimates, respectively (India, Ministry of Jal Shakti 2022).
- Reducing carbon emissions/intensity: 5–7 per cent biomass pellets would be co-fired in thermal power plants to support farmers and reduce emissions by 38 million tonnes. Focus is on agro- and private forestry, energy efficiency in commercial buildings, and switching to clean energy sources in rural infrastructure like creches
- Mobilizing green finance: Sovereign Green Bonds will be issued in public sector projects to reduce carbon intensity. A Climate Action Fund was introduced where 20 per cent activity funds will come from the Government

While the above budget allocation looks promising for green growth, large allocations have been made for the coal industry as well as for large-scale infrastructure development under the Prime Minister Gati Shakti programme for infrastructure development, which will directly contribute to increased GHG emissions and cutting down of trees. As proposed by NITI Aayog, a Just Transition fund can be created through fundraising from multilateral organizations, levying taxes, and other ways in order to fund research, skilling, and economic diversification in geographies and sectors affected negatively by greening.

4.2.3. Policies for Green Public Procurement

Public procurement accounts for 20–25 per cent of India's GDP according to the Ministry of Finance (2018). The Ministry of Finance in 2017 laid out rules to include environmental criteria and clearances in the procurement of products and services. India does not have a Sustainable Public Procurement policy yet, but the Ministry of Finance in 2018 created a Sustainable Procurement Task Force with the Ministry of Environment, Forest and Climate Change, UNEP and relevant stakeholders to create a Sustainable Procurement Action Plan for India. The task force is currently drafting sustainable procurement criteria for two selected categories of products – Paper and Refrigerants – through consultations with relevant stakeholders from the Government and industry associations. Public procurement in India has been digitized into the Government e-Marketplace (GeM), which makes it easier to "eco-mark" sustainable products and monitor green procurement.

Green procurement initiatives have been taken at organization level by both public and private sector bodies. Among government bodies, the Indian Railways was a trend-setter in replacing inefficient incandescent lights in housing colonies with compact fluorescent lamps, and including the achievement of energy efficiency in its 2020 vision statement. Indian PSUs such as BHEL, NTPC, and IOCL are also promoting sustainable procurement with a focus on energy conservation in small items. Within the industry, one of India's largest home and personal care companies, Godrej Consumer Products Limited (n.d.) has a detailed Sustainable Public Procurement Policy

focusing on both green products and processes. Multinational conglomerate ITC also has a platform to enable green sourcing.

On the other hand, at the international procurement front, India (along with China, Brazil and South Africa) has resisted the European Union's planned carbon-levy on imported products, saying that the move will unfairly penalize developing economies like ours and is "discriminatory and against the policies of equity" (Lo 2021).

4.2.3. Policies for eco-innovation/research and development support

The Department of Science and Technology (DST) has been funding research and development (R&D) efforts since 2009 through its Clean Energy Research Initiative (CERI) to accelerate the pace of clean innovations. DST has been leading Mission Innovation in Clean Energy which is part of the global Mission Innovation introduced at CoP21 in 2015. From 2014 to 2018 (India, DST 2016). DST under this mission has funded projects under energy efficiency, solar energy, smart grids and energy storage, and clean coal technologies. DST has undertaken various collaborative endeavours with international agencies such as the India-US Joint Clean Energy Research and Development Centre, India-UK Joint Research Activities in Clean Energy, and other such programmes with Norway and BRICS countries. Multiple national level programmes have been supported including collaborations with the Indian Railways to increase efficiency. DST is also undertaking research on EVs, but in very few projects. Another clear focus of research activities among green sector is on waste and water management technologies.

The Ministry of New and Renewable Energy has funded R&D since 2017. The Renewable Energy Research and Technology Development Programme (RE-RTD) has been accorded for continuation from 2021–22 to 2025–26 at a cost of 2.28 billion rupees[3]. The programme aims to boost indigenous technology development and manufacture for widespread applications across solar photovoltaic systems, biogas systems, waste to energy systems, wind energy systems, hybrid systems, storage systems, hydrogen and fuel cells, geothermal etc.

In the automotive sector, the Automotive Research Association of India works in extensive R&D, with recent projects covering Simulators for EV chargers, hybrid vehicle development, electric and hybrid vehicles. The Government of India is supporting projects of national interest related to offline and real-time simulators for EV/HEVs, conversion of conventional vehicles to EVs (ARAI, n.d.). Research by WRI states that stronger collaboration needs to be established between industry and academia if advanced technologies for energy storage in EVs are to be developed in India – this can be achieved through a network of incubation centres and centres of excellence to support the start-up ecosystem in clean energy technologies. Infrastructure for recycling Li-ion batteries should be setup in parallel to development of battery-industry-related efforts (Phadke et al. 2022). State EV policies support R&D in the sector.

4.3. Industry and sectoral policies

4.3.1. Industrial policies

The main objectives of India's industrial policy are (1) to maintain a sustained growth in productivity, (2) to enhance gainful employment, (3) to achieve optimal utilization of human resources, (4) to attain international competitiveness, and (5) to transform India into a major partner and player in the global arena (India, DPIIT, n.d.). Though multiple central government policies promote greening of industries, the imperative to decarbonize the industry lies with state governments, which need to create incentives to promote green industry and introduce measures to check emissions within their policies (Rana and Thakkar 2021). Given below are the major environmental aspects of India's industrial policies:

4.3.1.1. Energy and water conservation

The Government of India has been promoting energy efficiency through various innovative policy measures under the overall ambit of the Energy Conservation Act, 2001 and even set up a statutory body called the Bureau of Energy Efficiency (BEE) to facilitate implementation. In 2018, 24.5 per cent of India's

3 See Ministry of New and Renewable Energy Order for Administrative Approval for Continuation of the Renewable Energy Research and Technology Development (RE-RTD) Programme for the period from FY 2021–22 to FY 2025–26, dated 9 December 2021.

total energy use was covered by mandatory energy efficiency policies – with the highest coverage in the industrial sector (44 per cent of total energy use in the sector). The main contributor of these gains was the Perform, Achieve and Trade (PAT) scheme which has been now extended to its fourth cycle and continues to increase energy coverage (IEA 2021b). These programmes have given rise to jobs such as Energy Managers and Energy Auditors with expertise in policy analysis, project management, financing and implementation of energy efficiency projects. India now has 12,228 Certified Energy Managers of which 8,536 are qualified as Certified Energy Auditors (India, Ministry of Power, n.d.-b).

Another effective policy initiative has been to rate MSMEs on quality control and certification for energy efficiency through the ZED (Zero Effect Zero Defect) scheme. Through the certification, MSMEs can reduce wastage substantially, increase productivity, enhance environmental consciousness, save energy, use natural resources optimally. As of March 2022, ~24,000 MSMEs registered for the certification and over 500 have been ZED certified (India, Ministry of MSME 2022).

Different state industrial policies are supporting industrial areas and MSMEs by providing capital subsidies on rainwater harvesting and energy conservation expenditures, and financial assistance on energy and water audits.

4.3.1.2. Material and resource efficiency

In 2019, MOEFCC released the draft National Resource Efficiency Policy (NREP) which aims to make industries resource efficient and also remediate pollution of air, water and land. It outlines regulatory and market-based instruments that can help optimize resource use at a sectoral level. The draft NREP calls for significant waste management reform in various sectors, and aims to alter industry behaviour towards energy efficiency and consumer buying. Targeted sectors under this policy are automobile (both ICE and electric vehicles), plastic packaging, solar photovoltaic cells, building and construction, electrical and electronics, steel and aluminum. Industry stakeholders think that uptake of such policies is challenging since the cost of inaction is not clearly understood within the industry. Although there is general lack of clear policies around end-of-life treatment of e-waste, Battery Waste Management Rules 2022 have been released, covering EV and industrial batteries.

With a strong policy push for resource efficiency, jobs can be expected to emerge in circular economy and waste management, which calls for estimation of number of jobs, skills required and skills gaps, and strong employment policies that ensure adequate skilling and safe working conditions. The ILO estimates that by 2030, 412,000 jobs will be created in the e-waste management sector.

4.3.1.3. Pollution control

The Water Act 1974 and Air Act 1981 mandate industrial units to obtain a "Consent to Establish" and "Consent to Operate" certificate from the concerned state pollution control board before starting construction and production, respectively. Some states have provisions for green energy certificates, while the Bureau of Energy Efficiency gives certificates to industrial units which reduce the compliance/ regulatory requirements for the unit to operate.

To manage resource consumption and pollution across operations, implementation of Environmental Management Systems (ISO 14001) within industries is being promoted by the Central Pollution Control Board (2001). The Board has also tagged industrial clusters into different categories based on the levels of pollution they generate, and has provided detailed guidelines for industries to report their continuous emissions data using an online platform.

MOEFCC releases emissions norms for air pollution and sewage and effluent treatment plants. The National Green Tribunal (NGT) has played a pivotal role in ensuring that industrialization does not overheat the economy or put the poor and vulnerable at disproportionate risk.

4.3.1.4. Wastewater management

To tackle indiscriminate use and pollution of water by industries, the Government's Central Pollution Control Board in 2015 came up with the Guidelines on Techno-Economic Feasibility of Implementation of Zero Liquid Discharge (ZLD) for 17 water polluting industries which will facilitate recycling of industrial effluents (Bahadur 2021). At the state level, capital subsidies and financial incentives are provided to setup Zero Liquid Discharge units, Common Effluent Treatment Plants, and Sewage Treatment Plants.

4.3.1.5. Renewable energy

The Energy Conservation (Amendment) Act 2022 specifies that the industrial sector must meet a minimum amount of its energy demands from non-fossil fuel-based energy, the non-adherence to which will attract fines up to 1 million rupees.

4.3.2. Sectoral policies

Priority sectors for greening have been identified by different agencies (Planning commission NITI Aayog, SCGJ, World Economic Forum) and largely include energy, green transportation, built environment, sanitation and waste management, water resources, agriculture and pollution control. The strongest policy push and budgetary allocations for green jobs are in the renewable energy, EVs, energy efficiency, waste management/circular economy sectors. Other sectors with green focus and policies are agriculture, tourism, textiles, finance, and rural development. Stronger greening policies are required in industry and construction sectors. In this section, we assess policies of three sectors – the renewable energy and EV sectors since they have strong policies in place, and the textile/garment sector since it is an employment intensive and polluting industry with a growing focus towards sustainability. This analysis of the textile/garment sector will also lay the foundation for a Jharkhand state specific case study in the sector, since the state is facing closure of coal mines, and the growing textile sector (identified as a "thrust area" by the state government) can provide economic diversification in the region.

4.3.2.1. Renewable Energy

Among policies/schemes to promote renewable energy,

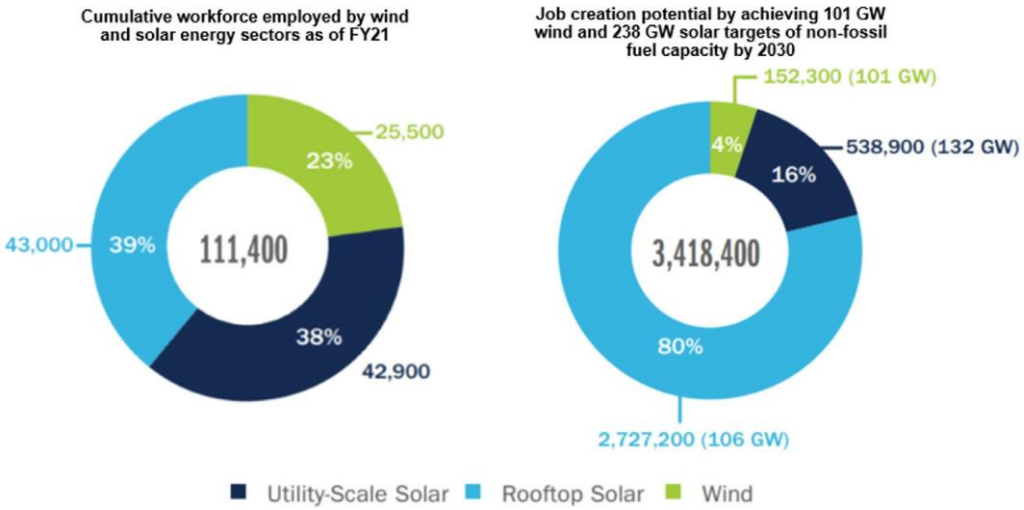
- The Government of India has mandated Renewable Purchase Obligations (RPO) for distribution companies to purchase 21 per cent of their total power requirement from renewable energy sources (India, MNRE, n.d.). Similarly, Renewable Generation Obligation (RGO) will be mandated for all power plants for them to set up renewable energy projects at their existing locations.
- Waivers on inter-state transmission and transmission losses for up to 25 years, providing tradeable renewable energy Certificates for those generating green power, and mandating Letter of Credit for to ensure advance payments of electricity bills to generators.
- PM-KUSUM scheme is one of the largest worldwide initiatives to provide renewable energy to over 3.5 million farmers by solarizing agricultural pumps, supporting the installation of 30.8 GW capacity.
- The Rooftop Solar Programme launched in 2015 provides incentives and subsidies for residential, institutional and social sectors with the target of achieving cumulative capacity of 40 GW by 2022, although there are implementation challenges in achieving this target since many states do not have a rooftop solar policy yet.
- The Solar Parks programme facilitates project developers to setup projects in a plug and play model to deploy world class infrastructure at scale. Green Energy Corridors, Greening of Islands projects, and Solar Cities.
- MNRE is supporting decentralized and off-grid solar programmes to ensure energy security and associated livelihood generation for rural and last mile communities – including setup of solar street lights and study lamps and pumps, off-grid systems, and supporting trainings of rural women solar engineers.

While sufficient manufacturing capacity exists for wind power in India, the same capacity in solar energy is much lower. 80 per cent of India's solar modules are imported, with Indian manufacturers long struggling to match Chinese costs, R&D and scale (IRENA and ILO 2021). To tackle these challenges, the Government is encouraging local production of high efficiency solar modules through PLI schemes, levying greater import duty on solar cells and modules, and mandating public procurement of renewable energy equipment from the domestic market.

Skilling in the renewable energy sector is led by the Skills Council for Green Jobs. By 2022, the Council has trained/certified over 100,000 trainees in renewable energy. Ministry of New and Renewable Energy launched the Suryamitra scheme in 2015 to provide training in solar technologies and has launched similar programmes for wind energy and solar pumps – namely, Vayu Mitra and Varun Mitra, respectively. Private sector skilling is prevalent – for instance, the Tata Power Skill Development Institute has so far trained 140,000 people in courses across conventional and renewable energy technologies and is expanding the programme to skill around 3,000 youth by 2023 and 5,000 by 2025.

In terms of jobs in the sector, worldwide renewable energy jobs increased by 700,000 in 2021, coming to 12.7 million in total – 7 per cent of these 12.7 million jobs are from India – translating to 863,000 jobs. Of these, 48 per cent are in hydropower, 25 per cent in solar PV, 10 per cent in biogas, 7 per cent in solid biomass and 4 per cent each in wind energy and liquid biofuels (IRENA and ILO 2022). Estimation of future green jobs in the renewable energy sector takes place periodically through collaborations between government and civil society, mainly led by environmental research organization CEEW. Figure 6 shows estimated jobs in solar and wind by 2030 (CEEW).

Figure 6. Employment in India's solar and wind sectors: Jobs as of FY2021 and estimates for 2030



Source: Adapted from CEEW, NRDC, and SCGJ 2022, 8.

According to the CEEW study, 3.4 million jobs (short and long term) could be created by installing 238 GW solar and 101 GW new wind capacity to achieve the 500 GW non-fossil electricity generation capacity by 2030 goal. A workforce of about one million can be employed to take up these green jobs, considering that one worker can do more than one job/day.

According to industry experts, caution needs to be exercised while making these job estimates because there is a fundamental difference between the jobs created by the coal industry and the solar industry. Coal factories take fewer people to build them but large number of people to operate and maintain them, while on the other hand, solar energy infrastructure requires a large number of people to install it but much fewer to maintain it, since the raw material (sunlight) is naturally occurring and does not need to be continuously extracted, like coal. The long-term employment intensity of the coal industry is therefore much higher than that of the solar industry – 80–90 per cent jobs created in the solar sector are short-term. This must be taken into account when estimating the job gains, transformations, and losses in the transition from coal to renewable energy.

To understand the split of the 3.4 million jobs to be created by 2030 by sub-sector and employment type, we look at the table below. Estimates of jobs created per MW of energy generated from different

technologies are done by multiplying the renewable energy capacity with "full time equivalent" (or FTE) value for each technology. FTE was calculated by CEEW in 2017 after extensive stakeholder consultations, which concluded that – FTE or number of jobs created per MW for utility scale solar energy is 3.46, for rooftop solar is 24.7, and for wind energy is 1.27.

Table 1. Estimated number of jobs to be created in the solar and wind energy sectors by 2030, by employment type

Employment type	Ground-mounted utility solar projects (132 GW)		Rooftop solar projects (106 GW)		Wind power projects (101 GW)		Comments
	Jobs per MW	Total jobs by 2030 (1 000s)	Jobs per MW	Total jobs by 2030 (1 000s)	Jobs per MW	Total jobs by 2030 (1 000s)	
Business development	0.05	6.6	1.53	162.2	0.06	6.06	174 800 jobs to be created, almost all highly skilled workforce
Design and pre-construction	0.2	26.4	8.85	938.1	0.11	11.11	975 600 jobs to be created, mostly skilled and semi-skilled workforce
Construction and pre-commissioning	2.7	356.4	13.84	1 467.04	0.6	60.6	1 884 000 jobs to be created, highly skilled and skilled workforce
Operations and maintenance	0.5	66	0.5	53	0.5	50.5	169 500 jobs to be created, large proportion of semi and unskilled
	3.45	455.4	24.72	2 620.3	1.27	128.27	

Source: Adapted from CEEW, NRDC and SCGJ 2019, 13–14.

From the table above, it can be seen that short-term jobs, those in business development, design, construction and pre-commissioning form the majority of the total jobs. It can also be seen that the rooftop solar sector has the highest scope for job creation in the coming years, given that demand and policy frameworks are conducive.

Some untapped sectors in the renewable energy sector are energy storage (manufacturing of batteries), floating solar PV, offshore wind, bio-energy, recycling and recovery of renewable energy waste, and the power sector (jobs in strengthening grid infrastructure). In another analysis by the CEEW, NRDC and SCGJ (2021), the floating solar PV sector shows promise in employment generation, though 91 per cent of the total employment created is temporary. Government targets for this sector need to be released more frequently and occupational risks such as electrocution, fire and ergonomic risks, working under extreme weather conditions such as wind, hail, typhoons need to be addressed and included into trainings.

The private sector is leading supply growth of renewable energy, which was initially being led by the public sector. Large power generators with coal-dominated energy portfolios, such as Adani Group, Jindal and Tata Power have announced big renewable energy targets and investments. The reason for this shift could be the coal shortages faced by India from August to October 2021 which led to high prices at the power exchange. Further, Indonesia in January 2022 announcing a coal export ban further showed the reduced reliability and increased volatility of coal imports. The year 2021 saw a sharp increase in renewable energy investment – India attracted about US$18.8 billion, three times the investment seen in 2020. The year 2021 also saw big ticket investments in renewable energy by large private Indian companies. Reliance has committed US$80 billion to install by 2030–35 100GW of solar energy and giga factories for modules and fuel, Adani Group has committed US$50 billion of investment in renewables, and ReNew Power has committed US$9 billion to new solar and wind projects by 2025. Private players are also starting to build an ecosystem by investing in domestic manufacturing of solar energy components – for instance Reliance has acquired and is investing in solar energy component manufacturers.

4.3.2.2. Electric vehicles

The automotive sector in India employs a workforce of 35 million. Green transportation is a major focus

area for India, where green fuels and EVs are constant discussion points. According to the Union Minister Transport in 2021, "The government intends to have EV sales penetration of 30 per cent for private cars, 70 per cent for commercial vehicles, 40 per cent for buses, and 80 per cent for two- and three-wheelers by 2030" (*The Hindu* 2021a).

The Government's flagship Smart Cities Mission and the National Electric Mobility Mission Plan promote the adoption of hybrid and electric vehicles (Ponkshe 2020). The Automotive Mission Plan 2016–26 incorporates "environmental friendliness" into its vision and estimates that hybrids/EVs could address 10–12 per cent of vehicle demand by 2026 (India, Ministry of Heavy Industries 2016). The National Mission on Transformative Mobility and Battery Storage (2018) was launched to facilitate extensive stakeholder and inter-ministerial consultations with focus on manufacturing, incentives, demand creation and R&D in low-carbon transport.

To create demand for EVs, Ministry of Road Transport and Highways exempts battery operated vehicles from payment of registration fees, Ministry of Power allows sale of electricity as "service" for charging EVs, and GST rates for EVs have been kept in the lower bracket of 12 per cent against the 28 per cent rate for conventional vehicles (India, Ministry of Heavy Industries 2019). The Department of Heavy Industries' 2015 FAME scheme (Faster Adoption and Manufacturing of (Hybrid and) Electric vehicles) has been effective at promoting electric mobility by providing demand incentive on the upfront cost of an EV (India, Ministry of Heavy Industries , n.d.). A strong push is being given to indigenous battery manufacturing to boost employment in the sector through Production Linked Incentive schemes for Automobile and Auto Components (259.38 billion rupees) and Advanced Cell Chemistry Battery Storage (180.00 billion rupees) (India, Ministry of Heavy Industries 2022). The lack of charging facilities is also being addressed through the release of a draft Battery Swapping Policy[4] to optimize space, reduce upfront EV cost, and promote battery recycling. Green fuels are a large focus area – the National Policy on Biofuels (2018) targeted of 20 per cent ethanol blending in petrol by 2030, which has been brought forward to 2025–26 due to encouraging performance. Compressed Natural Gas has been mandated for public vehicles in certain states. The Green Hydrogen Policy launched in 2022 opens up avenues for more green hydrogen fuel cell vehicles (India, Ministry of Power 2022).

14 states have come up with their EV policies – employment policies have been incorporated but are not robustly elaborated in these documents. This could be because of a lack of recognition of the importance of mainstreaming labour aspects into EV policies. Some employment policies for the sector include providing a stipend for new employees, providing a re-skilling allowance for existing employees, reimbursing the employers contribution to Provident Fund for all new jobs created till 2025, offering incentives to industry to employ more workforce in specific sites, and creating safe working conditions to improve women's participation in the sector.

In the shift to EVs, there is creation of direct employment (production of automobiles and auto components) and indirect employment (vehicle repair, service and maintenance, automobile and auto component dealers and retailers, vehicle drivers and logistics service providers, financing and insurance). Further, employment will arise in tyre and battery industries and their associated industries. Policy documents discuss skilling as an essential step to realizing EV targets. The Automotive Skill Development Council is the coordination body for skilling in the sector, and is working with industry and educational institutions to cater to demand for the EV workforce. However, since the EV sector is still small, trainings are managed mostly by private companies such as Hero Electric, which are designing their own programmes.

In terms of job creation, the National Electric Mobility Mission Plan (NEMMP) for 2020, drafted in 2012, projected that local manufacturing of EVs was to generate at least 60,000 – 65,000 new direct jobs by 2020 (India, Ministry of Heavy Industries and Public Enterprises, Department of Heavy Industry 2012). Research organization CEEW finds that by 2020, a total of 0.53 million EVs were sold in India, which

4 The text of the draft policy is available at: https://www.niti.gov.in/sites/default/files/2022-04/20220420_Battery_Swapping_Policy_Draft.pdf.

remains far from the NEMMP's 2020 target of 6–7 million EV and hybrid sales by 2020. This means that the number of jobs created in the segment are also much lower than the estimates in policy documents. It is pertinent to ask why the estimates have been so far from reality and to assess whether the enabling environment was not created to meet these targets. CEEW (2020) estimates that to achieve 30 per cent share of EVs in India by 2030 (as committed at the Clean Energy Ministerial), 160,000 jobs will be lost in the ICE sector, and 120,000 direct jobs will be created in the EV sector. If indirect jobs are also considered, there will be a net positive change in EV sector jobs.

Just Transition discourse in the EV sector is driven by civil society. NITI Aayog and World Resources Institute launched the "Forum for Decarbonising Transport", bringing together multiple stakeholders to discuss a Just Transition and skill development in the EV industry (WRI India, n.d.). Discourse around the subject is currently around acknowledging the need for a Just Transition, understanding challenges and charting out the work that lies ahead. Quantifying the magnitude of job losses and new skilling requirements have been identified as next steps.

4.3.2.3. Textile sector

One of the first industries to come into existence in India, the textile industry accounts for 14 per cent of the total manufacturing output of the country and directly employs 45 million people (second largest after agriculture). However, the industry has significant environmental implications – effluents from the industry pollute water bodies, ground water and soil, and large amounts of water are used for production of textiles – between 50–100 litres of water for handling just one kilogram of garment. The Government has taken cognizance of this impact and has taken steps towards minimizing it. The National Textile Policy (2000), though dated, focuses on developing state-of-the-art manufacturing facilities in conformity with national and international environmental standards, alongside welfare measures and social security for weavers in the handicraft and handloom sectors. Given below are focus areas for greening in the textile sector and relevant policies for the same –

- Pollution reduction: Effluent treatment is strictly mandated in the textile industry through the Ministry of Environment, Forest and Climate Change's Zero Liquid Discharge (ZLD) policy, thereafter issued under various directions by all state governments. Large textile clusters have set up wastewater treatment and recycling systems, with Tirupur cluster in the state of Tamil Nadu achieving 100 per cent ZLD in 2012. The Government's Integrated Processing Development Scheme and Scheme for Integrated Textile Parks provide financial support to setup new and upgrade existing Common Effluent Treatment plants. The Ministry of Skill Development and Entrepreneurship has developed training plans, courses, and assessments for skilling effluent treatment operators in the sector (India, Ministry of Skill Development and Entrepreneurship, n.d.).
- Circular economy: The Ministry of Textiles is keen on bringing circularity into the industry and in 2021 started working with UN Environment Programme and Centre for Environment Education to create a sustainable and inclusive roadmap for cleaner textile production in Surat, Gujarat. The Jute Packaging Materials (Compulsory Use in Packaging Commodities) Act, 1987, mandates the use of jute packaging in material in supply and distribution of certain commodities. According to the Act, 100 per cent of food grains produced and 20 per cent of sugar produced are mandated to be packaged in jute (India, Ministry of Skill Development and Entrepreneurship, n.d.).
- Energy efficiency: The Ministry of Textiles' schemes such as "Sustainable and Accelerated Adoption of Efficient Textile Technologies to Help Small Industries" and "Solar Energy Scheme for Power Looms" aim at enhancing energy efficiency and promoting use of solar energy in the sector (Sharma 2018). The Khadi and Village Industries Commission's "Solar Charkha Mission" supports women self-help groups in greening their equipment.
- R&D: Ministry of Textiles approved an R&D scheme for the textile industry including Jute from 2014–15 to 2018–19 with an outlay of 1.49 billion rupees, of which 150 million rupees was dedicated to conducting "benchmarking studies, knowledge dissemination and promoting green initiatives through R&D" (India, Ministry of Textiles 2021, 89).

Ministry of Textiles has taken up eight craft villages under the "Linking textile with Tourism" programme to

promote craft and tourism at a single location. The Craft Villages will develop handicrafts as a sustainable and remunerative livelihood option for an estimated 1,000 artisans (India, Ministry of Textiles 2022). The ILO is working on guiding MSMEs in the textile and garment sector in the states of AP and Odisha to adopt sustainable, inclusive, and sound management practices which will help them integrate into global supply chains (ILO, n.d.-a).

There are increasing examples of Indian clothing brands focusing on circularity. Main focus areas are around sourcing of eco-friendly and organic raw materials, designing for higher durability + refurbishment + recycling, increasing material and resource efficiency to reduce overall environmental impact (reduction in energy, water and chemical consumption), treatment of wastewater, and sustainable packaging. Working together with the private sector, the Ministry of Textiles in 2019 launched Project SU.RE. – Sustainable Resolution (India, Ministry of Textiles 2019). It is a commitment by 16 of India's biggest apparel brands to establish a sustainable pathway for the fashion industry. This will be done through environmental impact assessments and sustainable sourcing. The Government has announced initiation of seven Mega Investment Textiles Parks over the next three years with world class infrastructure having plug and play facilities. This in conjunction with Project SU.RE. will create many sustainable jobs. Global furniture company IKEA sources much of its cotton from India and is a founding member of the Better Cotton Initiative to achieve 100 per cent sustainable cotton grown with low resources, natural practices, and decent working conditions for the farmers (Technopak 2017).

Among CSR initiatives, companies like Levi's, Marks & Spencer, and H&M are working towards resource efficiency and waste management initiatives to be attractive among their competitors. Companies such as Marks & Spencer and IKEA have made concerted efforts to promote better agricultural practices for growing cotton in India.

In terms of green jobs, there are no clear estimates or definitions of green jobs in this sector. The textile sector's shift to greening calls for defining green jobs in the sector, detailed estimation of the number and type of jobs that will be gained/lost/transformed, analysis of skilling requirements to meet the new jobs, and designing of employment policies including stipends, social protection, and on-the-job-training provisions which will help a smooth transition into a greener textile industry.

4.4. Enterprise policy

The Ministry of Skill Development and Entrepreneurship and the Ministry of MSME are key government stakeholders for enterprise policy. Neither ministry has defined green enterprises in their policy documents. Government support for green enterprise development is not strategic, but multiple initiatives directly and indirectly promote greening in enterprises.

4.4.1. Support for green entrepreneurs

4.4.1.1. Information and assistance

Startup India is the Government's flagship programme launched in 2016 to build an enabling ecosystem for innovation and employment. Startup India does not have a particular and consistent focus on green enterprises, but recognizes and supports enterprises in typically "green" categories such as clean energy, energy efficiency, and waste management – for instance, two out of ten categories awarded the National Startup Awards were "energy" and "environment". Within the startups registered through this programme, "green technology" is one of the top ten categories of startups as per job creation (India, Ministry of Commerce and Industry, Department for Promotion of Industry and Internal Trade 2020). A "Startup Guidebook" was launched under this programme to help entrepreneurs start a business in India (company registration, intellectual property rights, legal considerations and more) – the guidebook does not contain specific information for green entrepreneurs (Startup India, n.d.). Startup India works with various ministries on one-time green challenges/hackathons/funding initiatives, particularly in the

fields of waste management and sustainable communities.

The Green Skills Academy – affiliated to the National Skill Development Council – offers entrepreneurship training programmes in green sectors such as solar energy, waste management, agriculture. The entrepreneurship arm of the Ministry of Skill Development and Entrepreneurship works extensively on building capacity of aspiring entrepreneurs and providing them with the necessary resources and government/industry connections. While they do not have specific support for green enterprises, they strongly encourage green startups. Their target groups include women, unemployed youth, and persons from the LGBTQ+ community.

UN agencies have also worked on assistance with green entrepreneurship –

- The ILO's Start and Improve Your Business program (SIYB) trains aspiring entrepreneurs in business with a focus on youth and women from rural areas. The program has launched a Green Business Booklet to help entrepreneurs come up with a green business idea and existing entrepreneurs to green their businesses.
- UNICEF India has been working on educating and mobilizing India's youth about green careers, connecting youth to professionals in the field, and building their capacities to ably contribute to the environmental sector
- UNEP India has worked on highlighting the voices and journeys of young green entrepreneurs, and has created an Eco-Entrepreneurship Guide to assist greening of SMEs (not specific to but is applicable to India) (Empretec Mauritius, n.d.)
- UNDP consistently engages with young green entrepreneurs, connecting them with aspiring entrepreneurs. UNDP is currently working on a green recovery project aiming to train rural entrepreneurs in the EV sector.

Outside the Government and the UN agencies, start-up accelerators and incubators such as the Climate Collective have a sole focus on climate/green solutions, with a strong focus on supporting women green entrepreneurs.

4.4.1.2. Financial incentives

According to a 2020 annual funding report by "Your Story", the Indian cleantech sector has received 6.7 per cent of the total funding for startups over the five-year period of 2015–20. Venture capital and private equity players have shown an interest in alternative energy, particularly solar and wind energy. This sector allows 100 per cent Foreign Direct Investment (Bhardwaj 2021). Some financial incentives provided to support greening in enterprises are –

- The Small Industries Development Bank of India has a dedicated vertical to increase MSME's resilience to combat climate change and facilitate greening. They launched:
  - 4E (End to End Energy Efficiency) scheme in 2014 to support MSMEs to reduce their power and fuel cost
  - Sustainable Finance Scheme to fund sustainable development projects contributing to energy efficiency and cleaner production – including green microfinance, green buildings, eco-labelling
- Generation-Based Incentive announced by MNRE for Grid Interactive Wind and Solar Power Projects with the main aim to broaden the investor base
- Ministry of Social Justice and Empowerment's Green Business Scheme provides financial support to climate change projects by persons from Scheduled Castes
- The World Bank is introducing a US$100-million credit guarantee scheme to boost India's rooftop solar programme. This is expected to benefit MSMEs
- Public financial institutions like Montreal Group provide assistance to cleantech ventures, and other commercial and stakeholder banks have increased their commitment to sustainability across loan book

4.4.2. Improving business resilience of MSMEs from a greening perspective

63 million MSMEs in India form the backbone of the economy, contributing to 30 per cent of the GDP and employing a workforce of 60 million. A major drawback that MSMEs face is the implementation of energy

efficiency norms owing to unfavourable economies of scale. Still recovering from the disruptions caused by the COVID-19 pandemic, greening is not a priority in the MSME sector. A strategic roadmap would be required to propel a low-carbon transition for MSMEs. Although not a priority, greening measures have been taken in the MSME sector. The Ministry of MSME's policy document (draft) talks about promoting green-field projects by tapping into the National Equity Fund Scheme (IIPA 2022). In developing MSME clusters, sustainable and green manufacturing technology is being promoted. The Ministry has also introduced a Sustainable Zero Effect Zero Defect (ZED) Certification through which MSMEs can reduce wastage, increase productivity, enhance environmental consciousness, save energy, and use natural resources optimally. As of March 2022, over 500 MSMEs have been ZED certified. The Ministry has worked with UNIDO to promote energy efficient technologies in MSMEs from seven sectors including pulp and paper, textiles, food processing, pharma, chemicals and dyes, foundry and forging, and iron and steel (India, Ministry of MSME 2022).

In another move to strengthen MSMEs, the Central Government in March 2022 approved a 60.62 billion rupee World Bank programme "Raising and Accelerating MSME Performance". Under this, WB conducted an Environmental and Social Standards Assessment, which found that while national/state governments have well-developed environmental and social legislations, the MSME sector's institutional mechanisms need further strengthening for effective implementation on the ground (World Bank 2020).

The Government is also focusing on preparedness of MSMEs to their greening policies – for instance, in light of the ban on certain categories of single use plastic in India from July 1, 2022, technical assistance is being provided to MSMEs in manufacturing of alternatives to the banned items (India, MOEFCC 2022). At the state level, Gujarat has introduced a scheme to reduce energy consumption and carbon footprint of MSMEs by harnessing of energy from "waste heat".

In terms of funding, initiatives are being taken to support greening/climate resilience of the sector, but disclosure on how financial institutions are responding to specific sustainable finance needs of MSMEs is generally low.

4.4.3. Improving business resilience of MSMEs outside of greening

General support provided by the Government to MSMEs, especially during and after the COVID-19 pandemic has helped build their resilience. Measures included provision of 200 billion rupee debt for MSMEs, revising the definition of MSMEs, easing the registration process, providing fiscal incentives and concessions, additional support of 1.5 billion rupees to the existing 3 billion rupees of credit guarantee funds, access to non-bank credit, and expansion of eligible sectors to MSME. Several states took measures to facilitate MSMEs for Ease of Doing Business, and better access to raw materials and finance (IIPA 2021).

The Union Budget 2021–22 brought relief to the capital-starved MSMEs, with the Government infusing 157 billion rupees for the sector. The decision to incentivize the incorporation of One Person Companies (OPCs) into the budget will feed the MSME ecosystem. Also, by redefining MSME, the Central Government and Ministry of MSME have brought in a large number of micro and small units under the sector, benefitting them with their schemes.

The adequacy of the Government's stimulus package is questionable, since the measures adopted were more of a loan offering and long-term measures rather than to improve cash flow and generate demand as immediate relief. It was recommended that the Government immediately come out with a larger economic package aimed at bolstering demand, investment, exports and employment generation to help MSMEs recover from the pandemic fall out. MSMEs stated that due to acute cash crunch, they required immediate liquidity to cope with the unprecedented circumstance (*The Hindu* 2021b).

From an analysis to see how climate change might affect MSMEs in India (using data from the India Brand Equity Foundation website – https://www.ibef.org/industry/msme and National Institute of Disaster Management's September 2021 report on Mapping Climate and Biological Disasters in India – https://nidm.gov.in/PDF/pubs/GIZNIDM_21.pdf), it was found that states with major MSME clusters in the country (Gujarat, Maharashtra, Kerala, Tamil Nadu, Andhra Pradesh, West Bengal, Uttar Pradesh) are also states with high vulnerability to climate change-induced disasters, based on their exposure levels and poverty levels –

for instance, Andhra Pradesh is prone to cyclones and droughts, Tamil Nadu to cyclones, Uttar Pradesh to flooding, heat waves and cold waves, West Bengal to flooding, heat waves and cyclones, Gujarat to heat waves, Maharashtra to heat waves and flooding. This calls for urgent action to analyse climate risks and improve climate resilience of MSMEs to avoid severe impacts on MSMEs.

4.5. Skilling policy

The National Policy on Skill Development and Entrepreneurship (2015) has the potential to promote green skills and entrepreneurship, although currently there is no explicit strategy for doing so (India, Ministry for Skill Development and Entrepreneurship 2015). To address the skilled workforce issue associated with sustainable development, the Ministry in 2015 set up the Skill Council for Green Jobs (SCGJ) to develop competencies in renewable energy, sustainable development and environmental issues. The Council today serves as a national coordination body for green skills development which identifies skills needs withing the green business sector and implements nation-wide, industry-led collaborative skills and entrepreneur development initiatives. While the immediate priority of the council is to skill the workforce for green jobs in priority sectors, discussions are underway to shift the mindset from "green jobs" to "green skills", in order to help the decarbonization of any sector. With a diverse governing council including representatives from government ministries, employer associations, individual employers and academia, SCGJ achieves green skills consensus.

4.5.1. Government of India's green skilling programmes

- SCGJ does skilling and qualification pack creation in renewable energy, waste management, water management, green construction, green transport and carbon sinks. SCGJ has trained more than 500,000 persons. By 2030, aims to train 1 million people in green technologies, and upskill/retrain 2 million people across sectors.
- The Green Skills Development Programme (2017) by MOEFCC enables youth to get gainful employment in environment and forest sectors – including zoos, sanctuaries, national parks, industry, eco-tourism, organic agriculture, waste management, education and research, etc.
- The Ministry of New and Renewable Energy introduced the Suryamitra Skills Development Programme (SSDP) to develop skills of youth in the solar energy sector (78,000 trainees certified till July 2021); Additional workforce of 9,000 will be skilled in wind energy, solar water pumping, biogas and biomass and small hydro
- The Ozone Cell at MOEFCC, Ministry of Skill Development and Entrepreneurship, and the Electronic Sector Skill Council of India (ESSCI) developed an upskilling certification course to train 100,000 air conditioner service technicians, of which 38,000 have been trained as of March 2021 (India, MOEFCC 2021).

Most of the Green jobs Qualification Packs (QPs) are being prepared by SCGJ, particularly for jobs in the renewable energy, waste management, and biogas sectors. In addition, the Power Sector Skill Council and the Automotive Sector Skill Council have created QPs for EVs and their charging stations.

4.5.2. Skilling by the private sector

If the TVET system is not responding effectively to sectoral demands, the private sector develops the required skills itself. Since 2010, the private sector has started training and building green skills development programmes to meet in-house as well as external demand. The present Government has placed great emphasis on privately owned small businesses with a focus on green initiatives, which increases the need for green skills to match the new jobs created.

4.5.3. Green skills for women and youth

The Government is making special efforts to train more women in green skills by – earmarking a percentage of intake for women in training-of-trainer institutes, establishing women-only training institutes, incorporating women-related issues into skill training guidelines, preparing for gender sensitive training environments, and maintaining complaint redressal mechanisms. IL&FS, India's largest vocational training company, has one of its focus areas as "Skilling and Entrepreneurship" with a focus on rural artisans and women from MSMEs. In India, there is traction around building clean energy skills among women from rural areas in programmes led by civil society organizations and often supported by government ministries.

Examples of civil society pioneering green training projects for women from rural areas

The Social Work and Research Centre, Rajasthan (aka Barefoot College) has trained over 1,700 rural women from 96 countries as solar engineers who have electrified 40,000 rural homes. Udaipur Urja Initiative, Rajasthan, trained a network of 200+ women grassroots entrepreneurs to sell affordable clean energy technology to rural homes. The Self-Employed Women's Association (SEWA) implemented the Hariyali Green Villages project showcasing women- led programs promoting clean energy use in villages. From June 2022, SEWA, ReNew Power and UN Environment Programme will train 1,000 women salt-pan workers from Gujarat as solar technicians.

Sources: Barefoot College, n.d.; Udaipir Urja, n.d.; ReNew Power, UNEP, and SEWA 2022.

Many of the Government's training programmes are also designed to skill unemployed youth. The Suryamitra Skills Development Programme and the Green Skills Development Programme aim towards skilling unemployed youth (including 10^{th}/12^{th} dropouts), persons from rural areas, women, and Scheduled Caste/ Schedules Tribe candidates.

There is a need to assess gender pay gap in green sectors, to include women in all stages across the value chains of green sectors, promote women-owned co-operatives groups, and provide women with access to technical and managerial skilling, as well as access to finance to implement environmentally sustainable solutions.

4.5.4. Integration of green skilling into educational and vocational training

The National Education Policy 2020, in revamping the current education system to be more holistic and multidisciplinary, suggests integration of greening into school and university curriculum. At school level, existing environmental curriculum will be updated with contemporary topics such as climate change, waste management, forest/wildlife conservation, and sustainable living. At the higher education level, focus will be on enhancing employability through skilling in environment and sustainable living for undergraduate students. The policy prioritizes courses on disruptive technologies such as renewable energy, water conservation, sustainable farming, and environmental preservation. The policy targets increasing the Gross Enrollment Ratio in higher education (including vocational) from 26.3 per cent in 2018 to 50 per cent by 2035 – this coupled with the focus on green training courses could increase the pool of skilled green workforce in India.

4.5.4.1. Renewable energy sector

The Ministry of New and Renewable Energy (2021) has a robust Human Resource Development Programme that aims to institutionalize renewable energy education and training to meet the requirement of qualified and trained manpower in the country. The financial outlay for the scheme is 2 billion rupees for the period FY 2021–22 to 2025–26, of which 70 per cent is allocated to short term trainings and skill development. The components of the scheme are –

1. Short term trainings and skill development in renewable energy: Training grass root level technicians, supervisors and managers, scientists/Under Secretaries/Joint Secretaries in MNRE; Providing infrastructural support to national/state level training centres, financial support for developing course content
2. Fellowships for higher studies and research in renewable energy: Renewable energy fellowships and scholarships introduced under initiatives like the National Renewable Energy Fellowship Scheme
3. Establishment of renewable energy facilities in institutions: Upgradation of laboratory equipment; providing financial grants (up to 5 million rupees) to encourage inclusion of education/training in renewable energy courses
4. National renewable energy internship scheme: Facilitating students of engineering, science, management, and other streams to undertake internship in the Ministry while being attached with senior level officers
5. Creation of a renewable energy chair: Creation of technical focal points for renewable energy/ technology development in institutions of national repute and eminence

A recent assessment of the Government's flagship solar training programme – Suryamitra Skills

Development Programme – conducted by research organization CEEW revealed that although Suryamitra respondents are satisfied with the quality of training and curriculum, industry and training partners highlighted the need for expanding the curriculum to include modules on topics like solar manufacturing, and focus on more practical and on-the-job training. Trainees have voiced that the long duration and residential format of the training are barriers to their participation, considering many of them are sole breadwinners for their families. Other challenges include the vulnerable nature of jobs created for the trainees, since Suryamitras are primarily hired as contractual workforce, which limits their career progression. Low wages and outstation employment exacerbate low workforce retention. The mismatch between Suryamitras trained and the solar capacity installed within a state results in low rate of local employment.

4.5.5. Identification of skilling needs

Identification of skilling needs in green jobs has been conducted since 2010, when ILO and UNEP started promoting green jobs and decent work. The 2010 ILO report on Skills for Green Jobs in India discusses skills gaps in biomass, water and sanitation, agriculture and forestry sectors among others. Recently, the Skills Council for Green jobs has carried out skills gap studies in its sub-sectors. A detailed skills gap study was conducted in 2016–17 which projected skills gaps in solar PV, thermal, wind and small hydro sectors in 2022, 2025 and 2030 (SCGJ 2016). Following this almost every year, skill gap studies are undertaken on new and upcoming technologies and technical areas. During the year 2020–21, studies were conducted on job potential in Bio-CNG plants, rural solar mini-grids, and floating solar.

MNRE in collaboration with USAID and Chamber of Indian Industry conducted a systematic manpower assessment and estimation for rooftop solar installations based on the targets for 2022 (United States, USAID, n.d.). Key job roles, skilling needs, training institutes, and courses were identified. Regular and detailed assessments like these are crucial for designing appropriate skilling programmes for the upcoming green labour force.

ILO's *Skills for Green Jobs in India* (2018b) report details the skills gaps in renewable energy sectors (as seen in figure 7) including solar, bio-energy, and wind across the areas of R&D, project management, manufacturing, construction/installation, and operation.

Figure 7. Skills gaps in the solar and wind energy sectors

Solar		Wind	
R&D	› Absence of exposure to advanced technologies such as the wafer technology, semiconductor technology; › Design skill in installing BIPV in buildings.	R&D	› Offshore wind technology; › Wind resource assessment; › Optimization of engineering design; › Battery technology; › Fatigue resistant materials; › Design of step-up gearbox.
Project Management	Project implementation, management, planning and co-ordination especially in handling CSP.	Project Management	› Design technique to match wind resource, rating and installation.
Manufacturing	› Low skill in module assembly; › System integration in solar PV.	Manufacturing	› Manufacturing of high-capacity turbine gearboxes; › Fabrication of wind turbine blades of complex design.
Construction / Installation	› Erection and commissioning of large-scale and on grid solar power projects; › Third party installers not skilled in erection; › Grid integration of mega projects.	Construction / Installation	› Installation of high-capacity wind turbines.
Operation	› Trouble shooting solar PV circuits; › Techno-commercial marketing skills; › After-sales service and customer care.	Operation	› Failure analysis of gearboxes.

Source: ILO 2018b.

More specific and updated skilling requirements need to be outlined for professionals who can contribute to a green transition, including Just Transition planning and implementation, renewable energy, EVs, waste management, among others.

4.6. Active labour market policy

While trade unions seem to be highly supportive of green jobs, their focus remains on a fair and just transition for the workforce whose jobs may be affected by the shift to greening. Their observations have been that workers' organizations have not yet been informed of greening policies, their employment impacts, and the corresponding skilling requirements. Current conversations and policies around greening are focused on governments, industry, and the customer. Trade unions are usually consulted within existing industries, but not so much in new and emerging industries. The renewables, green transportation and circular economy industries that are emerging should involve trade unions in policy discussions to ensure that workforce concerns and challenges are addressed within the policy frameworks. Trade unions also stress that in addition to skilling programmes, absorption of the workforce into jobs needs to be prioritized and incentivized, without which the transitioning workforce would not feel secure about their future livelihoods.

Strengthening of employability and training is underway in the renewable energy sector, specifically for solar energy. The Ministry of New and Renewable Energy (MNRE) has a Human Resource Development policy which provides the framework to implement holistic skilling and capacity development. The Ministry is also strategizing for ways to create job opportunities in the green energy sector. MNRE has drafted a framework for "Promoting Decentralised Renewable Energy in Livelihood Applications" to ensure both livelihood creation, as well as energy security (India, MNRE 2022). DRE livelihood applications entail the usage of solar, wind, micro-hydro, biomass, and their combinations to create livelihood opportunities in solar dryers, solar mills, solar or biomass powered cold storage, small-scale briquette making machines, and many others. The framework aims to enable a market- oriented ecosystem, unlock easy access to finance, promote skill development and livelihoods and R&D at the local level, and create opportunities for marginalized groups including women, Schedules Castes and Schedules Tribes. Relevant skilling bodies including the Skills Council for Green Jobs, Indian Institute of Technology, National Institute of Rural Development, and Industrial Training Institutes will be encouraged to create courses for DRE applications. Acting on the policy, the Skills Council for Green Jobs unveiled an online desktop version of a job portal in February 2022 for professionals hunting for jobs in the renewables sector, which provides wide-spread access to jobs in the sector, helping aspiring professionals to understand the job market clearly.[5] Such platforms translated to local languages, socialized among workers' organizations, in vocational training institutions and at district levels could help increase the reach of green jobs awareness to a much wider audience.

Focusing on unemployed workers/workers at risk of unemployment: MNRE's Suryamitra programme and MOEFCC's Green Skills Development Programme both focus on skilling unemployed youth, women, and marginalized groups belonging to the Scheduled Caste and Scheduled Tribe communities. No specific programmes are built for workers at risk of unemployment in communities/industries affected by climate change. In the automotive sector, the private sector is focusing on transitioning their existing workforce into the EV sector by conducting on-the-job trainings on servicing/maintenance of EVs. Though the automotive industry is not currently seeing losses of jobs in the sector due to introduction of EVs, the trainings may be useful to ensure smooth transition of workers between the ICE and EV sector.

Using public employment programmes for poverty eradication and ecosystem protection: The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), although not specifically designed as a policy to address climate change, has elements that advance pro-poor climate assistance objectives – including provision of minimum wage labour, development of small-scale and nature focused infrastructure, and decentralized community- based planning architecture. The scheme typically guarantees 100 days of unskilled work to persons from rural areas, but provides 50 days of additional wage employment in areas affected by climate hazards like floods, cyclones and droughts. India's National Action Plan for Climate Change links poverty eradication with ecosystem protection through its Green India Mission, which focuses on providing livelihoods to 3 million people through forest-based activities. Implementation began in 2015, and so far, a sum of 4.5 billion rupees has been released to 15 states to undertake afforestation and livelihood improvement activities. The Green India Mission is implementing the Ecosystem Services Improvement Project (ESIP) in two states – Chhattisgarh and Madhya Pradesh. The mission is also promoting livelihood improvement activities like fish farming, mahua collection, lac cultivation, poultry, among others (India, MOEFCC 2021). The National Biodiversity Action Plan (2014) focuses on integrating conservation activities into sectoral development plans for poverty alleviation and livelihood improvement, mentioning linking of efforts with employment guarantee schemes such as Mahatma Gandhi Rural Employment Guarantee Act (MNREGA) and Integrated Watershed Management Programme (IWMP) (India, MOEFCC 2014). India also has 20 per cent of its geographical area under effective natural conservation. With more

5 The online portal can be accessed at: https://www.scgjrozgar.in/#/.

impetus on people's participation in conservation initiatives in the country, there has been a substantial increase in the establishment of community reserves.

Providing avenues for on-the-job training: SCGJ provides on-the-job training courses in effluent waste management, automotive companies are conducting on-the-job training for ICE mechanics to obtain skills to work on EVs. The EV policies of certain state governments include employment aspects. For instance, the Karnataka State Government is looking into creating conducive work environments for women to participate in the EV workforce. The Andhra Pradesh EV policy under skill development initiatives provides a stipend of 10,000 rupees per employee per year up to 50 employees for a single company (India, Government of Andhra Pradesh, Industries and Commerce Department 2018). MNRE's flagship programme, the Suryamitra Skills Development Programme, which has trained 78,000 persons till date, provides free-of-cost training, and funds boarding and lodging of trainees at the rate of 200–300 rupees per trainee per day, for a 90-day period for up to 300 trainees. The host institute is encouraged to conduct placement programmes.

The National Career Service (NCS) was set up in 2015 by the Ministry of Labour and Employment to provide a platform for job seekers and employers to fulfil their requirement for gainful employment. The platform provides jobs postings, upcoming job fair notifications, and also skilling programmes for jobseekers. Career counselors conduct skills assessments, aptitude testing and training analysis. The portal currently has 3600+ career options across 53 industry sectors. Only one of these sectors is explicitly a green sector – water supply, sewerage, waste management – while many of the other sectors can possibly create green jobs such as automotives, power, food, and agriculture. Clear green career guidance, job opportunities, and skilling programmes can be well integrated into this portal.

Identifying Just Transition hotspots is a first step in Just Transition planning. A 2022 report (non-government) looks at states which will face high job losses by 2030 (close to 110,000 jobs at risk) as a result of coal mine closures – Maharashtra, Madhya Pradesh, Chhattisgarh, Jharkhand and West Bengal (Ernst & Young 2022). These locations do not coincide with states that have high potential of job creation in the renewable energy sector – Rajasthan, Gujarat, Karnataka, Andhra Pradesh, Telangana and Tamil Nadu (IBEF), although their renewable energy programmes are under development. Just Transition planning by the Government is being prioritized in some of these states, which would need to plan for reskilling and placement of transitioning coal mine workers into the renewable energy or other sectors.

4.7. Occupational safety and health

As of 2022, India has not ratified the ILO Occupational Safety and Health Convention, 1981 (No. 155), or the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187). However, delegates in the 110th International Labour Conference held in May-June 2022 adopted the resolution to add the principle of a safe and healthy working environment to the ILO's Fundamental Principles and Rights at Work (ILO 2022b). ILO Member States including India are now compelled to promote the principles and rights of workplace safety, whether or not the relevant Conventions have been ratified.

Throughout the subregion, the ratification rate of the ILO's Conventions related to OSH remains low. However, governments, workers' organizations and employers' organizations are now showing stronger commitment to improving and promoting OSH standards and related inspection systems. Efforts have been made to promote awareness on OSH among micro, small and medium enterprises (MSMEs) in collaboration with FICCI, the Ministry of MSMEs and the Ministry of Labour and Employment. However, trade union representatives express their reservations against sufficient monitoring and inspection of occupational hazards by the Government and ask for more stringent action to be taken in the event of a hazard.

In terms of institutional mechanisms, the Directorate General of Factory Advisory Services and Labour Institutes (DGFASLI), an attached office of the Ministry of Labour and Employment, serves as a technical arm of the ministry and assists in formulating national policies on occupational safety and health in factories and docks (WHO, n.d.). India also has the National Safety Council and State Safety Council which engages stakeholders in discussions around OSH, and organizes specialized training programmes, workshops, safety audits, and hazard risk assessments (India, National Safety Council, n.d.).

4.7.1. New Labour Code for a New India

In the New Labour Code for a New India launched in 2020, 13 existing labour laws were combined to form the Occupational, Safety, Health and Working Conditions Code, 2020. This Code covers the security of workers engaged in factories, mines, plantations, motor transport sector, beedi and cigar workers, and contract and migrant workers, amongst other sectors. The Code ensures that employers provide safe working conditions for women (especially for work at nights), increase paid maternity leave from 12 weeks to 26 weeks, and ensuring creche facilities. Trade unions have voiced that the new OSH Code covers units with above ten workers, but must also include micro units with less than ten workers. They are also concerned that India's OSH Code is in contradiction to ILO Conventions Nos 155 and 187 and needs to be redesigned by the Government through tripartite consultation. Details are provided under section 4.8.

4.7.2. OSH in green jobs

Many of the green jobs certification and training programmes have OSH guidelines incorporated in them. In the renewable energy sector, solar PV projects are usually located in areas where solar irradiation is high and involves outdoor work, making heat stress a critical occupational risk factor for solar workers. Solar PV installers also face risks such as (but not limited to) musculoskeletal disorder from repetitive work at awkward positions, falls from elevated surfaces, and electrical risks and hazards (e.g., electric shock, burns, electrocution, and arc flash hazards (Hanson and Thatcher, 2020, U.S. Department of Labor., 2017a). With large amounts of installed renewable capacity on-going and upcoming in the country, it is pertinent to ensure that OSH is central to the working conditions in renewable energy sites. OSH in the sector seems to be in place in documents. For instance, the National Thermal Power Corporation's Renewables subsidiary discusses OSH practices under its safety initiatives, including the creation of safety consciousness, committees to monitor and advise on OSH practices and regular plant inspections (NTPC, n.d.-b). ReNew Power, one of India's largest renewable power infrastructure companies, has a dedicated vertical to address OSH practices. They have structured Safety Governance processes through four committees – (1) Policies and Procedure Committee, (2) Corporate Implementation Committee, (3) Audit and Monitoring Committee, and (4) Capacity-building Committee. They have a zero-fatality policy, an online tool for timely reporting of any unsafe incidents, and have OSH as an integral part of their annual sustainability reports (ReNew Power, n.d.).

OSH risks in upcoming green jobs are under-addressed. A recent study discusses the risks associated with installation and operation of floating solar photo voltaic panels, which include electrocution, fire, exposure to hazardous substances, and risks associated with working for long hours in extreme temperatures and harsh climatic conditions.

With renewable energy and EV boom in India, battery disposal is a real and emerging issue. Though battery re-use and recycling has been an informal industry in India for some time, the new lithium-ion batteries are more challenging to handle, since their recycling value chain is at an incipient stage with a mix of informal and formal actors. Proper environmental, health and safety management are not prevalent in the dismantling, smelting and disposal of the components of lead acid batteries, with wide ranging effects related to processing. These include contamination of surface and groundwater, along with the corresponding risk posed to potable water, which is of particular concern for vulnerable communities. Similarly, related health risks are particularly heightened for informal workers and local communities. It is unclear whether this will be significantly different for lithium-ion battery processing. India's Batteries (Management and Handling) Rules, 2001 (as per Environment (Protection) Act, 1986) mandates for every manufacturer, importer, re-conditioner, assembler, dealer, recycler, auctioneer, consumer and bulk consumer involved in the manufacturing, processing, sale, purchase and use of batteries or components thereof, to recycle used batteries and dispose of hazardous waste generated. To date, however, there has been a lack of awareness, as well as weak implementation of these rules (WRI 2021).

Consultations with select Central Trade Union representatives during primary research revealed that green jobs are strongly supported by the Trade Unions, provided the new jobs have safe working conditions. They have cautioned that every new job has its own set of hazards. Trade unions point out that OSH is critical in the waste management industry, especially since the nature of waste is increasingly shifting from biodegradable to non-biodegradable and sometimes toxic waste (electronic waste), with not enough training imparted to workers in the sector who are exposed to this type of waste on a daily basis. ILO is working with city municipalities of

Ahmedabad and Pune to train waste pickers on OSH components relevant to waste collection and recycling of chemical and bio-medical waste (ILO).

4.7.3. OSH for climate change

A number of both indoor and outdoor worker populations may be particularly vulnerable to climate variations. This could be due to occupational exposure to heat, air pollution, extreme weather such as natural disasters, biological hazards resulting from increased vectors or pathogens in warmer conditions.

India is one of the countries said to be most affected by heat stress. 5.8 per cent of working hours will be lost by 2030, equating to the loss of 34 million full-time jobs by 2030 and 5 per cent reduction in the GDP. According to an ILO report, by 2030 9.04 per cent jobs will be lost each in the agricultural and construction sectors, 5.29 per cent in manufacturing, and 1.48 per cent in the services sector (ILO 2019). There is an understanding of climate change impacts on workers. The Government has developed measures to protect workers from heat stress by prohibiting work during the hottest hours of the day in summer months. But clear assessments on the impacts of climate change on workers need to be conducted and addressed.

4.8. Social protection

Social protection is defined by the ILO as "provision of benefits, in cash or in kind, intended to ensure access to medical care and health services, as well as income security throughout the life cycle, particularly in the event of illness, unemployment, employment injury, maternity, family responsibilities, invalidity, loss of the family breadwinner, as well as during retirement and old age". Social protection becomes particularly important in building climate resilience and supporting a Just Transition towards a greener economy, as it allows workers and their families to meet basic needs during periods of unemployment, training, or education, therefore empowering them to move into new jobs and sectors. In 2014, the International Trade Union Confederation (ITUC) demanded a commitment to a Just Transition based on social dialogue from the workplace to the national level, with green skills and social protection guaranteed (Just Transition Centre 2017).

India has a large number of social protection schemes, both at the central and state levels, which cater to different segments of the population. However, the size, increasing informality and heterogeneity of the workforce leads to low levels of social protection and high vulnerability among India's workers. According to the ILO (n.d.-b), 24.4 per cent of India's population is covered by at least one social protection benefit as of 2020. The Employees' State Insurance Act 1948 (ESI Act) was the first major legislation on social security for workers in India and is the most popular social protection scheme as mentioned by the Government as well as trade unions. The ESIC (n.d.) provides:

- Medical benefit: Full medical care to insured person, their family members from the day they enter insurable employment. There is no ceiling on expenditure on the treatment of an Insured Person or his family member. Medical care is also provided to retired and permanently disabled insured persons and their spouses on payment of a token annual premium of Rs. 120/-.
- Sickness benefit (SB): Sickness Benefit in the form of cash compensation at the rate of 70 per cent of wages is payable to insured workers during the periods of certified sickness for a maximum of 91 days in a year. In order to qualify for Sickness Benefit, the Insured Person is required to contribute for 78 days in a contribution period of 6 months. Extended Sickness Benefit (ESB) and Enhanced Sickness Benefit are further available for long-term diseases and sterilization for family planning respectively.
- Maternity benefit (MB): Maternity Benefit for confinement/pregnancy is payable for Twenty Six (26) weeks, which is extendable by further one month on medical advice at the rate of full wage subject to contribution for 70 days in the preceding Two Contribution Periods.
- Disablement benefit:
    - Temporary disablement benefit (TDB): From day one of entering insurable employment & irrespective of having paid any contribution in case of employment injury. Temporary Disablement Benefit at the rate of 90% of wage is payable so long as disability continues.
    - Permanent disablement benefit (PDB): The benefit is paid at the rate of 90% of wage in the form of monthly payment depending upon the extent of loss of earning capacity as certified by a Medical Board

- Dependents benefit (DB): DB paid at the rate of 90 per cent wage in the form of monthly payment to the dependents of a deceased insured person where death occurs due to employment injury or occupational hazards
- Other benefits: These include Funeral Expenses (An amount of Rs.15,000/- is payable to the dependents or to the person who performs last rites from day one of entering insurable employment) and Confinement Expenses (An Insured Women or an I.P.in respect of his wife in case confinement occurs at a place where necessary medical facilities under ESI Scheme are not available)

The scheme also provides need-based benefits to insured workers, including vocational rehabilitation for permanently disabled people undergoing VR, and physical rehabilitation due to employment injury. This scheme covers two unemployment relief measures - the Rajiv Gandhi Shramik Kalyan Yojana introduced in 2005, which offers Insured Persons unemployed due to factory closure, retrenchment or 40% or more invalidity from non-employment injury, a 50% wage allowance for up to two years along with medical care and vocational training covered by ESIC, and the second measure is the Atal Beemit Vyakti Kalyan Yojana (ABVKY) introduced in 2018, which provides relief payments for up to 90 days, once in a lifetime, to employees covered under Section 2(9) of the ESI Act, 1948, and has been extended until June 30, 2022, with an increased unemployment relief rate of 50%, relaxed eligibility conditions, and the option for online claim submission. Finally, the scheme provides incentives to employers in the Private Sector for providing regular employment to persons with disabilities.

Social health protection is provided through contributory and non-contributory schemes, covering approximately 140 million and 120 million people, respectively. The Government of India wants to scale up the non-contributory scheme (PM-JAY) to reach 500 million beneficiaries. The Ayushman Bharat National Health Protection Scheme provides coverage up to 500,000 rupees per family per year for secondary and tertiary care hospitalization. The scheme aims to cover 100 million poor and vulnerable families.

Of ILO's social protection conventions, India has ratified C118 with provisions for medical care, sickness, maternity and migrant workers. The provisions not covered by India as per ILO conventions are unemployment, old age, employment injury, family, invalidity and survivors.

Other social protection measures in India encompass the Mid-Day Meal programme for school children, the Public Distribution System, the National Rural Employment Guarantee Scheme, and the National Social Assistance Programme. During the COVID-19 employment crisis in 2020–21, the Government introduced new welfare schemes like providing rations and direct cash transfers to vulnerable communities. These were implemented by piggybacking on the existing infrastructure of the Public Distribution System, through which "essential item kits" were distributed. The Public Distribution System covers 797.1 million persons out of the total intended coverage of 813.5 million persons under the National Food Security Act.

There are also multiple pension schemes offered by the Government. The National Pension Scheme is available for all employees including the public sector, private sector and even the unorganized sector – except those who work in the armed forces. With a minimum contribution of 6,000 rupees per year, the scheme provides monthly instalments of 500 rupees to the subscriber. The Indira Gandhi National Old-age Pension scheme was launched in 2007 to offer social protection in the form of senior citizen pension, widow pension, and pensions for disabled people. The Employee Pension Scheme offers widow, child, and orphan pension in case the insured person is deceased.

The Government is committed towards achieving universalization of social security and a very significant step taken in this direction is the launch of e-Shram portal to capture the data of unorganized sector workers for evidence- based policymaking and for providing social security to the unorganized sector workers (India, Ministry of Labour and Employment 2021). About 290 million workers have been registered on this platform as of June 2023.

Table 2. Effective coverage of social protection in India, 2020 or latest available year from ILO's World Social Protection Report 2020–22

People protected by social protection systems including floors	%
SDG 1.3.1 – Population covered by at least one social protection benefit (except health)	24.4
SDG 3.8.1 – Universal health coverage	55
Children	24.1
Mothers with newborns	41.5
Persons with severe disabilities	5.6
Unemployed	0
Older persons	42.5
Workers in case of work injury	3.7
Vulnerable persons covered by social assistance	16.4
Labour force covered by pension scheme (active contributors)	15.5

Source: ILO 2021b, 274.
Note: Unemployment benefit too low to be indicated in this table. Also note that the coverage figures in the table above are based on available data. It is important to acknowledge that India's social protection schemes are evolving and subject to ongoing updates.

In 2020, the Government created the New Labour Code for a New India, wherein 29 existing laws were merged under four labour codes on social security, wages, occupational safety, and industrial relations. Under the new labour code for social security, the Employees Provident Fund, the Employees Pension Scheme, and coverage of all types of medical benefit under Employees' Insurance will be available to all workers. Various provisions in the Code support inter-state migrant workers by allowing them – a legal identity independent of their contractor (which was not the case previously), to-and-fro travel allowance from their native place to work site, mandatory and free annual health check-ups, flexibility in availing ration services in a different state, among others. The Code ensures increase paid maternity leave from 12 weeks to 26 weeks, and creche facilities. The trade union leaders however are in opposition of the New Labour Code for a New India. They express that workers' organizations have not been adequately consulted in the formulation of the Code (despite state government labour department representatives mentioning that trade unions were invited for discussions), and that the Code violates and dilutes relevant ILO Conventions and is not worker-friendly.

4.8.1. Social protection against climate change and environmental degradation

The Prime Minister's National Relief Fund (PMNRF) is used to render immediate relief to families of those killed in natural calamities like floods, cyclones, earthquakes etc. State Disaster Response Fund (SDRF) under the Disaster Management Division of the Ministry of Home Affairs is funded largely by the Central Government to provide immediate relief to victims of natural disasters considered within local context (India, Ministry of Home Affairs, Disaster Management Division, n.d.).

India's pandemic response demonstrated the significance of social protection schemes such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) for channeling relief. At a time of crisis, such schemes provide a safety net by guaranteeing 100 days of employment to rural households. The MGNREGS supports decentralized, nature-based infrastructure creation, which in-turn has contributed to climate change adaptation and building livelihood resilience within rural communities during calamity. The scheme covers works under the categories of coastal areas, drought proofing, fisheries, flood control and protection, food grain, land development, micro irrigation works, renovation of traditional water bodies, rural drinking water and sanitation, and water conservation and water harvesting. Despite playing this crucial role in livelihood security and climate resilience, the scheme sees a reduced budget allocation from 980 billion rupees in 2021 to 730 billion rupees in 2022.

In order to increase climate resilience of last mile communities, the UK Department for International Development (DFID) undertook the "Infrastructure for Climate Resilience Growth" (ICRG) programme to provide technical support to the Ministry of Rural Development on planning and implementing climate- resilient infrastructure. The programme was aimed at the three disaster-prone states of Bihar, Chhattisgarh and Odisha with a focus on improving the durability of assets enshrined in the MGNERGS by building climate resilience and

thereby enhancing livelihood security of the rural poor and vulnerable groups (IPE Global, n.d.).

District Mineral Foundations in 22 states have incorporated the Prime Minister Khanij Kshetra Kalyan Yojana which will implement welfare programs in mining affected areas to minimize adverse impacts on health, environment and socio-economics of people in mining districts. The welfare activities will provide education, drinking water, sanitation, healthcare and infrastructure development (energy, irrigation, watershed development) to identified affected families.

4.8.2. Social protection in the coal industry

The Government of India sees the advantage of the planned closure of uneconomic mines, accompanied by social dialogue and stakeholder engagement and the planning of transformational measures. Due to this development, less productive mines are not continuously exploited/are being closed. The Ministry of Coal has already tied up with the World Bank to implement a robust mine closure framework based on the principles of a Just Transition. The Ministry also has a Just Transition cell to overlook these activities.

Trade unions are concerned that public mines are closing, and that mining contracts may be awarded to private players who do not have the level of social protection systems and benefits offered by the public sector. The Coal Mining Provident Fund Organisation (CMPFO) serves as the social safety net for coal mining workers and their dependents. The CMPFO provides a monthly pension to long-term employees, disablement pension, monthly widow or widower pension, children and orphan pension. The Indian Bureau of Mines came up with a *Manual for Appraisal of Final Mine Closure Plan* in June 2022, which states that compensation would be provided in case of socio-economic repercussions as a result of the mine closing. Consulted trade union representatives argue that despite the provisions being mentioned in policy documents, the scheme benefits do not reach those facing unemployment from coal mine closure, and that there is a need for skilling the workforce for newer work and transitioning them into alternate livelihood streams.

In the shift from fossil-fuel based energy to renewable energy, it is important that social protection systems are adapted. Those working in the public coal sector have various benefits and safety mechanisms for themselves and their families. The renewable energy sector however, because it is emerging, does not have a similar structure, which can make the shift from coal to renewables difficult. Current jobs being created in the renewables sector are majorly temporary – about 60–70 per cent jobs are only limited to the installation period, after which only about 30 per cent of the workforce is employed for the long-term in operations and maintenance of the plant. The coal sector being heavily unionized also offers a level of security to its workers, which will have to be replaced in whichever sector the workers shift to.

4.9. Cross-cutting elements

4.9.1. Policy coordination

There is no existing coordination body for green jobs and a Just Transition in India. Back in 2009, the Ministry of Labour and Employment was leading a "Multi-stakeholder Taskforce on Climate Change and Green Jobs" with the core aim of managing the labour-market elements of the nation's transition to a greener economy (ILO 2018c). There is not much information around the activities of this taskforce over the last decade, but it could serve as an ideal coordination mechanism for data collection, reporting, and promotion of green jobs.

More recently in December 2020, the Ministry of Environment, Forest and Climate Change (MOEFCC) constituted a high-level inter-ministerial Apex Committee for Implementation of Paris Agreement (AIPA) (India, MOEFCC 2020b).The purpose of AIPA is to generate a coordinated response on climate change matters that ensures India is on track towards meeting its obligations under the Paris Agreement including its NDCs, and to operate as a National authority to regulate carbon markets in India, issue guidelines on carbon pricing, market mechanism, and other similar instruments. Senior officials from fourteen ministries will serve as Members to AIPA who will oversee the progress in implementation of India's NDCs and receive periodic information updates to monitor, review and revisit climate goals to fulfil the requirements of the Paris Agreement. The constituent ministries

include health, power, renewable energy, finance, science and technology, *jal shakti* (water), earth sciences, urban affairs, rural development, commerce and industry, apart from the Government's policy think-tank, the NITI Aayog. The Ministry of Labour is not a member of the AIPA, therefore it may be difficult to ensure policy coherence for Just Transition of key ministries are not including in coordinating institutional mechanisms.

Looking into specific sectors, the renewable energy sector policies and initiatives are under the Ministry of New and Renewable Energy, and the Skills Council for Green Jobs is the national coordination body for green skilling in the country promoted by MNRE and the Confederation of Indian Industry. In this sector, there is more need for representation from the world of work – industry associations, and employers' and workers' organizations. More policy coordination is required in the EV sector as well. The planning commission NITI Aayog formulated the National Mission on Transformative Mobility and Battery Storage in order to facilitate cooperative federalism extensive stakeholder and inter-ministerial consultations, and implementation of end-to-end policy frameworks in the mobility landscape. This Mission has a steering committee consisting of representatives from different ministries (power, renewable energy, transport, heavy industries) which would help in creating policy coherence across energy, industry and transportation sectors. However, a platform – such as one in the form of a Just Transition Committee that includes tripartite representatives and other relevant stakeholders (such as impacted communities, NGOs and academia etc.) – is necessary, and should include employers' and workers' organizations in order to create the most inclusive policies. The planning commission NITI Aayog has created 11 working groups on circular economy.

4.9.2. Social dialogue

India has ratified the ILO Tripartite Consultation (International Labour Standards) Convention, 1976 (No. 144), though according to stakeholders, social dialogue in upcoming green sectors is low. Adequate involvement of industry and workers' organizations in the planning process is currently missing and needs to be ensured. However, at a larger level, conversations are taking place on the need for a coordinated response to the increasing green jobs in India.

A Tripartite National Dialogue on Global Call to Action for a human-centred recovery from COVID-19 crisis in the context of India was organized by the ILO in collaboration with Ministry of Labour and Employment in December 2021. The objective of the tripartite conference was to discuss the four priority areas of the Global Call to Action a) Inclusive economic growth and employment; b) Protection of all workers; c) Universal social protection; d) Social Dialogue; in the context of India. The conference was envisaged to foster convergence and tripartite action contributing to the implementation of the ILO Centenary Declaration for the Future of Work and Sustainable Development Goals in India. In his keynote address on the occasion, Shri Bhupender Yadav, Union Minister for Labour and Employment emphasized on the need for tripartite social dialogue, capacity-building, skill development, occupational safety of the workers and transition towards green jobs and green economy for inclusive, resilient and sustainable development of the country (India, Ministry of Labour and Employment 2021).

Trade unions have voiced that the consultations with workers' organizations in the planning of upcoming green sectors has been negligible/very low and needs to be strengthened. In unionized public sectors like coal and automobile, trade unions are usually engaged in social dialogue but this has not yet happened in the context of a Just Energy Transition. Informing trade unions about geographies and industries where jobs will be lost due to greening of the industry/sector, and new skills to be gained by the workforce to transition into green jobs is necessary.

4.9.3. The role of trade unions in promoting decent work creation in India

The trade unions in the country have been in the forefront in terms of organizing the workers and educating them thereby enhancing their human resource capabilities. Their continuous efforts have been instrumental in creating an ambience of harmony and thus helpful in the country's economic development. Many of the trade union leaders have also played an extremely important role as Members of Central Legislative Assembly and Provincial Legislative Assemblies in the pre-independence India and as Members of Parliament and various State Legislative Assemblies in moving the proposals for many of the Labour Legislations and Labour Law Amendments. Many of the trade union leaders have authored remarkably outstanding books on various labour issues, most of which are

relevant even today and thus have rendered valuable contribution in highlighting the importance and development of trade unionism in the country. To sum up, despite the apprehension that trade unions have been weakened after the process of Industrialization, Privatization and Globalization, the trade unions continue to make their presence felt in the country.

However, the unions in India are currently facing a number of challenges such as, the growth of informal employment and contract workers, the need to promote the right to organize and bargain collectively, protection of migrant workers (both inter-state and international migrants), gender inequality, lack of social security, and workers' safety and security. Inadequate job creation, particularly of decent work, and the uneven distribution of the benefits of economic growth are key challenges. In addition, they also have the challenge of protecting the interest of the newly emerging categories of workers such as the platform workers and gig workers (Upadhyaya 2022). The accelerated growth of digital technologies, machine learning and Artificial Intelligence is creating more avenue for an informal workforce that cannot be organized.

Central trade unions also voice that currently, tripartism and social dialogue in India across sectors is irregular and insufficient and needs to be strengthened through institutionalization of tripartite bodies at central, state, sector, and unit level. The prevalence of union-busting and de-registration are undermining the value of trade unions and need to be curbed.

4.10. Summary table

Policy area	Status	Comment
Macroeconomic and growth policies (Green agenda part of national development, CC assessments, links to NDCs, Paris Agreement)		Green policies integrated into national development framework; National Electricity Plan, Green Hydrogen Mission, Draft National Resource Efficiency Policy, Env Ministry regulations – all in line with achieving NDCs
Public investment leveraged for green jobs (Infrastructure investments, green public procurement, research and development, and eco-innovation funding)		Significant govt budgetary allocations in green sectors; Indian and UK govts investing in Green Growth Equity Fund; Green public procurement policy being led by Min of Finance; Eco-innovation funding available but not sufficient according to experts
Industrial and sector policies (Target sectors for green jobs scoped out, sector specific policies for energy, waste, agriculture, built env)		Target sectors for green jobs scoped out by various agencies; Sectoral green policies present for energy, transport, energy efficiency, waste management; Green policies are in progress/not fully developed for other sectors
Enterprise policies (Availability of information and financial assistance, entrepreneurship support, business resilience for micro, small and medium enterprises)		No specific policies/incentives/assistance for green enterprises in the Government's Startup India programme; Few green funding avenues exist; MSME greening and business resilience programmes exist and can be strengthened
Skill development (Green skills consensus, skill adequacy/gap assessment, integration of on-the-job training)		Skills Council for Green Jobs defines green skills, conducts skills gap assessments, on-the-job trainings, green jobs certifications; Strong HR policy in place for skilling workforce in renewable energy sector; Govt focus is on women and unemployed youth
Active labour market policies (Green jobs and skills labour market information by geography, demographic, Just Transition plans, retraining of workers)		Green jobs labour market information by geography/demographic not collected by the Government; Info for selected states available in 2022 report by EY; Just Transition plans initiated for energy sector by Min of Coal and World Bank; Platform created for posting renewable energy jobs; Policies/initiatives framed for decentralized renewable energy livelihoods
Occupational safety and health (OSH) (OSH for climate change affected areas; ILO Convention No. 155 in force)		The ILO Occupational Safety and Health Convention, 1981 (No. 155), and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187) have not been ratified, but OSH is fundamental principle and right at work; OSH policies in place in private and public sector renewable energy companies; OSH to be focus for value chains of upcoming green sectors
Social protection (SP) (Unemployment and social protection policies for regions affected by climate change and job losses due to green transition)		New Labour Code for New India expands scope for SP; Min of Labour and Employment's E-Shram portal captures data of workers in unorganized sector; Specific SP strategies for individuals and communities affected by climate change and green transition need to be strengthened, including provision of support for re-skilling and re-employment
Cross-cutting elements (Inclusion of labour rights into green jobs, Just Transition policies, social dialogue for implementation of green policies, ILO Convention No. 144 in force, policy coordination, coherence)		Labour rights not clearly included in green jobs policies; India has ratified the ILO Tripartite Consultation (International Labour Standards Convention, 1976 (No. 144); Social dialogue involving workers' organizations is low for implementation of green policies; Policy coordination bodies exist but are not active; Policy coherence is strong in priority sectors

Significant policy elements in place | Some policy elements in place | Limited/No policy elements in place

Note: The assessment above is based on snapshot data available until June 2023. India's policies and schemes with respect to greening the economy are continuously evolving and subject to ongoing updates.

5. CONCLUSIONS AND RECOMMENDATIONS

5. CONCLUSIONS AND RECOMMENDATIONS

Green jobs and Just Transition understanding in India

- The integration of environmental consciousness into the national development agenda and industrial/sectoral policies has been underway for several decades in India. However, the concept of green jobs has only emerged more recently, first introduced to Ministry of Labour only in 2009 through ILO, followed the formation of a Skills Council for Green Jobs in 2015, and increasing public focus and mentions of the concept of green jobs since 2021–22, particularly during the Labour and Employment Ministers Meeting (LEMM) among BRICS countries in 2022.
- The only official definition of green jobs is by the Skills Council for Green Jobs, which is a brief and direct adaptation of the ILO definition. Green jobs are also not defined in policy documents of other government ministries (including labour, skilling, renewable energy, environment, industries, transport, urban affairs). There is a need to create a detailed definition of green jobs, green sectors and green skills through consensus across ministries, such that it can provide a framework to map and understand green jobs among current and upcoming occupations.
- The understanding of green jobs within the Government and trade unions is largely limited to being "environment-related" jobs within upcoming green sectors such as renewables and EVs, and traditional green sectors such as waste management and forestry. Focus and awareness around the decent work aspects of a green job is low and needs to be increased, including decent work considerations at the global level where raw materials/services for green sectors are imported. There is also a need to raise awareness around the spectrum of green jobs, on which some jobs may be considered "core green" such as a solar technician, while some others are "indirectly green" such as a construction worker in a green building – value chain analysis of jobs created in green sectors needs to be undertaken for this.
- Estimates of total future green jobs in India have been made by both government and international agencies, but jobs in the agriculture and forestry sectors have not been included in these estimates. Studies estimating sectoral green job creation in India are led by civil society research supported by government agencies, particularly in the renewable energy and EV sectors. In the past, job estimates in the rooftop solar and the electric vehicle sectors have far exceeded actuals – therefore there is a need to analyse the adequacy of the enabling environment for these sectors. There is a need for consolidation and standardization of estimation methodology of current and estimated green jobs by sector, given India's climate commitments for the years 2030 and 2070, in order to understand and prepare for skilling requirements and labour policies. The geographic and demographic distribution of these new jobs will also be pertinent to understand for planning the transition of workers to new green sectors.
- A clear Just Transition definition does not exist in policy documents, although Just Transition is a focus area for the Ministry of Coal. Discourse and initiatives around a Just Transition are at nascent stages and dominated by civil society – focus is on the energy and transport sectors. Government stakeholders from the coal industry are discussing a Just Transition and related issues, and recognize skilling, financing, and economic diversification as key aspects of a Just Transition. An in-depth study of the coal ecosystem and dependent livelihoods is suggested as an essential first step to Just Transition planning. This will involve data collection on informal/ contractual workers (at gender disaggregated level), socio-economic backgrounds of the labour, skill levels and aspirations of the transitioning workforce – with consultation of trade unions. Other key aspects to consider for a Just Energy transition include assessing and mitigating the impacts on vulnerable groups such as tribals, displaced, indigenous, differently-abled groups, and making gender equality a pillar for Just Transition planning.
- Priority sectors, sectoral targets, and implementation roadmaps for greening and green jobs creation are required in order to estimate future green jobs and plan for skilling accordingly. Currently, firm targets have been set and implementation roadmap is being prepared for the renewable energy sector, but this is not clear for other green sectors.

Assessing readiness of policies impacting demand for green jobs

- In terms of macroeconomic policy, India's updated Nationally Determined Contributions (NDCs) are ambitious and the Government has put in place policies and structures to achieve them. It is encouraging that multiple ministries are already working towards increasing sustainability in their initiatives and impact – some of them being the ministries of rural development, textiles, finance, housing and urban affairs. A national coordination body for green jobs is absent and is required to set sectoral targets and draft clear roadmaps on greening and job creation in those sectors. Employment policies need to be more prominent and central to greening through the involvement and consultation of trade unions and other workers' organizations while drafting policies for green sectors.
- Public sector contribution to investment in green sectors of clean energy and clean transportation in the year 2019/20 have been significant. However, the total annual green finance in India is 25 per cent of the required finance in order to achieve NDCs by 2030, therefore focus needs to be on using public funding to mobilize resources from the private sector. The Union Budget 2022–23 has clear focus on green initiatives such as promoting renewable energy technologies and reducing emissions intensity. There is a need for financing Just transition planning and implementation.
- Priority green sectors have been identified by different agencies – planning commission NITI Aayog has identified energy, green transportation, built environment, sanitation and waste management, water resources, agriculture and pollution control. These sectors are more or less in consensus with those identified by the national green skilling coordination body Skills Council for Green Jobs, which in addition is looking at building sector-agnostic skills that can aid decarbonization of any sector.
- At a sectoral level, the strongest policy push for green jobs is in the renewable energy, electric vehicles, energy efficiency, waste management/circular economy sectors. Other sectors with green focus are agriculture, tourism, textiles and rural development. Stronger greening policies are required in industry and construction. In renewable energy, the Government's tax incentives, interstate transmission waivers, opening up of green energy access, and the promotion of domestic manufacturing through PLI schemes have created a conducive environment for companies to increase installed renewable energy capacity. The schemes for employment intensive sectors, such as the rooftop solar programme and decentralized renewable energy policy, coupled with a strong Human Resource Development policy are creating a solid foundation for green jobs creation. In the electric vehicles sector, the Government's FAME-II scheme for subsidizing EVs and PLI scheme to promote indigenous battery and auto component manufacturing have laid a solid platform to develop a progressive value chain for job creation. In industry policy, the Perform-Achieve-Trade scheme has yielded positive results, and the National Resource Efficiency Plan lays a framework for decarbonization of industries.
- Support for green entrepreneurs in India is present but is not strong. The Government's flagship entrepreneurship programme does not have specific programmes or trainings for green enterprises, barring one-time sustainability challenges and hackathons. However, a few financial assistance government schemes exist for green enterprises, mostly by Small Industries Development Bank of India. Ministry of MSME has also implemented the Zero Effect Zero Effect (ZED) scheme to promote greening, and would benefit from a roadmap to propel strategic green transition. There is a need for separate and focused support to budding green enterprises in India through financial and mentorship assistance, creating green internships and apprenticeships. Providing MSMEs with trainings and financial incentives to green their businesses will also increase the scope for green jobs.
- Just like the Government has mandated every central ministry, department and PSU to set a target of minimum 25 per cent procurement from the micro and small enterprise sector, targets set for green public procurement will create both demand and supply for more green products, and in extension green jobs, given adequate training and funding provisions for the MSME sector move towards greener products and processes.
- In general, providing guidelines, skilling, funding opportunities and mentorship towards creating greener products and processes in the MSME sector and among emerging startups will play a significant role in creating demand for green products and green jobs.

Assessing readiness of policies impacting supply of green jobs

- Since 2015, India has a Skills Council for Green Jobs which is a national coordination body for green skills. The Council identifies green sectors and green skilling requirements based on government targets and priorities, builds capacities of green businesses, and conducts skills gap analysis in selected sectors. The Council has trained over 500,000 people in green skills over the last seven years. To train a large enough skilled workforce that meets India's NDCs and green targets, the Council is looking at (1) stronger industry collaborations in training and recruitment, (2) strengthening infrastructure and capacities of its training partners, and (3) obtaining green skilling requirements at a geography level to conduct localized trainings. Other ministries such as environment and renewable energy are also designing and implementing green skilling programmes. Special strategies are being implemented by the Government and civil society to train women, unemployed and marginalized youth. While formal and vocational education systems are slowly being linked with green skills, the need for integrating industry requirements into higher education and vocational training is critical to realizing future workforce requirements.
- Awareness around upcoming green jobs is limited among both trade unions and the labour market, and needs to be improved upon. The Skills Council for Green Jobs has created a portal which compiles green jobs requirements by skill levels and geography. Translating the portal (which is currently in English) to local languages and socializing it among vocational training institutes, colleges, and at the district level could help take green jobs information to a larger audience. The National Career service can also be leveraged to create a green career path to jobseekers, which can integrate information on green job opportunities, skilling programmes and career guidance into its services. More strategies need to be created to bring information about employment services in green sectors to the workforce outside the formal labour market.
- Substantial incentives in the form of stipends and other benefits should be available for workers interested in transitioning into green jobs, especially from sectors such as coal mining, automotives, and other industries to encourage on-the-job training in green skills. Ministry of New and Renewable Energy is providing fully funded solar trainings, and some state government EV policies provide training stipends to workers in new EV enterprises. Incentives should also be extended to enterprises that provide on-job training in green skills to workers.
- Higher impetus has been given to people's participation in conservation initiatives, particularly in rural areas, through employment guarantee programmes and ecosystem restoration services. Documenting successful models and best practices of such services will provide the states with a framework to create green employment in large numbers while also getting closer to achieving our NDCs.
- OSH provisions are in place in policy documents of renewable energy companies and PSUs, and are being integrated into green jobs certifications and training programmes, but on-ground implementation of OSH procedures and effective monitoring by the Government to prevent/inspect occupational hazards needs to be strengthened, according to trade unions. OSH trainings and awareness for upcoming green sectors such as floating solar PV and e-waste handling are under-addressed, and need to be conducted for relevant government agencies, employers' organizations and workers' organizations.
- Many schemes provide social protection benefits to employees. In the shift towards a greener economy, strategic social protection measures need to be designed for those whose jobs are lost or being transformed, with special attention to informal workers. For instance, coal mining workers of older ages (50+) whose mines are shutting down can be provided with compensation packages, temporary and time-bound social protection packages can be designed to provide a financial cushion for those who are upskilling/reskilling themselves with new green skills, and provision of alternate employment options and reskilling avenues for those wanting to work within the region where job losses have occurred.
- According to trade unions, the New Labour Code for New India, 2020, which covers OSH, social security and wage provisions for the workforce is in violation of the relevant ILO conventions and is not worker-friendly since it was drafted without adequate trade union consultation.

Policy coordination and coherence

- Policy coherence exists to some extent across India's NDCs, green sectoral targets and policies, and green skilling programmes – particularly in the renewable energy sector. Stronger coordination is required between industry and green skilling programmes to design the most relevant courses that translate into gainful employment. Policy incoherence is observed in the increased coal targets running in parallel with increasing renewable energy capacity targets. The reason for increasing coal energy targets is to ensure energy security for millions of poor families, and also to serve as a back-up energy source during low productivity of renewable sources.
- Institutional mechanisms for green jobs need to be made stronger. The inter-ministerial Apex Committee for Implementation of Paris Agreement (AIPA) created in end 2020 has diverse constituent ministries, but does not include the Ministry of Skill Development and the Ministry of Labour and Employment – inclusion of these ministries along with revitalizing of the committee will help create employment centric green policies that will help realize green targets more smoothly. Activities of the committee are not known.
- The world of work, especially the Ministry of Labour and Employment, trade unions, and workers' organizations are not adequately involved in green policy planning. Tripartism and social dialogue have not been adequately practiced by the Government and need to be strengthened – both in general as well as in context of the country's green transition. It is suggested that tripartite dialogue be institutionalized and made regular, while also inviting key stakeholders from civil society organizations who have demonstrated the implementation of successful projects/programmes. Trade unions ask to be provided with information about geographies and industries where jobs will be created and lost due to greening of the industry/sector, and new skills to be gained by the workforce to transition into green jobs.

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PAGE PARTNERSHIP FOR ACTION ON GREEN ECONOMY

India is one of the fastest growing economies in the world, and has made significant progress in mainstreaming green economy activities into the country's macroeconomic and national development plans. The country is moving towards green growth to decouple emissions from economic prosperity while also creating millions of decent jobs. Many sectors are in different stages of creating/implementing policies and strategies to drive sustainability, with significant focus being laid on boosting the renewable energy sector.

The energy transition will, however, create significant employment changes. In the face of such changes, developing a supportive policy ecosystem to enable future green jobs growth and to ensure a Just Transition is critical. This green jobs policy readiness assessment aims to develop a baseline perspective of current green jobs and Just Transition policy frameworks in India, with a focus on the energy sector. To this end, the report explores recommendations for measures aimed at supporting the labour market, from both the supply and demand sides, as well as for overarching measures that will promote the enabling environment needed to ensure a Just Transition process.

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